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Federal Rules and Regulations in the Field of the Use of Atomic Energy

“Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships”

(NP-037-24)

**I. Purpose and Scope of Application**

1. These federal rules and regulations in the field of the use of atomic energy “Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships” (NP-037-24) (hereinafter referred to as the Rules) establish safety requirements for decommissioning of ships and other watercraft with nuclear reactors (hereinafter referred to as ships with nuclear reactors), as well as NM ships (for the list of abbreviations see Appendix No. 1 to the Rules) and are intended for application by OOs, as well as by organizations performing work and rendering services in respect of the said ships at the stages of their design, construction, operation, and decommissioning.

2. The Rules apply to ships with nuclear reactors and NM ships (hereinafter referred to as ships) subject to the requirements of federal rules and regulations in the field of the use of atomic energy:

“General Safety Provisions for Ships and Other Watercraft with Nuclear Reactors” (NP-022-17), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 351 dated September 4, 2017 (registered by the Ministry of Justice of the Russian Federation on September 27, 2017, registration No. 48344) (hereinafter referred to as
NP-022-17);

“General Safety Provisions for Nuclear Maintenance Ships” (NP-109-20), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 120 dated March 18, 2020 (registered by the Ministry of Justice of the Russian Federation on August 12, 2020, registration No. 59247), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 378 dated September 29, 2020 (registered by the Ministry of Justice of the Russian Federation on October 30, 2020, registration No. 60673) (hereinafter referred to as NP-109-20); and

“Ensuring Safety during Decommissioning of Nuclear Energy Facilities. General Provisions” (NP-091-14), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 216 dated May 20, 2014 (registered by the Ministry of Justice of the Russian Federation on July 14, 2014, registration No. 33086), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 610 dated December 11, 2018 (registered by the Ministry of Justice of the Russian Federation on January 14, 2019, registration No. 53341) (hereinafter referred to as NP-091-14).

**II. General Safety Requirements for Decommissioning of Ships**

3. Ship decommissioning activities shall comply with the basic principles and general safety requirements established in NP-091-14, NP-022-17, and
NP-109-20.

4. Ship decommissioning planning at the stages of ship design and construction shall be carried out by the lead design organization by ensuring that the ship decommissioning concept is developed and updated (for the list of terms and definitions thereof see Appendix No. 2 to the Rules), which shall be presented in the SAR developed in accordance with the requirements of clause 13 of
NP-022-17 (for ships with nuclear reactors) or clause 16 of NP-109-20 (for NM ships).

Ship decommissioning planning during the operational stage shall be carried out by the OO by ensuring that the ship decommissioning concept is reviewed (updated).

5. For an operating ship for which a decommissioning concept has not been developed, the OO shall ensure that the concept is developed prior to the development of a ship decommissioning program for the selected decommissioning option.

6. Preparation for decommissioning and/or decommissioning of the ship shall be carried out with a safety case for the said activity presented in the SAR:

developed in accordance with the requirements of clause 13 of NP-022-17 (for ships with nuclear reactors) or clause 16 of NP-109-20 (for NM ships) – for ships whose operational safety was justified in accordance with the requirements of federal rules and regulations in the field of the use of atomic energy “Requirements to the Safety Case Report on Ships and Other Watercraft with Nuclear Reactors” (NP-023-20), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 236 dated June 22, 2020 (registered by the Ministry of Justice of the Russian Federation on November 18, 2020, registration No. 60955) (hereinafter - NP-023-20), and of federal rules and regulations in the field of the use of atomic energy “Requirements to the Safety Case Report on Nuclear Maintenance Vessels” (NP-011-21), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 285 dated August 23, 2021 (registered by the Ministry of Justice of the Russian Federation on September 28, 2021, registration No. 65164) (hereinafter referred to as
NP-011-21), with the SAR to be revised prior to preparation for decommissioning of the vessel in accordance with the requirements of clause 34 of the Rules;

developed in accordance with the requirements of clause 13 of NP-091-14 – for ships, the operational safety case of which was carried out before the introduction of NP-023-20 or NP-011-21.

7. The OO shall ensure that the SAR is developed (revised).

8. The performance of preparatory work for decommissioning and decommissioning of the ship shall not affect the safety of other ships and/or the safety of buildings (structures), process equipment, vehicles, and communications necessary to ensure that the ship is decommissioned and/or other ships are in operation.

9. The ship decommissioning concept shall comply with the requirements of clause 7 of NP-091-14, and shall contain the following information:

the selected decommissioning option, specifying the criteria and justification for the choice of this option;

measures to ensure that safety relevant information is collected and stored during decommissioning of the ship;

frequency of revision (update) of the decommissioning concept, as well as the requirements for the need to revise (update) it in case of changes in legislative and other regulatory legal acts affecting the planning and execution of preparatory work for decommissioning and decommissioning of the ship, or changes in the ship decommissioning option.

10. Decommissioning of the ship shall be carried out in accordance with the options “storage under supervision” or “burial” implemented by means of “immediate dismantling” or “delayed dismantling.”

11. The decommissioning option shall be selected by the lead design organization (when developing and updating the decommissioning concept at the stages of the ship life cycle: design and construction) or by the OO (when revising (updating) the decommissioning concept after acceptance of the ship into service[[1]](#footnote-1)) based on the results of the assessment of:

measures stipulated in the ship design to ensure the safety of decommissioning operations;

expected radiation impact of decommissioning operations on the crew, special personnel of the ship, and employees of the OO and organizations performing work and rendering services in relation to ships at the stage of their decommissioning (hereinafter referred to as employees (personnel), the public, and the environment;

performance indicators of the decommissioning options.

12. For the selected decommissioning option, the ship decommissioning concept shall contain:

an estimate of the volume, activity and composition of waste generated when decommissioning the ship, including type, category, and class of RW;

the results of technical condition audits and justification of the remaining service life of the systems and components of the ship, the operability of which is required during decommissioning;

the list, schedule, description of preparatory measures and work for decommissioning, and decommissioning of the ship, including a description of the main safety measures.

13. The OO shall ensure that a ship decommissioning database (hereinafter referred to as the database) is established and maintained during the operational and decommissioning stages of the ship in order to collect and retain information required to make and justify decisions to ensure the safety of the ship during its decommissioning.

14. The OO’s activities on ship decommissioning shall be carried out in accordance with the ship design and/or ship decommissioning design documentation (hereinafter referred to as decommissioning project).

If no additional technical solutions need to be developed for the decommissioning of an NM ship implemented by the “immediate dismantling” method, and the vessel design specifies all necessary safety measures, the decommissioning operations are carried out in accordance with the ship design and the ship decommissioning program without developing a ship decommissioning project.

**III. Safety Requirements for Decommissioning of Ships Implemented When They Are Designed and Constructed**

15. The ship design shall provide for organizational and technical measures aimed at ensuring the safety of decommissioning operations, including:

selection of materials for manufacturing of ship systems (components) that ensure the minimum achievable level of their induced activity over the entire lifetime of the ship and/or minimize the amount of RW generated during decommissioning of the ship;

employment of technical solutions aimed at simplification of work on dismantling and decontamination of the equipment located in the rooms and compartments of the ship and/or removal of the whole room, block of rooms, compartment, or reactor (process) plant of the ship during its decommissioning, with indication of preliminary choice of technologies for the performance of the said operations;

employment of methods of work organization providing minimal surface radioactive contamination of the systems (components) and process equipment of the ship during operation;

employment of technical solutions for removal of NMs, RSs, RW, and other hazardous substances and materials from the ship systems and equipment when preparing for decommissioning;

development of a list of the ship systems (components) required for decommissioning operations, as well as setting requirements for their technical condition;

ensuring operability of the ship systems (components) required for decommissioning operations;

development of measures to ensure physical protection, accounting and control of RSs and RW for possible decommissioning options.

16. Technical and organizational measures aimed at ensuring the safety of decommissioning operations shall be presented in the SAR.

17. The ship design shall contain:

a description of possible decommissioning options, including a description of possible transitions from one option to another;

a list of basic safety measures to ensure safety during preparation for decommissioning and decommissioning of the ship;

an estimate of the volume, activity and composition of waste generated when decommissioning the ship, including that for each type, category and class of RW.

18. At the ship construction stage, the shipbuilding organization shall ensure that information on the chemical composition of the ship equipment materials, ship structures and reactor biological protection is collected and systemized in order to enable assessment of their induced activity when preparing the ship for decommissioning. Prior to signing the ship acceptance certificate, the shipbuilding organization shall transfer the information specified in this clause to the OO.

**IV. Safety Requirements for Decommissioning of Ships Implemented During Their Operation**

19. Throughout the service life of the ship, the OO shall ensure that information important to safety during the decommissioning of the ship is collected and stored in a database, including:

results of the assessment of radioactive contamination levels of the ship systems (components), equipment, ship structures, as well as their induced activity;

results of technical condition audits and justification of remaining service life of the ship structures and systems (components) required for decommissioning operations;

information on the consequences of abnormal operation on board resulting in radioactive contamination in excess of the established limits.

20. The OO shall review (update) the concept of decommissioning of the ship at least ten years before the day of expiry of its design service life.

21. The OO shall ensure that the ship decommissioning program for the selected decommissioning option is developed (updated) no later than five years before the day of expiry of the design service life for ships with nuclear reactors and no later than three years before the day of expiry of the design service life for NM ships.

The ship decommissioning program shall contain a list of systems required to ensure ship safety at the stage of preparation for ship decommissioning, as well as a list of interrelated, in terms of timing, organizational and technical measures and operations to be performed by:

preparation of the ship for decommissioning before decommissioning operations commence;

decommissioning of the ship.

22. Organizational and technical measures and operations for decommissioning of the ship shall include measures and operations for:

dismantling and decontamination of the equipment, systems, rooms, and compartments of the ship;

RW management[[2]](#footnote-2);

management of materials and articles with low levels of man-made radionuclides[[3]](#footnote-3) that may be restricted for limited use in accordance with clause 3.11.4 of OSPORB-99/2010 (hereinafter referred to as restricted materials and articles);

mitigation of potential accidents;

radiation control;

physical protection, accounting and control of RSs and RW;

preservation and isolation of the ship equipment and systems (for the decommissioning option implemented by the “delayed dismantling” method);

maintaining in serviceable condition the ship structures, systems and equipment necessary for decommissioning of the ship, their replacement in case of expiry of the service life, and impossibility or inexpediency of repair;

fire safety.

23. When preparing the ship for decommissioning, prior to the commencement of decommissioning operations, the OO shall ensure that:

all NMs (if any) are removed from the ship;

radioactive media are removed from the ship systems and equipment;

the ship systems, components, rooms, and compartments are decontaminated to the extent necessary for decommissioning operations;

all RW on board the ship is transferred to onshore storage facilities for liquid and solid RW or to NM ships;

IERSA of the ship is conducted, the results are entered into the database, and a report on IERSA results is prepared (for requirements to IERSA of the ship see Appendix No. 3 to the Rules, for requirements to the report on IERSA results see Appendix No. 4 to the Rules);

the ship decommissioning program is updated based on IERSA results;

the decommissioning project for the decommissioning option selected by the OO is developed;

the SAR on the basis of the ship decommissioning project is developed (revised).

24. The time limits for the performance of the measures and operations specified in clause 23 of the Rules shall be specified in the ship decommissioning program.

25. When preparing for decommissioning and when decommissioning the ship, the OO shall:

maintain the serviceable condition and availability of residual life of the ship structures required for decommissioning of the ship;

ensure that residual life of the ship systems (components) required for decommissioning operations is available, or ensure that their replacement is possible after expiry of their life.

26. The decommissioning project shall be developed on the basis of the ship decommissioning program and the information contained in the database, including the results of IERSA.

27. The decommissioning project shall include measures for safe decommissioning of the ship and shall also contain:

a list and description of decommissioning stages, including the sequence and timing of their implementation;

a description and characteristics of the final state after decommissioning of the ship;

criteria for achieving the final state specified in the ship design after the ship is decommissioned, and requirements for methods of confirming the achievement of the final state of the ship.

28. For the decommissioning stages, the decommissioning project shall present:

types of decommissioning operations, indicating technologies, procedure and sequence of operations;

requirements for the minimum number and composition of employees (personnel) necessary to ensure safe decommissioning of the ship at this stage and their justification;

a list of operations that require safety measures, as well as information on the number and composition of employees (personnel) required to perform the operations;

requirements to safety measures for the performance of the operations;

a list of systems (components) required to perform decommissioning operations at this stage;

a list and justification of the selection of systems (components) important for safety, indicating the equipment that cannot be replaced by other equipment without making changes to the decommissioning project;

limit values of radiation parameters, deviations from which may lead to an accident (hereinafter referred to as limit values of radiation parameters);

minimum requirements for the quantity, characteristics, technical state, maintenance, monitoring and testing conditions of the systems and components important for safety, which ensure that the radiation parameter limits are not exceeded;

a list of initiating events of accidents that are possible when the ship is decommissioned;

the procedure for monitoring the condition of physical barriers when the ship is decommissioned;

the procedure for checking the operability and compliance with the design of the systems (components) important for safety;

conditions, timing and sequence of decommissioning of the ship systems (components);

scope (types, facilities, procedure, frequency, points) of radiation monitoring when the ship is decommissioned, and monitored parameters, their permissible values and requirements for technical means and methods of radiation monitoring, including the list and number of technical means of radiation monitoring;

estimation of the amount, activity and composition of RW of each type, category and class generated at this stage;

estimation of the amount, activity and radionuclide composition of materials and products with low levels of man-made radionuclides generated at this stage;

estimation of individual radiation doses to workers (personnel) under normal conditions of each type of decommissioning operations;

estimation of individual radiation doses to workers (personnel) and the public in accidents possible during decommissioning;

quantitative estimates of RW emissions and discharges into the environment as a result of the operations;

places and time terms of storage on the ship of RW, materials and articles with low levels of man-made radionuclides generated during decommissioning, including materials and articles of limited use, sequence and routes of their removal from the ship to the shore or NM ships;

places and time terms of interim storage of RW removed from the ship;

places and time terms of onshore storage of materials and products with low levels of technogenic radionuclides;

criteria (characteristics) for completion of the decommissioning stage.

29. The decommissioning project shall include technical and organizational measures necessary for:

radiation safety at workplaces;

minimization of workers’ (personnel’s) exposure during the performance of operations;

non-exceeding the standards and minimization of RW releases and discharges into the environment;

dismantling of the ship systems (components), ship structures, including the systems and equipment limiting radionuclide intake into the rooms and compartments of the ship and into the environment, including through application of local air suction systems at the places of dismantling and fragmentation;

separation of materials and products with low levels of man-made radionuclides and RW generated during decommissioning of the ship, depending on their specific activity level[[4]](#footnote-4);

collection, processing and temporary storage of liquid and solid RW generated on the ship (at the place of operations), their removal from the ship to the shore or an NM ship;

ensuring safe onshore management of materials and articles with low radionuclide levels, including restricted materials and articles;

onshore storage, processing and conditioning of RW, confirmation of compliance of RW with the criteria of acceptability for disposal[[5]](#footnote-5);

ensuring the survivability of the ship[[6]](#footnote-6) and its industrial safety during decommissioning;

signaling and notification of employees (personnel) of a radiation accident;

accounting and control of RSs and RW;

ensuring physical protection of the ship.

30. The scope, methods and means of radiation monitoring established in the decommissioning project shall provide:

monitoring of exposure of employees (personnel), including individual dosimetry control;

monitoring of non-spread of radioactive contamination, including control of contamination of skin covering, personal protective equipment of workers (personnel);

monitoring of radiation situation in the places where dismantling and decontamination operations are performed, in the ship rooms, in the location of basing (anchorage, decommissioning of the ship) (hereinafter referred to as the basing location), including its territory (water area), in the sanitary protection zone and surveillance zone (if any);

monitoring of radiation characteristics of the ship systems (components) being dismantled, and the ship structures and equipment;

radiation monitoring of vehicles, waste, materials, and products when they are removed from the ship and/(or transported from the basing location;

radiation process monitoring, including monitoring of radiation characteristics of RW, other waste, materials, and products, and monitoring of RW releases and discharges into the environment.

31. In places where operations are performed on the ship and where RW management systems are located, where monitored parameters may exceed control levels[[7]](#footnote-7), the decommissioning project shall provide for the use of radiation monitoring facilities (instruments) with automatic sound and light signaling to workers (personnel) about exceeding the control levels.

32. The decommissioning project for the ship being decommissioned under the “storage under supervision” option shall, in addition to the technical and organizational measures specified in clause 29 of the Rules, provide for and justify the technical and organizational measures necessary for:

radiation survey of the underwater part of the ship hull after docking, including the scope and methods of the survey;

decision-making on decontamination and installation of protective shields attenuating the impact of ionizing radiation on workers (personnel), and criteria of necessity of their implementation;

prevention and control of leakage of liquid RW, wash and decontamination water onto the slipway (dock floor);

control of contamination of the environment and surfaces of the ship structures, ship hull, and dock with radioactive aerosols during cutting out and dismantling of a room, block of rooms, or compartment;

radiation survey of the ship after removal of a radiation contaminated room, block of rooms, or compartment from the ship, including the scope and methods of survey in order to clarify the radiation situation and ensure radiation safety during further separate handling of the ship;

conversion of a room, block of rooms, or compartment removed from the ship with preliminary implementation of measures to determine the radiation characteristics of RW placed in the room, block of rooms, or compartment, and to exclude the spread of radioactive contamination and RW in each of the rooms during the entire period of maintaining the isolation capacity of the removed room, block of rooms, or compartment;

establishing the time term and conditions for preserving the isolation capacity of the removed room, block of rooms, or compartment after conversion under the conditions of impacts and loads possible during its transportation and storage;

establishing requirements for the scope and methods of control of maintaining the isolation capacity of the removed room, block of rooms, or compartment after conversion;

ensuring buoyancy and unsinkability of the removed room, block of rooms, or compartment during its transportation (towing) to the RW storage facility by sea and/or during storage afloat;

loading of the removed room, block of rooms, or compartment after conversion onto a special watercraft designed for its delivery to the RW storage facility, and unloading from the watercraft to the RW storage facility site;

ensuring physical protection, accounting and control of RW in the removed room, block of rooms, or compartment until the day of its transfer to (installation at) the RW storage facility.

33. The decommissioning project for the ship being decommissioned under the “disposal” option, for the ship afloat, in addition to the technical and organizational measures specified in clause 29 of the Rules, the following technical and organizational measures shall be provided and justified in order to:

separately handle the dismantled systems (components) of the controlled access rooms and other rooms of the ship, including by isolating the entrance to and exit from the controlled access rooms from other rooms of the ship. The controlled access rooms shall be equipped with technical means ensuring forced radiation monitoring of workers (personnel), waste, materials, and products removed from the ship;

prevent deterioration of radiation situation in the rooms of the ship where work may be performed by persons other than employees (personnel) due to dismantling of physical barriers during decommissioning of the ship, including biological protection components;

ensure that waste, materials, and non-process equipment that do not pose a radiation hazard are removed from the controlled access rooms on a priority basis;

ensure that decommissioning operations at the dock where rooms (block of rooms, compartments) of the controlled access zone are being separated are safely continued.

34. The development (revision) of the SAR shall be based on the decommissioning project. The SAR shall present technical and organizational measures envisaged in the decommissioning project to ensure safety during decommissioning and justify that these measures ensure safe performance of all stages and types of work established in the decommissioning project, including:

a description of the selected decommissioning option and justification for its selection;

justification for the selection and description of systems (components) and technologies to be used during decommissioning;

a list of systems (components) important for safety, justification of the application of these systems (components) at each stage of decommissioning;

justification of radiation safety during decommissioning;

justification of safety in the management of RW, materials and articles with low levels of man-made radionuclides, including materials and articles of limited use;

information on the number and composition of employees (personnel) required to ensure safe decommissioning of the ship during the decommissioning stages;

justification of explosion and fire safety during decommissioning;

justification of organizations of decommissioning operations;

analysis of accidents possible during decommissioning;

emergency planning measures during decommissioning;

ensuring physical protection, accounting and control of RSs and RW during decommissioning;

ensuring the quality of work performed and services rendered during decommissioning;

activities to be carried out at the end of decommissioning operations.

35. The OO shall ensure that organizational and technical documentation required for the decommissioning project is developed (revised), including:

regulations (instructions) for work performance, repair and maintenance of systems, equipment, buildings, and structures used in decommissioning operations;

instructions for operation of the equipment and systems of the ship being decommissioned;

plan for personnel actions and protection in case of nuclear and/or radiation accidents on ships and other watercraft with nuclear reactors, developed in accordance with the federal rules and regulations in the field of the use of atomic energy “Requirements for Planning Measures for Personnel Actions and Protection in Case of Nuclear and Radiation Accidents on Ships and Other Watercraft with Nuclear Reactors” (NP-079-18), approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 278 dated June 27, 2018 (registered by the Ministry of Justice of the Russian Federation on September 3, 2018, registration No. 52051).

instructions for accident mitigation during decommissioning of the ship.

36. The OO shall develop and approve a private quality assurance program for decommissioning of the ship.

37. Prior to the start of decommissioning operations, the OO shall ensure that employees (personnel) involved in decommissioning operations are selected, trained, and admitted to independent work, and their qualification is maintained.

**V. Safety Requirements Implemented During Decommissioning of Ships**

38. The OO shall perform ship decommissioning operations independently or with the involvement of specialized (ship-building, ship repair) or other organizations performing operations and/or rendering services in accordance with the ship decommissioning project and with organizational and technical documentation developed for decommissioning.

The decommissioning project shall not be diverged from its implementation. The ship decommissioning program and SAR shall be kept up to date when changes are made to the decommissioning project. Once the decommissioning project has been developed, changes in the sequence, order and technology of decommissioning operations shall be made after changes have been made to the decommissioning project and SAR.

39. The following shall be ensured during decommissioning of the ship:

survivability of the ship when it is laid up and/or when decommissioning operations associated with dismantling of the systems (components) on the ship;

operation safety in the management of RSs and RW;

accounting and control of RSs and RW;

physical protection of RSs and RW;

implementation of measures to prevent unauthorized releases and discharges of RSs into the environment;

development and implementation of private quality assurance programs of operations performed.

40. Before the beginning of each decommissioning stage, the OO shall ensure that:

the organizational measures envisaged in the decommissioning project aimed at ensuring safety when performing operation at the stage are implemented;

the necessary number of workers (personnel) for safe conduct of operations at the stage is in place;

the ship systems (components), as well as other systems and technical means necessary for decommissioning operations at the stage are in operable (serviceable) condition;

organizational and technical documentation (if it is conditioned by the specifics of work performance at the stage) has been developed and/or updated;

measures to exclude dismantling of structures and systems (components) on the ship afloat (provided that the ship is moored to the quay wall), the nomenclature and quantity of which are not justified for the stage in the decommissioning project, have been developed and implemented.

41. Before the beginning of each decommissioning stage, the control levels of radionuclide contamination of the work surfaces and air environment of the rooms, ionizing radiation dose rates in the places where decommissioning operations are performed, and releases and discharges of RSs into the environment shall be established in the OO, as well as in the organizations perform work and/or rendering services for decommissioning of the ship (if decommissioning of the ship is performed on the territory of organizations performing works for and/or rendering services for decommissioning of the ship to the OO).

42. Dismantling of physical barriers, components of ventilation and cleaning systems during decommissioning of the ship shall be performed providing that the possible releases and discharges of RSs into the environment, as well as radioactive contamination of the ship rooms do not exceed the limits values of radiation parameters established in the decommissioning project in accordance with clause 28 of the Rules.

43. The organizational and technical documentation developed for decommissioning of the ship shall establish the procedure, rules and methods for safe performance of decommissioning operations.

44. When performing decommissioning operations, the OO shall ensure that regular inspection of technical condition, maintenance, repair and service life assessment of the systems (components) important for safety[[8]](#footnote-8) and required for decommissioning operations are carried out. The results of technical condition inspections and service life assessment shall be documented.

45. The scope, methods and means of radiation monitoring shall comply with the requirements established in clause 30 of the Rules at all stages of decommissioning.

46. Waste generated during decommissioning of the ship shall be subjected to radiation monitoring.

47. Materials and articles with low levels of man-made radionuclides generated during decommissioning of the ship shall be subjected to radiation monitoring, the results of which shall be used to separate them into those suitable for unrestricted use and those suitable for restricted use.

48. RW storage in the ship rooms and at RW storage sites at the ship home base is allowed if it is envisaged by the decommissioning project and the safety of its storage and the possibility of its subsequent retrieval are justified.

49. When decommissioning the ship, RW, materials and equipment shall be moved around the ship along prepared routes using special equipment, handling and transportation means.

50. The organizations performing work and/or rendering services on decommissioning to the OO shall take technical and organizational measures stipulated in the decommissioning project to ensure safety during decommissioning of the ship.

51. The OO shall ensure that the activities of engaged organizations performing work and/or rendering decommissioning services to the OO are controlled.

52. Upon completion of each stage of decommissioning, the OO shall analyze whether the results of the work performed meet the criteria (characteristics) of stage completion set out in the decommissioning project and whether it is necessary to carry out an additional engineering and radiation survey, update the ship decommissioning program and the decommissioning project. The results of the analysis and the performed additional survey shall be documented.

53. Upon completion of each stage of decommissioning, the OO shall ensure that the following information is entered into the database:

technologies and methods used for dismantling and decontamination;

a list of work performed on dismantling and decontamination of the systems and components, as well as a room, block of rooms or compartments of the ship;

quantity (volume), activity, radionuclide composition of waste generated and transferred to onshore storage facilities and/or to NM ships, reprocessed and conditioned RW, and volume and class of conditioned RW;

RW storage locations, as well as storage locations of materials and articles with low levels of man-made radionuclides, including materials and articles of restricted use (base site, RW storage site, NM ship);

the dates of transfer of RW, as well as materials and articles with low levels of man-made radionuclides, including restricted use materials and articles, from the ship;

a list of methods used for RW processing and conditioning;

results of additional inspections of the ship, including those envisaged in its decommissioning project;

parameters characterizing the radiation situation (after completion of the decommissioning stage) in the ship rooms, decommissioning locations, sanitary protection zone and surveillance zone (if any);

results of monitoring of individual radiation doses of workers (personnel), and their collective dose;

measures taken to ensure physical protection when storing RW generated during decommissioning of the ship.

54. The OO shall investigate and account for irregularities during decommissioning of the ship in accordance with the requirements of federal rules and regulations in the field of the use of atomic energy “Regulation on the Procedure for Investigation and Accounting of Violations of Irregularities in the Operation of Ships with Nuclear Installations and Radiation Sources” (NP-088-11), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 667 dated November 29, 2011 (registered by the Ministry of Justice of the Russian Federation on April 13, 2012, registration No. 23835), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 310 dated July 15, 2013 (registered by the Ministry of Justice of the Russian federation on August 14, 2013, registration No. 29388).

55. Decommissioning operations shall be completed after achieving the final state defined in the decommissioning project, with the OO drawing up a document (certificate) confirming that the final state after decommissioning has been achieved. To confirm that the final state after decommissioning has been achieved, the OO shall ensure that a final inspection is carried out.

56. The results of the final inspection shall be formalized by the OO in the form of a report containing:

information on the techniques, methods and technical means of measurements used during the final inspection;

values of the controlled characteristics established in the decommissioning project and the results of their comparison with the criteria for achieving the final state after decommissioning of the ship;

conclusion on (non-)compliance of the actual state after decommissioning of the ship with the final state specified in the decommissioning project and
(non-)fulfillment of the criterion for safe termination of decommissioning operations.

57. Upon completion of the decommissioning operation, the OO shall ensure (until the last ship of the project is decommissioned) that the decommissioning details of the ship are safeguarded, including:

ship decommissioning concept;

ship decommissioning program;

report on IERSA results;

decommissioning project;

SAR;

database;

report on the results of the final inspection;

a document confirming that the final state after decommissioning of the ship as defined in the decommissioning project of the said facility has been achieved.

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APPENDIX No. 1

to Federal Rules and Regulations in the Field of the Use of Atomic Energy

“Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships”

approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service

No. 354 of November 26, 2024

**List of Abbreviations**

|  |  |
| --- | --- |
| NM | – nuclear maintenance |
| RW | – radioactive waste |
| RSs | – radioactive substances |
| IERSA | – integrated engineering and radiation safety audit |
| SAR | – safety analysis report |
| OO | – operating organization |
| NMs | – nuclear materials |

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appendix No. 2

to Federal Rules and Regulations in the Field of the Use of Atomic Energy

“Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships”

approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service

No. 354 dated November 26, 2024

**Terms and Definitions**

**1. Conversion of a room, block of rooms or compartment** is a set of technical measures ensuring sealing of a room, block of rooms, or compartment cut out and removed from the ship in order to prepare it for transportation and/or temporary storage (including afloat).

**2. Decommissioning stage** is a set of organizational and technical measures established in the project (concept, program) of ship decommissioning and implemented within a specific time interval, aimed at achieving the specified final state of the ship at the time of completion of all measures envisaged at this stage.

**3. Deferred dismantlement** is a method of implementation of the decommissioning option when dismantlement and decontamination operations and/or removal of a room, block of rooms, or compartment from the ship are started after safe preservation of the ship for a long time until the radionuclide content therein as a result of natural decay decreases to the levels established in the decommissioning project.

**4. Disposal** is a decommissioning option providing for decontamination of ship structures and systems (components) contaminated with radionuclides to an acceptable level in accordance with radiation safety standards and/or their dismantling, handling of generated RW with its subsequent disposal.

**5. Final state after ship decommissioning** is the state of the ship specified in the concept (program, project) of ship decommissioning after completion of all decommissioning operations.

**6. Immediate dismantlement** is a method of implementation of the decommissioning option when dismantlement and decontamination operations and/or removal of a room, block of rooms, or compartment from the ship begin immediately after the operation of the ship is terminated.

**7. Isolation of the ship systems (components)** is a set of technical and organizational measures ensuring transfer of the ship systems (components), the further operation of which is not required, to a state when the possibility of radionuclides or ionizing radiation contained therein escaping to other systems (components), rooms or compartments of the ship and to the environment is limited by using existing physical barriers or creating additional physical barriers.

**8. Preservation of ship systems (components)** is a set of organizational and technical activities to ensure that the temporarily unused ship systems (components) are in operable condition as required for decommissioning operations during the period stipulated in the program or project of ship decommissioning.

**9. Selected decommissioning option** isa decommissioning option adopted on the basis of a comparison of the possible decommissioning options considered in the decommissioning concept of the ship.

**10. Ship decommissioning concept** is a document establishing the procedure and measures to ensure that the ship is safely decommissioned and aimed at minimizing radiation impact on workers (personnel), the public and the environment from the forthcoming decommissioning operations, and to ensure that its operation is safely terminated.

**11. Ship decommissioning database** is a set of documented and organized data on ship operation, engineering and radiation surveys, results of calculation studies, design, operational and technological documentation required for the development of a decommissioning project and performance of work to prepare for the decommissioning and decommission the ship, as well as on the results of decommissioning operations.

**12. Supervised storage** is a decommissioning option that involves removal of a room, block of rooms, or compartment with radioactively contaminated and/or activated equipment located in it from the ship in its entirety with subsequent placement of the said room, block of rooms, or compartment in an RW storage facility for the purpose of natural reduction of radioactivity level, and further separate handling of the ship without sources of radiation hazard.

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appendix No. 3

to Federal Rules and Regulations in the Field of the Use of Atomic Energy

“Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships”

approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service

No. 354 dated November 26, 2024

**Requirements for Integrated Engineering and Radiation Safety Audit of the Ship**

1. IERSA shall include:

study of the ship design;

analysis of compliance of the solutions implemented on the ship with the design solutions;

analysis of the ship operational documentation, determination of the condition of the ship structures, systems and components in order to justify their use during decommissioning of the ship;

determination of radiation situation in controlled access rooms and in other rooms of the ship;

determination of the amount (volume), activity, and radionuclide composition of radioactive contamination of surfaces, equipment materials, ship structures, and biological protection of the ship;

analysis of information on the amount and location of NMs, RSs and RW on the ship, including determination of the amount (volume), radionuclide and chemical composition, activity, and aggregative state of RW, including RW containing NMs;

calculation and research work.

2. General requirements for the scope, methods and timeframes of IERSA shall be established in the ship decommissioning program. The scope, methods and timeframes of IERSA shall be detailed in the IERSA program depending on the technical means for the audit, availability of systems (components) for the audit, and the amount of information required for the development of the decommissioning project. The IERSA program shall contain, inter alia:

qualification requirements for the workers (personnel) performing IERSA operations;

information on materials and equipment required to perform IERSA operations;

list of technical solutions and organizational measures to ensure safety of the workers (personnel);

procedure for collecting, analyzing and storing data obtained during IERSA.

3. When conducting a radiation safety audit of the ship, the following shall be determined:

zones and boundaries of radioactive contamination, characteristics of radiation situation on the ship;

levels of radioactive contamination of the internal and external surfaces of the ship systems (components) and ship structures;

levels of radionuclide contamination of the materials of the ship systems (components) and ship structures by depth from the external surface;

volumes and radionuclide composition of radioactive deposits inside the ship systems (components);

distribution of radioactive deposits in the ship systems (components).

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appendix No. 4

to Federal Rules and Regulations in the Field of the Use of Atomic Energy

“Safety Rules for Decommissioning of Ships and Other Watercraft with Nuclear Reactors, and Nuclear Maintenance Ships”

approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service

No. 354 dated November 26, 2024

**Requirements for Report on Results of Integrated Engineering and Radiation Safety Audit of the Ship**

1. The report on the results of the ships IERSA shall contain:

objectives, tasks and scope of the audit;

information on techniques, methods and technical means of measurements used during the audit;

parameters and characteristics controlled during the audit;

results obtained during the audit;

conclusions based on the IERSA results.

2. The results of the engineering audit shall contain:

description of the ship;

list of the ship rooms;

schematic diagrams of power and heat supply;

list of technical and weight-and-dimensional characteristics of the installations, equipment, systems, and components;

list and characteristics of handling and transportation means;

list and characteristics of the ventilation and purification systems, sewerage systems;

list and characteristics of the fire-fighting systems;

information on assessment of actual technical condition, serviceability and residual life of ship structures, systems and components of the ship required for decommissioning operations at the time of the audit;

information on the quantity and characteristics of poisonous (toxic), explosion and fire hazardous substances on the ship;

information necessary to assess the possibility of placing additional equipment for dismantlement operations, the possibility of making additional openings in the ship hull and/or ship structures for decommissioning operations.

3. The results of radiation safety audit shall include:

list of the audited ship rooms with indication of the area and type of surface (bulkheads, decks, walls, roofs) and coatings;

information on the volumes of liquid RW and other radioactive media in the ship storage tanks, and their specific and total activity;

information on the volumes of solid RW present on the ship, its specific and total activity, radionuclide and chemical composition;

information on the quantity and characteristics of radioactive contamination (deposits) accumulated in the ship systems (components) and equipment, its chemical composition, aggregate state, and specific (volumetric) and total activity;

information on particle flux density from the equipment surfaces, ionizing radiation dose rate from the ship equipment and RW storage facilities;

information on induced activity and radionuclide composition of the materials of the ship structures, ship equipment and biological protection (for ships and other watercraft with nuclear reactors);

information on radiation situation (dose rates of ionizing radiation, levels of radioactive contamination of the surfaces, volumetric activity of radioactive aerosols and gases in the air) for the ship rooms;

maps of radiation fields.

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1. Part Three of Article 40 of Federal Law “On the Use of Atomic Energy” No. 170-FZ dated November 21, 1995. [↑](#footnote-ref-1)
2. Paragraph nine of Part One of Article 3 of Federal Law “On the Use of Atomic Energy” No. 170-FZ dated November 21, 1995. [↑](#footnote-ref-2)
3. Clause 3.11.1 of Sanitary Rules and Regulations SP 2.6.1.2612-10 “Basic Sanitary Rules for Radiation Safety (OSPORB-99/2010),” approved by Resolution of the Chief Public Health Officer of the Russian Federation, No. 40 dated April 26, 2010 (registered by the Ministry of Justice of the Russian Federation on August 11, 2010, registration No. 18115), as amended by Resolution of the Chief Public Health Officer of the Russian Federation,
No. 43 dated September 16, 2013 (registered by the Ministry of Justice of the Russian Federation on November 5, 2013). [↑](#footnote-ref-3)
4. Resolution of the Government of the Russian Federation No. 1069 of October 19, 2012, “On criteria for classifying solid, liquid and gaseous waste as radioactive waste, criteria for classifying radioactive waste as special radioactive waste and as radioactive waste to be disposed of, and criteria for classifying radioactive waste to be disposed of”. [↑](#footnote-ref-4)
5. Clauses 64 through 66 of the federal rules and regulations in the field of the use of atomic energy “Criteria of radioactive waste acceptability for disposal”, approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 572 dated December 15, 2014 (registered by the Ministry of Justice of the Russian Federation on March 27, 2015, registration No. 36592), as amended by Orders of the Federal Environmental, Industrial and Nuclear Supervision Service No. 481 dated November 17, 2017 (registered by the Ministry of Justice of the Russian Federation on December 11, 2017, registration No. 49197), and No. 428 dated December 14, 2021 (registered by the Ministry of Justice of the Russian Federation on March 25, 2022, registration No. 67916). [↑](#footnote-ref-5)
6. Sub-clause “b” of clause 8 of the technical regulations on the safety of maritime transport facilities, approved by the Government of the Russian Federation No. 620 dated August 12, 2010. [↑](#footnote-ref-6)
7. Clauses 7.3 and 7.4 of Sanitary Rules and Regulations SanPiN 2.6.1.2523-09 “Radiation Safety Standards
(NRB-99/2009)” approved by Resolution of the Chief State Health Officer of the Russian Federation No. 47 dated July 7, 2009 (registered by the Ministry of Justice of the Russian Federation on August 14, 2009, registration
No. 14534). [↑](#footnote-ref-7)
8. Clause 33 of NP-022-17. [↑](#footnote-ref-8)