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**DECREE OF THE MINISTRY OF EMERGENCY SITUATIONS OF  
THE REPUBLIC OF BELARUS  
September 28, 2010 No. 47**

**ON APPROVING RULES AND REGULATIONS OF NUCLEAR AND  
RADIATION SAFETY ASSURANCE "RADIOACTIVE WASTE  
MANAGEMENT SAFETY. GENERAL PROVISIONS"**

On the basis of Article 6-2 of the Law of the Republic of Belarus of January 5, 1998, "On Radiation Safety of Population" the Ministry of Emergency Situations of the Republic of Belarus DECIDES:

1. Approve the attached rules and regulations of nuclear and radiation safety assurance "Radioactive Waste Management Safety. General Provisions"
2. The Decree should enter into force since January 1, 2011.

Minister

E.R.Bariev

APPROVED  
Decree of the  
Ministry of  
Emergency Situations of  
The Republic of Belarus  
28.09.2010 No. 47

**RULES AND REGULATIONS OF NUCLEAR AND RADIATION  
SAFETY ASSURANCE "RADIOACTIVE WASTE MANAGEMENT  
SAFETY.GENERAL PROVISIONS"**

**SECTION I  
GENERAL PROVISIONS**

**CHAPTER 1  
DESIGNATION AND SCOPE, TERMS AND DEFINITIONS**

1. Rules and regulations of nuclear and radiation safety assurance "Radioactive Waste Management Safety. General Provisions" (hereinafter - Rules) have been developed in accordance with the Law of the Republic of Belarus of July 30, 2008 "On Nuclear Energy Use" (National Register of Legal Acts of the Republic of Belarus, 2008, No. 187, 2/1523), Law of the Republic of Belarus of January 5, 1998, "On Radiation Safety of Population" (Bulletin of the National Assembly of the Republic of Belarus, 1998, No.5, Art. 25) and set objectives and principles as well as general requirements of radiation waste management (hereinafter - RW).

2. The Rules are mandatory to be executed in the territory of the Republic of Belarus by all natural and legal persons, irrespective of their subordination and forms of ownership of RW management.

3. Requirements of the Rules should not apply to activities on radioactive decontamination waste management generated as a result of activities to overcome Chernobyl accident consequences.

4. For the purpose hereof, the terms and their definitions are used in the senses established by the Laws of the Republic of Belarus of January 5, 1998, "On Radiation Safety of Population" and of July 30, 2008 "On Nuclear Energy Use", as well as the following terms and their definitions:

RW management safety - state of protection of employees (staff), population and environment from harmful radiation exposure in RW management;

RW disposal system safety - properties of RW disposal system to limit radiation exposure on population within the whole period of preservation of RW potential danger on the levels regulated by normative legal acts, including technical normative legal acts;

Defense-in-depth - a system of physical barriers on the way of propagation of ionizing radiation and radioactive substances into environment and a system of technical and organizational measures to protect the barriers and maintain their effectiveness, as well as for the protection of staff, population and environment;

Permissible emission (hereinafter - PE) – a standard of RW management permitted for a facility considering the principle of optimization of the emission of radionuclides into the atmosphere within a year;

Permissible discharge (hereinafter - PD) - a standard of RW management permitted for a facility considering the principle of optimization of the discharge of radionuclides with waste water into the environment within a year;

Closure of RW disposal facility - activities carried out upon completion of RW disposal at RW disposal facility and directed to bringing the RW disposal facility to the state to remain safe within a period of potential danger of RW disposed;

RW disposal - safe disposal of packages of conditioned RW into their disposal system without any purpose to remove them later;

RW disposal in deep geological formations – RW disposal when RW disposal system barriers are located at a depth of several hundred meters in a stable geological formation;

Near-surface RW disposal – RW disposal in engineered structures located above ground or at a depth of several tens of meters;

RW conditioning - operations to manufacture RW packaging acceptable for handling, storage, transportation, long-term storage and (or) disposal. The conditioning includes transfer of liquid waste into solid form, RW disposal in special containers and, if necessary, use of an additional container;

RW container – a container (RW packaging item) used for RW collection, and (or) storage and (or) transportation and (or) long-term storage and (or) disposal;

Criteria of RW acceptability for long-term storage and disposal - characteristics of packages of conditioned RW, which it should meet after collection, treatment, storage and conditioning;

RW neutralization - transfer of RW with hazardous substances into non-hazardous condition;

RW management - activities related to RW collection, sorting, neutralization, storage, treatment, conditioning, transportation, long-term storage and (or) disposal;

RW treatment - processing operations on changing RW characteristics including densification and (or) changing its physicochemical properties, RW conditioning;

RW potentially hazardous period - a period of time after which the specific activity of radionuclides contained in RW will decrease to the values allowing it to be free of the regulations provided by technical normative legal acts;

Maximum permissible emission (hereinafter - MPE) – a standard of the emission of radionuclides into the atmosphere permitted for RW management facility within a year, calculated on the basis of a quota established for RW management facility emissions;

Maximum permissible discharge (hereinafter - MPD) – a standard of the discharge of radionuclides with waste water into the environment within a year, calculated on the basis of a quota established for RW management facility liquid radioactive discharges;

Safe operation limits – values of parameters and characteristics of plants, systems and equipment under operation, established by design documentation, deviations from which may lead to an accident;

RW disposal facility (hereinafter - RWDF) - a stationary facility and (or) structure, which is a part of RW disposal system, acting as physical barriers

located within a certain area defined by design documentation and equipped with systems and equipment required for RW management;

Separation (sorting) - operations by means of which various waste is separated (sorted) or kept separated considering its radiological, chemical and (or) physical properties to facilitate waste management and (or) treatment;

RW collection - RW concentration in specially designated and equipped places;

RW disposal system - a set of natural geological formation, RW disposal facilities and conditioned RW packages disposed or subject to be disposed;

Process blow-offs - steam-gas mixtures of gaseous and (or) aerosol substances removed from processing equipment;

Conditioned RW package - end product of conditioning, suitable for handling, storage, transportation, long-term storage and (or) disposal;

Physical barrier (barrier) – an obstacle to prevent spreading of ionizing radiation and radionuclides into the environment;

RW storage - temporary RW content in containers (storage facilities) providing RW insulation with its further removal;

RW long-term storage - safe disposal of conditioned RW packages in RW storage facility for a long period of time;

RW storage facility - a stationary facility and (or) structure for RW storing, located within a certain area defined by design documentation and equipped with the systems and equipment required for RW management;

Operational limits - values of parameters and characteristics of the state of systems (components) and equipment designated for normal operations according to design documentation.

## CHAPTER 2

### GOALS AND PRINCIPLES OF RW MANAGEMENT SAFETY

5. Goals of RW management safety are:

Reliable protection of employees (staff) and population from RW radiation exposure in excess of that established by technical normative legal acts;

Reliable RW isolation from environment for entire period of its potential danger, protection of present and future generations, biological resources from radiation exposure in excess of the limits established by technical normative legal acts;

Prevention of RW emissions (discharges) into the environment in excess of maximum permissible emissions (discharges).

6. The following principles should be complied in RW management:

Acceptable level of protection of employees (staff) and population from RW radiation exposure in accordance with the principles of justification,

optimization and standardization (principle of human health protection);

Acceptable level of environmental protection from harmful RW radiation exposure (principle of environment protection);

Predictable levels of exposure of future generations due to RW disposal should not exceed permissible levels of public exposure established by normative legal acts, including technical normative legal acts (principle of future generations protection);

Consideration of interconnection between RW formation and treatment stages (principle of interdependence of RW formation and treatment stages);

Non-laying unreasonable burden on future generations associated with the need to provide RW management safety (principle of non-laying unreasonable burden on future generations);

RW formation and accumulation should be restricted to minimum practicable level (principle of RW formation and accumulation control);

Prevention of accidents with radiological consequences and weakening of possible consequences if they occur (principle of safety) .

## SECTION II REQUIREMENTS TO RW MANAGEMENT SAFETY

### CHAPTER 3 GENERAL REQUIREMENTS TO RW MANAGEMENT SAFETY

7. According to the state of aggregation, RW are divided into liquid, solid and gaseous.

8. Considering the waste as radioactive and classification of liquid RW (hereinafter - LRW) and solid RW (hereinafter - SRW) should be carried out in accordance with the criteria established by normative legal acts, including technical normative legal acts.

9. Relating to buildings, structures, premises, systems (components), with regard to RW management, the design documentation should include:

Work categories depending on a group of radiation danger of radionuclide and its actual activity in workplace;

Classification of buildings, structures, systems (components) by seismic stability categories;

Classification of systems (components) by purposes, impact on safety and nature of their safety functions;

List and classification of buildings, structures, systems (components) to be analyzed on resistance to natural and anthropogenic impacts;

Categorization of buildings and premises on fire and explosion safety

10. Design and operational documentation of RW management facility should include specific technical solutions and organizational arrangements

of RW management safety for each category, including:

RW minimization by the value of their activity, weight (volume);

LRW and SRW collection, and (or) treatment and (or) conditioning, and (or) storage, including RW resulting from decommissioning of RW management facility;

Exposure and (or) decontamination of gaseous RW (hereinafter - GRW);

Methods and means of radiation and process monitoring;

Prevention of emissions (discharges) of radionuclides above maximum permissible;

Safe RW transportation at site of RW management facility and (or) to location of RW disposal;

Prevention of self-sustaining nuclear chain reaction while managing RW containing nuclear hazardous fissile nuclides;

RW physical protection, accounting and monitoring

11. RW management safety should be provided on the basis of application of a system of physical barriers on the way of propagation of ionizing radiation and radioactive substances into environment. The amount and purpose of the barriers should be identified and justified in design documentation of RW management facility.

12. Design and operational documentation of RW management facility should include radionuclide composition, value of activity and amount of RW generated during normal operation of RW management facility and during accidents.

13. Engineering solutions and organizational arrangements should be provided in design and operational documentation of RW management facility regarding RW safe storage of each category, and maximum permissible amount (volume) of stored RW should be specified and justified, as well as their specific and total activity, radionuclide composition and shelf life.

14. Structure and structural materials of RW storage facility should prevent release of radionuclides into environment above the levels established by normative legal acts and provide service life of the storage facility for at least service life of RW management facility where it is located.

15. Design and operational documentation of RW management facility should include safe operation limits of emissions and discharges at MPE and MPD levels and PE and PD operational limits. MPE and (or) MPD excess is unacceptable during normal operation of RW management facility.

16. Reference levels of emissions (discharges) should be determined per day and per month to monitor emissions (discharges) on the basis of the designed PE and PD values. The reference level values of emissions (discharges) should be below PE and PD values determined by the design documentation of RW management facility and periodically revised in light

of experience gathered and improving technological development.

Values of reference levels of emissions (discharges) should be monitored and recorded for each emission (discharge) source, including:

When emitted – air (gas) consumption, qualitative and quantitative radionuclide composition, total activity of radionuclides in the emission (Bq/day, Bq/month, Bq/year);

When discharged - fluid flow, qualitative and quantitative radionuclide composition, total activity of radionuclides in the discharge (Bq/day, Bq/month, Bq/year).

17. Design documentation should contain the analysis of processes and scales of consequences of accidents in accordance with a list of possible accidents, as well as design solutions for emergency response measures.

18. Design and operational documentation should provide a set of activities for decommissioning of RW management facility in order to bring it to a safe state for population and environment.

19. Environmental impact assessment should be carried out for RW management facilities in accordance with an established procedure.

The environmental impact assessment report is an integral part of the design documentation of RW management facility.

20. Management of RW of different categories (low, medium and high active) and non-radioactive waste should be carried out in separate systems of RW management facility.

21. In order to provide safety, an operating organization and (or) user of ionizing radiation sources should define hazardous characteristics of RW (toxicity, pathogenicity, explosion hazard, fire hazard, high reactivity, ability to form persistent organic pollutants during neutralization).

22. RW collection, separation (sorting) should be carried out in places of their formation separately from non-radioactive waste, taking into account :

RW aggregative state;

RW categories;

RW amount;

RW physical and chemical properties;

Half-life of the radionuclides contained in RW (less than 15 days, more than 15 days);

RW explosion hazard and fire hazard;

Further methods of RW management

23. It is prohibited to discharge LRW into water bodies, on ground surface, as well as into household and industrial and storm water sewerages.

24. Process vents subject to mandatory clearing. Connecting process vent pipes to prefabricated ventilation ducts, through which air flows into a ventilation pipe, is allowed only after cleaning and (or) exposure of process vents in GRW management equipment.

Use of general dilution (exhausting) ventilation system to remove process blow-offs is not allowed.

25. Operating organization and (or) user of ionizing radiation sources, in the course of activities of which the RW management is provided, should have RW management scheme for planning and implementation of activities to provide radiation safety.

26. Radiation monitoring should be carried out in RW management in accordance with requirements of normative legal acts, including technical normative legal acts. The following should be regulated in design and operational documentation of RW management facility:

Radiation monitoring facilities;

Radiation monitoring types;

Parameters to monitor;

Radiation monitoring periodicity;

Radiation monitoring technical means and methodological support

27. Radiation monitoring technical means in RW management should provide conducting:

Individual dosimetric monitoring of employees (staff);

Radiation monitoring of premises and site of RW management facility;

Radiation monitoring of non-proliferation of radioactive contamination;

Radiation monitoring of environment;

Radiation technological monitoring, providing assessment of integrity and effectiveness of physical barriers, status and operating capacity monitoring of systems and elements of RW management facility, including monitoring of RW radiation characteristics.

28. RW transportation at the site of RW management facility should be carried out:

In containers considering size and weight of RW to be transported, its physical and chemical properties, activity, radiation type and dose rate on outer surface of the containers;

According to the routes established by design documentation of RW management facility, in accordance with a technological transportation scheme

RW transportation at the site of RW management facility should not be carried out through the premises of permanent stay of employees (staff).

Transportation means and containers should be subjected to radiation monitoring and decontamination, if necessary.

RW transportation off-site of RW management facility should be carried in containers (transport packaging sets) in specially equipped transportation means in accordance with requirements of normative legal acts, including technical normative legal acts.

29. Conditioned RW is subject to long-term storage if it meets RW



eligibility criteria for storage at RW management facility, as determined design and operational documentation, in accordance with requirements of normative legal acts, including technical normative legal acts.

30. In order to determine the need for the implementation of technical solutions and organizational activities aimed at raising the level of safety of operated RW storage facilities, an operating organization and (or) a user of ionizing radiation sources should provide an assessment of current level and results of look-ahead calculation of radiation safety status of RW storage system.

According to the results of the conducted assessment of radiation safety status, all reasonably practicable activities should be carried out aimed at raising safety level of RW storage facilities.

31. System of technical solutions and organizational activities to provide RW management safety should be presented in Safety Case Report of RW management facility. The Report is developed for newly created and commissioned RW management facilities.

No discrepancies permitted between the information contained in the Safety Case Report of RW management facility and design documentation of RW management facility. Compliance of the Report with actual state of RW management is supported by an operating organization and (or) a user of ionizing radiation sources within a whole operating period of RW management facility.

The Report is developed to justify RW management facility safety both during their operation and after decommissioning.

32. In order to provide safety at all operating stages of RW management and safe operation of systems (elements), structures and components of RW management facility, an operating organization and (or) a user of ionizing radiation sources should develop and use a quality assurance program.

The quality assurance program is carried out at all stages of RW management facility life cycle, which includes site selection, construction (including design), equipment manufacturing, commissioning, operation and decommissioning of RW management facility.

## CHAPTER 4 GENERAL SAFETY REQUIREMENTS TO RW DISPOSAL

33. RW disposal system safety (long-term safety) should be provided on the basis of multi-barrier principle based on the application of barriers system on the way of propagation of ionizing radiation and radioactive substances into environment, that any violation of integrity of one of the barriers or probable external events of natural or anthropogenic origin would not lead to an unacceptable reduction of RW disposal system safety level.

Choice of RW disposal method (near surface disposal or disposal in underground geological formations), storage facility structures and barrier properties should be defined and justified in RWDF (Radioactive Waste Disposal Facility) project documentation depending on RW characteristics (radionuclide composition, specific activity, potential hazard period, physical and chemical properties) taking into account natural conditions of RWDF location.

34. Conditioned RW is subject to be disposed that meets the criteria of RW acceptability for disposal at RWDF. The criteria of RW acceptability for disposal are established in RWDF design and operational documentation in accordance with requirements of normative legal acts, including technical normative legal acts.

LRW disposal using underground disposal method is determined in the manner prescribed by legislation.

35. RWDF safety should be provided by consistent implementation of defense-in-depth concept based on the application of physical barriers system on the way of propagation of ionizing radiation and radioactive substances into environment, as well as system of technical and organizational activities to protect physical barriers and maintain their effectiveness and to protect employees (staff), population and environment.

36. RWDF should have a system of barriers preventing propagation of ionizing radiation and radioactive substances into environment.

Number and designation of RWDF barriers are identified and justified in design documentation, taking into account the results of studies of the properties of barriers and look-ahead calculations for RW disposal system safety assessment.

RWDF lifetime should not be less than potential hazard period of RW to be disposed.

37. Technical solutions and organizational activities to assure safety at RW disposal should be defined and justified in RWDF design documentation on the basis of look-ahead calculations of RW disposal system safety assessment, taking into account:

Radionuclide composition of RW to be disposed;

Permissible total activity of RW disposed;

Total and specific activity of radionuclides (medium and maximum) in RW packaging waste at RWDF;

Permissible number of RW packages under storage and to be disposed at RWDF.

38. When disposing RW containing nuclear hazardous fissile materials, technical solutions and organizational activities should be provided aimed at preventing the emergence of a self-sustaining nuclear fission chain reaction. Barriers properties should exclude any possibility of a self-sustaining nuclear

fission chain reaction due to potential (probabilistic) concentration of radionuclides at their migration in RW disposal system.

39. When operating RWDF and within a certain period of time after its decommissioning, specified and reasoned by RWDF design documentation, CDEP period of time after it is closed, radiation control and monitoring of RW disposal system should be carried out.

Means, volume, frequency and duration of RWDF radiation monitoring and RW disposal system monitoring after decommissioning should be defined and justified in RWDF design documentation.

40. In order to determine the need of implementation of technical solutions and organizational activities aimed at raising safety level of RWDF operated, an assessment should be carried out of current level and results of look-ahead calculation of RW disposal system radiation safety.

According to the results of the assessment of radiation safety, all reasonably practicable activities should be carried out aimed at raising RWDF safety level.

## CHAPTER 5 SAFETY ASSURANCE AT CARRYING OUT ACTIVITIES ON RADIATION ACCIDENT MANAGEMENT

41. When carrying out activities on radiation accident management, technical means and organizational activities should be provided aimed at minimizing volumes of RW generated and RW management safety assurance.

42. Decisions taken on RW management safety assurance should be based on the results of radiation survey of the territory, on which the implementation of activities is required on radiation accident consequence management, including the information on:

Dose rate of gamma radiation;

Levels of radioactive contamination levels of alpha- and beta - active nuclides;

Location, depth of occurrence and weight (volume) of contaminated soils, grounds, water;

Radionuclide composition and specific activity of contaminated soils, grounds, water.

43. When managing RW generated during the implementation of activities on radiation accident consequence management, radiation monitoring should be provided in accordance with Clause 26 and 27 hereof, including radionuclide and chemical composition of environmental contamination (atmosphere, soil, groundwater).

44. When managing RW generated during the implementation of

activities on radiation accident consequence management, technical means and organizational activities should be provided aimed at preventing exposure of employees (staff) and population above the levels established by technical normative legal acts, and preventing propagation of radionuclides into environment, including:

- Timely detection of contaminated soils, grounds and water;
- RW collection
- Prevention of dusting and spreading by wind of radioactive aerosols;
- RW transportation to RW storage (disposal) facilities

## CHAPTER 6 REQUIREMENTS TO RW ACCOUNTING, MONITORING AND STOCKTAKING

45. The following RW is subject to accounting and monitoring in an organization:

Liquid RW, in which specific activity of radionuclides is more than 10 times as high of the value of interference levels, established by technical normative legal acts, when coming with water;

Solid RW, if specific activity of radionuclides in them exceeds the value of the minimum significant specific activities established by technical normative legal acts.

46. RW accounting and monitoring in an organization should be carried out at all stages of RW management.

47. RW transfers by responsible persons from one process step to another, movements from one storage location to another one, as well as between structural units of RW management facility, should be documented.

48. RW should be registered in the process of manufacturing (formation) and (or) if received from other organization. In the case of RW treatment, a separate RW log book should be maintained for each RW treatment unit or complex.

49. RW stocktaking is carried out at least once every 5 years. In case of change of legal form, liquidation or reorganization of an operating organization and (or) a user of ionizing radiation sources, complete RW treatment stoppage, ascertainment of facts of theft, unauthorized impact on RW location or storage facilities (places), after emergency mitigation, as well as in other cases, an extraordinary RW stocktaking should be carried out by the decision of the head of organization.

50. In order to carry out stocktaking, a stocktaking commission should be appointed according to the administrative document of the head of the organization; terms of preparation and carrying out of stocktaking should be defined, as well as a time point after which any RW movements are

prohibited for the stocktaking period (except for continuous technological processes of RW formation and treatment) without a permission of the chairman of the stocktaking commission, including RW sending and receiving.

51. According to the stocktaking results, a RW stocktaking act should be drawn up, in which the following should be reflected:

Results of inspection of accounting and reporting documentation maintenance; check of availability of RW inventory items and their storage conditions;

Main stocktaking results;

All violations and shortcomings revealed in RW accounting and monitoring, as well as corrective measures taken in the course of stocktaking;

Proposals to eliminate violations and shortcomings revealed in RW accounting and monitoring.

52. In case of reveal of loss, theft, unauthorized use, detection of RW shortage (surplus), corresponding information should be provided to the Nuclear and Radiation Safety Department of the Ministry of Emergency Situations of the Republic of Belarus within 24 hours from the moment the above facts were revealed.

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