

APPROVED by  
Order No 22.3-120 of the Head of  
the State Nuclear Power Safety  
Inspectorate of 31 December 2010  
(As amended by Order No 22.3-132  
of the Head of the State Nuclear Power  
Safety Inspectorate of 31 July 2017)

**NUCLEAR SAFETY REQUIREMENTS  
BSR-3.1.2-2017**

**PRE-DISPOSAL MANAGEMENT OF RADIOACTIVE WASTE AT NUCLEAR  
INSTALLATIONS**

**CHAPTER I  
GENERAL PROVISIONS**

1. Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal management of radioactive waste at nuclear installations” (hereinafter “the Requirements”) set out the requirements for the management of radioactive waste at nuclear installations (NI) up to the emplacement of radioactive waste in a disposal facility (repository) as well as the requirements for the siting, designing, constructing, commissioning and operating a radioactive waste management facility.

2. The Requirements shall apply to applicants and licence holders operating radioactive waste management facilities in order to ensure the safety of pre-disposal management of radioactive waste generated during the operation and decommissioning of the NI and of radioactive waste transferred to radioactive waste management facilities.

**CHAPTER II  
REFERENCES**

3. The Requirements contain references to the following legal acts:

3.1. European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Annexes A and B

3.2. Convention concerning International Carriage by Rail (COTIF), Annex to Appendix C “International Carriage of Dangerous Goods by Rail” (RID);

3.3. Agreement on International Goods Traffic by Rail (SMGS), Annex 2 “Provisions for the Carriage of Dangerous Goods”;

3.4. Commission Regulation (Euratom) No 302/2005 on the application of Euratom safeguards (OJ L 54, 2005, p. 1);

3.5. Law on Nuclear Energy of the Republic of Lithuania;

3.6. Law on the Management of Radioactive Waste of the Republic of Lithuania;

3.7. Law on Nuclear Safety of the Republic of Lithuania;

3.7<sup>1</sup>. Law on Construction of the Republic of Lithuania;

3.8. Lithuanian Hygiene Standard HN 73:2018 “Basic standards of radiation protection”, approved by Order No 663 of the Minister for Health of the Republic of Lithuania of 21 December 2001 “On the approval of the Lithuanian Hygiene Standard HN 73:2001 ‘Basic standard of radiation protection’”;

3.9. Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation protection at nuclear facilities”, approved by Order No 22.3-95 of the Head of the State Nuclear Power Safety Inspectorate (VATESI) of 6 October 2011 “On the approval of Nuclear Safety Requirements BSR-1.9.3-2016 ‘Radiation protection at nuclear facilities’”;

3.10. 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”, approved by Order No 22.3-98 of the Head of the State Nuclear Power Safety Inspectorate (VATESI) of 27 September 2011 “On the approval of 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’”;

3.11. Nuclear Safety Requirements BSR-1.9.2-2018 “Establishment and application of clearance levels of radionuclides for the materials and waste generated during the activities in the area of nuclear energy”, approved by Order No 22.3-90 of the Head of VATESI of 27 September 2011 “On the approval of Nuclear Safety Requirements BSR-1.9.2-2018 ‘Establishment and application of clearance levels of radionuclides for the materials and waste generated during the activities in the area of nuclear energy’”;

3.12. Nuclear Safety Requirements BSR-3.2.1-2015 “Radioactive waste acceptance criteria for near surface repository”, approved by Order No 22.3-103 of the Head of VATESI of 27 May 2015 “On the approval of Nuclear Safety Requirements BSR-3.2.1-2015 ‘Radioactive waste acceptance criteria for near surface repository’”;

3.13. Nuclear Safety Requirements BSR-1.2.1-2014 “Rules of procedure of nuclear material accounting and control, and provision of information about research and development activities”, approved by Order No 22.3-85 of the Head of VATESI of 30 May 2014 “On the approval of Nuclear Safety Requirements BSR-1.2.1-2014 “Rules of procedure of nuclear material accounting and control, and provision of information about research and development activities” and repeal of some Orders approved by the Head of State Nuclear Power Safety Inspectorate”;

3.14. Nuclear Safety Requirements BSR-1.8.3-2017 “Technical Specification of Nuclear Facility”, approved by Order No 22.3-222 of the Head of VATESI of 24 November 2017 “On the approval of Nuclear Safety Requirements BSR-1.8.3-2017 ‘Technical Specification of Nuclear Facility’”;

3.15. Nuclear Safety Requirements BSR-1.8.4-2018 “Ageing management of structures, systems and components important to safety of nuclear facility”, approved by Order No 22.3-169 of the Head of VATESI of 25 July 2018 “On the approval of Nuclear Safety Requirements BSR-1.8.4-2018 ‘Ageing management of structures, systems and components important to safety of nuclear facility’”;

3.16. Nuclear Safety Requirements BSR-1.8.5-2018 “Commissioning of nuclear facility”, approved by Order No 22.3-295 of the Head of VATESI of 4 December 2018 “On the approval of Nuclear Safety Requirements BSR-1.8.5-2018 ‘Commissioning of nuclear facility’”.

### **CHAPTER III DEFINITIONS**

4. The definitions used in the Requirements shall have the following meanings:

4.1. **Secondary radioactive waste** (“secondary waste”) – secondary radioactive waste resulting from radioactive waste processing.

4.2. **High-level radioactive waste**– spent nuclear fuel; radioactive liquid originating from reprocessing spent nuclear fuel from the first cycle of solvent extraction, which contains most of fission products and actinides present in spent nuclear fuel, and long-lived radioactive waste from reprocessing spent nuclear fuel; long-lived solidified radioactive waste from reprocessing spent nuclear fuel.

4.3. **Very low-level radioactive waste (VLLW)** – short-lived radioactive waste, the values of radiological characteristics of which exceed clearance levels but meet the criteria of acceptance of radioactive waste packages to a VLLW repository.

4.4. **Exempt waste** – waste that may be contaminated with or contain radionuclides the values of radiological characteristics of which do not exceed clearance levels.

4.5. **Radioactive waste container** (“container”) – a tank designed for the transportation, storage and/or disposal of radioactive waste and/or other radioactive waste management operations.

4.6. **Radioactive waste package** (“package”) – a product of final treatment of radioactive waste consisting of a radioactive waste container and radioactive waste contained therein.

4.7. Other definitions used in the Requirements shall be understood as they are defined in the legal acts referred to paragraphs 3.3 to 3.7 of the Requirements.

#### CHAPTER IV

#### GENERAL SAFETY REQUIREMENTS FOR RADIOACTIVE WASTE MANAGEMENT

5. Safety policy for radioactive waste management developed by the organisation operating a radioactive waste management facility shall meet the requirements laid down in legal acts regulating nuclear safety and radiation and physical protection. Ensuring the safety shall be given a high priority in the policy.

6. Priority in the siting, design, construction, commissioning, operation and decommissioning of the sites of radioactive waste management facilities shall be given to nuclear safety and radiation protection. Safety should be substantiated for each individual stage of the lifecycle of the radioactive waste management facility and for all of them as a whole.

7. In the course of the management of radioactive waste, activity of radionuclides discharged to the environment shall not exceed the activity limits set in compliance with the legal act referred to in paragraph 3.10 of the Requirements.

8. The holder of the licence specified in Article 22(1)(1) or Article 22(1)(3) of the legal act referred to in paragraph 3.7 of the Requirements must ensure that a radioactive waste management facility is constructed in accordance with the design of the radioactive waste management facility.

9. All the steps in the management of radioactive waste from its generation up to disposal shall be understood as a seamless process where each component shall be consistent with any other component. For this purpose, the applicant for the licence specified in Article 22(1)(1) to (4) of the legal act referred to in paragraph 3.7 of the Requirements or the holder of the licence specified in Article 22(1)(1) to (4) of the legal act referred to in paragraph 3.7 of the Requirements (“the licence holder”) and the holder of the permit specified in Article 22(2)(2) of the legal act referred to in paragraph 3.7 of the Requirements (“the permit holder”) shall decide on the ways of managing radioactive waste on the basis of the analysis of possibilities for the management of radioactive waste, with account taken of the quantity and activity of radioactive wastes which require treatment and conditioning, their physical and chemical characteristics, quantities of generated secondary waste, quantities of radioactive waste anticipated for storage, disposal possibilities and radioactive waste management technologies available for the applicant or licence/permit holder and shall prepare and implement, taking into account the Programme for the Development of Radioactive Waste Management **and progress in science and technology**, a strategy (programme) for radioactive waste management which shall be updated subject to any changes in legislation governing radioactive waste management, Programme for the Development of Radioactive Waste Management and/or any material changes in radioactive waste management activities (e.g., non-conformity of the generated quantities of radioactive waste to the anticipated quantities is detected or new equipment for radioactive waste management is put into operation). The strategy (programme) for radioactive waste management should contain a description of radioactive waste management, covering all stages of radioactive waste management at licence/permit holder’s NI or

at radioactive waste management facilities operated by other entities, if they intend to manage radioactive waste, as well as the management of radioactive waste accepted from others.

10. The strategy (programme) for radioactive waste management of the licence holder shall specify the following:

10.1. objectives of the management of radioactive waste, implementation stages and time limits;

10.2. description of the generated quantities of radioactive waste by their classes and characteristics and estimates of the quantities of radioactive waste to be generated (including that generated during decommissioning of the NI);

10.3. plans and technical solutions for the pre-treatment, treatment, conditioning, transportation (including transportation outside the NI site), storage and disposal of radioactive waste (including the transfer of radioactive waste to radioactive waste management facilities of other licence holders);

10.4. rules of procedure for measures to implement radioactive waste management solutions;

10.5. rules of procedure for measures for storing information on radioactive waste and radioactive waste management facilities.

11. The holder of the licence specified in Article 22(1)(2) of the legal act referred to in paragraph 3.7 of the Requirements and the holder of the permit specified in **Article 22(2)(4) of the legal act referred to in paragraph 3.7 of the Requirements** shall be responsible for the management of radioactive waste generated at the NI and accepted for storage, treatment and/or conditioning of radioactive waste **at the radioactive waste management facility under the conditions of normal operation and in cases of unusual events.**

12. The licence holder shall:

12.1. seek a decrease in the maximum total activity and volume of generated radioactive waste, taking into account technological feasibility and following the principle of radiation protection optimisation;

12.2. choose such technologies for the treatment of radioactive waste that would enable safe storing and disposal of radioactive waste. **In addition, it is required that methods and technologies for treating radioactive waste are selected in compliance with the requirements of nuclear safety and radiation protection, generation of secondary waste and that discharges of radioactive waste into the environment are reduced and that the same is incorporated in the management system of the organisation operating the radioactive waste management facility;**

12.3. improve the existing methods of the treatment, conditioning and storage of radioactive waste, taking into account experiences gained in the process of operation, **including experience related to storage and package quality assurance;**

12.4. ensure that staff members involved at individual stages of radioactive waste management are trained to analyse and assess all stages of radioactive waste management in an integrated way so that the management of radioactive waste at one stage would not affect other management stages, taking into account their interdependence and ability to adequately respond in cases and under conditions of any deviations from the limits of normal operation;

12.5. perform monitoring of changes in the characteristics of radioactive waste and analyse them on a regular basis;

12.6. perform control over the radioactive waste management facility and monitoring of changes in the characteristics of the site;

12.7. perform management of the ageing of SSCs IS in accordance with the requirements laid down in the legal act referred to in paragraph 3.15 of the Requirements over the entire period of

operation of the radioactive waste management facility and use the experience gained by the licence holder and that of others in the area of operating radioactive waste management facilities in relation to determining the remaining operation lifetime.

**12<sup>1</sup>. The licence holder shall be responsible for the selection of containers for radioactive waste and must ensure their appropriateness, with account taken of the characteristics of radioactive waste condition and further stages of radioactive waste management.**

13. The rights to ownership of radioactive waste are defined in the legal act referred to in paragraph 3.3 hereof. The distribution of responsibilities, rights and obligations between the owner of radioactive waste and the licence holder shall be clearly defined and recorded in the documentation of the radioactive waste owner and the licence holder.

14. The licence holder shall notify VATESI of any changes in the right to ownership of radioactive waste or in the relationship between the owner of radioactive waste and the licence holder.

15. Safety of the radioactive waste management facility shall be ensured through a consistent implementation of the “defence-in-depth” principle based on the system of barriers which prevents the spread of radioactive materials within the radioactive waste management facility and their leakage outside and which protects, by applying the system of technical and administrative measures, the barriers and maintains their suitability during the operation and decommissioning of the radioactive waste management facility.

## CHAPTER V

### DESIGNING OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

16. The radioactive waste management facility must be designed in compliance with:

16.1. legal acts referred to in paragraphs 3.5, 3.6, 3.7 and 3.7<sup>1</sup> of the Requirements;

16.2. obligatory normative technical documents of nuclear safety listed in Article 5(1) (1) and (2) of the legal acts referred to in paragraph 3.7 of the Requirements;

16.3. obligatory design documentation of a construction works of a radioactive waste management facility listed in Article 24(3) of the legal act referred to in paragraph 3.7<sup>1</sup> of the Requirements;

16.4. technical specification of a radioactive waste management facility drawn up by the builder (client) of the radioactive waste management facility and coordinated with VATESI. Requirements for the preparation, coordination and amendment of the technical specifications of the radioactive waste management facility are set out in the legal act referred to in paragraph 3.14 of the Requirements.

17. Construction products and buildings materials in designing structures, systems and components (SSCs) are selected taking into account the envisaged service life.

18. The substantiation of the solutions set forth in the design of radioactive waste management facility shall be clearly and systemically described in the design documentation of the radioactive waste management facility (“the design”).

19. Selection of radioactive waste management technologies and design of radioactive waste management facilities shall take into consideration short-term and long-term effects of ionising radiation on employees and population.

20. Radioactive waste management facilities shall be designed so that the requirements of radiation protection laid down in the legal acts referred to in paragraphs 3.7 and 3.9 of the Requirements are implemented. The radioactive waste management facility shall be designed so that the annual effective dose for population would not exceed 1 mSv in case of design-basis accidents (radiological accidents caused by the impacts of the external and internal hazards envisaged in the design) during facility operation and would not exceed 5 mSv in case of beyond-design-basis accidents.

21. Radioactive waste management facilities shall be **designed and operated with priority being given to passive safety measures.**

22. SSCs shall be **classified in the design of the radioactive waste management facility using a graded approach**. SSCs shall be classified as SSCs important to safety (SSCs IS) and those **directly** not related to the safety **in accordance with the safety functions they perform and importance to nuclear safety and radiation and physical protection, taking into account their role in ensuring the quality of radioactive waste packages**.

23. Classification of SSCs IS by the **safety** function they perform requires that the SSCs IS necessary to protect people and the environment against the harmful impact of ionising radiation are identified, taking into account their role in accident prevention or minimisation of post-accident radiological consequences.

24. Account should be taken of the effects of the postulated initiating events on the performance of SSCs. SSCs should be qualified as SSCs IS, if this is necessary to ensure that SSCs perform the safety function or secure the functioning of other SSCs IS in case of the initiating event. The functions performed by SSCs should be assessed at all levels of defence in depth.

25. SSCs that are physically attached to SSCs IS should be classified taking into account their likely impacts on SSCs IS, including on the functions performed by the SSCs IS not only in the event of accidents, but also during operation of the radioactive waste facility under normal conditions and in case of anticipated operational events. The SSCs that are physically attached to SSCs IS and are likely to affect the functions of the SSCs IS shall be qualified as the SSCs IS.

26. The classification of SSCs shall be reviewed and updated in line with any changes in design solutions made in the process of the construction, commissioning and operation of the radioactive waste management facility as well as during the decommissioning thereof, if such changes influence the functions of the SSCs.

27. Based on the classification of SSCs, applicable engineering design rules are selected for the SSCs and construction normative technical documents are drawn up to serve as a basis for the design, manufacturing, construction, installation, commissioning, operation, testing, inspection and maintenance of SSCs IS so that the functions attributed to them would be performed in a reliable manner.

29. SSCs IS shall be designed in such a way that to ensure that the SSCs IS withstand the effects of internal and external hazards specified in the design in the event of design-basis accidents. SSCs IS may not survive the effects of beyond-design-basis accidents.

30. The following shall be described in the design (including supporting evidence):

30.1. external natural hazards likely to affect the safety of the radioactive waste management facility (e.g. extreme weather conditions (rain, hail, snow, icing, wind, tornado, hurricane, lightning, high and low temperatures, humidity), flooding and impoundment, earthquake, fire, impacts caused by terrestrial and aquatic fauna and flora);

30.2. external human-induced hazards likely to affect the safety of the radioactive waste management facility (e.g. fire, explosion, spread of hazardous and corrosive substances, plane crash, flying objects, flooding and impoundment, loss of power supply, wrongful acts or omissions causing infrastructural disruptions and stoppage);

30.3. internal hazards (e.g. loss of power supply or volatile substances (power supply, air and compressed air, vacuum, overheated water and steam, coolant, chemical preparations and ventilation), improper use of power supply and chemical substances, mechanical failures, including falling of a heavy items, damage to pressure-resistant vessels, leakage (corrosion), blockage inside systems, technical and control failures, human errors, wrongful acts or omissions, internal fire and explosions (as a result of gas formation and technological process hazards), flooding and overloading of tanks).

31. The design shall contain a list of postulated initiating events serving as a basis for designing radioactive waste management facilities and identifying technical data of the facilities. The radioactive waste management facilities shall be designed so that to specify evidence-based secondary effects of external and internal hazards. The list of postulated initiating events should be

made taking into account external and internal hazards, including potential failures in SSCs IS, staff errors and other actions and combinations thereof likely to result in a postulated initiating event. The list of the postulated initiating events shall include events that can lead to both design-basis accidents and beyond-design-basis accidents.

32. The design shall specify, describe and substantiate design-basis earthquake ground motion for the site of the radioactive waste management facility to be withstood by SSCs IS. The earthquake shall be estimated as a ground motion on a bare field above the ground and at the level of the foundation base and shall be expressed as the ground motion acceleration spectrum.

33. SSCs IS, the failure of which may result in radioactive emissions inside or outside the NI, and SSCs IS required for the performance of accident management actions shall be designed on the basis of calculations and evidence of impacts on the SSCs IS resulting from the loads of design-basis earthquakes.

34. Systems containing combustible or explosive materials and located in the same premises together with other SSCs IS as well as fire detection, fire alarm and extinction systems located in the same premises together with other SSCs IS shall be designed to withstand the loads of the design-basis earthquake.

35. The SSCs referred to in paragraphs 33 and 34 above shall maintain the integrity, tightness and functionality during the design-basis earthquake.

36. The design shall describe and provide evidence showing that the SSCs IS referred to in paragraphs 33 and 34 of the Requirements are resistant from the seismic point of view. When describing and substantiating the seismic resistance of the SSCs IS, it is advisable to comply with the established engineering practices laid down in standards and other documents (e.g. Seismic Analysis of Safety-Related Nuclear Structures, ASCE 4-98, published by American Society of Civil Engineers, 2000, Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities, ASCE/SEI 43-05, published by American Society of Civil Engineers, 2005).

37. The floor response spectrum, which is derived as structural response to the design-basis ground motion, shall be used as the seismic input for designing the SSCs IS referred to in paragraphs 33 and 34 above.

38. When designing seismic-resistant SSCs, normal operation loads and loads in case of anticipated operational occurrences shall apply in conjunction with the loads of the design-basis earthquake.

39. When designing the radioactive waste management facility, seismic qualification of the SSCs referred to in paragraphs 33 and 34 above shall be performed using one or more of the following approaches: analysis, testing, earthquake experience and/or comparison of candidate SSCs with already qualified items (similarity).

40. The seismic qualification of actual or prototype SSCs shall be made by the use of one of the following:

40.1. reduced-scale model;

40.2. reduced-scale prototype;

40.3. simplified SSC, in accordance with similarity analysis between the component and its reference item when direct qualification has been performed on the latter.

40.4. Seismic qualification by analysis should be used for SSCs that cannot be qualified by testing.

41. For components not modelled together with the supporting structure, the input for analysis shall be the floor response, expressed in terms of either design floor time history (a record of the floor motion with time for the structure under consideration derived from the design-basis ground motion, with account taken of the variability of and uncertainty in the input ground motion and the characteristics of the building and the foundation) or design response spectra.

42. The output of seismic linear dynamic analysis shall be expressed in terms of floor response spectra, maximum relative displacements, relative velocities, absolute accelerations and maximum stresses during an earthquake.

43. The design of the radioactive waste management facility shall take into account the properties of the site of the radioactive waste management facility and the surrounding area likely to influence the mitigation of the consequences of accidents, fire extinction and other emergency response within the radioactive waste management facility and on its site.

44. The design of the technical measures of physical protection system of the radioactive waste management facility shall take into account the circumstances identified during analysis and substantiation of the site of the radioactive waste management facility that may affect the application of the technical measures of physical protection or their effectiveness (e.g. topography of the area, infrastructure in the vicinity, meteorological conditions and other factors), so that the designed technical measures and the selected organisational measures of the physical protection system, which have been implemented in accordance with the design, would compensate for the identified on-site circumstances that may have adverse effects and would meet the provisions laid down in the legal act referred to in paragraph 3.14 of the Requirements.

45. To design SSCs IS, external hazard loads shall apply at a level of reoccurrence less than once in 100 years. For external pressure loads reoccurring more frequently than once in 100 years, a reserve coefficient should be applied. The reserve coefficient should be justified in terms of safety and substantiated in the design.

46. SSCs IS of the radioactive waste management facility shall be designed and arranged within the facility and/or on its site in such a way that to minimise effects of external and internal hazards. The SSCs IS shall be designed and arranged taking into account their importance to the mitigation of the consequences of the effects caused by external and internal hazards.

47. The design shall analyse negative interactions that may be caused by external hazards between the buildings with SSCs IS and other buildings and structures of the radioactive waste management facility and shall provide basis for the acceptability of such interactions.

48. The radioactive waste management facility shall be designed so that to apply the principle of optimisation of radiation protection which is implemented by minimising the probability of anticipated operational occurrences and mitigating the consequences in the event of such occurrences.

49. The radioactive waste management facility and its SSCs shall be designed so that to ensure the following key safety functions under the conditions of normal operation, anticipated operational occurrences and design-basis accidents:

- 49.1. maintenance of subcriticality, if radioactive waste contains fissile materials;
- 49.2. securing radiation protection for employees and population;
- 49.3. heat removal, if radioactive waste emits heat the removal of which requires special design solutions;
- 49.4. containment of radionuclides.

50. Subcriticality shall be ensured by design solutions rather than by administrative safety measures.

51. The design of the radioactive waste management facility should take into account the quantities of secondary waste and radioactive waste to be generated during the decommissioning of the radioactive waste management facility with a view to minimising the quantities thereof.

52. Pursuant to the safety analysis and substantiation, the design should set out and justify safe operation limits and conditions for SSCs IS of the **radioactive waste management facility in order to ensure the compliance of the radioactive waste management facility with the nuclear safety and radiation protection requirements and the quality of radioactive waste packages, i.e. the compliance of the characteristics of radioactive waste packages with the criteria for acceptance in a storage and disposal facility.**

53. Radioactive waste management facilities shall be designed so that radioactive waste is handled without coming into contact with non-radioactive waste.

54. SSCs IS shall be designed taking into account the complexity of radioactive waste management process and the properties of radioactive waste handled therein.

55. Radioactive waste management facilities shall be designed and operated so that the principles of radioactive waste management defined in the legal act referred to in paragraph 3.6 of the Requirements are followed.

56. Radioactive waste management facilities shall be designed for collecting, processing and storing radioactive waste generated in normal operation and during anticipated operational occurrences and design-basis accidents. Where radioactive waste management facilities are incorporated in the design of a the nuclear power plant, the efficiency of the designed radioactive waste management facilities and the storage capacity shall be sufficient to process and store waste resulting from the normal operation of the nuclear power plant and during anticipated operational occurrences and design-basis accidents.

**56<sup>1</sup>. Radioactive waste management facilities shall be designed so that to ensure the quality of the packages produced.**

57. The design shall provide for the maintenance, monitoring, periodic testing and inspection of the SSCs IS of the radioactive waste management facility throughout the entire lifetime of the radioactive waste management facility.

58. The design of radioactive waste management facilities and the procedures of operation shall meet the best principles of ergonomics so that the probability of erroneous acts is minimised.

59. The design of radioactive waste management facility shall ensure the possibility to remove packages after the expiry of their storage period. Likewise, the possibility shall be envisaged to examine each package, to verify their integrity and tightness and to perform repairs and other radioactive waste handling procedures. For this purpose, there should be a reserve area provided for in the design of the radioactive waste storage facility for temporary placement of packages stored in the radioactive waste storage facility.

60. It is advisable that the equipment of radioactive waste storage facilities is designed and the normative technical documents of the license holder are drawn up in accordance with the documentation issued by the International Atomic Energy Agency (IAEA) and practices of organisations engaged in activities in the area of radioactive waste management.

60<sup>1</sup>. Package handling equipment, lifting installations and their equipment intended for relocating, lifting, dismantling of packages, containers and other SSCs IS as well as for other handling process operations performed at NIs and on their sites, including operations performed above SSCs IS (“handling equipment”), shall be designed in such a way, and the licence holder’s normative technical documents shall specify such measures, that:

60<sup>1</sup>.1. to ensure protection of employees against exposure to ionising radiation, facilitate maintenance of handling equipment and minimise the probability of anticipated operational occurrences and accidents, as well as their consequences, during the relocation, lifting, dismantling of packages, containers and other SSCs IS as well as other handling process operations performed at NIs and on their sites, including operations performed above SSCs IS;

60<sup>1</sup>.2. packages, containers and other SSCs IS are secured by their fasteners from accidental detachment and are protected against uncontrolled dropping while being lifted, relocated or lowered;

60<sup>1</sup>.3. movement zones for moving equipment and speed limits applicable to them during the lifting, relocation or lowering of packages, containers and other SSCs IS are established;

60<sup>1</sup>.4. manual operation of the handling equipment is provided for in cases of any failures of the handling equipment and design-basis and beyond-design-basis accidents;

60<sup>1.5</sup>. the loads of the handling equipment, packages, containers and other SSCs IS do not exceed the limits established in the design and mechanical load limiters are designed for the handling equipment;

60<sup>1.6</sup>. operations involving the relocation and lifting of packages, containers and other SSCs IS as well as other handling process operations are performed and controlled in a remote way;

60<sup>1.7</sup>. the handling equipment remains effective and does not impair the integrity and tightness of the packages, containers and other SSCs IS in cases of anticipated operational occurrences or radiological accidents (e.g. in the event of accidental dropping of the components being handled);

60<sup>1.8</sup>. there is no opportunity for incidental or unauthorised use of the handling equipment;

60<sup>1.9</sup>. there is no opportunity for lifting, relocating and lowering packages, containers and other SSCs IS, if such lifting, relocating and lowering are not envisaged and their safety is not substantiated in the NI design;

60<sup>1.10</sup>. the layout, dimensions, direction of movement and the lifting, relocating and lowering heights of the handling equipment are ensured so that the operation of the handling equipment has no adverse effects on packages, containers and other SSCs IS;

60<sup>1.11</sup>. the use of the handling equipment is ensured only in the conditions envisaged in the NI design.

## **CHAPTER VI COMMISSIONING OF RADIOACTIVE WASTE MANAGEMENT FACILITIES**

61. The purpose of the commissioning of a radioactive waste management facility is to prove that the constructed or installed radioactive waste management facility is capable of being safely operated. The requirements for the commissioning of the radioactive waste management facility are set out in the legal act referred to paragraph 3.16 of the Requirements.

68. Trials involving the use of nuclear or nuclear fuel cycle materials shall cover handling process operations for radioactive waste management, recording of such operations and SSCs IS performance checks. Radioactive waste the characteristics of which are known shall be used for trials.

72. The licence holder shall ensure that the course and results of trials for the commissioning of SSCs IS are recorded in the chronological order. The trial documentation (conformity assessment documents issued by an independent assessment body, certificates, attestations, forms listed in the management system documentation of the licence holder, etc.) shall be kept up to the completion of the decommissioning of the radioactive waste management facility.

73. During the commissioning of the radioactive waste management facility, the licence holder shall approve and implement documentation for the maintenance, monitoring and inspection of SSCs IS, specifying all the administrative and technical measures necessary to identify and minimise functional degradation of the SSCs IS in a timely manner or to restore the functions of degraded SSCs IS to the level envisaged in the design of the radioactive waste management facility. A system of scheduled and periodic inspections should be in place to ensure that the radioactive waste management facility is operated in a safe manner in accordance with the nuclear safety normative technical documents. The scope of the maintenance, monitoring and inspection of SSCs IS should be in conformity with the scope indicated in the safety analysis report of the radioactive waste management facility.

## **CHAPTER VII OPERATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES**

74. The licence holder shall ensure that the normative technical documents of the licence holder related to the operation of the radioactive waste management facility shall be in place prior to the commencement of trials not involving the use of nuclear and/or nuclear fuel cycle materials.

Requirements for preparing, checking and amending the licence holder's normative technical documents related to the operation of the radioactive waste management facility are set out in the legal act referred to in paragraph 3.16 of the Requirements.

*Amendments to the paragraph:*

No [22.3-296](#), 04/12/2018, published in TAR on 4 December 2018, ID 2018-19718.

75. Personnel working with SSCs IS shall perform their duties in accordance with the rules of procedure for operational procedures and operate radioactive waste management facilities in accordance with their operating instructions.

78<sup>1</sup>. The licence holder shall ensure that the status of nuclear safety, radiation and physical protection and emergency preparedness is regularly analysed and assessed, taking into account most recent research results, developments in international nuclear safety standards and operational experience of the licence holder and of other operators in the nuclear energy sector. If the results of the analysis and assessment identify areas where improvements of nuclear safety, radiation and physical protection and emergency preparedness may be implemented, the licence holder shall define safety improvement measures on the basis of the information obtained. The safety improvement measures should meet the requirements laid down in the legal acts governing nuclear safety, radiation and physical protection and emergency preparedness and be in line with proven engineering practices (activity based on the use of standardised engineering methodology in ensuring the quality of the product and submitting product quality verification results).

78<sup>2</sup>. The licence holder shall draw up a safety improvement programme for the implementation of safety improvement measures.

78<sup>3</sup>. The safety improvement programme shall specify:

78<sup>3</sup>.1. safety improvement measures;

78<sup>3</sup>.2. objectives of safety improvement measures;

78<sup>3</sup>.3. anticipated outcomes;

78<sup>3</sup>.4. time-limits for the implementation of safety improvement measures;

78<sup>3</sup>.5. persons or structural units responsible for the implementation of safety improvement measures;

78<sup>3</sup>.6. other information, if any, required for the planning, implementation and traceability of safety improvements.

78<sup>4</sup>. The safety improvement programme shall be annually reviewed and amended by removing safety measures already in place and adding new safety improvement measures where such measures are necessary in the context of the provisions of paragraph 78<sup>1</sup> above.

78<sup>5</sup>. The licence holder is required to submit the safety improvement programme and its amendments for coordination to VATESI.

78<sup>6</sup>. VATESI shall coordinate the safety improvement programme and its amendments once it has verified that the safety improvement measures envisaged in the safety improvement programme and its amendments are compatible with the requirements laid down in the legal acts governing nuclear safety, radiation and physical protection and emergency preparedness. A decision regarding the coordination of the safety improvement programme and its amendments shall be adopted by VATESI and notified to the licence holder in writing within 20 business days after the receipt of the documents (programme or draft amendment thereof).

79. The marking of radioactive waste packages shall ensure the possibility to identify each package during the overall storage period. The identification labels shall be attached to radioactive waste packages. All the packages shall also be marked with the main ionising radiation sign.

80. The reserve area shall be available for the placement and inspection of retrieved packages at any time during the operation of the radioactive waste storage facility.

**80<sup>1</sup>. It must be ensured, before planning any modifications, that the designed modifications and the potential consequences thereof in any one SC SSC would not affect the operation and/or safety of the related or adjacent SSCs IS and of radioactive waste**

**management facilities, possibilities for further handling of radioactive waste and the quality of packages.**

## **CHAPTER VIII REDUCTION OF RADIOACTIVE WASTE**

81. The amounts of radioactive waste to be generated at the NI shall be calculated taking into account all radioactive waste sources. The minimum practicable amounts of radioactive waste, in terms of its both volume and activity, shall be envisaged in the design of the NI and pursued during its commissioning, operation and decommissioning. This provision shall apply to both primary waste generated in the course of operation and to secondary waste.

82. The amounts of radioactive waste shall be reduced with priority being given to radioactive waste reduction at the place of generation thereof, reuse of materials and equipment, and waste removal when the levels of clearance have been met.

83. The amounts of radioactive waste at the NI shall be reduced in the following ways:

83.1. selection and control of technological processes, substances and equipment;

83.2. use of the possibility to store radioactive waste until the decay of short-lived radionuclides (radionuclides with a half-life of  $^{137}\text{Cs}$  or less);

83.3. proper planning and performance of maintenance works;

83.4. retention of the integrity of radioactive substances, waste and/or their packages;

83.5. waste sorting at its generation places;

83.6. decontamination of areas, premises and equipment and prevention of the spread of radionuclides;

83.7. re-use of substances and equipment, analysis of the opportunities aimed at minimising the amounts of secondary waste generated during technological processes, e.g. decontamination;

83.8. avoidance of the entry of non-radioactive items and substances (e.g., packing materials) into controlled areas;

83.9. avoidance of the use of items made from materials decontamination of which is complicated (e.g. wood) in controlled areas;

83.10. use of gaseous radioactive waste filtration systems.

84. The amounts of radioactive waste at the nuclear power plant shall be reduced in the following ways:

84.1. operating the reactors in such a way as to avoid failures in nuclear fuel bundles;

84.2. reducing coolant leakage from the main circulation circuit;

84.3. keeping radioactive contamination levels of the coolant as low as practicable subject to technical feasibility;

84.4. applying chemical treatment of radioactive waste in the main circulation circuit with a view to reducing corrosion of structural materials and deposition of radioactive substances.

## **CHAPTER IX CHARACTERISATION OF RADIOACTIVE WASTE**

85. Radioactive waste shall be characterised at all stages of pre-disposal radioactive waste management, i.e. the radionuclide and chemical composition, physical, chemical, radiological and biological properties of radioactive waste shall be identified. The determined composition and properties shall serve as a basis for selecting radioactive waste management methods. The licence holder shall develop and approve the methods of characterisation of waste packages and have them coordinated with VATESI before the production of packages.

86. VATESI shall adopt a decision on the coordination of methodology for the radiological characterisation of packages in accordance with the time limits set out in Article 34(2) of the legal act referred to in paragraph 3.7 of the Requirements. VATESI shall adopt a decision to

coordinate the methodology for the characterisation of packages, if the methodology demonstrates that:

86.1. activity concentrations have been identified for all radionuclides listed in the criteria for acceptance of packages in radioactive waste storage and disposal facilities or for radionuclides important to safety identified by a preliminary safety assessment of a radioactive waste disposal facility (repository) when the approved design of the radioactive waste disposal facility and initial safety analysis report are not available;

86.2. radionuclide activity concentrations have been identified in accordance with standardised procedures and validated research methods (e.g. approved by the International Organisation for Standardisation or described in IAEA's publications);

86.3. results and tolerances of measuring instruments and calculations for radionuclide activity concentrations are acceptable in accordance with the criteria for acceptance of packages in a radioactive waste storage and disposal facility or in accordance with the preliminary criteria for acceptance in a radioactive waste disposal facility defined by a preliminary safety assessment of the radioactive waste disposal facility when the approved design of the radioactive waste disposal facility and initial safety analysis report are not available.

87. Measuring procedures for the direct or indirect characterisation of radioactive waste shall be validated. Laboratory sample measurements for the characterisation of radioactive waste shall be carried out in laboratories accredited in accordance with LST EN ISO/IEC 17025:2006 "General requirements for the competence of testing and calibration laboratories".

## **CHAPTER X RADIOACTIVE WASTE ACCEPTANCE CRITERIA**

88. The characteristics of radioactive waste and packages shall be controlled during the treatment and conditioning of radioactive waste so that to ensure compliance of the packages with the criteria for acceptance of packages in a radioactive waste storage and disposal facility or with the preliminary criteria for acceptance in a radioactive waste disposal facility defined by a preliminary safety assessment of the radioactive waste disposal facility when the approved design of the radioactive waste disposal facility and initial safety analysis report are not available for this class of radioactive waste.

89. The characteristics of radioactive waste to be accepted in a radioactive waste management facility and the criteria for acceptance of packages in a radioactive waste storage facility shall be defined by the licence holder. The characteristics and criteria shall be defined on the basis of the safety analysis and substantiation of the radioactive waste management facility and the technical documentation of its components, with account taken of the conditions of waste management (processing and storage of radioactive waste) and the criteria for acceptance of packages in a radioactive waste storage facility or with the preliminary criteria for acceptance in a radioactive waste disposal facility defined by a preliminary safety assessment of the radioactive waste disposal facility when the approved design of the radioactive waste disposal facility and initial safety analysis report are not available for this class of radioactive waste. The physical, mechanical, chemical, radiological and biological characteristics of radioactive waste accepted for handling in the radioactive waste management facility should meet the characteristics of acceptance in the radioactive waste management facility where the radioactive waste is to be managed. Radioactive waste packages shall meet the criteria for acceptance in the radioactive waste storage facility where the packages are to be stored.

90. The radioactive waste package shall retain its integrity and ensure containment of radionuclides during the entire pre-disposal storage period. If necessary or upon the expiry of the package storage period, it shall be possible to perform lifting, relocation and other handling operations with such packages, treat them additionally, and transport them to the radioactive waste disposal facility (repository) and dispose them.

91. The main documents describing the quality of radioactive waste packages are the rules of procedure and passport of the packages. **The rules of procedure for radioactive waste packages shall provide the following information about radioactive waste:**

**91.1. radiological characteristics;**

**91.2. chemical, biological and physical characteristics;**

**91.3. weight and volume;**

**91.4. place of generation;**

**91.5. package labelling.**

91<sup>1</sup>. The radioactive waste generator shall prepare the rules of procedure of short-lived low and intermediate level waste (LILW) packages in compliance with the legal act referred to in paragraph 3.12 of the Requirements. The requirements for the rules of procedure of packages laid down in paragraph 3.12 of the Requirements **may *mutatis mutandis*** apply to the rules of procedure for packages other than short-lived LILW. The requirements for the passport of the radioactive waste package are set out in Annex 2 hereto.

92. The holder of the licence specified in Article 22(1)(2) of the legal act referred to in paragraph 3.7 of the Requirements and the holder of the permit shall have a process of ensuring the compliance of radioactive waste or packages accepted to the radioactive waste management facility with the criteria for acceptance of radioactive waste at the radioactive waste management facility incorporated in the licence/permit holder's management system, including audits of the package production process and inspections of package characteristics. **Likewise, the licence holder's management system shall have in place the procedure for verifying the conformity of the packages with their technical specifications. All inspections, audits and/or verifications shall be recorded.**

## CHAPTER XI

### RADIOACTIVE WASTE PROCESSING

#### SECTION I

##### OBJECTIVES OF RADIOACTIVE WASTE PROCESSING

93. Radioactive waste shall be processed in accordance with nuclear safety normative technical documents and licence holder's normative technical documents so that the processed radioactive waste could be stored, transported and disposed.

94. Radioactive waste shall be solidified unless it is proved that there is no risk of uncontrolled releases. Other dangerous properties of radioactive waste (e.g. flammability, spontaneous combustion, explosive nature, chemical aggression or biological decomposition) that may have effects on radionuclide release from radioactive waste should be assessed and analysed in terms of the effects of such properties on the safety of radioactive waste management facilities and their compliance with nuclear safety normative technical documents.

#### SECTION II

##### RADIOACTIVE WASTE PROCESSING METHODS

95. When planning the radioactive waste management facilities necessary for the management of radioactive waste, the applicant shall examine various radioactive waste processing alternatives in order to select methods for the treatment and conditioning of radioactive waste. Each pre-disposal waste management step shall be selected in such a way that it neither imposes constraints on subsequent waste management stages nor predetermine the choice of the method to be used for processing radioactive waste. Due account should be taken of the chemical compatibility of materials in order to avoid potential risks in the process of handling, storage and disposal of radioactive waste.

96. Each selected method for the treatment and conditioning of radioactive waste requires an adequate technical process to be developed to ensure that the activity of the discharges of

radionuclides into the environment does not exceed the design-basis limit values and is kept to the levels as low as practicable, and that the produced package meets the criteria for acceptance at a radioactive waste storage or disposal facility or the preliminary criteria for acceptance in a radioactive waste disposal facility defined by the preliminary safety assessment of the radioactive waste disposal facility when the approved design of the radioactive waste disposal facility and initial safety analysis report are not available. Rules of procedure for testing and evaluations supporting the characteristics of the packages must be in place.

97. The testing of the structures, systems and components of the radioactive waste facility designed for the treatment or conditioning of heterogeneous radioactive waste not involving and involving the use of nuclear materials and/or nuclear fuel cycle materials shall include the inspection of the technological process intended for the processing thereof. Unprocessed and processed waste shall be examined and measures for taking the samples thereof shall be established.

### **SECTION III**

#### **RADIOACTIVE WASTE COLLECTION, CLASSIFICATION AND SORTING**

98. The license holder shall classify radioactive waste on the basis of its physical state as solid, liquid and gaseous.

99. The licence holder shall classify radioactive waste according to its radiological characteristics as follows:

99.1. Solid radioactive waste shall be classified in accordance with the radiological characteristics of radioactive waste and the criteria for acceptance in a disposal facility (repository) set out in Annex 1 to the Requirements;

99.2. Liquid radioactive waste shall be classified according to activity thereof into:

99.2.1. low-level ( $<4 \cdot 10^5$  Bq/l) radioactive waste;

99.2.2. intermediate level ( $\geq 4 \cdot 10^5$  Bq/l) radioactive waste.

100. Waste and equipment units which are not intended for further use and which may have been contaminated with radionuclides shall be provisionally assigned to the appropriate waste class in accordance with Annex 1 to the Requirements. The final class of waste shall be confirmed by the radiological characterisation of the packages or by checking their conformity with the clearance levels in accordance with the legal act referred to in paragraph 3.11 hereof.

101. Solid radioactive waste shall be further classified according to the treatment methods applied at the NI as combustible, non-combustible, compactable, non-compactable and non-treatable.

102. The license holder shall sort radioactive waste according to its physical state, radiological, chemical and biological properties. Sorting is completed when the radioactive waste is placed in tanks (for liquid waste) or containers (for solid waste) designed for that type of radioactive waste.

103. When sorting radioactive waste with hazardous properties (e.g. flammability, spontaneous combustion, explosive nature, chemical aggression or biological decomposition), it is necessary to label it as hazardous, stabilise it and ensure that such waste is not mixed with radioactive waste that does not have the same hazardous properties.

104. In NIs where radioactive waste is generated, it is necessary to sort radioactive waste as close to the source of waste generation as possible.

105. The mixing of different radioactive waste streams and waste with different characteristics (e.g. different classes of radioactive waste) must be avoided.

106. It is prohibited to dissolve radioactive waste in order to change the class of waste by lowering activity concentrations to meet the criteria for acceptance at a radioactive waste storage or disposal facility.

107. Liquid radioactive waste shall be sorted according to its physical properties (homogeneous or heterogeneous radioactive waste), chemical properties (organic, inorganic, combustible, non-combustible, hydrophilic, hydrophobic, hydrated), chemical composition and the envisaged radioactive waste treatment method.

108. After the sorting, different types of radioactive waste to be processed shall be stored separately from each other, e.g. in different containers or reservoirs.

109. VLLW may be stored until the decay of short-lived radionuclides (radionuclides with a half-life of  $^{137}\text{Cs}$  or less) when radiation protection controls are no longer necessary for such waste in accordance with the legal act referred to in paragraph 3.11 of the Requirements, in designated areas and under the conditions set out in the technical solutions for such areas (ensuring containment of radionuclides, carrying out containment controls and ensuring the possibility to carry out waste monitoring). Waste storage conditions shall be based on the safety analysis of waste storage in the designated areas.

110. Temperature control devices shall be used if the properties of radioactive waste may cause temperature variations in the radioactive waste.

111. Liquid radioactive waste shall be held in leak-tight tanks, selected on the basis of the chemical and radiological properties of the waste, its volume and the radioactive waste management operations it requires. Each such tank shall be equipped with pumps and devices for the inflow and outflow of liquids and devices for controlling the level of liquids.

112. Facilities for the collection of liquid intermediate-level radioactive waste shall be equipped with the following:

112.1. devices for temperature and dose rate controls in the tank, when this is necessary taking into account the technology of liquid radioactive waste management;

112.2. equipment for taking samples;

112.3. devices for removal of sludge (dirt) and sediments;

112.4. tanks to contain the liquid contents of the tank;

112.5. equipment for control and removal of hydrogen gas, if there is any hazard of such gas release.

113. Ventilation and fire safety shall be ensured for the collection and storage of organic and combustible radioactive wastes taking into account the radiological risks they pose.

114. Solid radioactive waste must be collected in dedicated containers, taking into account their physical and radiological properties, their volume and needs for storage as well as the need for other radioactive waste handling operations in relation thereto. Damp solid radioactive waste shall be collected so that to avoid leakage of liquids contaminated with radionuclides.

115. A space for empty and partly filled containers should be arranged at all places of collection and sorting of radioactive waste. The containers should be marked in accordance with the category of the radioactive waste collected.

116. Adequate lifting and transfer equipment shall be provided for on-site transportation of containers with solid radioactive waste.

117. Fixed and mobile devices shall be installed for measuring dose rates of all containers loaded with solid radioactive waste and their surface contamination. A radionuclide content composition shall be determined for completely filled containers. The methods for determining the radionuclide composition shall be verified and validated.

118. Alarm levels shall be set for each radioactive waste class prior to measuring the radiological properties of a container with solid radioactive waste to signal when the radioactive waste activity level in the container is exceeded. If the alarm signal is sent showing that the radioactive waste activity level in the container is exceeded, the radioactive waste placed therein shall be re-sorted.

119. Containers shall be checked for surface contamination after being used for radioactive waste management. If the containers are found to be contaminated with radionuclides, the surface contamination must be removed.

#### **SECTION IV PROCESSING OF LIQUID RADIOACTIVE WASTE**

120. Liquid radioactive waste shall be processed with the aim to reduce its volume by the separation of bulky liquid material which radionuclide activity concentrations does not exceed the activity limits determined in accordance with the legal act referred to in paragraph 3.10 of the Requirements. The amounts of discharged liquids generated by processing liquid radioactive waste shall be maintained to the minimum practicable. It is prohibited to discharge liquid which does not mingle with water. If the discharged liquid contains any solid particles, the latter shall be subject to filtration. Liquids with hazardous properties (e.g. flammability, spontaneous combustion, explosive nature, chemical aggressiveness, biological decomposition) likely to adversely affect wastewater management and/or the environment must be further treated to eliminate their hazardous properties before being released into the environment.

121. Where radioactive waste contains fissile materials, the design of its handling facilities and the technological process of radioactive waste treatment or conditioning shall be such that no critical mass could be generated.

122. In the course of treatment of liquid radioactive waste, it is necessary to take into account the anticipated volume, radionuclide and chemical composition, toxicity, temperature, flammability and gas emissions of radioactive waste.

123. The characteristics of liquid radioactive waste shall be additionally adjusted prior to the treatment of radioactive waste in order to make the waste more amenable to further processing, and to reduce or eliminate certain potential hazards related to the physical, chemical, biological or radiological characteristics of the radioactive waste.

124. Liquid radioactive waste shall be eventually solidified during its conditioning by using binding materials. Solidified radioactive waste shall be placed in containers meeting the acceptance criteria for storage and/or disposal.

#### **SECTION V PROCESSING OF SOLID RADIOACTIVE WASTE**

125. In the course of processing solid radioactive waste, its volume shall be reduced and according to the characteristics thereof, the treatment method shall be selected. When selecting the technological process for processing radioactive waste, it is necessary to assess and control potential dispersion of volatile radionuclides, generation of liquid, chemical activity, as well as fire and explosion hazards posed by the components of compressed radioactive waste during the treatment of radioactive waste.

126. Inside the radioactive waste treatment or conditioning facility, there should be separate areas for storing empty containers, containers with radioactive waste and radioactive waste packages to be shipped to a radioactive waste storage or disposal facility.

127. Solid radioactive waste of Classes B, C, D and E (according to Annex 1 to the Requirements) shall be subject to conditioning. Secondary radioactive waste resulting from the treatment of solid radioactive waste shall also be processed.

128. Solid and powdery radioactive waste of Classes B, C, D and E (for example, fine fractions) shall be immobilised.

129. Solid radioactive waste containing radionuclides with a half-life shorter than 100 days shall be stored until clearance levels are met and no further regulatory control is needed.

130. Spent sealed sources of ionising radiation shall be managed and stored separately from other radioactive waste.

131. It is prohibited to separate spent sealed sources of ionising radiation from their protection prior to conditioning. Where it is necessary to treat spent sealed sources of ionising radiation in order to ensure their storage safety, treatment methods shall be such as to retain the integrity of sealed sources of ionising radiation.

## **SECTION VI PROCESSING OF GASEOUS RADIOACTIVE WASTE**

132. Gaseous radioactive waste processing systems shall detain radionuclides under both normal operating conditions and during deviations from normal operating conditions so that the activity of radionuclide emissions into the environment does not exceed the limit activity values set forth in the legal act referred to in paragraph 3.10 of the Requirements.

133. Appropriate safety measures shall be in place to prevent the formation of explosives and in the event that gaseous radioactive waste may be combustible.

134. Parameters important for the safe operation of the filtration system of gaseous radioactive waste shall be defined by the licence holder in the rules of procedure for operation limits and conditions and shall be kept under control.

135. The filtration system shall be backed up to prevent failure of the entire filtration system in the case one failure of single components (e.g., the system may have two filters, each of which is capable of proper gas purification independently of each other).

136. Used filters and sorbents for filtering gaseous radioactive waste shall be considered solid radioactive waste. Therefore, filter materials shall be selected so that their physical and chemical characteristics allow processing them together with solid radioactive waste streams.

137. Filters shall be replaced and used filters shall be treated so that to prevent the dispersion of trapped radionuclides into the environment.

## **CHAPTER XII STORAGE OF RADIOACTIVE WASTE**

138. Radioactive waste stored at storage facilities shall meet the criteria of acceptance for storage at the facility. Radioactive waste storage facilities must be designed and constructed for the intended period of storage of radioactive waste, taking into account the aging of waste packages. The adequacy of the capacity of the existing radioactive waste storage facilities to meet the needs of radioactive waste storage shall be assessed at intervals set by the licence holder.

139. Radioactive waste storage facilities shall be designed and operated with priority being given to passive safety measures.

140. An inspection programme must be in place to verify the compliance of the radioactive waste and packages with the operation limits and conditions set out in the safety substantiation documents and to ensure the effectiveness of the safety measures provided for in the safety substantiation documents. The programme shall provide for the monitoring of environmental conditions inside the storage facility and the condition of radioactive waste and radioactive waste packages, as well as inspection possibilities during normal operation, maintenance, repair and radiological accidents and incidents.

141. Prior to establishing the operation limits and conditions, the following shall be taken into account depending on the characteristics of waste:

141.1. environmental conditions inside the storage facility (i.e. temperature, humidity, quantity of pollutants/contaminants, etc.);

141.2. heat emitted by radioactive waste, including its effects on packages and the overall storage facility;

141.3. aerosols and gaseous concentrations in the storage facility, likely formation of gas in waste, potential for inflammation, explosion, deformation of packages and likely radiological consequences of the aforementioned events;

141.4. criticality prevention in radioactive waste, packages and the overall radioactive waste storage facility;

141.5. possibility to retrieve packages, perform their transfer or carry out other radioactive waste handling operations.

142. The radioactive waste storage facility shall have a ventilation system for the effective removal of gases generated in normal operation and in cases of design-basis events.

### **CHAPTER XIII**

#### **LIFTING, TRANSFER, MONITORING AND TRANSPORTATION OF PACKAGES**

143. Package handling equipment must be in place and must be suitable for all anticipated transfers of radioactive waste. The capability to load packages to the means of transportation shall be provided.

144. Space and means for storage, transfer and inspection of empty containers shall be provided.

145. In cases where shielding is required for packages, a container handling system shall have the capability to load/unload unshielded filled containers into/from shielded containers remotely.

146. Packages transported for disposal outside the NI shall comply with transportation requirements set out in the legal act referred to in paragraphs 3.1–3.3 of the Requirements.

147. Prior to entering or leaving the storage facility, the packages must be checked for the radiation dose rate and radioactive contamination. Packages found to be contaminated must be subject to decontamination.

148. All actions involving packages must be described in writing and registered by the licence holder.

### **CHAPTER XIV**

#### **CORRECTIVE ACTIONS**

149. If the package does not conform to the specifications envisaged in the design and/or does not meet the criteria for acceptance at the radioactive waste storage facility, the non-conformity shall be recorded, the nature and reasons thereof shall be identified and decisions shall be adopted regarding the corrective actions needed or return of the package to the radioactive waste generator in accordance with the rules of procedure for acceptance of packages to the storage facility drawn up by the licence holder. Radioactive waste conditioning operations shall be preceded by the drawing up of a plan for the elimination of non-conformities.

150. Should the descriptions of waste packages be incompatible with the criteria for accepting packages to a storage or disposal facility due to the fact that these criteria were established subsequently to drawing up of the descriptions, the packages shall be inspected for compatibility with the criteria for accepting packages to a storage or disposal facility.

151. There must be plans for the elimination of any deviations from the storage facility operation limits and conditions, identification and elimination of the reasons for such deviations and management measures for packages that are not removed in the storage facility using the available designed measures or upon detection of package degradation.

152. Data on any cases of non-compliance shall be compiled and analysed and corrective actions shall be taken in view of the findings obtained in order to avoid the reasons for non-compliance and to ensure safety.

**CHAPTER XV  
SAFETY ANALYSIS AND SUBSTANTIATION FOR RADIOACTIVE WASTE  
MANAGEMENT FACILITY**

**SECTION I  
SAFETY-SUPPORTING DOCUMENTATION FOR RADIOACTIVE WASTE  
MANAGEMENT FACILITY**

153. In order to ensure the safety of radioactive waste management facilities during their entire lifetime, safety-supporting documentation must be drawn up and implemented to demonstrate that the design is in compliance with the requirements laid down in nuclear safety and radiation protection legislation and normative technical documents of nuclear safety.

154. The applicant or licence holder shall carry out safety analysis and substantiation in compliance with the requirements set out in the legal acts regulating nuclear safety and radiation protection and in normative technical documents for nuclear safety.

155. It is the responsibility of the applicant and the license holder to assess the potential hazards at different stages of radioactive waste management. The safety analysis and substantiation shall cover all activities and hazards associated with all the circumstances of radioactive waste management.

156. The safety analysis and substantiation of radioactive waste management facilities shall include the safety of radioactive waste management facilities, the safety of radioactive waste management operations and the safety of packages. The scope of the safety analysis and substantiation of radioactive waste management facilities shall be proportionate to the level of dangers posed by ionising radiation.

**156<sup>1</sup>. Before using mobile equipment for radioactive waste management, the license holder shall carry out safety analysis and substantiation of the mobile equipment in accordance with the principle of graded approach. The safety analysis and substantiation of the mobile equipment for radioactive waste management shall include safety assessment at the stages of installation, operation, maintenance, decontamination and dismantling of the equipment and of its interaction with existing radioactive waste management facilities.**

157. Organisational and/or technical measures (such as design changes, new license holder's normative technical documentation for operation, additional staff training) shall be provided to prevent and counteract hazards identified during the safety analysis and substantiation.

158. The safety analysis and substantiation shall take into account the operating period of the radioactive waste management facility and assess the impact of normal operation, postulated events and anticipated operational occurrences of the radioactive waste management facility on employees and population. Changes in radioactive waste characteristics over the full range of potential values shall also be taken into account.

159. A typical content of the safety analysis report is provided in Annex 4 hereto. Safety assessment data contained in the safety analysis report shall be of sufficient detail and quality for safety substantiation, evaluation and verification. All models, assumptions and other data used in the safety assessment shall be clearly described. Clarity in the preparation of the safety-supporting documentation means the structure of the documents which is in conformity with the typical content of the safety analysis report, the detail and style of preparing the documents according to their purpose as well as taking into account the stakeholders to whom they are addressed. The traceability of records must be ensured.

160. The safety analysis report shall include information summarising the expected exposure of workers, population and the environment to ionising radiation. The safety analysis and substantiation shall provide calculations of the limits of the activity concentrations of radionuclide emission under the conditions of safe and normal operation.

161. In case of any new information likely to have effects on the safety of the radioactive waste management facility, the applicant or the license holder shall update the safety-supporting documents as soon as possible, taking into account any modifications made, their relevance for safety, **the results of the assessment of operational experience and analysis of unusual events** as well as new legislation on radioactive waste management.

162. The safety-supporting documentation must be reviewed and revised if it no longer meets the actual circumstances and/or the requirements of the legal acts governing nuclear safety and radiation protection and of the normative technical documentation on nuclear safety. The safety-supporting documents must also be revised if:

162.1. there were unplanned deviations in the radioactive waste management facility from the operation limits and conditions set forth in the design of the radioactive waste facility;

162.2. there were changes in the operation-related normative technical documents of the licence holder, radioactive waste acceptance criteria were modified, or waste characteristics important to safety changed in comparison with the characteristics specified in the safety-supporting documents;

162.3. the characteristics of radioactive waste changed unexpectedly and fail to comply with the limits set out in the safety-supporting documents of the radioactive waste management facility;

162.4. the information contained in the safety analysis report no longer corresponds to the current status of the radioactive waste management facility.

163. The results of the periodic safety analysis and substantiation shall be taken into account when updating the safety-supporting documents.

## **SECTION II SAFETY ANALYSIS AND SUBSTANTIATION FOR THE SITES OF PRE-DISPOSAL RADIOACTIVE WASTE MANAGEMENT FACILITIES**

164. Site safety analysis and substantiation shall be carried out in compliance with the legal acts referred to in paragraphs 3.6 and 3.7 of the Requirements.

165. During the site safety analysis and substantiation, the properties of the site that may directly affect the safety of the radioactive waste management facility shall be investigated and evaluated, the potential uncertainties of the site data shall be assessed and the site suitability for the radioactive waste management facility and its safe operation on the selected site shall be substantiated.

166. The safety analysis and substantiation of the radioactive waste management facility site shall include:

166.1. the determination of the baseline condition of the site;

166.2. the identification of the site-specific events and processes likely to impede the operation of the radioactive waste management facility;

166.3. the analysis of safety impacts of factors associated with the radioactive waste management facility.

167. When assessing external natural factors by their potential impact on the operation of the radioactive waste management facility, it is required to:

167.1. collect information on the history of natural hazards on the site of the radioactive waste management facility and in the vicinity thereof and the severity of their consequences, and to assess the uncertainty of the collected data;

167.2. identify and assess potential events likely to occur as a result of external natural hazards on the site and in the vicinity thereof. While assessing the hazards/, the size of the territory for which external natural hazards are to be identified and assessed should be proportionate to potential impacts of the hazards on the safety of the radioactive waste management facility.

168. When assessing potential hazards caused by human activity, it is required to:

168.1. assess the infrastructure in the vicinity of the site which may have effect on the safe operation of the radioactive waste management facility;

168.2. identify the factors induced by human activities which may have effect on the safety radioactive waste management facility;

168.3. apply models for assessing impacts of human activities on the radioactive waste management facility established in the best international practices (valid IAEA documentation).

169. The site safety analysis and substantiation shall cover the assessment of the effects of ionising radiation and non-radiological consequences for the population in case of anticipated operational occurrences and design-basis accidents.

170. To obtain a license referred to in Article 22(1) (1) or Article 22(1) (3) of the legal act referred to in paragraph 3.7 of the Requirements, the applicant is required to prepare and provide in the preliminary safety analysis report a procedure for monitoring external natural and human-induced hazards, their changes and effects on the characteristics of the site. The preliminary safety analysis report shall assess variations in the external natural and human-induced hazards/, compared with those identified in the site safety analysis and substantiation, if such variations have been identified.

171. The site safety analysis and substantiation shall identify measures of emergency preparedness needed during the operation of the radioactive waste management facility. Changes in site characteristics should also be taken into account when reviewing the emergency preparedness measures.

172. When assessing the site of the radioactive waste management facility, it is required to analyse and assess the possibility of applying administrative and technical measures to ensure physical protection. The analysis shall be focused on the assessment of the following characteristics of the site and its surrounding area which may have effect on the application of the physical protection measures or their effectiveness: the topography of the area, infrastructure, meteorological conditions and other factors.

173. If the safety analysis and substantiation of the site identifies deficiencies of the site of the radioactive waste management facility which may have a negative effect on the safety of the radioactive waste management facility at any stage of its lifetime, technical solutions of the design of the radioactive waste management facility and administrative measures shall be specified to compensate for the above-mentioned deficiencies. If the deficiencies cannot be compensated, the site shall be declared as not suitable.

174. The site assessment report shall be drawn up in accordance with a typical content of the site assessment report presented in Annex 3 hereto and shall contain all the information referred to therein, except for cases when the presentation of certain information is not possible due to the stage of the radioactive waste management facility lifetime to substantiate the safety of which the report is being made, due to the technology of the specific radioactive waste management facility or due to other circumstances characteristics to the specific radioactive waste management facility, and/or when the information has no effect on ensuring the safety of the radioactive waste management facility at the stage at issue and further stages of its lifetime. The aforementioned circumstances must be listed and substantiated in the site evaluation report.

### **SECTION III**

#### **PERIODIC SAFETY ANALYSIS AND SUBSTANTIATION**

175. In compliance with the requirements of the legal act referred to in paragraph 3.7 of the Requirements, the licence holder is required to carry out periodic safety analysis and substantiation, draw up a periodic safety evaluation report and submit it to VATESI for coordination.

## CHAPTER XVI

### SPECIAL REQUIREMENTS FOR THE LICENSE HOLDER'S MANAGEMENT SYSTEM

179. The management system of the license holder engaged in activities in the area of pre-disposal management of radioactive waste shall ensure the following:

179.1. the compliance with the technical conditions and requirements necessary for the safety of radioactive waste management throughout the lifecycle of the radioactive waste management facility, from its design to decommissioning;

179.2. the conformity of the properties of **processed** radioactive waste **accepted at a radioactive waste management facility with the design of the radioactive waste management facility and of the quality of radioactive waste packages** with the radioactive waste storage and disposal requirements;

179.3. the quality, integrity and tightness of the packages stored throughout the overall storage period;

179.4. the quality of the passports, marking and labelling of packages;

**179.5. the establishment of permissible limits or tolerances for all processes relating to the quality of packages produced and the characteristics of the packages;**

**179.6. the setting of the requirements for purchased goods and services related to package quality assurance;**

**179.7. the establishment of control methods for package production, including the methods for package testing and the frequency of controls.**

180. Safety-related operations, including those performed by suppliers of services, goods and/or works, shall be planned and carried out at all stages of the lifecycle of the radioactive waste management facility in accordance with normative technical documentation and standards on nuclear safety. It is also recommended to follow the IAEA recommendations on radioactive waste management and practices of other organisations acting in this area.

181. Precautionary measures must be in place to ensure that packages meet the criteria for acceptance of radioactive waste into a radioactive waste storage or disposal facility. For this purpose, the license holder shall implement measures envisaged in the management system documentation to ensure compliance with the acceptance criteria at all stages of radioactive waste management:

181.1. characterisation of radioactive waste;

181.2. preparation of technical specifications for packages;

181.3. approval (validation) of the process of radioactive waste treatment or conditioning;

181.4. approval of the characteristics of packages;

181.5. checking of quality control records.

## CHAPTER XVII

### RADIOACTIVE WASTE ACCOUNTING, DOCUMENTATION AND RECORD-KEEPING

182. Adequate procedures for producing, keeping, storing and updating documents and records shall be established to ensure that all the records and documents necessary for the implementation of the Radioactive Waste Management Development Programme and the Strategy on Radioactive Waste Management are kept and are up to date:

182.1. rules of procedure of non-treated radioactive waste and radioactive waste accepted for storage and/or processing at the NI, describing the radioactive waste according to the waste classification requirements set out hereinabove;

182.2. records on materials and exempt waste transported out from the NI for (re)use or disposal;

182.3. records of the return of radioactive waste if the radioactive waste has been accepted for treatment or conditioning from another person;

182.4. records of radioactive waste containing nuclear materials made in accordance with the documents specified in paragraph 3.13 of the Requirements;

182.5. records of the operation of radioactive waste treatment or conditioning facilities related to the quality of radioactive waste packages (e.g. cases of non-compliance of radioactive waste with the characteristics of radioactive waste accepted at the radioactive waste management facility, non-compliance of materials used for the production of radioactive waste packages with package specifications, deviations from the limits and conditions of operation of the radioactive waste management facility, results of sample testing);

182.6. designs, plans, technical drawings, descriptions of technical specifications and processes, rules of procedure for operating procedures of the radioactive waste management facility;

182.7. documents on the safety assessment methods and the records of the results of such assessments;

182.8. records of the implementation of processes and application and improvement of the management system;

182.9. records of the personnel exposures and activity of radionuclides discharged into the environment (ambient air and water).

183. The system for processing, storing and updating records shall ensure the traceability of radioactive waste data from the generation or acceptance of radioactive waste for treatment, if it is accepted for management or storage from another person.

184. Radioactive waste storage facilities shall contain the following records on each radioactive waste package stored therein:

184.1. information about radioactive waste origin and generator;

184.2. information about the location of each package in the radioactive waste storage facility;

184.3. rules of procedure of the packages;

184.4. passports of the packages;

184.5. technical specifications of the packages;

184.6. records of audits of all containers and packages;

184.7. acquisition documentation for containers that must remain leak-tight for a period of time set in the technical design (e.g. in the repository);

184.8. records of non-compliance with the technical specifications, reasons thereof, actions taken to rectify the situation and the results of such actions.

185. The scope and detail of the records should depend on hazards and/or complexity of the radioactive waste management facility. The records shall be collected and kept at least in two places in different formats (paper and electronic) until the decommissioning of the radioactive waste management facilities.

186. To transfer radioactive waste for disposal, the license holder shall submit the documents and records specified in paragraphs 184.4, 184.5, 184.6 and 184.8 above to the operator of the disposal facility (repository).

187. A database must be installed and regularly updated for collecting data on the properties of radioactive waste generated and accepted for treatment **in the radioactive waste management facility** and of radioactive waste **treated** and stored in the storage facility. Records of the location of all radioactive waste in the NI **or information on the transfer of radioactive waste to other persons**, their management operations and the properties below shall be entered and regularly updated in the database:

- 187.1. weight and volume;
- 187.2. radiological properties;
- 187.3. chemical, **biological** and physical properties;
- 187.4. the place of generation;
- 187.5. hazardous properties and quantities of hazardous materials;
- 187.6. the need for special management actions related to the functions of maintaining subcriticality, heat removal and ensuring radiation protection.

188. The system shall provide the possibility to obtain data on the radionuclide composition of all radioactive waste and each radioactive waste package stored in the storage facility.

### **CHAPTER XVIII REPORTS ON THE OPERATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES**

189. Annual reports on the nuclear safety of the radioactive waste management facility shall be submitted to VATESI by 1 March of the following calendar year, providing the following information:

- 189.1. volume, total activity and radionuclide composition of the generated liquid radioactive waste;
- 189.2. volume and weight (as per class), as well as total activity and radionuclide composition of the generated solid radioactive waste;
- 189.3. quantities of radioactive waste accepted from other waste generators;
- 189.4. volume and weight (as per class) of treated and conditioned radioactive waste;
- 189.5. number, total volume and weight (as per class) of the produced radioactive waste packages;
- 189.6. types, number and the total volume of the packages handed over for disposal, individual radionuclide concentrations and total radionuclide activity in the packages;
- 189.7. developments in the quantity and composition of radioactive waste received, processed, stored and shipped, as well as developments in operational safety;
- 189.8. exposure doses of the personnel and activity of radionuclides discharged into the environment;
- 189.9. cases of non-compliance with the criteria for radioactive waste acceptance in the radioactive waste management facility, reasons thereof and the results of the actions taken for the elimination thereof;
- 189.10. progress in the implementation of the safety improvement programme for the last calendar year, specifying:
  - 189.10.1. completed safety improvement measures under the safety improvement programme and documents showing the completion thereof;
  - 189.10.2. objectives achieved;
  - 189.10.3. results obtained;
  - 189.10.4. interim results for measures started but not yet complete;

189.10.5. safety improvement measures not implemented and the reason for that;

189.10.6. other information, if any, necessary for the planning, implementation and traceability of safety improvements.

## **CHAPTER XIX**

### **PREPAREDNESS IN CASE OF ANTICIPATED UNUSUAL EVENTS AND ACCIDENTS**

190. **Preventive** measures shall be in place to minimise the occurrence and mitigate the consequences of unusual events, uncontrolled releases of radioactive materials, and to prevent or minimise exposure to personnel and population.

191. The licence holder must be prepared to respond to accidents related to the management, storage and transportation of radioactive waste. The results of accident analysis should feed into the emergency preparedness plan and rules of procedure for emergency preparedness.

---

Annex 1 to Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal management of radioactive waste at nuclear installations”

**CLASSIFICATION OF SOLID RADIOACTIVE WASTE**

Radioactive waste classes	Definition	Abbreviation	Surface dose rate, mSv/h	Conditioning of radioactive waste	Disposal method*
0	Exempt waste	EW	-	Not required	Management and disposal as per requirements set out in the legal act referred to in paragraph 3.11 of the Requirements
Short-lived low- and intermediate-level waste **					
A	Very low-level waste	VLLW	<0.2	Not required	Near-surface (very low-level waste) repository
B	Low-level waste	LLW-SL	0.2–2	Required	Near-surface radioactive waste repository
C	Intermediate-level waste	ILW-SL	>2	Required	Near-surface radioactive waste repository
Long-lived low- and intermediate-level waste ***					
D	Low-level waste	LLW-LL	<10	Required	Near-surface radioactive waste repository (cavities at intermediate depth)
E	Intermediate-level waste	ILW-LL	>10	Required	Deep geological radioactive waste repository
High-level radioactive waste					
G	High-level radioactive waste	HLRW	-	Required	Deep geological radioactive waste repository
Spent sealed sources					

F	Spent sealed sources	SSS	-	Required	Near-surface or deep geological repository ****
---	----------------------	-----	---	----------	---

\* Disposal method shall be determined according to radioactive waste package compliance with the criteria for acceptance of packages in a relevant radioactive waste disposal facility (repository).

\*\* Containing alpha-emitting radionuclides with a half-life longer than  $^{137}\text{Cs}$  and activity concentrations, measured and/or calculated using approved methods, equal or less than 4000 Bq/g in individual radioactive waste package, provided that the average activity concentrations of the alpha emitting radionuclides calculated of the basis of all radioactive waste packages is equal or less than 400 Bq/g. Activity of alpha-, beta- and/or gamma-emitting radionuclides shall not exceed values set out in radioactive waste acceptance criteria of a near-surface radioactive waste disposal facility (repository).

\*\*\* Containing alpha-emitting radionuclides with a half-life longer than  $^{137}\text{Cs}$  and activity concentrations, measured and/or calculated using approved methods, equal or less than 4000 Bq/g in individual radioactive waste package, also if the average activity concentrations of the alpha emitting radionuclides calculated of the basis of all radioactive waste packages exceeds 400 Bq/g and/or activity of alpha-, beta- and/or gamma-emitting radionuclides exceeds values set out in radioactive waste acceptance criteria of a near-surface radioactive waste disposal facility (repository).

\*\*\*\* Depending on acceptance criteria applied to spent sealed sources.

Annex 2 to Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal management of radioactive waste at nuclear installations”

## REQUIREMENTS FOR RADIOACTIVE WASTE PACKAGE PASSPORT

1. The passport of a radioactive waste package shall provide the characteristics of radioactive waste in such package (“the package”) expressed in figures.
2. Each package passport shall contain the following package-specific data:

- 2.1. Model and structure of the package;
- 2.2. Code of the package description;
- 2.3. Package identification data (code, marking place, date of production and other);
- 2.4. Weight;
- 2.5. Cavities;
- 2.6. Dose rate on the package surface;
- 2.7. Surface contamination;
- 2.8. External measurements;
- 2.9. Characterisation of radioactive waste:
  - 2.9.1. Origin;
  - 2.9.2. Treatment of radioactive waste;
  - 2.9.3. Volume,
  - 2.9.4. Chemical composition;
  - 2.9.5. Density;
  - 2.9.6. Activity (specific, total  $\alpha$ ,  $\beta$  and  $\gamma$  activity);
  - 2.9.7. Composition of radionuclides;
- 2.10. Person(s) in charge of the quality of the package and preparation of the package passport;
- 2.11. Limit values of environmental conditions and performance parameters having an impact on the quality of the package and package compliance with the conditions and parameters.

## **TYPICAL CONTENT OF AN ASSESSMENT REPORT OF A RADIOACTIVE WASTE MANAGEMENT FACILITY SITE**

1. Introduction (purpose and operation stages of the radioactive waste management facility, description of the procedure for preparing the assessment report)
  2. Summary
  3. Description of the construction site (“the site”) (location and layout of the site, technical drawings)
  4. Characteristics of geography, topography and geology of the site and the area (seismologic, tectonic, lithologic, stratigraphic, geomorphologic, topographic, hydrologic, hydrogeologic, meteorological and climatological data)
  5. Demographic data and social-economic environment of the site area
  6. Industrial or military activities in the vicinity, land or air vehicles and other factors likely to have any effect on the safety of the facilities
  7. Safety analysis and substantiation of the appropriateness of the site:
    - 7.1. Assessment of external natural hazards (e.g. extreme weather events, flood, earthquake, fire, geotechnical site hazards)
    - 7.2. Assessment of human-induced hazards (e.g. aircraft crash, explosion, flooding, fire, spread of hazardous and corrosive substances, flying objects, loss of power supply)
  8. Assessment of exposure to the population (activity of released radionuclides, assessment of radiological dispersion, assessment of radiological consequences for the population, assessment of non-radiological consequences for the population).
  9. Possibility to apply physical protection and emergency preparedness measures
  10. Site safety analysis and substantiation results (appropriateness of the siting, deficiencies and measures to compensate for the deficiencies)
  11. Conclusions (summary of the site assessment results)
-

## TYPICAL CONTENT OF A SAFETY ANALYSIS REPORT

1. Introduction (purpose and operation stages of the radioactive waste management facility, description of the procedure for preparing the assessment report).
2. General description of the radioactive waste management facility (location and layout of the construction site (“the site”), and facilities, purpose of the radioactive waste management facility, overview of the facilities and technologies)
3. Requirements for the radioactive waste management facility (applicable nuclear safety requirements, regulations, standards and other technical normative documents, safety objectives and criteria)
4. Characteristics of the radioactive waste management facility site (geomorphology and topography of the site and the surrounding area, geotechnical characteristics of the storage facility site, seismicity, shifts, slope stability and surface erosion, meteorology and climatology of the area, hydrology and hydrogeology of the area and storage facility site, fauna and flora on the site and in the vicinity thereof)
5. Human activities in the area (distribution of the population in the region and vicinity of the site, agricultural, commercial and industrial activities in the vicinity of the site, transport lines, quarrying and excavation works, nuclear installations, potentially dangerous facilities and infrastructure in the vicinity of the site). The size of the area shall be selected in compliance with the best international practices (e.g. described in IAEA’s publications), with account taken of the problem-specific features related to the safety analysis and substantiation of the radioactive waste management facility.
6. Quantity and properties of radioactive waste
7. Description of the radioactive waste management facility and technological radioactive waste management process within it (location and layout of the site and the facility on the site, description of the operating conditions of the facility, constructions, systems and components important to the safety of radioactive waste treatment, conditioning and/or storage, equipment used in the radioactive waste management facility, containers and packages, radioactive waste management operations, on-site waste transportation, identification of origin of radioactive waste, optimisation of radioactive waste management strategies, management of radioactive waste resulting from the operation of the radioactive waste management facilities and reduction of such waste)
8. Design solutions and substantiation (acceptable loads in design work, classification of structures, systems and components of the radioactive waste management facility, description of the functions of structures, systems and components important to safety and their assessment in terms of the radioactive waste management facility operation period, selection and substantiation of materials used for the structures, systems and components, substantiation of the period of radioactive waste management facility operation, implementation of the defence-in-depth principle)
9. Safety analysis and substantiation (assessment of hazards, postulated initiating events and their consequences, measures of protection against external and internal hazards, safety analysis and substantiation of safety compliance under the conditions of normal operation and upon occurrence of design-basis and beyond-design-basis accidents, substantiation and control of safe and normal operation limits and conditions, containment and control of the release of radionuclides, exposure assessment and optimisation for employees and population, **protection of employees and population against the dangers related to the whole activity of radioactive waste processing**)
10. Characteristics of acceptance of radioactive waste to the radioactive waste management facility or criteria of acceptance of radioactive waste packages for storage in the radioactive waste storage facility.
11. Compliance with the requirements for transportation of radioactive waste beyond the site boundaries (if such transportation is envisaged)

12. Physical safety performance of the radioactive waste management facility (summarised information on the measures for ensuring physical protection specified in the plan for ensuring physical protection of the nuclear installation)
  13. Description of the monitoring of changes resulting from natural and human-induced hazards
  14. Description of decommissioning (sequence of decommissioning operations, applicable technologies, summary description of radioactive waste management)
  15. Description of emergency preparedness (summary information)
  16. Description of fire hazard analysis for the radioactive waste management facility
  17. Description of the operation of the radioactive waste management facility (description of maintenance, monitoring, testing and inspection, management of ageing, management of modifications, assessment of operational experience, description of radiation protection performance)
  18. Description of the management system (description of the organisational structure and management system, description of staff training, description of quality assurance with application to the specific radioactive waste management facility)
  19. Conclusions (summary of safety analysis and substantiation results)
-

## TYPICAL CONTENT OF A PERIODIC SAFETY EVALUATION REPORT

1. Introduction
2. General description of the radioactive waste management facility
3. Brief description of the structures, systems and components of the radioactive waste management facility
4. Assessment of compliance of the radioactive waste management facility with its design and requirements laid down in legal acts on the nuclear safety, radiation and physical protection and emergency preparedness of the radioactive waste management facility as well as in nuclear safety normative technical documentation:
  - 4.1. Description and assessment of changes in the characteristics of the site of the radioactive waste management facility site and/or its vicinity and of related measures to compensate for the changes
  - 4.2. Assessment of hazards and unusual events affecting the safety
  - 4.3. Description and assessment of modifications made during the operation of the radioactive waste management facility
  - 4.4. Description and assessment of compliance with the criteria of acceptance of radioactive waste at the radioactive waste management facility
  - 4.5. Description and assessment of compliance with the requirements for transportation of radioactive waste beyond the site boundaries (if such transportation is envisaged)
  - 4.6. Assessment of changes in the interdependencies between radioactive waste management stages
  - 4.7. Assessment of the effects of ageing of structures, systems and components important to safety on the radioactive waste management facility
  - 4.8. Other assessments of compliance of the radioactive waste management facility with its design and requirements laid down in legal acts on the nuclear safety, radiation and physical protection and emergency preparedness of the storage facility as well as in nuclear safety normative technical documentation
5. Outcomes of the analyses of most recent research results, developments in international nuclear safety standards, best international practices (publications by the European Nuclear Safety Regulators Group and the Western European Nuclear Regulators Association as well as the safety requirements set out by the International Atomic Energy Agency), own experience and that of others operating in the nuclear energy sector, safety improvement measures and time-limits for their implementation
6. Description of radiological effects on the environment and compliance of radionuclides discharged into the environment, their intensity, pathways, media or points of discharge with the plan on release of radionuclide into the environment
7. Necessary corrective measures to ensure compliance of the storage facility with its design and requirements laid down in legal acts on nuclear safety, radiation and physical protection, emergency preparedness and in nuclear safety normative technical documentation (where cases of existing non-compliance with the aforementioned documents or cases of non-compliance that may occur until the next periodic safety analysis are detected during the periodic safety analysis) and time-limits for their implementation
8. The deadline for carrying out the next periodic safety analysis and substantiation