



## **On approval of the Rules of the organization of collection, storage and burial of radioactive wastes and spent nuclear fuel**

### *Unofficial translation*

Order of the Minister of Energy of the Republic of Kazakhstan dated February 8, 2016 No. 39 . Registered with the Ministry of Justice of the Republic of Kazakhstan on March 28, 2016 No. 13537.

### *Unofficial translation*

In accordance with subparagraph 29) of Article 6 of the Law of the Republic of Kazakhstan "On use of atomic energy" and subparagraph 2) of paragraph 3 of Article 16 of the Law of the Republic of Kazakhstan "On state statistics" **I hereby ORDER:**

**Footnote. The preamble - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

1. To approve the attached Rules of the organization of collection, storage and burial of radioactive wastes and spent nuclear fuel.

2. To invalidate order № 209 of the Minister of Energy of the Republic of Kazakhstan dated March 18, 2015 “On approval of the Rules of the organization of collection and burial of radioactive wastes” (registered in the Register of State Registration of Regulatory Legal Acts under № 10834, published in the Adilet information and legal system dated May 12, 2015).

3. In the manner prescribed by the legislation of the Republic of Kazakhstan, the Committee for Atomic and Energy Supervision and Control of the Ministry of Energy of the Republic of Kazakhstan shall:

1) provide the state registration of this order with the Ministry of Justice of the Republic of Kazakhstan;

2) within ten calendar days after the state registration of this order with the Ministry of Justice of the Republic of Kazakhstan, direct its copy for official publication in periodicals and Adilet information and legal system, and also to the Republican State Enterprise with the Right of Economic Management “Republican Center of Legal Information” of the Ministry of Justice of the Republic of Kazakhstan for its inclusion in the Reference Control Bank of Regulatory Legal acts of the Republic of Kazakhstan;

3) place this order on the official Internet resource of the Ministry of Energy of the Republic of Kazakhstan and the intranet portal of the state bodies;

4) within ten working days after the state registration of this order with the Ministry of Justice of the Republic of Kazakhstan, report to the Department of Legal Service of the

Ministry of Energy of the Republic of Kazakhstan on execution of the actions provided for in subparagraphs 2) and 3) of this paragraph.

4. Control over the execution of this order shall be assigned to the supervising Vice Minister of Energy of the Republic of Kazakhstan.

5. This order shall take effect upon expiry of ten calendar days after the date of its first official publication.

*Minister of Energy  
of the Republic of Kazakhstan*

*V. Shkolnik*

“AGREED”

Minister of National Economy  
of the Republic of Kazakhstan

\_\_\_\_\_ Ye. Dossayev  
February 26, 2016

Approved  
by order № 39  
of the Minister of Energy  
of the Republic of Kazakhstan  
dated February 8, 2016

## **Rules for organizing the collection, storage and disposal of radioactive waste and spent nuclear fuel Chapter 1. General Provisions**

**Footnote. Title of Chapter 1 as amended by Order №316 of the Minister of Energy of the Republic of Kazakhstan dated 21.09.2020 (shall be enforced upon expiry of ten calendar days after the date of its first official publication)**

1. These Rules for organization of collection, storage and disposal of radioactive waste and spent nuclear fuel (hereinafter referred to as the Rules) have been developed in accordance with subparagraph 29) of Article 6 of the Law of the Republic of Kazakhstan "On use of atomic energy" (hereinafter referred to as the Law) and shall determine the procedure for organization of collection, storage and disposal of radioactive waste and storage of spent nuclear fuel.

**Footnote. Paragraph 1 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

2. The requirements of these Rules shall be observed at the design, construction, operation and decommissioning of nuclear facilities.

3. The following terms and definitions shall apply in these Rules:

- 1) compound - matrix material with radioactive waste included in it;
- 2) packaging - a packaging set with spent nuclear fuel or radioactive waste, prepared for transportation (or) storage and (or) burial;

3) complex of spent nuclear fuel storage and handling systems - a set of systems, devices, elements intended for storage, loading, unloading, transportation and control of spent nuclear fuel;

4) radioactive waste container - a container used for collection and (or) transportation and (or) storage and (or) disposal of radioactive waste;

5) collection of radioactive waste - concentration of radioactive waste in specially designated and equipped places;

6) conditioning of radioactive waste - one of the main stages of radioactive waste management, which consists in reducing their volume, transferring to a form convenient for transportation, storage and disposal in order to improve the safety of their handling;

7) processing of radioactive waste - technological operations to reduce the volume of radioactive waste and (or) remove radionuclides from radioactive waste and (or) change the composition of radioactive waste;

8) vitrification of radioactive waste - inclusion of radioactive waste in glass-like matrix material;

9) bitumination of liquid radioactive waste - inclusion of radioactive waste in bitumen matrix material;

10) holding of liquid radioactive waste - storage of liquid radioactive waste in order to reduce radioactivity and heat release due to decay of short-lived radionuclides;

11) cementing liquid radioactive waste - including liquid radioactive waste in the cement matrix material;

12) solidification of liquid radioactive waste - transfer of liquid radioactive waste into a solid aggregate state in order to reduce the possibility of radionuclide migration into the environment;

13) barrier - a barrier on the path of radionuclides spreading into the environment. The barriers shall be sealed enclosures of premises and storages, equipment and pipelines containing radioactive waste, physical and chemical form of conditioned radioactive waste;

14) grid pitch - the distance between the axes of adjacent fuel assemblies, bottles or packages located in the nodes of the regular grid.

Other terms and definitions shall be used in accordance with the legislation of the Republic of Kazakhstan in the field of atomic energy use.

**Footnote. Paragraph 3 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

## **Chapter 2. Procedure for organizing collection, storage and burial of radioactive wastes**

**Footnote. Title of Chapter 2 as amended by Order №316 of the Minister of Energy of the Republic of Kazakhstan dated 21.09.2020 (shall be enforced upon expiry of ten calendar days after the date of its first official publication)**

## **Paragraph 1. General requirements in the collection, storage and burial of radioactive waste**

4. In the radioactive waste (hereinafter - RW) management, the operating organization shall:

1) keep records of all generated wastes, ensure the possibility of their control at all stages from collection to storage and (or) disposal and annually, as of January 1 to March 1 of the year following the reporting year, send a report on the inventory of the RAW, which is compiled on the basis of the inventory report of the RAW and the RAW passports, on paper and (or) electronic media to the authorized body in the field of atomic energy use in form according to the Annex to these Rules;

2) ensure operational safety of the facility, for which it shall:

carry out assessment of safety and environmental impact;

provide the necessary protection level for the personnel, the population and the environment;

create the necessary organizational structure;

organize selection and training of the personnel;

acquire the necessary amount of good-quality equipment;

develop and implement a quality assurance programme in the RW management;

create a system for collecting and storing data on the RW formation, storage and burial;

monitor and control the technological process.

**Footnote. Paragraph as amended by the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

5. Technical means and organizational measures to ensure radiation safety in the RW management at nuclear facilities shall be determined on the basis of assessment and consideration of the maximum possible RW activity at these facilities.

6. When handling the RAW, the RAW classification shall be used in accordance with Article 369 of the Environmental Code of the Republic of Kazakhstan.

**Footnote. Paragraph 6 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

7. During collection, storage and disposal of the RAW, decontamination of equipment, pipelines, containers and premises used for this purpose shall be provided.

Decontamination of the used equipment, pipelines, containers shall be carried out in an equipped special room or place in the room.

**Footnote. Paragraph 7 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

8. For the RW collection, processing, storage and conditioning, the equipment shall be used that has corrosion resistance in aggressive environments, low radioactive substances sorption ability and is easily deactivating.

9. Collection, storage and disposal of radioactive waste shall be documented:

1) when collecting, a log of solid radioactive waste is kept according to Form 1 in accordance with Annex 33 to the Sanitary Rules "Sanitary and epidemiological requirements for radiation-hazardous facilities," approved by the order of the Minister of Healthcare of the Republic of Kazakhstan dated August 25, 2022 № MH RK -90 (registered in the Register of State Registration of Regulatory Legal Acts № 29292) (hereinafter referred to as the Sanitary Rules for radiation hazardous facilities) and the register of liquid radioactive waste as per Form 2 according to Annex 33 to the Sanitary Rules for radiation hazardous facilities;

2) during storage and disposal, a log of solid radioactive waste according to Form 1 shall be kept in accordance with Annex 33 to the Sanitary Rules for radiation hazardous facilities and a log of liquid radioactive waste according to Form 2 in accordance with Annex 33 to the Sanitary Rules for radiation hazardous facilities and a passport for a batch of radioactive waste shall be filled out, transferred for processing, conditioning, storage, burial in accordance with Annex 31 to the Sanitary Rules for radiation-hazardous facilities.

**Footnote. Paragraph 9 - as amended by order of the Minister of Energy of the Republic of Kazakhstan dated 02.10.2023 № 353 (shall enter into force upon expiry of ten calendar days after the day of its first official publication).**

10. Collection, storage and disposal of the RAW shall be carried out taking into account the Sanitary Rules "Sanitary and epidemiological requirements for ensuring radiation safety," approved by order of the Minister of Healthcare of the Republic of Kazakhstan dated December 15, 2020 № RK HCM-275/2020 (registered in the Register of State Registration of Regulatory Legal Acts under № 21822) (hereinafter referred to as Sanitary Rules).

**Footnote. Paragraph 10 - in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

10-1. The RAW sorting shall be a mandatory stage of the RAW collection.

Collection and sorting of the PAW shall be carried out in the places of their generation and (or) processing taking into account radiation, physical and chemical characteristics in accordance with the classification of waste, according to Article 338 of the Environmental Code of the Republic of Kazakhstan, and taking into account the methods of subsequent treatment of them.

The primary sorting of waste shall include its separation into radioactive and non-radioactive components.

Primary sorting of liquid and solid RAW shall be aimed at separation of waste into different categories and groups for processing and for preparation for subsequent storage and disposal.

In the process of collection, the RAW shall be divided into combustible and non-combustible. Combustible liquid RAW shall be collected in separate tanks that meet the fire safety requirements approved by order of the Minister of Emergency Situations of the Republic of Kazakhstan dated February 21, 2022 № 55 "On approval of fire safety Rules" (registered in the register of state registration of regulatory legal acts under № 26867).

**Footnote. The rules as added by paragraph 10-1 in accordance with the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

10-2. Radioactive waste collection shall be carried out in containers. For the primary collection of solid radioactive waste, plastic or paper bags shall be used, which are then loaded into containers. Bags made of polymer film shall be mechanically strong, maximum resistant to low temperatures and have a cord for tight tightening of the bag top after its filling. When disposing waste in bags, measures shall be taken to prevent the possibility of its mechanical damage with sharp, stabbing and cutting objects. radioactive waste containers shall be filled under radiation control under conditions that exclude the possibility of their disintegration and spill.

Radioactive waste containing radionuclides with a half-life of less than 15 (fifteen) days shall be collected separately from other radioactive waste and stored in temporary storage areas to reduce activity to levels not exceeding those specified in hygienic standards for ensuring radiation safety, approved by order of the Minister of Healthcare of the Republic of Kazakhstan dated August 2, 2022 № MH RK -71 (registered in the Register of State Registration of Regulatory Legal Acts № 29012) (hereinafter referred to as the Hygienic standards).

After such exposure, solid waste shall be removed as industrial waste, and liquid waste shall be used by the organization in the circulating utility water supply system or drained into domestic sewerage.

**Footnote. The Rules as added by paragraph 10-2 in accordance with the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication); in the wording of the order of the Minister of Energy of the Republic of Kazakhstan dated 02.10.2023 № 353 (shall enter into force upon expiry of ten calendar days after the day of its first official publication).**

## **Paragraph 2. Procedure for the collection, storage and burial of liquid radioactive wastes**

11. Collection of liquid radioactive waste (hereinafter referred to as LRAW) shall be an obligatory stage of their preparation for processing, storage and conditioning by concentration of LRAW in special containers and packages produced directly in the places of their generation separately from ordinary waste, taking into account:

waste categories;

physical and chemical characteristics;

of nature (organic and inorganic);

half-life of radionuclides in waste (less than 15 (fifteen) days, more than 15 (fifteen) days)

;

explosion and flammability;

adopted waste processing methods.

**Footnote. Paragraph 11 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

12. The design documentation of the LRW management system shall establish and substantiate the permissible volumes of LRW, their radionuclide composition, the amount of activity and the storage term of LRW, and also the necessary technical means and organizational measures shall be provided for the safe storage of LRW.

13. Storage of large volumes of LRAW shall be carried out in specially equipped storages with a structure and a system of physical storage barriers that prevents radionuclides from entering the environment in an amount that creates the content of radionuclides in it above the permissible levels established by the Hygienic Standards. Physical barriers shall be installed and justified by the operating organization in the design documentation of the LRAW handling system.

**Footnote. Paragraph 13 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

14. The construction materials of the LRW storage facility shall be selected in such a way as to ensure the service life of the LRW storage facility not less than the operational life of the technological system, installation or enterprise (institution, organization) in which it is placed.

15. The volume of LRW storage tanks shall be designed in such a way as to ensure the necessary technological exposure of LRW prior to their reprocessing and (or) decay of short-lived radionuclides.

16. Reprocessing of LRW shall be carried out in order to reduce the volume, change the state of aggregation and (or) the physicochemical properties of LRW. Technical methods and means of LRW reprocessing shall be established and substantiated in the design documentation of the LRW handling system.

17. The technological process of LRW solidification shall be selected in such a way as to ensure the receipt of products with quality indicators meeting the criteria for acceptability of radioactive waste storage and (or) burial facility.

18. LRW solidification shall be carried out by the methods of cementing, bituminization and vitrification. In the selection of the LRW solidification method, the physical and chemical properties of LRW, the properties of the matrix material, the proposed method of storage and (or) burial of conditioned waste shall be factored in.

19. The LRW solidification by cementing shall be carried out in compliance with the following safety requirements:

- 1) placement of the cementing unit in a separate room equipped with a ventilation system;
- 2) quality of the cement matrix, ensured by inorganic binders used (cement, Portland cement, slag Portland cement, etc.);
- 3) LRW containing substances interacting with cement with the formation of toxic substances are not included in the cement matrix.

20. When packing the cement compound into containers to prevent spillage, the following requirements shall be met:

- 1) control of the cement compound container placement under the discharge manifold;
- 2) control of the container filling with the cement compound;
- 3) a device that eliminates the possibility of spill during transportation of the container with the cement compound from the place of filling to the place of exposure for solidification.

21. The LRW solidification by bituminization shall be carried out in compliance with the following safety requirements:

1) placement of the bitumen installation in a separate room equipped with a ventilation system, fire alarm and fire extinguishing means;

2) requirements for bitumen used as matrix material:

flash point not lower than 200 ° C;

ignition temperature not lower than 250 ° C;

self-ignition temperature not lower than 400 ° C;

3) the bitumen matrix must not include LRW, whose components provoke chemical reaction with it, accompanied by exothermic effects, formation of toxic or explosive substances and deterioration of the resulting compound quality;

4) exclusion of LRW containing organic substances, which in the process of bituminization form volatile compounds in quantities capable of creating an explosive concentration in the gas phase, and providing control over the content of volatile compounds in the exhaust gases.

22. To prevent spill during packing of the bitumen compound, the following measures shall be provided:

1) control over the placement of the bitumen compound container under the manifold;

2) control over the tank filling with a bituminous compound;

3) a device that eliminates the possibility of spillage during transportation of the container with a bituminous compound from the place of filling to the place of exposure for cooling.

23. Solidification of LRW by vitrification shall be carried out in compliance with the following safety requirements:

1) placement of vitrification installation in a separate room equipped with a ventilation system;



2) to prevent spill during the packaging of glass composite, the following measures shall be ensured:

control of the placement of the glass composite container under the manifold;

control of the container filling with glass compound;

control of concentrations of radionuclides, harmful and dangerous gases and aerosols in emissions;

a device that eliminates the possibility of spill during transportation of the container with glass compound from the place of its filling to the place of exposure for cooling.

Paragraph 3. Procedure for collection, storage and disposal of solid radioactive waste

**Footnote. The title of paragraph 3 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

24. The solid radioactive waste collection, storage, processing and conditioning system (hereinafter referred to as SRAW) shall provide for:

1) collection directly in the places of their generation separately from ordinary waste, taking into account:

waste categories;

physical and chemical characteristics;

of nature (organic and inorganic);

half-life of radionuclides in waste (less than 15 (fifteen) days, more than 15 (fifteen) days)

;

explosion and flammability;

adopted waste processing methods;

2) SRAW collection in special rooms;

3) sorting SRAW in accordance with their classification;

4) use of containers, lifting and transportation equipment and special vehicles for transportation of radioactive waste.

**Footnote. Paragraph 24 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

25. According to the SRAW processing method, they shall be divided into compressible, incinerated, crushed and remelted. Technojournalical operations of SRAW processing and conditioning shall be carried out in order to reduce their volume and transfer them to forms that ensure safe storage and (or) burial.

**Footnote. Paragraph 25 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

26. SRW treatment shall be carried out by methods of incineration, compression, grinding (fragmentation), remelting (for metal waste). Specific technical methods and means of SRW

treatment shall be established and substantiated in the design documentation of the SRW management system.

27. SRAW incineration shall be carried out in order to reduce the volume of combustible materials and eliminate fire hazards during their storage and disposal.

Special clothing, rags, paper, elements of ventilation filters, organic solutions and biojournalical materials, as well as rubber and polyethylene materials shall be subject to burning.

The specific activity of SRAW sent for combustion shall not exceed the levels at which the required degree of purification of waste gases shall not be achieved and the established control levels of personnel exposure are exceeded.

**Footnote. Paragraph 27 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

28. Solid radioactive waste sent for incineration pass incoming inspection. solid radioactive waste containing explosive substances shall not be subject to incineration. In burned solid radioactive waste, the content of materials is limited, as a result of the combustion of which aggressive and toxic substances shall be formed in an amount exceeding the limits established by order of the Minister of Healthcare of the Republic of Kazakhstan dated August 2, 2022 № MH RK -70 "On approval of hygienic standards for atmospheric air in urban and rural settlements, in the territories of industrial organizations," (registered in the Register of State Registration of Regulatory Legal Acts № 29011) (hereinafter referred to as Hygienic standards for atmospheric air).

**Footnote. Paragraph 28 - as amended by the order of the Minister of Energy of the Republic of Kazakhstan dated 02.10.2023 № 353 (shall enter into force upon expiry of ten calendar days after the day of its first official publication).**

29. To prevent excess of the permissible emission of radioactive substances into the atmosphere in the SRW combustion, technical means shall be ensured for:

1) purification of radionuclides and chemically harmful substances generated during the SRW burning to the levels established by the Hygienic standards and the Hygienic standards for atmospheric air;

2) control of the combustion process parameters, including temperature and pressure (depression) in the combustion furnace, the content of explosive components in the gas phase, radionuclide composition of the emitted gases;

3) automatic and (or) remote control of the combustion process;

4) decontamination of the equipment and facilities;

5) fire warning and fire extinguishing.

30. The parameters of the technological regime of the SRW combustion process shall provide complete oxidation of the intermediate products of combustion and pyrolysis.

31. The ash resulting from the SRW combustion shall be converted into a monolithic form using matrix material.

32. In order to reduce the volume of incinerated SRAW, they are pressed. Non-combustible non-metals (heat insulation materials, cables, non-combustible organic materials (polyvinyl chloride, fluoroplastic), construction debris) and metal wastes shall be pressed. Compressed waste shall be placed in the RAW container.

**Footnote. Paragraph 32 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

33. When pressing SRW, it is necessary to provide technical means for:

- 1) preventing the release of dust and radioactive aerosols into the atmosphere;
- 2) removal and collection of moisture released from the pressed SRW;
- 3) packing of pressed waste into containers;
- 4) automatic and (or) remote control of the process.

34. SRW intended for pressing shall undergo input control. SRW containing pyrophoric and explosive substances in an amount provoking explosion of these substances under compression shall not be pressed.

35. SRAW sent for burning and (or) pressing shall be packed in multilayer paper or polyethylene bags and placed in containers ensuring radiation protection of personnel.

**Footnote. Paragraph 35 - as amended by the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

36. To reduce the volume of not burned and not pressed SRAW, they shall be crushed (fragmented) by cutting or crushing.

Large-sized, long-length SRAW products, processing, packaging or transportation of which shall be difficult, shall be subject to grinding (fragmentation). During SRAW grinding (fragmentation), technical means shall be provided for cleaning the air in the room from radioactive dust and aerosols, which exclude the flow of radioactive substances into the working premises and into the environment in an amount leading to exceeding dose limits and emission standards.

Metal SRAW of low and medium level of activity with surface contamination shall be decontaminated. The decontamination method shall be determined by the nature and level of contamination. The resulting solutions and sludges shall be cured and packaged.

**Footnote. Paragraph 36 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

37. In order to reduce the volume of metal SRAW, they shall be remelted. Metal SRAW shall be remelted after their decontamination and/or grinding (fragmentation).

The SRAW remelting shall be carried out in special smelting furnaces or plants dedicated for these purposes. No remelting of the SRAW shall be carried out in furnaces intended for smelting metal used to manufacture metal products.

Metal with specific activity not exceeding the values specified in Hygienic Standards shall be allowed for reuse after remelting.

**Footnote. Paragraph 37 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

38. When remelting metal SRAW, the following equipment is provided:

- 1) SRAW radiation monitoring;
- 2) automatic and/or remote process control;

3) monitoring of process parameters, including temperature in the furnace, content of radionuclides in the gas phase after its purification, resistance of filters in the gas purification system;

- 4) unloading and processing of radioactive slags;
- 5) decontamination of equipment and premises;
- 6) fire notification and fire extinguishing.

**Footnote. Paragraph 38 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

39. SRAW sent for remelting shall be cleaned to the maximum extent possible from organic coatings and inorganic materials.

**Footnote. Paragraph 39 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

40. The SRAW sent for remelting, if necessary, are crushed (fragmented) to sizes that allow their loading into a melting furnace. For grinding metal SRAW, methods and means of mechanical cutting, thermal (gas-plasma, plasma) cutting, as well as means and methods ensuring minimal contamination of surfaces and air of working premises with radioactive substances are used.

**Footnote. Paragraph 40 – in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

41. When smelting SRAW, the purification of waste gases from radionuclides to the levels established by the Hygienic Standards is provided, as well as cleaning from chemically harmful substances to the level at which the maximum permissible concentration in the environment corresponds to the values established by the Hygienic Standards for atmospheric air.

Footnote. Paragraph 41 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

42. Secondary RAW generated during melting of metal SRAW (slag, used refractory materials, dust from the gas purification system, spent filters, gas purification systems) shall be collected, stored, processed and conditioned as SRAW in accordance with the requirements of these Rules.

Footnote. Paragraph 42 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

43. Fine and dust-like SRAW shall be converted into a monolithic form.

Footnote. Paragraph 43 - in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

44. The SRAW, which shall not to be pressed, processed before their conditioning in order to reduce their volume and increase the packing density by cutting and grinding (fragmentation).

Footnote. Paragraph 44 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

45. The SRAW conditioning ensures SRAW transfer to forms suitable for subsequent storage and/or burial.

Footnote. Paragraph 45 - in the wording of the order of the acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

46. Depending on characteristics of SRAW and methods of subsequent handling of conditioned SRAW, including their transportation, processing and/or storage and/or burial, SRAW conditioning shall include the following operations or their combination:

- 1) placement of SRAW in the container;
- 2) placement and colonization of SRAW in the container;
- 3) placement of SRAW package in additional container.

Footnote. Paragraph 46 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

47. Storage facilities shall be provided for non-conditioned and conditioned SRW.

48. The SRAW storage design and structural materials shall be selected in such a way as to prevent radionuclides from entering the environment in an amount exceeding the limits established by the Hygienic Standards and ensure the storage life of the storage system is not less than the service life of the collection, processing, conditioning and storage system.

Footnote. Paragraph 48 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).

49. Technical means shall be provided in SRW storage facilities for:

- 1) inspection, revision and removal of SRW from storage;
- 2) remote control of the movement of containers with SRW in case of increased capacities of equivalent doses;
- 3) collection and removal of moisture from the store;
- 4) fire extinguishing and fire alarms (in the storage of combustible SRW);
- 5) ventilation and radiation control;
- 6) decontamination of the internal surfaces of the premises.

### **Chapter 3. Procedure for organizing storage of spent nuclear fuel**

Footnote. Title of Chapter 3 as amended by Order №316 of the Minister of Energy of the Republic of Kazakhstan dated 21.09.2020 (shall be enforced upon expiry of ten calendar days after the date of its first official publication)

#### **Paragraph 1. General requirements for storage of spent nuclear fuel**

50. Legal entities authorized to handle spent nuclear fuel (hereinafter - SNF) shall be guided by:

- 1) project materials of the complex of spent nuclear fuel storage and handling systems (hereinafter - the complex);
- 2) regulatory legal acts on the safety requirements of research nuclear facilities;
- 3) instructions on nuclear, radiation and nuclear physical safety during the SNF storage, transportation, and refueling at the complex approved by the operating organization.

51. The safety of the complex shall be ensured by the choice of a site for SNF storage, establishment of a sanitary protection zone and a surveillance zone around the storage, technological excellence and reliability of equipment, control of its condition, as well as the organization and implementation of work in accordance with the requirements of regulatory legal acts and operational documents, proficiency and discipline of the staff.

52. In the designing and operating of the complex, the following requirements shall be met:

- 1) the effective neutron multiplication coefficient ( $k_{eff}$ ) not exceeding 0.95 under normal operation and during design basis accidents;
- 2) storage and temporary placement of SNF only in specially designated places determined by the project;
- 3) routes must not be laid to other operational areas through the SNF storage and temporary location sites;

4) eliminating the need of moving cargoes over the stored SNF unless they are parts of lifting and handling devices;

5) choice of short and simple routes for SNF transportation to exclude the possibility of an accident in the event of SNF packages falling;

6) accounting and control over the location, quantity and movement of the SNF in the processes of SNF handling, storage, transportation;

7) securing fuel assemblies, spent-fuel canisters and packages transported by vehicles in such a way as to prevent them from tipping over under normal operation conditions, in a ductility level event (hereinafter- DLE) and other natural phenomena inherent in the area where the complex is located;

8) designs of canisters, racks in storage facilities, vehicles for the SNF transportation ensuring their stability under normal operation, in DLE events and other natural phenomena, in the territory of the complex;

9) design of the complex equipment providing nuclear safety, mainly by placing SNF accountable items with a certain lattice pitch;

10) equipment for SNF handling preventing the possibility of packages, spent fuel assemblies (hereinafter - SFA) or SNF canisters falling off during normal operation, as well as their damage that could lead to accidents during initial events causing packages, SFA or canisters to fall;

11) providing technical means excluding uncontrolled, spontaneous movements of SNF handling equipment;

12) providing in storage facilities in which SNF is stored under water, the devices and systems for supplying, purifying, cooling water, ventilation, monitoring radioactivity, temperature, level, chemical composition of water and, if necessary, hydrogen content;

13) providing in dry storages the measures to control and limit the accumulation of radioactive substances in the atmosphere of the store, to control the ingress of water, humidity, temperature;

14) conduct work associated with withdrawal of systems and components for maintenance and repair, the failures of which may be the initial events leading to a breach of the operating safety conditions, according to a special technical solution with mandatory registration.

53. For SNF storage at the reactor, it is necessary to provide for sufficient storage capacity enabling SNF exposure to reduce radioactivity and heat generation, as well as available free volume for one full core offload at any time.

54. Nuclear safety during storage, refueling, transportation of SNF shall be provided in accordance with the requirements of the Law.

55. Radiation safety during the SNF storage, refueling, transportation shall be regulated by Hygienic standards and Sanitary rules.

56. At all stages of the design, construction, operation and decommissioning of the complex, also in the SNF handling, including during transportation, the nuclear physical

safety of the complex shall be ensured. Nuclear physical security shall be provided in accordance with the requirements of the Law.

**Paragraph 2. The procedure of organizing spent nuclear fuel storage in water**

57. The placement of SFA and canisters in racks, cases, and cells shall be chosen so that the effective neutron multiplication coefficient  $k_{eff}$  of the storage does not exceed 0.95.

58. When storing SFA in cases, the case design shall provide a neutron multiplication factor of not more than 0.95 when the covers are placed closely in water or in the other medium in which they are stored.

59. It shall be allowed to set the pitch of fuel assemblies taking into account burnup, provided that the burnup control in the storage is ensured by technical measures (burnout depth control units).

60. The storage shall be equipped with the following systems necessary for ensuring safety:

1) water cooling (excepting cases of proved exclusion of exceeding the design values of the water temperature in the storage and without special cooling);

2) water treatment;

3) technological control (temperature, water level, water-chemical regime, hydrogen content in the air, if necessary, the content of homogeneous absorbers in water or heterogeneous absorbers in racks, if these systems are provided for by the project);

4) radiation control;

5) ventilation;

6) filling and emptying of the water pool;

7) control, collection and return of leakage;

8) charging.

61. To avoid depressurization, destruction of fuel rods, and releases of radioactive substances from SNF, it is necessary to remove residual heat. In this case, the following requirements have to be fulfilled:

1) designing of the cooling system so that the water temperature in the storage does not exceed the design limits during normal operation and design basis accident. Exceeding the design values of the water temperature in the storage is excluded during normal operation and design basis accident with the help of reliable power supply with redundancy, as well as redundancy of pumps, valves, pipelines, heat exchange units. When designing cooling systems, the use of bulk passive devices must be envisioned;

2) in the presence of several separate compartments in the storage facilities, possibility of cooling water in each compartment shall be provided for.

62. Storage facilities shall be provided with devices preventing overflow of the exposure pool with water.



63. Equipment shall be design-provided for measuring the level, temperature, specific activity of water, concentration of homogeneous absorbers with a control system and an alarm system in the control room.

64. During the storage, water shall be used that meets the requirements for distilled water. The water treatment system shall be designed to:

- 1) provide water quality indicators;
- 2) remove suspended particles and dissolved impurities that affect the water transparency;
- 3) remove radioactive, ionic and solid impurities from the water in the exposure pools, especially from 30 centimeters thick surface layer.

65. In the event of a fall of fuel assemblies, of covers to the bottom of the exposure pool, all work on reloading and transportation shall be stopped until they are retrieved.

66. Leaking and defective fuel assemblies, according to control results of the tightness of the shells, must be stored in canisters that withstand the temperature and pressure resulting from residual heat from SFA, and also in consequence of chemical reactions between the fuel and its shell and the working medium in the canister.

67. Control of the SNF canisters tightness shall be ensured.

68. To remove highly active waters from the canisters, devices shall be provided, able to remove these waters from the canisters without mixing them with the waters of the exposure pool.

69. In storage facilities radiation control shall be carried out in accordance with the Sanitary Rules requirements.

### **Paragraph 3. Procedure of organizing the storage of spent nuclear fuel in dry storage facilities**

70. The SNF dry storage facility shall be designed in such a way as to prevent ingress of neutron-slowing materials (water into fuel storage areas, and so on).

71. For dry storage of SNF, forced or free cooling shall be provided, so that that the temperature of the fuel rods' cladding does not exceed the design values.

72. Equipment for SNF dry storage facility shall be designed so that the neutron multiplication factor does not exceed 0.95 even when the storage is filled with water, and also at such quantity, distribution and density of water resulting from initial events, which leads to the maximum effective neutrons multiplication factor ( $k_{eff} [max]$ ).

73. The placement of SFA in canisters, racks, cases, and cells shall be chosen so that the effective neutron multiplication factor of the storage does not exceed 0.95 during normal operation and a design basis accident.

74. Storage facilities shall be equipped with automatic or primary fire extinguishing appliances. Fire extinguishing shall not be allowed with means that can increase the  $k_{eff}$  value, for example, water or foam.

Storing of combustible materials in the storage facility, as well as materials with properties that are dangerous in case of fire (for example, chemical toxicity, corrosiveness, explosion hazard), which are not part of packaging kits, shall not be allowed.

It shall not be allowed to lay wires through the storage area that are not directly related to the electricity supply to the SNF handling equipment, and pipelines with combustible and explosive liquids and gases.

The design shall provide for automatic shutdown of the storage ventilation in the event of fire in it.

75. Storage facilities shall be provided with security and fire alarms, work and emergency lighting, and, if necessary, a video surveillance system.

76. Radiation control shall be carried out in storage facilities.

Annex  
to Rules for collection  
organization, storage and burial  
radioactive waste and  
spent nuclear fuel

Form intended for  
to collect administrative data

Submitted: to the state institution "Committee for atomic and energy supervision and control of the Ministry of Energy of the Republic of Kazakhstan."

The administrative data form shall be posted on the Internet - pecypce: [www.kaenk.energo.gov.kz](http://www.kaenk.energo.gov.kz).

### Radioactive waste inventory report

**Footnote. Annex 1 – in the wording of the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**

Administrative data form index: form f1-RAO.

Frequency: annual.

Reporting period: 20 \_\_\_\_ .

Circle of persons presenting information: individuals and legal entities having radioactive waste.

The deadline for submitting the administrative data form: annually as of January 1 to March 1 of the year following the reporting year.

№ r/n	Classification of radioactive waste	Radioactive waste category	Availability at the beginning of the reporting year, ton (t),	Formed in the reporting	Received from individuals or legal entities for the reporting year, ton (t),	Sent to individuals or legal entities for the reporting	Note
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			meter in the cube (m <sup>3</sup> )	year, ton (t), meter in the cube (m <sup>3</sup> )	meter in cube (m <sup>3</sup> )	year, ton (t), meter in cube (m <sup>3</sup> )	
1.	2.	3.	4.	5.	6.	7.	8.
1.	Solid radioactive waste	Low-active					
		Medium-active					
		Highly active					
2.	Liquid radioactive waste	Low-active					
		Medium-active					
		Highly active					

Respondent \_\_\_\_\_ Address \_\_\_\_\_

IIN/BIN \_\_\_\_\_

Phone number \_\_\_\_\_

Contractor \_\_\_\_\_

\_\_\_\_\_  
surname, first name and patronymic (if any) signature, phone number

The head or person acting as his \_\_\_\_\_

\_\_\_\_\_  
surname, first name and patronymic (if any) signature

Place of sealing (except for persons who are private entrepreneurs)

**Explanation for filling out the form for collecting administrative data  
radioactive waste inventory report  
(Index f1-RAW, annual frequency)**

1. General requirements.

Data on all radioactive waste on the balance sheet (accounting) shall be entered into the form.

2. Paper form filled in:

an individual shall be signed by the contractor (responsible for accounting for radioactive waste);

the legal entity shall be signed by the executor (responsible for accounting for radioactive waste), the first manager (for the period of his absence - the person acting) and is certified by the seal (with the exception of persons who are private enterprises).

3. The form is filled in as follows:

1) column 1 "№ r/n" shall indicate the number of the record in order;

2) column 2 "Classification of radioactive waste" one of the types of radioactive waste shall be indicated;

3) column 3 "Radioactive waste category" shall specify the radioactive waste category;

4) column 4 "Availability at the beginning of the reporting year, ton (t), meter in the cube (m<sup>3</sup>)" shall indicate the total quantitative value of the generated radioactive waste for the reporting year, in terms of tons (t) (if solid radioactive waste), in meter in the cube (m<sup>3</sup>) (if liquid radioactive waste);

5) column 5 "Generated during the reporting year, ton (t), meter in the cube (m<sup>3</sup>)" indicates the quantitative value of the generated radioactive waste per year by the operating organization, calculated in tons (t) (if solid radioactive waste), in meter in the cube (m<sup>3</sup>) (if liquid radioactive waste);

6) column 6 "Received from individuals or legal entities for the reporting year, ton (t), meter in the cube (m<sup>3</sup>)" shall indicate the quantitative value of radioactive waste received from individuals or legal entities for the reporting year, recalculated in tons (t) (if solid radioactive waste), in meter in the cube (m<sup>3</sup>) (if liquid radioactive waste);

7) column 7 "Sent to individuals or legal entities for the reporting year, ton (t), meter in the cube (m<sup>3</sup>)" shall indicate the quantitative value of radioactive waste sent to physical or legal entities for the reporting year, recalculated in tons (t) (if solid radioactive waste), in meter in the cube (m<sup>3</sup>) (if liquid radioactive waste);

8) column 8 "Note" additional information shall be indicated at its discretion.

Appendix 2  
to the Rules of the organization  
of collection, storage and burial  
of radioactive wastes and  
spent nuclear fuel  
The Form

**Footnote. Annex 2 as excluded by the order of the Acting Minister of Energy of the Republic of Kazakhstan dated 11.05.2022 № 169 (shall enter into force upon expiry of sixty calendar days after the day of its first official publication).**