THE SEVENTH NATIONAL REPORT OF THE RUSSIAN FEDERATION

on compliance with the obligations of the Joint Convention
on the Safety of Spent Fuel Management
and on the Safety of Radioactive Waste Management

prepared for the Eighth Review Meeting
of the Joint Convention on the Safety of Spent Fuel Management
and on the Safety of Radioactive Waste Management

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ROSATOM

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Federal Environmental, Industrial and Nuclear Supervision Service

Federal State-Funded Scientific Institution Nuclear Safety Institute of the Russian Academy of Sciences

Federal State-Funded Institution Scientific and Engineering Center for Nuclear and Radiation Safety

This seventh National Report of the Russian Federation on compliance with the obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter Report) was prepared by the State Atomic Energy Corporation Rosatom and the Federal Environmental, Industrial and Nuclear Supervision Service.

The following organizations took part in the preparation of the Report:

— Federal State-Funded Scientific Institution Nuclear Safety Institute of the Russian Academy of Sciences (IBRAE RAN);
— Federal State-Funded Institution Scientific and Engineering Center for Nuclear and Radiation Safety (FSFI SEC NRS).

The Report considers in detail the obligations arising from the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and compliance with them by the Russian Federation.

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List of Acronyms and Abbreviations

AECC	— Joint Stock Company Angarsk Electrolysis Chemical Complex
AMB	– Atomic Peaceful Large (abbreviation for the water-cooled graphite-moderated channel type thermal neutron reactor operated at the Beloyarsk NPP)
BE	– back end
BN	– fast neutron reactor
CMP	– Joint Stock Company Chepetsky Mechanical Plant
DGR	– deep geological repository for radioactive waste
DWIF LRW	– deep-well injection facility for liquid radioactive waste
EGP	– loop-type graphite power reactor
EIA	– environmental impact assessment
EMERCOM	– Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of the Consequence of Natural Disasters
FA	– fuel assembly
FEO	– Federal State Unitary Enterprise Federal Environmental Operator
FMB	– floating maintenance base
FMBA of Russia	– Federal Medical and Biological Agency
FNR	— Fast neutron reactor
FRR	– federal rules and regulations
FR	– fuel rod
FTNPP	— Floating Thermal Nuclear Power Plant
FTP NRS	– Federal Target Program Nuclear and Radiation Safety in 2008 – 2015
FTP NRS-2	– Federal Target Program Nuclear and Radiation Safety in 2016 – 2030
FZ	– Federal law
GD	– guideline document
GSP NFCF	– General Safety Provisions for Nuclear Fuel Cycle Facilities
HLW	– high-level waste
IAEA	– International Atomic Energy Agency
IEC	– industrial energy complexes
ILW	– intermediate-level waste
IPPE	– Federal State Unitary Enterprise State Scientific Centre of the Russian Federation — Leipunsky Institute of Physics and Power Engineering (FSUE SSC IPPE)
JSC	– Joint Stock Company
LLW	– low-level waste
LRW	– liquid radioactive waste
MA	– minor actinides
MCC	– Federal State Unitary Enterprise Mining and Chemical Combine (FSUE MCC), Zheleznogorsk
MEPhI	– National Research Nuclear University MEPhI
MNUP	– mixed nitride uranium-plutonium nuclear fuel
MOX	– mixed oxide fuel
MSZ	– JSC ELEMASH Machine-Building Plant
NCCP	– Public Joint Stock Company Novosibirsk Chemical Concentrates Plant
NF	– nuclear facility
NFC	– nuclear fuel cycle

NI	– nuclear installation
NIFHI	– Joint Stock Company Karpov Scientific Research Institute of Physical Chemistry (JSC NIFHl)
NITI	– Federal State Unitary Enterprise Alexandrov Research Institute of Technology (FSUE NITI)
NM	– nuclear material
NO RAO	– National Operator for Radioactive Waste Management
NPF	– nuclear power facility
NPGC	– nuclear power generation complex
NPP	– nuclear power plant
NRC KI	– National Research Center Kurchatov Institute
NRHF	– nuclear and radiation hazardous facility
NRS	– nuclear and radiation safety
OSPORB 99/2010	– Basic Sanitary Rules of Radiation Safety (OSPORB 99/2010). Basic Rules and Standards SP 2.6.1.2612-10
PA Mayak	– Federal State Unitary Enterprise Production Association Mayak (FSUE PA Mayak)
PA Start	– Federal State Unitary Enterprise Federal Research and Production Center named after M.V. Procenko (Production Association Start)
PDC	– pilot demonstration center
PDEC	— pilot demonstration energy complex
PDC UGR	– joint stock company Pilot Demonstration Centre for Uranium-Graphite Production Reactor Decommissioning (JC PDC UGR)
PIMCU	– Public Joint Stock Company Priargunsky Industrial Mining and Chemical Union
PUGR	– production uranium graphite reactor
RADON	– Federal State Unitary Enterprise RADON
RBMK	– high power graphite moderated channel-type reactor
RF	– the Russian Federation
RI	– V. G. Khlopin Radium Institute
RIAR	– Open-Type Joint Stock Company State Research Centre Research Institute of Atomic Reactors (JSC SRC RIAR)
RISI	– Joint-Stock Company Research and Development Institute of Scientific Instruments
RM	– radioactive materials
Rosenergoatom Concern	– Joint-Stock Company Rosenergoatom
Rostechnadzor	– Federal Environmental, Industrial and Nuclear Supervision Service
RR	– research reactor
RS	– radiation source
RSS	– radiation safety standards
RTG	– radioisotope thermoelectric generator
RTN	– thermal neutron reactor
RW	– radioactive waste
RWDF	– radioactive waste disposal facility
SAR	– safety analysis report
SCC	– Joint Stock Company Siberian Chemical Combine (JSC SCC)
SCR	– self-sustained chain reaction
SEP	– special environmental program
SF	– storage facility
SFA	– spent fuel assembly
SNF	– spent nuclear fuel

SNF SF	– storage facility for spent nuclear fuel
SPZ	– sanitary protection zone
SRS	– sealed radioactive source
SRW	– solid radioactive waste
tHM	– tons of heavy metal
TUK	– transportation cask
UECC	– Joint Stock Company Ural Electrochemical Combine (JSC UECC)
URL	– underground research laboratory
USS RW	– Unified State System for Radioactive Waste Management
VNIINM	– Joint Stock Company A.A. Bochvar High-Technology Scientific Research Institute for Inorganic Materials (JSC VNIINM)
VVER	– water-cooled water-moderated power reactor

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Section A. Introduction

A.1. Purpose of the Report

The Russian Federation ratified the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter referred to as the Joint Convention) in 2005.

The Russian Federation remains firmly committed to meet its obligations on safety enhancement and has been implementing a wide range of measures to address the challenges associated with its past practices.

The long-term strategy for nuclear power development in the Russian Federation provides for a transition to a two-component structure based on thermal and fast reactors with a closed nuclear fuel cycle (NFC).

Nuclear legacy problems have been consistently addressed under federal target programs. In particular, federal target program for Nuclear and Radiation Safety in 2016 – 2035 (hereinafter referred to as FTP NRS-2) is being implemented now.

The following activities are viewed as priority focus areas for the safe SNF and RW management in the Russian Federation:

— SNF shipment from onsite storage facilities for long-term storage and reprocessing;

— further advancement of SNF reprocessing methods provided fullest possible engagement of regenerated nuclear materials in the NFC and efficient management of the generated RW;

— isolation of large near-surface LRW storage facilities and their upgrading to a radiation-safe state;

— development of RW disposal infrastructure adequate to the needs in the final disposal of accumulated and newly generated RW of various classes;

— decommissioning of nuclear legacy facilities and nuclear cleanup.

The seventh National Report of the Russian Federation accounts for the changes that occurred in the field of SNF and RW management in the Russian Federation in the period from 2020 to the beginning of 2024. Due to changes in the reporting period caused by a one-year delay in holding the Review Meeting, the Report also presents relevant data for 2020 and 2021.

The National Report aims to inform the Contracting Parties on compliance with the obligations on the safe SNF and RW management assumed by the Russian Federation under the Convention.

The National Report places special emphasis on the issues and challenges highlighted by the Contracting Parties in the course of the review and discussion of national reports at the seventh Review Meeting held at the IAEA Headquarters (Vienna, Austria) on June 27 – July 8, 2022.

A.2. Structure of the Report

The report was prepared in keeping with the requirements of the Guidelines Regarding the Form and Structure of National Reports (INFCIRC/604/rev.4).

The Report provides information on the compliance with the obligations arising from provisions and requirements of the Joint Convention and its articles undertaken by the Russian Federation. Table A.2.1 refers to relevant sections in the Report and articles of the Convention.

Table A.2.1 – Sections of the Joint Convention

Section	Section title	Article of the Convention	Pages in the Report
A	Introduction	-	10
B	Policies and Practices	32.1	19
C	Scope of Application	3	42
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E	Legislative and Regulatory System	18-20	63
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A.3. Conclusions drawn from the discussion of the sixth National Report of the Russian Federation presented at the seventh Review Meeting

The following milestones in addressing relevant SNF and RW management tasks associated with safety regulation and safety enhancement were highlighted by the Russian Federation at the seventh Meeting of the Contracting Parties on the review of obligations arising from the Joint Convention:

1. Closure of LRW storage reservoirs in Tomsk, Chelyabinsk regions and the Krasnoyarsk Territory.
2. Nuclear decommissioning and cleanup at the following sites:
   - gaseous diffusion building for uranium isotope separation was decommissioned (Irkutsk region);
   - building of a fuel fabrication plant for uranium-graphite reactors (Novosibirsk region) was decommissioned;
   - HEU processing plant (Tomsk region) was decommissioned;

— pre-decommissioning operations were underway at the BR-10 research reactor (Kaluga region);

— nuclear cleanup operations were completed at the sites of decommissioned facilities in Irkutsk, Murmansk regions and the Republic of Tatarstan.

3. Decommissioning of icebreakers approaching the end of their service life and maintenance ships.
4. Transportation of NPP SNF to MCC for centralized storage.
5. Special program implemented to comply with the recommendations of the IAEA peer-review of the Deep Well Injection Practice for Liquid Radioactive Waste.
6. Construction of near-surface disposal facilities for LLW and ILW.
7. Construction of an underground research laboratory.
8. Upgrading regulatory, legal and scientific-methodological framework for safe SNF and RW management.
9. Development of new reprocessing methods addressing the main types of SNF accumulated at the MCC site.

The above milestones were discussed in detail in the sixth National Report, namely, Section K. General Efforts to Improve Safety.

Special mention was made of the new coronavirus (COVID-19) pandemic and its impact on the State Corporation Rosatom and Rostechnadzor and their activities: the pandemic produced considerable impact neither on the safety of SNF and RW management nor the licensing activities. Relevant efforts were implemented in accordance with established procedures.

The following activities were highlighted as examples of "good performance":

— implementation of the Unified State System for Radioactive Waste Management (USS RW) including a RW disposal facility established in Sverdlovsk region and the approved Strategy for the Development of a DGR in the Nizhnekanskiy Rock Mass (Krasnoyarsk Territory);

— construction of an underground research laboratory (URL) and the long-term R&D program on HLW disposal in deep geological formations;

— construction of a consolidated centralized SNF management complex at the MCC site;

— development of reprocessing methods for previously unreprocessable SNF types (uranium-zirconium, carbide, and others);

— SNF unloading from the Lepse FMB;

— decommissioning of a surface LRW storage reservoir at the MCC site, isolation of LRW storage reservoirs in Tomsk and Chelyabinsk regions;

— remediation of contaminated areas;

— personnel training and personnel appraisal on a regular basis.

The following problematic issues (challenges) associated with safe SNF, RW management and nuclear decommissioning were noted as requiring further action:

— ensuring the safety of industrial LRW storage reservoirs in Tomsk, Chelyabinsk regions and the Krasnoyarsk Territory;
— continued dismantling of nuclear icebreakers and floating maintenance bases;
— continued cleanup of radioactively contaminated areas in Chelyabinsk region.

Considerable progress attained in NFC closure was acknowledged as an example of good practice at the seventh Review Meeting of the Contracting Parties to the Joint Convention.

Information on the current status and progress associated with planned and ongoing safety enhancement efforts in SNF and RW management, including those noted based on the discussion of the sixth National Report, is presented in the subsequent sections of this Report.

A.4. Main guideline documents on the safe SNF and RW management and the introduced amendments

A.4.1. National policies of the Russian Federation in nuclear power development and nuclear and radiation safety

Energy Strategy of Russia for the period until 2035 approved by the Government Order of the Russian Federation No. 1523-r of June 9, 2020 (hereinafter Energy Strategy) defines the goals and the objectives for further development of the national energy sector highlighting a transition to an environmentally friendly and resource-saving energy as one of its priorities. As it comes to nuclear power, the Energy Strategy promotes the development and introduction of a new technological platform with thermal and fast neutron reactor units operating simultaneously to provide NFC closure.

The Russian nuclear energy development strategy for the period until 2050 – 2100 approved by the Strategic Council of the State Corporation Rosatom (hereinafter Strategy-2021) considers advanced VVER and fast neutron reactor technologies with NFC closure as a key development trend.

State Policy Fundamentals of the Russian Federation in the Field of Nuclear and Radiation Safety for the period up to 2025 and beyond approved by the Presidential Decree of the Russian Federation No. 585 of October 13, 2018 (hereinafter State Policy Fundamentals) specify the goals, the key trends, principles and relevant tasks for the state policy in this area. These goals address the following matters:

— to ensure the safety of nuclear facilities operated for peaceful and defense purposes, nuclear legacy facilities, materials high in naturally occurring radionuclides;
— to keep the radiation exposure of employees (personnel) at the lowest possible level in accordance with limitation, justification and optimization principles;
— to provide phased decommissioning, disposal and disposition of nuclear legacy facilities;

— to protect the population and the environment from radiation exposure in keeping with modern requirements;
— to ensure the priority of nuclear and radiation safety and to maintain it at a high level through relevant improvements in the state management and state safety regulation in the field of atomic energy use considering the state-of-art and advances in science, technologies and industry;
— to increase the responsibility of federal executive authorities, the State Corporation Rosatom and operating organizations for nuclear and radiation safety;
— to prevent radiation accidents and disasters in the Russian Federation or contain and minimize their consequences.

Urgent problems associated with the nuclear and radiation safety of nuclear legacy facilities have been addressed under federal target programs. FTP NRS-2 is seen as a logical continuation of the federal target program Nuclear and Radiation Safety in 2008 – 2015 (hereinafter FTP NRS-1), which is aimed at addressing the following tasks:

— establishment of infrastructure facilities, including processing capacities for accumulated SNF and RW inventories and construction of RW disposal facilities;
— upgrading nuclear legacy facilities to ensure their nuclear and radiation safety;
— continuous fulfillment and reduction of state liabilities associated with past activities in the field of atomic energy use and their consequences.

The comprehensive program Development of Equipment, Technologies and Scientific Research in the Field of Atomic Energy Use in the Russian Federation for the period until 2024 (hereinafter Comprehensive Program) is being implemented in accordance with the Presidential Decree of the Russian Federation No. 270 of April 16, 2020. The Comprehensive Program prompts the establishment of a safe and efficient energy system and its elements based on advanced nuclear, thermonuclear, plasma and other technologies. In particular, it aims to develop and implement two-component nuclear power technologies with a closed NFC. In keeping with the Presidential Decree of the Russian Federation No. 202 of April 14, 2022, the Comprehensive Program has been extended until 2030.

A.4.2. Organizational and legal developments in the nuclear sector and safety regulation in the field of atomic energy use

The Russian Federation is constantly working to improve its legal framework and to provide sustainable and effective NRS regulation in the field of atomic energy use.

The following amendments were introduced to the Federal Law No. 170-FZ On Atomic Energy Use of November 21, 1995 by the Federal Law No. 219-FZ On Amendments Introduced to the Federal Law On Combating the Legalization of Income (Money Laundering) and Certain Legislative Acts of the Russian Federation of June 28, 2022:

— Article 52 introduced a ban stating that persons listed as entities and individuals associated either with terrorist organizations and terrorists or with the proliferation of weapons of mass destruction in keeping with the powers provided for in Chapter VII of the UN Charter, the UN Security Council or bodies specially established by a UN Security Council decision cannot be admitted to work with nuclear materials and radioactive materials at a nuclear installation and a radiation source, in storage facilities for nuclear materials and radioactive materials, RW storage facilities and landfills.
— Article 61 was supplemented to specify the liabilities of state authorities, local authorities, management bodies in the field of atomic energy use, state safety regulators, operating organizations, organizations performing work and providing services to operating organizations and their officials for legal violation in the field of atomic energy use and more specifically as regards the issuance of permits authorizing the work for persons specified in the new wording of Article 52.

Government Decree of the Russian Federation No. 1929 of October 29, 2022 introduced certain amendments to the Government Decree of the Russian Federation No. 1069 of October 19, 2012.

The changes address RW categorization criteria, namely:

— those used to define solid, liquid and gaseous waste as radioactive waste;
— those used to define radioactive waste as non-retrievable RW and Retrievable RW;
— those used to refer the Retrievable RW to RW classes 1-6.

Amendments were introduced to the Regulation Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations approved by the Government Decree of the Russian Federation No. 88 of February 17, 2011 to avoid the occurrence of ownerless nuclear facilities (Government Decree of the Russian Federation No. 984 of May 30, 2022) and to promote digital service for acknowledging organizations as operating organizations (Government Decree of the Russian Federation No. 1637 of September 17, 2022).

Presidential Decree of the Russian Federation No. 711 of October 5, 2022 On Specific Aspects of Legal Regulation in the Field of Atomic Energy Use in the Zaporozhye Region (hereinafter Decree-711) was adopted.

In accordance with the Decree-711, organization operating the Zaporozhye NPP was given the legal status of an operating organization in the field of atomic energy use responsible for the operation and decommissioning of nuclear facilities at the Zaporozhye NPP using its own resources or subcontracting other organizations.

The Government of the Russian Federation was tasked to assume federal ownership over the nuclear facilities of the Zaporozhye NPP and other property required for its operation, to provide the establishment of a federal state unitary enterprise and the safety of the Zaporozhye NPP and its nuclear facilities and to identify the specific aspects associated with the use of financial, material and other resources in the period until January 1, 2028 required for the operator of the Zaporozhye NPP to provide the safety of nuclear installations, radiation sources, storage facilities for nuclear and radioactive materials, storage facilities, RW storage facilities and to ensure proper management of nuclear and radioactive materials.

The list presenting the job titles of employees at NF managed by the State Atomic Energy Corporation Rosatom required to obtain permits from the Federal Service for Environmental, Technological and Nuclear Supervision for operations in the field of atomic energy use was approved by the order of the State Corporation Rosatom No. 1/20-NPA of August 28, 2023 (registered by the Ministry of Justice of Russia No. 75385 on September 29, 2023). Pursuant to the Decree-711, it also lists the job titles of those employed at the Zaporozhye NPP.

Since 2020, a number of decrees and orders of the Government of the Russian Federation on the transportation of SNF and other radioactive materials have been issued, namely:

— Government Decree of the Russian Federation No. 341 On the Approved List Specifying the Types of High-Risk Freights of March 10, 2022;

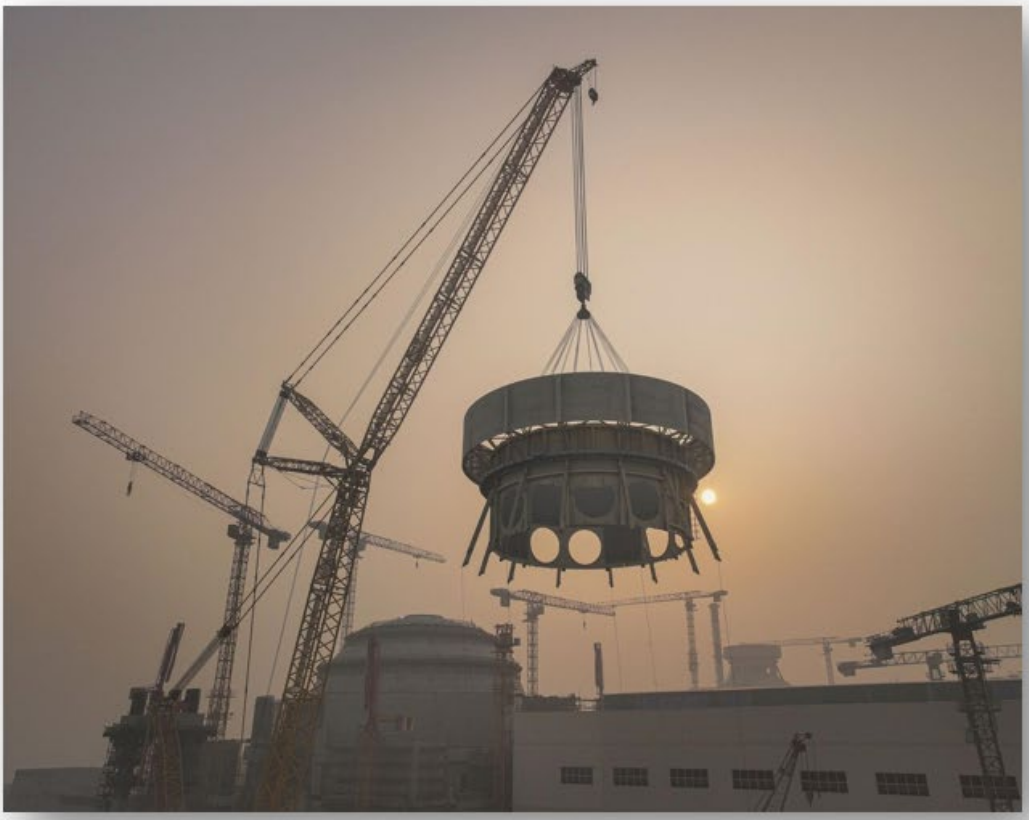
— Government Decree of the Russian Federation No. 661 On the Approved Regulation for Arranging and Implementing the State Control Over Safe Transportation (Shipment) of Nuclear Material, Radioactive Materials and Relevant Products with the Exception of Nuclear Materials Transferred as Part of Products to the Russian Defense Ministry of April 14, 2022;

— Order of the Government of the Russian Federation No. 2803 of October 28, 2020 On Signing the Agreement on Cross-Border Transportation of Radioactive Materials in the Member States of the Commonwealth of Independent States of November 6, 2020.

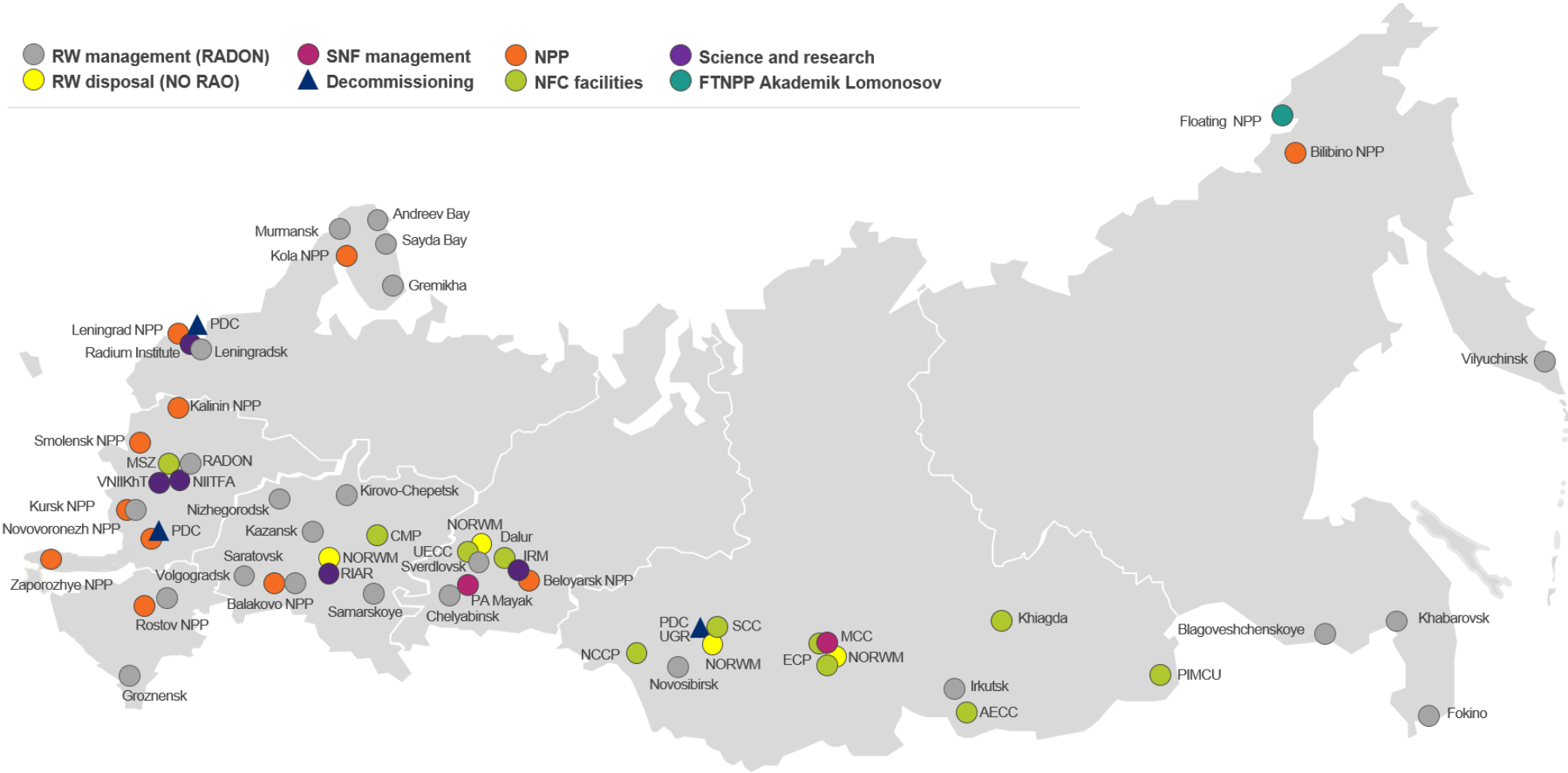
Pursuant to Order of the State Corporation Rosatom of January 13, 2022, the standard of the State Corporation Rosatom STO 95 12075-2021 Nuclear Safety Rules for Spent Nuclear Fuel Reprocessing Plants was approved and put into effect.

The Program for Enhancing the Emergency Preparedness and Response System of the Rosatom State Corporation for the period until 2035 and beyond was approved by the Order of the Rosatom State Corporation No. 1/1279-P on September 28, 2022 and is being successfully implemented.

Section E.2 of the Report discusses the changes introduced to the system of federal norms and rules.



B. Policies and Practices


RW management (RADON)
RW disposal (NO RAO)
SNF management
Decommissioning
NPP
NFC facilities
Science and research
FTNPP Akademik Lomonosov
Floating NPP
Bilibino NPP
Andreev Bay
Murmansk
Sayda Bay
Kola NPP
Gremikha
Leningrad NPP
PDC
Radium Institute
Leningradsk
Vilyuchinsk
Kalinin NPP
Smolensk NPP
MSZ
RADON
VNIIKhT
NIITFA
Kirovo-Chepetsk
Kursk NPP
Nizhegorodsk
Novovoronezh NPP
PDC
Kazansk
CMP
NORWM
Dalur
UECC
IRM
Saratovsk
NORWM
Sverdlovsk
RIAR
Volgogradsk
Beloyarsk NPP
Zaporozhye NPP
Balakovo NPP
Samarskoye
PA Mayak
Chelyabinsk
Rostov NPP
PDC
SCC
UGR
MCC
NCCP
NORWM
ECP
NORWM
Novosibirsk
Khiagda
Blagoveshchenskoye
Khabarovsk
PIMCU
Irkutsk
AECC
Fokino
Groznensk

Section B. Policies and Practices (Article 32.1)

Article 32. Presentation of reports

1. According to the provisions of article 30 each Contracting Part presents a national report to each review meeting of Contracting Parts. In this report are reviewed the measures, assumed to fulfill every obligation fixed in the Convention. The report of each Contracting Part presents also its:
I) policy in the field of SNF management;

II) practices of SNF management;

III) policy in the field of RW management;

IV) practices of RW management;

V) criteria used for definition and classification of radioactive wastes.

B.1. Policy in the field of SNF management

The highest priority in SNF management is the safety provided at all stages of SNF management, physical protection and security of fissile materials and avoiding undue burdens on future generations.

The state policy of the Russian Federation in the field of SNF management is based on the principle of its reprocessing ensuring environmentally acceptable handling of fission products and the return of regenerated nuclear materials into the NFC. SNF reprocessing and the engagement of recovered materials in nuclear fuel fabrication meet the circular economy principles.

The following documents state the key trends for the scientific and technical policy and the main provisions for the development and implementation of institutional and technical arrangement at all SNF management stages:

— State Policy Fundamentals;
— Energy strategy;
— Strategy-2021;
— Comprehensive program;
— State program for NPGC Development approved by the Government Decree of the Russian Federation No. 506-12 of June 2, 2014 and subsequent amendments to it;
— SNF Management Concept of the State Corporation Rosatom for 2023 – 2050 approved by Order of the SC Rosatom No. 1/1618-P-dsp of December 5, 2022;
— Action Strategy of the State Atomic Energy Corporation Rosatom for the period until 2030.

In the medium- and long-term perspective, the following milestones are planned to be achieved (and kept on with):

— full engagement of regenerated nuclear materials in the fabrication of fresh nuclear fuel;
— meeting the nuclear fuel needs of fast neutron reactor plants;
— meeting the needs of thermal neutron reactor plants in regenerated uranium;

— reducing the rate of SNF accumulation provided subsequent reduction of SNF volumes accumulated at Russian NPP;

— technological development of promising MOX and MNUP SNF management methods minimizing RW generation and resulting in SNF regeneration products suitable for effective recycling provided minimal cooling time;

— commissioning of the second start-up PDC complex at MCC;

— commissioning of new RTN SNF reprocessing capacities;

— complete reprocessing of challenging SNF types, i.e., AMB, EGP-6 SNF;

— introduction of a SNF reprocessing method with fractionation providing MA segregation and their subsequent afterburning minimizing the RW volumes subject to geological disposal;

— development of a competitive container SNF/HLW storage system for NPP abroad;

— commissioning of a Pilot Demonstration Energy Complex designed to test NFC closure technologies provided two-component nuclear power (for more details, see section B.2.7.2)

— comprehensive research, development and design studies providing the establishment of industrial energy complexes paving the way for the fourth-generation nuclear power facilities;

— fulfilling the international obligations assumed by the Russian Federation in the field of SNF and RW management.

The priority management tasks associated with accumulated SNF, including the development of infrastructure SNF management facilities, are planned to be addressed under FTP NRS-2.

B.2. Practices in the field of SNF management

National practice in the field of SNF management is geared to the reprocessing of various SNF types.

The following activities are being implemented:

— storage (onsite and centralized);

— transportation;

— SNF reprocessing;

— management of SNF reprocessing products.

As of January 1, 2024, the SNF inventory accumulated in the Russian Federation amounted to over 29,100 tons.

In the Russian Federation, 600 tons of SNF are annually unloaded from various types of reactor units provided further SNF management arranged as follows:

— VVER SNF:

• VVER-1000/1200 – transportation and centralized storage at the MCC site provided its subsequent reprocessing at the PDC, as well as transportation to PA Mayak and reprocessing at the RT-1 plant;

• VVER-440 – transportation to PA Mayak and reprocessing at the RT-1 plant.

— RBMK-1000 SNF:

• transportation and centralized storage at the MCC site. Its reprocessing is expected at the RT-2 plant upon completing a 50-year-long cooling period. Earlier reprocessing is possible if the regenerated nuclear materials become necessary in the NPP NFC in Russia;

• damaged SNF unsuitable for long-term storage are sent for reprocessing to PA Mayak.

— BN SNF – transportation to PA Mayak and reprocessing at RT-1;

— RR SNF – transportation to PA Mayak and reprocessing at RT-1;

— icebreaker SNF – transportation to PA Mayak and reprocessing at RT-1;

— AMB, EGP-6 SNF– onsite storage, further transportation to PA Mayak and reprocessing at RT-1;

— SNF from FTNPP – unloading every 10-12 years for further reprocessing at RT-1 (as planned).

Figure B.1.2 presents SNF management stages provided for by the current practice indicating further short- and medium-term plans in this area.

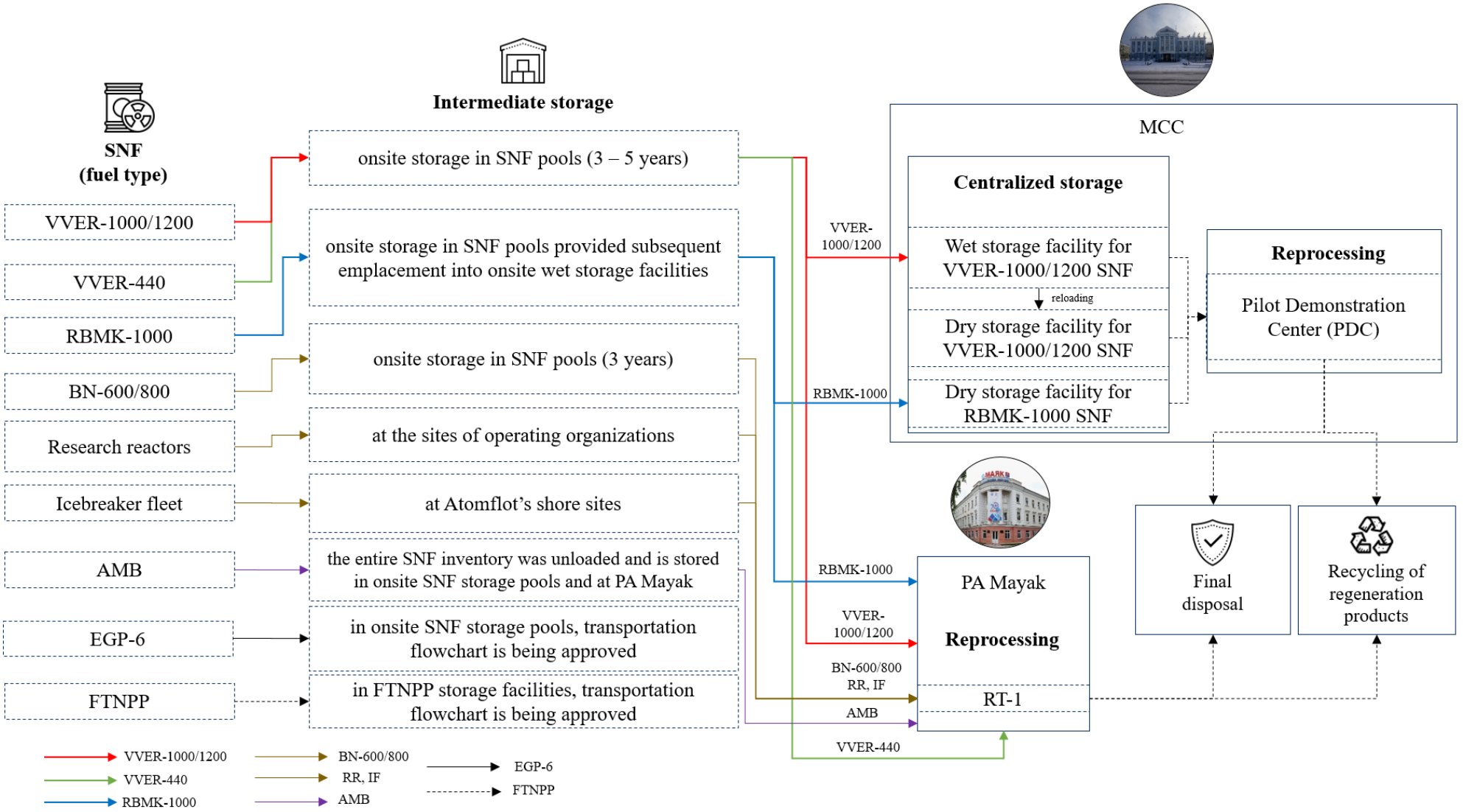


Figure B.1.2 – SNF management practice in the Russian Federation

B.2.1. SNF storage and reprocessing

B.2.1.1. Centralized storage

Centralized SNF storage is provided at the MCC site (wet and dry storage of VVER-1000 SNF and dry storage of RBMK-1000 SNF).

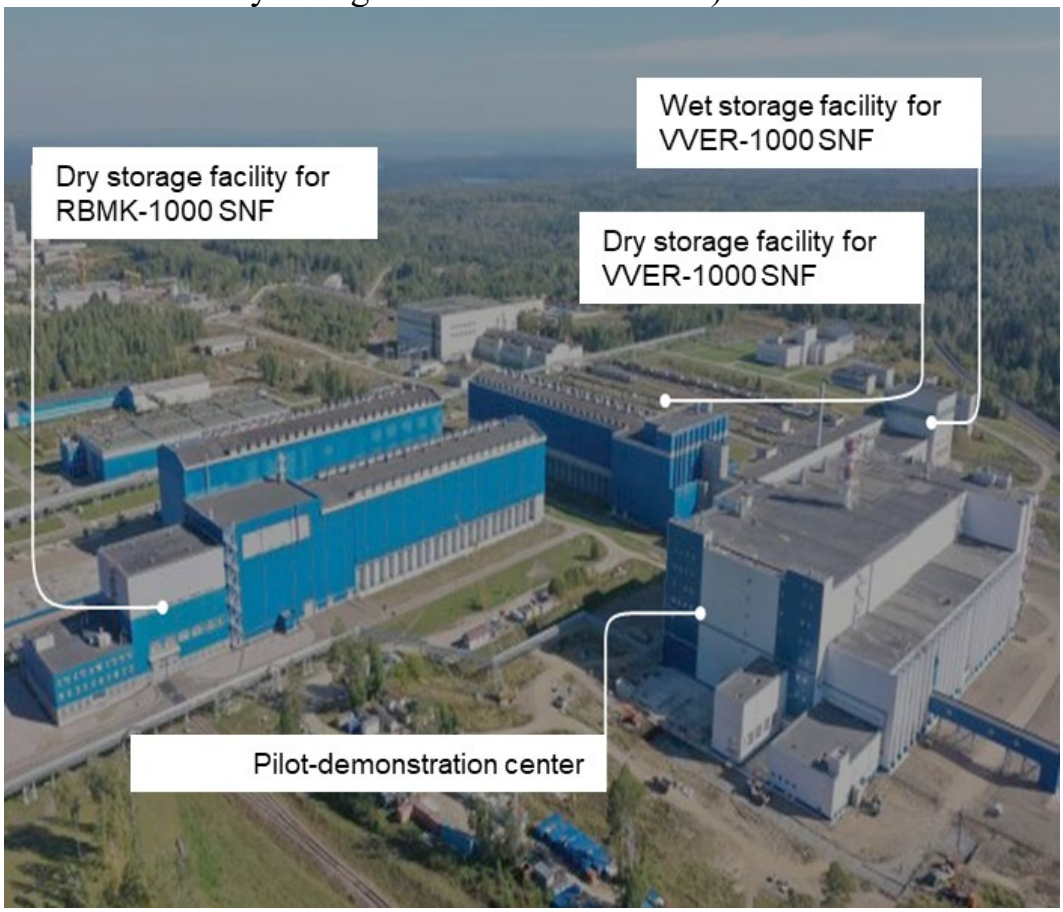


Figure B.2.1 – Centralized storage and reprocessing facilities at the MCC site

Table B.2.1 presents the characteristics of centralized SNF storage facilities.

Enterprise	Centralized storage type	Design capacity (t SNF)	Filled capacity, %	Year of commissioning	Expected end of operation
MCC	Wet VVER-1000 SNF	8,600	86%	1985	2045
	Dry VVER-1000 SNF	10,456	17%	2016	2066
	Dry RBMK-1000 SNF, building 3A	9,687	88%	2012	2062
	Dry RBMK-1000 SNF, building 3	10,786	0%	2016	2066

Figure B.2.2 – SNF management in a dry storage facility at the MCC site

Section D.1.1 overviews the rates of SNF shipment for centralized storage.

B.2.1.2. Onsite storage

Each NPP and RR unit has an onsite SNF storage pool designed for temporary SNF storage after the fuel is unloaded from these reactors.

NPP with RBMK-1000 type reactor units, the Novovoronezh NPP and research centers (RIAR, NRC Kurchatov Institute) are also fitted with standalone wet storage facilities into which the spent fuel is loaded upon completing its cooling in onsite SNF pools and is stored until its shipment either for centralized storage to MCC or for reprocessing to PA Mayak.

Wet storage provides the required radiation and thermal SNF characteristics enabling its further shipment in transportation casks and emplacement into centralized storage facilities.

At the Zaporozhye NPP, SNF is stored in a dry container-type storage facility.

Section D.1.2 provides a list of onsite SNF storage pools available at Russian NPP.

B.2.1.3. Reprocessing

The RT-1 plant at the PA Mayak site provides reception, temporary storage and reprocessing of various SNF types from power VVER-440, VVER-1000/1200, BN-600/800, RBMK-1000, research and production reactors, as well as AMB SNF storage (additional facilities designed to provide the pre-reprocessing management of this fuel type are currently under construction). The reprocessing flowchart is

based on water-extraction methods similar to the conventional form of the PUREX process. High-level waste is immobilized into aluminophosphate glass waste form, which is poured into cans and sealed in purpose designed canisters emplaced into an air-cooled storage facility.

PDC for SNF reprocessing has been commissioned at the MCC site (license since 2016). Construction of its second startup complex designed for thermal reactor SNF reprocessing with a design capacity of up to 220 tHM of SNF per year has been almost completed.

All high-level LRW are planned to be sent for vitrification providing waste immobilization into borosilicate glass waste forms.

Table B.2.2 presents the characteristics of SNF reprocessing facilities.

Table B.2.2 – Characteristics of SNF reprocessing facilities (design based)

Enterprise	Facility	Design capacity (tHM)	Year of commissioning	Reprocessing method
PA Mayak	RT-1	400	1977	PUREX
MCC	PDC (startup complex)	4	2016	PUREX 3+
MCC	PDC (second startup complex)	220	2025 (planned)	PUREX 3+

Figure B.2.3 – SNF unloading compartment in the wet storage facility at the MCC site

B.2.2. Management of SNF from NPP

As of January 1, 2024, 43 power units with an overall installed capacity of 28.5 GW were operating in the Russian Federation, including the FTNPP Akademik Lomonosov. Data on accumulated SNF inventories from different reactor types are summarized in Table L.1.2 (Annex L).

Practical SNF management activities were performed in the following areas.

Infrastructure development:

— Construction activities performed at two sites: the second PDC startup complex for SNF reprocessing (MCC) and upgraded complex for AMB SNF management (PA Mayak).

Transportation:

— SNF shipment from NPP onsite storage facilities, research institutes and production reactor sites;

— encapsulation of substandard SFA and their reloading from SFA pools into SNF storage facility at the Leningrad NPP;

— development and production of the TUK-137T.R prototype package designed for VVER-1200 SNF shipment for reprocessing;

— upgrading the designs of the 14-9820 TK-U railway transporter designed to ship TUK-137T.R loaded with SNF;

— development and substantiation of the transport and process flowchart proposed for EGP-6 SNF shipment from the Bilibino NPP to PA Mayak.

Technological advances:

— development of a strategic industry-wide program focused on advances in radiochemistry;

— development and production of equipment at PDC MCC to demonstrate the performance of methods proposed for the extraction of short-lived strontium and cesium fraction from the raffinate resulting from the PUREX process and production of borosilicate glass providing Sr and Cs inclusion into the waste form.

Annex L.1 summarizes data on SNF transportation rates from NPP sites.

B.2.3. Management of SNF from research reactors (RR)

17 research reactors are currently operated in the Russian Federation: 1 RR is under reconstruction, 1 RR was shut down and 3 RR are being decommissioned. Table L.1.4 (Annex L) presents the list of research reactors.

RR SNF is reprocessed at the RT-1 plant: the spent fuel is shipped to PA Mayak upon completing its temporary storage at the site of the operating organization.

Sustainable rates of SNF transportation for reprocessing have been provided.

In 2020-2023, 6,800 RR SFA were shipped for reprocessing. No RR SNF accumulation occurs at the sites of operating organizations.

B.2.4. Management of SNF from shipboard nuclear units

The following units are operated in the Russian Federation as part of the nuclear icebreaker fleet: Taimyr (since 1988), Vaygach (since 1990), Yamal (since 1992), 50 Let Pobedy (since 2007), Arktika (since 2020), Sibir, Ural (since 2022) and a nuclear light container carrier Sevmorput (since 1988).

Figure B.2.4 – Nuclear icebreaker 50 Let Pobedy

All ships of the nuclear icebreaker fleet are operated by Atomflot. Sustainable rates of SNF transportation to PA Mayak have been provided; no SNF accumulation occurs at Atomflot sites.

Decommissioning operations were completed at a most challenging nuclear legacy facility - the floating maintenance base Lepse, which supported the operation of the first nuclear icebreakers. In 2021, the last 19 SFA were removed and sent to PA Mayak. The bow unit package with decontaminated ship structure elements was loaded into a storage facility for reactor compartments operated in Saida Bay.

Figure B.2.5 – Completed operations on the disposition of the Lepse floating maintenance base: 1 – FMB Lepse before the disposition activities were launched; 2 – protective cover mounted to provide SNF unloading from the bow-unit package; 3 – long-term storage of the bow-unit package in the regional center (Saida Bay)

B.2.5. Management of SNF from foreign reactor units

NPP with VVER-440, VVER-1000/1200, RBMK-1000/1500, BN-350 reactor units, as well as research reactors that burned or are burning Russian-made nuclear fuel have been operating outside the territory of the Russian Federation.

SNF returned to the Russian Federation is subject to reprocessing at PA Mayak.

The Russian Federation has all necessary resource and infrastructure capacities required to manage SNF from any RR types regardless of its condition (including leaking SFA).

The Russian-American Research Reactor Return Program (RRRFR) focused on Russian (Soviet) origin RR SNF return to the Russian Federation for reprocessing that was running in 2016-2022 has been suspended. Under this Program, 40 RR SNF shipments were performed from 13 countries that provided the removal of a total of about 2.28 tons of highly enriched SNF. Germany was the only country that did not take part in this Program.

Cooperation with the Republic of Belarus on managing the SNF from the Belarusian NPP has been fostered with two intergovernmental agreements signed, namely:

— on cooperation in the field of nuclear material transportation of November 8, 2021;

— on cooperation in the field of SNF management of November 21, 2022.

Under the Balanced Nuclear Fuel Cycle product development line, the Russian Federation offers foreign customers a full range of power reactor SNF management services, including the following:

— SNF reprocessing providing the separation of regenerated uranium and plutonium, HLW fractionation, including the short-lived HLW fraction and its return to foreign customers;

— development of long-term SNF/HLW storage infrastructure at the customer's sites including the supply of relevant systems;

— fabrication of nuclear fuel from regenerated nuclear material;

— disposition of plutonium and minor actinides separated from SNF supplied by foreign customers in Russian fast reactors.

B.2.6. SNF transportation casks

Table B.2.3 presents the list of transportation casks produced and used for SNF transportation according to fuel types.

Table B.2.3 – List of applied TUK by fuel types

SNF/ reactor type	TUK	Capacity, pcs. of SFA
VVER-1000 (5th unit of the Novovoronezh NPP and damaged SFA)	TUK-141O	18
VVER-1200	TUK-137T.R	18
VVER -1300	TUK-137T.A1	18
RBMK-1000	TUK-109	72
	TUK-109T	72
VVER-440	TUK-140	42
BN-600/800	TUK-11	35
AMB	TUK-84/1	up to 35
Research reactors	TUK-19	4
	TUK-128	20
Nuclear submarines	TUK-18, TUK-108/1	-
FTNPP	TUK-18	-

The TUK-137T container series includes TUK-137T.R (transportation) for Russian and the Belarusian NPP, TUK-137T.A1 (dual-purpose) for Akkuyu NPP (Republic of Turkey).

Figure B.2.6 – Production of the head TUK-137T.A1

Scheduled TUK design development and improvement efforts were implemented, in particular:

— efforts preceding trial shipment of leaking and damaged VVER-1000 spent fuel assemblies (DSFA) from Kalinin NPP to PA Mayak and their further reprocessing were completed, including plans drawn to customize the designs of TUK-141O fitted with a cover for sealed canisters;

— TUK-137T.R designs were developed, certified and introduced into relevant designs of Russian and the Belarusian NPP (VVER-1200) units currently being at the design development and construction stages;

— pilot VVER-440 SNF shipment to PA Mayak for reprocessing was performed in TUK-140 designed purposely for this SNF type;

— VVER-1000 SNF shipment to PA Mayak for reprocessing was started, including pilot VVER-1000 SNF shipment in TUK-141O purposely designed for SNF with increased initial enrichment and higher burnup;

— performance of an upgraded unified railway transporter TK-U designed for SNF transportation in TUK-109T (RBMK-1000 SFA), TUK-137T.R and TUK-137T.A1 (VVER-1000/1200 SFA) was tested;

— pilot shipment of damaged RBMK-1000 SNF in TUK-109T from the Leningrad NPP was performed to deliver the SNF for reprocessing to PA Mayak;

— equipment supporting the application of TUK-109T was manufactured and installed at the Leningrad NPP with RBMK-1000 reactor units.

B.2.7. The use of SNF reprocessing products

In the Russian Federation, two basic options are currently being considered as regards multiple plutonium and MA recycling in fast reactors:

— the use of plutonium, neptunium and americium for mixed oxide fuel (MOX) fabrication;

— the use of plutonium, neptunium and americium for mixed nitride fuel fabrication.

Transition to two-component nuclear power envisaged by the Energy Strategy and Strategy-2021 provides for the following key conditions relevant for supporting infrastructure development that should be fulfilled:

— sufficient infrastructure enabling storage and transportation of SNF, nuclear materials and RW of various classes, as well as RW disposal in near-surface facilities and geological formations;

— sufficient SNF reprocessing infrastructure so that serial BN are provided with fuel and starting fuel loads and first refueling can be started before the regenerated materials are recycled back to the reactor;

— sufficient infrastructure for uranium-plutonium fuel fabrication and refabrication, FNR SNF reprocessing.

For two-component nuclear power, all sources of nuclear materials suitable for fuel supply, including the regenerated uranium, are of particular importance. As it comes to RTN fuel supply, in addition to meeting the RTN needs in starting loads and first refuelings, RTN SNF reprocessing is expected to reduce the need in natural uranium mining (owning to regenerated uranium recycling).

B.2.7.1. The use of uranium-plutonium fuel in thermal neutron reactors (MOX fuel)

VVER SNF reprocessing and recycling of separated uranium and plutonium applied in the fabrication of thermal reactor fuel compositions was proposed as an option to close the NFC with thermal reactors.

Depleted uranium and plutonium are used for MOX fuel fabrication, thereby, providing zero costs for the uranium fuel component – mining, conversion and enrichment. Nevertheless, plutonium, after having been burnt as a MOX fuel component, requires certain adjustment in terms of its isotopic composition. The core of operating reactors may be loaded with MOX to up to 30–50% with the rest of the load accounting for uranium fuel. Although the development of a reactor unit purposely designed for MOX fuel application is underway, issues associated with regenerated material introduction into NFC are going to stay relevant for quite a long time.

By the end of the nuclear power system life cycle, SNF reprocessing under the uranium-plutonium NFC option is expected to provide a 6-fold reduction in the total stored SNF and HLW inventory. Moreover, due to MA afterburning in FNR, the radiotoxicity of the waste subject to final disposal can be reduced fundamentally.

Figure B.2.7 - MOX fuel loading at Beloyarsk NPP

B.2.7.2. The use of plutonium in FNR fuel (PRORYV project)

In keeping with the Russian Nuclear Energy Development Strategy for the period until 2050 – 2100, the State Corporation Rosatom has been implementing practical efforts to enable a transition to a two-component nuclear energy system with a closed NFC. Under this system, fast neutron reactors will operate efficiently burning uranium-plutonium fuel (depleted uranium and plutonium mixtures), thereby, enabling multifold expansion of the raw material base in the nuclear power sector.

Besides, global modern expectations from nuclear power set some new requirements regarding the trends for its further development. Sweeping development is possible only provided the evolvement of new technological products constituting to the two-component nuclear energy system, including thermal neutron VVER reactor (pressurized water power reactors) and industrial fast neutron reactor units enabling NFC closure.

The Rosatom State Corporation has accumulated vast and successful experience in FNR development and operation. Thus, in 2023, SC Rosatom managed to complete the BN-800 reactor unit transition to a 100% uranium-plutonium core and to move on with the industrial operation of FNR with a 100% MOX fuel core. By late 2023, MCC manufactured three MOX fuel assemblies the fuel composition of which involved not only uranium and plutonium, but also minor actinides – americium-241 and neptunium-237. In 2024, these fuel assemblies are going to be loaded into BN-800 reactor at Beloyarsk NPP for pilot-industrial operation.

The PRORYV project is seeking to demonstrate the technical and economic competitiveness, explore and obtain reference on a complete process cycle constituting to the so-called *short* closed NFC based on mixed uranium-plutonium fuel (MNUP and MOX fuel). PDEC is under construction at the SCC site as part of a lead-cooled FNR power unit along with FNR SNF reprocessing unit and FNR MNUP fabrication and refabrication unit.

PDEC is going to provide the first world experience in demonstrating sustainable operation of a full-fledged complex (BREST-OD-300 power unit, fuel fabrication/refabrication unit, fuel reprocessing unit) enabling NFC closure within a single site. The onsite NFC option provides the capacities required to test the *short fuel cycle* technologies within a single site.

PDEC has the following design characteristics:

— installed electrical capacity – 300 MW;
— fuel type – mixed nitride uranium-plutonium;
— design service life (in the R&D mode) – 30 years;
— fuel fabrication and refabrication capacity – 14.75 tHM/year (provided possible upgrading and capacity increase to 20.4 tHM/year to meet the fuel supply needs of the BN-1200M power unit);
— SNF reprocessing capacity – 10 tHM/year;
— the PDEC Reprocessing Unit is designed to reprocess the SNF in accordance with the so-called combined flowchart based on a combination of pyrochemical and hydrometallurgical operations. Thus, SNF is going to be reprocessed provided minimum cooling time (one year) with the final product being free from fission products (actinide mixture) and suitable for new fuel fabrication.

Large-scale nuclear energy implies the deployment of industrial energy complexes with high-power FNR based on the PDEC prototype. No external Pu resource will be required by IEC upon attaining the self-sufficiency mode: the cycle is expected to be closed within a single site. In the long term, Russia intends to establish a series of such complexes.

B.3. Policy in the field of RW management

Safe management of RW is seen as an important component of the national security and a prerequisite for nuclear power use both now and in the future.

National RW management policy of the Russia Federation is set forth in the norms and provisions of Federal Law No. 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011. The law establishes the requirements for mandatory RW disposal, requirements for the safe management of accumulated RW inventories and also sets the organizational and financial framework for the activities implemented in this area, including the federal ownership over the accumulated RW inventories and the internationally recognized financial liability principle, i.e., the *polluter pays* principle.

The USS RW being established in the Russian Federation aims at arranging and providing safe and cost-effective RW management, including its disposal. USS RW operation provides for the interaction between government bodies, state safety regulators, the national operator for RW management, specialized organizations and RW generators.

The National Operator for RW Management is a legal entity authorized to perform RW disposal operations and other types of RW management activities. Federal State Unitary Enterprise National Operator for Radioactive Waste Management was recognized as the National Operator in Russia.

RW disposal costs, including those associated with NO RAO's investment and production programs, are covered through fees paid into a special reserve fund No. 5 of the State Corporation Rosatom, the established RW disposal tariffs, federal budget funds.

Tariffs are established by the federal executive body authorized to set the RW disposal tariffs at the proposal of the government body in the field of RW management. These are set as fixed tariff rates per 1 cubic meter of RW subject to disposal.

Since 2018, the third stage of USS RW deployment has been underway. The following goals have been set under this stage:

— establishment of a HLW disposal system;

— upgrading sites holding non-retrievable RW into non-retrievable RW isolation facilities and non-retrievable RW isolation facilities into RW disposal facilities;

— commissioning of URL facilities with R&D launched to demonstrate the safety of the proposed deep HLW disposal facility;

— continued commissioning efforts at the sites of LLW and ILW repositories (Chelyabinsk and Tomsk regions).

A Comprehensive Action Plan on the Establishment of RW Management Infrastructure was developed, approved by order No. 1-1/802-r of the Rosatom State Corporation of November 30, 2022 and is being implemented. The Action Plan provides for the following activities:

— assessments performed to forecast RW generation volumes according to RW classes with an account taken of RW inventories generated from nuclear decommissioning and those from SNF reprocessing expected until 2050;

— building up a reserve fund to cover the RW disposal costs;

— development of disposal facilities designed for various RW categories, including those resulting from nuclear decommissioning and SNF reprocessing.

B.4. Practices in the field of RW management

National RW management practice provides for RW disposal seen as the final RW management stage.

The following activities are underway:

— development of a centralized RW disposal system;

— RW processing, conditioning and transfer for disposal;

— isolation of facilities holding non-retrievable RW;

— development of an environmental monitoring system.

B.4.1. Development of a centralized RW disposal system

Construction of a deep disposal facility for RW Class 1 and 2 and near-surface disposal facilities for SRW Class 3 and 4 is seen as a priority RW management task for the Russian Federation (RW classification criteria are presented in Section B.4.5). RWDF development costs are covered from two sources: the special reserve fund No. 5 and the federal budget. Table B.4.1 summarizes the progress in their development.

Table B 4.1 – Status of USS RW disposal facilities

RWDF type	Facilities	Status	Commissioning
DGR for RW Class 1&2	DGR in the Nizhnekanskiy rock mass	URL construction	URL in 2028
Near-surface disposal facility for RW Class 3&4	RWDF Novouralsk, Sverdlovsk region	Operation	2016
	RWDF Ozersk, Chelyabinsk region	Construction and installation (first section)	2026
	RWDF Seversk, Tomsk region	Construction and installation (second section)	2026

Figure B.4.1 – Second section of a disposal facility in Novouralsk

In addition to a waste disposal facility in Sverdlovsk region with a total capacity of 55,000 m^3, construction of waste disposal facilities is underway in Chelyabinsk and Tomsk regions. They were issued siting and construction licenses; construction and installation operations are underway at these sites to establish complexes of auxiliary buildings and structures, transport infrastructure, internal and external utility networks, as well as basic modular RW disposal structures.

Upon completing the first RWDF sections, the total capacity provided by near-surface disposal facilities is expected to reach 116,000 m^3. Subsequent phased RWDF construction is going to provide the infrastructure necessary for RW Class 3 and 4 disposal with a total design capacity of 420,000 m^3.

As it comes to URL establishment, completed was the construction of the URL power supply system involving a 220 kV power line, a 220 kV central transformer substation, voltage supply has been provided and further commissioning operations are underway. Construction and installation operations are underway to establish complexes of auxiliary buildings and structures, internal and external utility networks, physical protection and onsite security systems. Construction, installation and excavation operations have been started to arrange the ventilation and the auxiliary shafts.

Under the approved Strategy for the Development of a Deep Geological Repository for Radioactive Waste (hereinafter the DGR Strategy), operations supporting URL development are going to be implemented in successive phases. These phases may vary in their duration depending on certain geological, hydrological, infrastructural and other factors newly identified in the course of research. Currently, the DGR Strategy provides for 6 successive phases:

— No. 1 Operations preceding URL construction. Expected duration – up to 5 years;

— No. 2 Construction of a demonstration center and main URL structures. Expected duration – up to 5 years;

— No. 3 URL operation and development. Expected duration – over 5 years;

— No. 4 Decision-making on the possibility of DGR construction. Licensing of activities related to DGR construction. Construction of the 1st DGR section. Expected duration – over 5 years;

— No. 5 Operation of the first DGR section and URL. Expected duration – over 30 years;

— No. 6 Closure of the first DGR section. Expected duration – over 5 years.

Three SC Rosatom enterprises (MCC, SCC, RIAR) have been disposing of their low-level and intermediate-level LRW inventories (MCC, SCC, RIAR): the waste has been injected into isolated reservoir beds in deep geological formations (deep well injection facilities, DWIF LRW). NO RAO is responsible for DWIF LRW operation.

B.4.2. RW processing, conditioning and transfer for disposal

Federal Law No. 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 states that prior to the expiration of interim temporary storage periods established by the government body in the field of RW management, organizations shall condition the RW and hand the waste over to NO RAO for disposal.

Thanks to staged upgrading of RW processing equipment and facilities at NPP sites, the rate of RW processing and conditioning exceeds the one of its generation. Thus, not only the entire inventory of newly generated waste can be conditioned, but also the processing of earlier accumulated RW inventories stored at NPP sites can be started.

A total inventory of over 58,000 m^3 of RW has been processed and conditioned to comply with waste acceptance criteria since the enactment of the Federal Law On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 with some 47,000 m^3 of the waste that were transferred for disposal and the rest of the waste inventory emplaced into storage facilities.

Figure B.4.2 – RW and radioactively contaminated soil removal

Considerable progress has been made in the management of RW generated from nuclear legacy cleanup in the North-Western and Far Eastern regions. RW processing and storage centers were established in the Saida Bay, a LRW processing complex and a SRW conditioning center were commissioned in the Far East.

Rosenergoatom Concern has been running a comprehensive R&D program seeking to provide considerable reduction in RW generation rates. The R&D are focused on achieving the following milestones:

— development of reference low-waste conditioning methods and pilot facilities designed to process regeneration and decontamination solutions, special laundry and drain waters, still residues, spent ion-exchange resins, sludge resulting in an annual generation of no more than 45 m^3 of conditioned SRW per 1 power VVER-1000/1200 unit intended for disposal and packages with conditioned RW complying with waste acceptance criteria for disposal provided as far as possibly low generation of secondary RW and conditioned RW subject to disposal;

— introduction of the developed methods at operating (if possible) and newly commissioned NPP.

B.4.3. Isolation of facilities holding non-retrievable RW

Certain RW inventories were referred to the non-retrievable RW category, namely, when their in-situ disposal contributed to lower environmental and

technogenic risks and costs required to maintain their safety compared to the waste removal option.

Based on the primary registration of accumulated RW inventories, over 99.9% of all accumulated LRW was referred to the non-retrievable RW category; by volume, most of this inventory accounts for the storage reservoirs operated by PA Mayak.

Over 82% (by volume) of the accumulated SRW inventories were referred to the non-retrievable RW category; with 81% of this SRW inventory (by volume) accounting for the tailings operated by PIMCU, NCCP and CMP.

Federal Law No. 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 stipulates that all facilities holding non-retrievable RW shall be consistently upgraded to disposal facilities through their phased upgrading and installation of new safety barriers (or by demonstrating the compliance of the existing ones with appropriate safety requirements). Practical efforts have been primarily focused on the most challenging category of such facilities, namely, the LRW storage reservoirs. Under these efforts, relevant strategies are being implemented at all near-surface LRW storage reservoirs within the framework of FTP NRS-2.

Figure B.4.3 – Backfilling operations at the B-1 storage reservoir (SCC)

Isolation operations are ongoing at PUGR facilities being decommissioned in accordance with the entombment decommissioning strategy. The following activities are being implemented in a stepwise manner:

— upgrading to a nuclear safe state;
— partial dismantling of process equipment and systems;
— strengthening individual building structures;
— backfilling the emerging voids with a purposely developed clay-based buffer mixture;
— installation of a multifunctional protective screen.

B.4.4. Environmental monitoring and safety demonstration system

An industry-wide system for onsite subsoil monitoring was introduced at 58 enterprises of the State Corporation Rosatom. The monitoring system provides

regular subsoil observations tracking the changes in its state and the state of adjacent media within the areas of industrial sites impacted by process operations and the production waste. The data base supplying information for long-term safety assessments is also updated on a regular basis. Methodological and software tools are considered as the second component of the monitoring system. Figure B.4.4 overviews the trends for the monitoring system introduction.

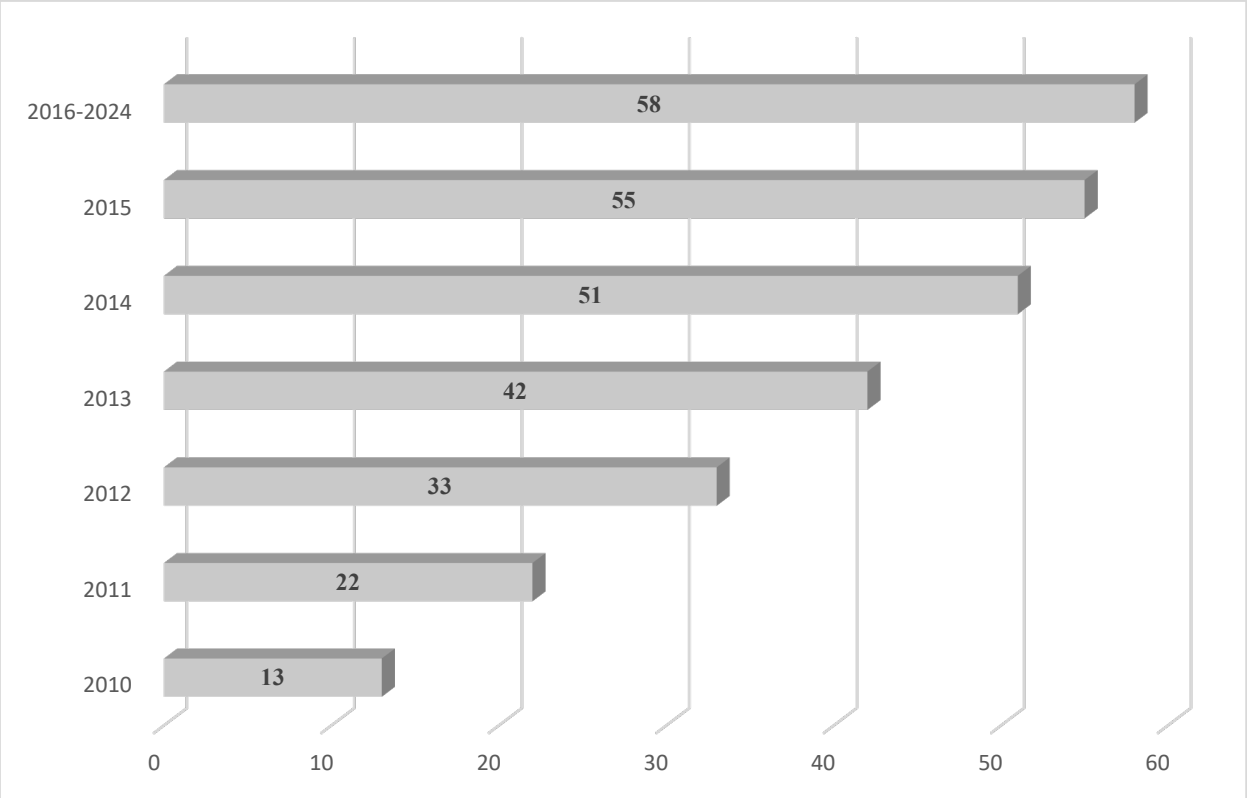


Figure B.4.4 – Trends for monitoring system introduction at SC Rosatom enterprises

B.4.5. Criteria used for definition and classification of RW

Pursuant to Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, RW is recognized as nuclear materials and radioactive substances for which no future use is foreseen, as well as equipment, goods (including spent sources of ionizing radiation) containing radionuclides in concentrations greater than the limits set forth by the Government of the Russian Federation.

Government Decree of the Russian Federation No. 1929 of October 29, 2022 introduced certain amendments to the Government Decree of the Russian Federation No. 1069 On the Criteria Used to Categorize Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Categorize Radioactive Waste as Non-retrievable Radioactive Waste and Retrievable Radioactive Waste, Classification Criteria for Retrievable Radioactive Waste of October 19, 2012. The efforts on adjusting the criteria took over three years.

All RW categorized as Retrievable RW can be referred to one of the six classes presented below (Table B.4.2).

Table B 4.2 – Retrievable RW classification system

Classification	Description of the RW class
Class 1	Waste with high heat release (over 100 W/m^3) subject to deep disposal; upon conditioning, the waste complies with waste acceptance criteria for deep disposal.
Class 2	Waste with no high heat release (less than 100 W/m^3) subject to deep disposal; upon conditioning, the waste complies with waste acceptance criteria for deep disposal.
Class 3	The specific activity of radionuclides with a half-life of over 31 years does not exceed 10^6 Bq/g for beta-emitters and 4,000 Bq/g for alpha-emitters; upon conditioning, the waste complies with waste acceptance criteria for near-surface disposal.
Class 4	The specific activity of radionuclides with a half-life of over 31 years does not exceed 10,000 Bq/g for beta-emitters and 400 Bq/g for alpha-emitters; the waste complies with waste acceptance criteria for near-surface disposal provided no prior conditioning.
Class 5	LRW disposed of in DWIF LRW
Class 6	RW generated from uranium ore mining and milling, from the extraction and processing of mineral and organic raw materials high in naturally occurring radionuclides.

Section C. Scope of Application (Article 3)

Article 3. Scope of Application

1. This Joint Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not in the scope of this Joint Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.

2. This Joint Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Joint Convention shall not apply to waste that contains only naturally occurring radioactive substances and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or if it is declared as radioactive waste for the purposes of this Joint Convention by the Contracting Party.

3. This Joint Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defense programs, unless declared as spent fuel or radioactive waste for the purposes of this Joint Convention by the Contracting Party. However, this Joint Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defense programs if and when such materials are transferred permanently to and managed within exclusively civilian programs.

4. This Joint Convention shall also apply also to the discharges as is envisaged in the articles 4, 7, 11, 14, 24 and 26.

C.1. Russian Federation declares that:

It shall provide information on the safety of SNF management when the spent fuel results from the operation of civilian nuclear reactors, as well as on the safety of the spent fuel management that is held at reprocessing facilities, declaring SNF reprocessing to be part of SNF management in terms of Article 3 (1) of the Convention.

C.2. Russian Federation declares that:

It shall apply the Joint Convention to the safety of RW management when the radioactive waste results from civilian applications. This report shall not discuss waste that contains only naturally occurring radionuclides, unless RW results from atomic energy uses envisaged in the Article 4 Types of Activities in the Field of Atomic Energy Use of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995.

C.3. Russian Federation declares that:

It shall discuss discharges/releases as envisaged in the Articles 4, 7, 11, 14, 24 and 26 of the Convention.

Explanations

This Section contains confirmation of compliance with obligations arising from Article 3 of the Convention.

Section D. Inventories and Lists

Section D. Inventories and Lists (Article 32.2)

Article 32. Reporting
32-2. This report shall also include:
i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;
ii) an inventory of spent fuel that is subject to this Joint Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;
iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;
iv) an inventory of radioactive waste that is subject to this Joint Convention that:
a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;
b) has been disposed of; or
c)has resulted from past practices.
This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;
v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D.1. SNF management facilities (Article 32.2 (i))

The Report considers the following SNF management facilities:
onsite storage facilities – onsite SNF storage pools;
standalone and centralized storage facilities;
SNF reprocessing facilities.

Table L.1.1 (Annex L) presents data on SNF management facilities.

D.1.1. Centralized SNF storage facilities at NFC sites

The following facilities provide centralized SNF storage at the MCC site (Table D.1.1):
wet VVER-1000 SNF storage facility;
dry VVER-1000 SNF storage facility (after having been cooled in the wet storage facility);
dry RBMK-1000 SNF storage facility.

Table D.1.1 – The rates of SNF transfer for technological storage in 2020-2023

Facility	Handed over for storage, pcs. SFA				
	2020	2021	2022	2023	Total
wet VVER-1000 SNF storage facility at MCC	315	298	82	249	944
dry VVER-1000 SNF storage facility at MCC	605	655	818	1,030	3,108
dry RBMK-1000 SNF storage facility at MCC	7,488	8,064	7,488	7,487	30,527

D.1.2. Onsite SNF storage facilities

Table D.1.2 provides a list of onsite SNF cooling pools available at NPP sites indicating the capacity filled to date.

Table D.1.2 – List of onsite SNF pools at NPP

Facility	NPP	Fuel type	Design capacity, pcs. SFA	Stored inventory, pcs. SFA	Filled capacity, %
Cooling pool № 1	Kola NPP	VVER - 440	2,646	683	26
Cooling pool № 1	Novovoronezh NPP	VVER - 440	677	121	18
Cooling pool № 2	Novovoronezh NPP	VVER - 1000	256	91	36
Cooling pool № 3	Novovoronezh NPP	VVER - 1200	1,512	458	30
SNF SF	Novovoronezh NPP	VVER - 1000	589	118	20
Cooling pool № 1	Balakovo NPP	VVER - 1000	2,185	1,129	52
Cooling pool № 1	Rostov NPP	VVER - 1000	2,313	1,036	45
Cooling pool № 1	Kalinin NPP	VVER - 1000	2,106	1,072	51
Cooling pool № 1	Kursk NPP	RBMK-1000	12,496	3,259	26
SNF SF	Kursk NPP	RBMK-1000	35,040	23,645	67
Cooling pool № 1	Leningrad NPP	RBMK-1000	8,196	3,318	40
Cooling pool № 2	Leningrad NPP	VVER - 1200	1,464	265	18
SNF SF	Leningrad NPP	RBMK-1000	37,254	23,287	63
Cooling pool № 1	Smolensk NPP	RBMK-1000	6,928	2,742	40
SNF SF	Smolensk NPP	RBMK-1000	35,120	24,486	70
Cooling pool № 1	Beloyarsk NPP	BN-600	3,150	394	13
Cooling pool № 2	Beloyarsk NPP	BN-800	3,000	1,145	38
Cooling pool № 3	Beloyarsk NPP	AMB	-	122	50
Cooling pool № 1	Bilibino NPP	EPG-6	8,930	7,630	85
Cooling pool № 1	Zaporozhye NPP	VVER - 1000	601	393	65

Cooling pool № 2	Zaporozhye NPP	VVER - 1000	601	331	55
Cooling pool № 3	Zaporozhye NPP	VVER - 1000	601	423	70
Cooling pool № 4	Zaporozhye NPP	VVER - 1000	601	359	59
Cooling pool № 5	Zaporozhye NPP	VVER - 1000	601	370	61
Cooling pool № 6	Zaporozhye NPP	VVER - 1000	613	372	60

Dry SNF storage facility operated at Zaporozhye NPP provides intermediate SFA storage in ventilated concrete containers (Table D.1.3).

Table D.1.3 – Information on dry SNF storage facility at Zaporozhye NPP

Number of filled containers, pcs.	Total number of SFA in containers, pcs.	Design capacity of the SNF SF (number of containers), pcs.
173	4,146	380

In the reporting period, SNF shipment from Russian power NPP and research reactor sites for centralized storage and reprocessing was continued. Relevant information is provided in Tables L.1.3 and L.1.4 (Annex L).

D.1.3. SNF reprocessing facilities

SNF reprocessing is provided by PA Mayak at the RT-1 plant.

From 2017 to the present, the PDC startup complex has been implementing R&D focused on VVER-1000 SNF reprocessing. Commissioning of the PDC's second startup complex is scheduled for 2025.

Table D.1.4 presents data on SNF reprocessing.

Table D.1.4 – Rates of SNF reprocessing at RT-1 operated by PA Mayak

SNF type/volume	2014-2016	2017-2019	2020-2023
Reprocessed total, including	**514.5**	**259.8**	**525.8**
SNF VVER-440, t	476.3	95.4	201.7
SNF VVER -1000, t	0.8	45.2	203.1
SNF BN-600, t	6.5	50.3	80.9
SNF BN-800, t (uranium)	-	-	10.2
SNF RBMK-1000, t	27.3	64.5	12.2
SNF RBMK-1000 (damaged), t	-	-	-
RR, t	1.3	4.35	13.1
IF, t	2.3	0.02	4.6
AMB SNF, t	-	-	-

D.2. SNF inventories (Article 32.2 (ii))

Table L.1.2 presents inventories providing data on various SNF types at Russian enterprises, whereas data on annual SNF accumulation and transportation are given in Table L.1.3 (Annex L).

D.3. RW management facilities (Article 32.2 (iii))

The Report considers the following RW management facilities:
RW processing facilities (complexes);
sites holding RW and RW storage facilities;
RW disposal facilities.

D.3.1. RW processing facilities (complexes)

Types of operated RW processing facilities depend on the specific nature of activities implemented by relevant organizations, the involved production and operational processes, as well as the regulatory requirements on minimizing the number of RW packages that should also meet the acceptance criteria for safe RW storage and disposal.

Depending on the generated and accumulated RW, namely its state of aggregation and morphological composition, various RW processing methods are applied: strong evaporation, ion-selective treatment, segregation, compaction, remelting, incineration, cementation, vitrification, decontamination, etc.

Most diverse RW processing systems (complexes) are operated in the branches of Rosenergoatom Concern:

— Balakovo NPP – UGU-500 strong evaporation facilities for salt melt production, facilities for SRW incineration, compaction, cementation;

— Beloyarsk NPP – cementation facilities for bottom residues, filter materials, sludge, ion exchange resins, facilities for SRW incineration, compaction, fragmentation;

— Kalinin NPP – facilities for RW bituminization and incineration with a SRW cementation, segregation, compaction, fragmentation unit;

— Kola NPP – facilities for ion-selective treatment, cementation of filter materials, sludge, ion-exchange resins, incineration facility with SRW cementation, compaction, fragmentation unit;

— Kursk NPP – facilities for strong evaporation and incineration with a cementation, pressure compaction, thermal insulation melting unit;

— Leningrad NPP – facilities for LRW (bottom residues, SIER) solidification, incineration, compaction;

— Novovoronezh NPP – facilities for spent ion exchange resin conditioning; strong evaporation facilities producing salt melt; facilities for bottom residue cementation, incineration, compaction, high-pressure compaction; radioactive thermal insulation compaction, fragmentation;

— PDEC – strong evaporation facility for salt melt production, plasma processing complex;

— Rostov NPP – facilities for RW cementation, incineration, segregation, compaction, fragmentation;

— Smolensk NPP – cementation facilities for bottom residues, filter materials, sludge, ion exchange resins; facilities for ion-selective treatment, incineration; ash residue cementation, segregation and compaction, super-compaction, plastic crushing, liquid decontamination.

As of 2024, a total of 130 RW processing facilities of various types were operating at SC Rosatom enterprises.

Table L.2.2 (Annex L) presents the list of RW processing facilities operated by Rosenergoatom Concern, RADON, MCC, TVEL.

In 2020-2023, the following facilities were commissioned:

1. At NFC facilities:

— NCCP – a sedimentation facility for liquid radioactive waste;

— SCC – facilities for RW fragmentation, compaction, cementation, electrochemical decontamination.

2. At NPP:

— Kursk NPP – RW processing complex involving facilities for RW cementation, ion-selective treatment, electrochemical decontamination, compaction, incineration, pyrolysis of ion-exchange resins, high-pressure water jet decontamination, abrasive decontamination;

— Leningrad NPP – facilities for ion-exchange resin and bottom residue cementation, processing facilities for LRW with homogeneous composition;

— Novovoronezh NPP: strong evaporation facility UGU-500-1.

The following facilities are expected to start their operation by 2025:

— PDC UGR – metal SRW cutting, mechanical and liquid decontamination and melting unit designed as part of a LLW SRW processing complex;

— PA Mayak – LLW treatment complex; SRW processing complex with a fragmentation and mechanical decontamination unit, facilities providing electrochemical ILW decontamination, spent electrolyte conditioning, super-compaction and cementation;

— Beloyarsk NPP – LRW processing complex with facilities designed for ion-selective treatment and cementation; SRW processing complex fitted with fragmentation, compaction, plasma incineration facilities;

— Bilibino NPP – the UGU-1500 evaporation facility designed as an integral part of a low-level LRW processing complex;

— Kursk NPP – LLW and ILW processing complex fitted with cementation, ion-selective treatment, electrochemical decontamination, PVC decontamination, compaction, incineration, ion-exchange resin pyrolysis, high-pressure water jet decontamination, abrasive decontamination facilities.

The following processing facilities are expected to start their operation until 2027:

— Balakovo NPP – facility for spent ion exchange resin drying;

— Beloyarsk NPP – LRW processing complex fitted with ion-selective treatment, cementation facilities; SRW processing complex fitted with fragmentation, compaction, plasma incineration facilities;

— Bilibino NPP – establishment of a solid LLW management complex fitted with segregation, fragmentation, shot blasting decontamination, compaction, conditioning, certification facilities.

D.3.2. RW accommodation and storage

D.3.2.1. Non-retrievable RW

Operations providing isolation of facilities holding non-retrievable RW are underway to upgrade them to a safe state.

LRW facilities. Safety of surface LRW storage reservoirs is a highest priority for PA Mayak, SCC and MCC. Considerable efforts in this area were implemented under FTP NRS-1 and are still ongoing under FTP NRS-2.

At present, the situation has been considerably stabilized: the developed strategies are being implemented at all near-surface LRW storage reservoirs with isolation efforts that have been completed at some of these facilities (Table D.3.1).

Table D.3.1 – Strategies for managing near-surface LRW storage facilities

Site	Reservoir, capacity	Strategy	Safety efforts implemented in 2020-2023
PA Mayak	TCR (360 mln m^3)	Strategic Master Plan for the PA Mayak's Techa Cascade of Water Reservoirs	Groundwater and atmospheric air were monitored to identify contamination levels in all reservoirs; Geodetic monitoring of the backfill mass was completed at reservoir V-9.
	V-2 (86 mln m^3)	Operated as a reservoir for recycling water supply	
	V-6 (19 mln m^3)	Operated as a reservoir for recycling water supply	
	V-9 (0.4 mln m^3)	Isolated (2015)	
	V-17 (0.36 mln m^3)	Isolation efforts are under way (2025)	
SCC	VKh-1 500,000 m^3, (bottom sediments – 71,000 m^3)	Reconstruction of protective and hydraulic structures (2015), shutdown (2036), decommissioning (2055) Will be defined in 2027 based on completed studies	Condition and performance of EBS installed at reservoirs VKh-3,4 were evaluated as part of a feasibility study supporting the decision-making on their end state, i.e., changing their legal status from a facility holding non-retrievable RW into an isolation facility for non-retrievable RW. Radionuclide transport around VKh-1,3,4 structures has been studied.
	VKh-3 (2.1 mln m^3)		
	VKh-4 (2.8 mln m^3)		
	PKh-1 (73,000 m^3)	Pre-decommissioning stage completed (2015), shutdown (2016), isolation (2020)	Drawing permitting documentation for an isolation facility for non-retrievable RW, i.e., pulp storage facilities PKh-1, PKh-2 at SCC's radiochemical plant site; R&D prompting further development of RW management methods supporting the isolation of non-retrievable RW storage facilities, namely, by constructing and testing experimental safety barriers at the sites of pulp storage facilities PKh-1, 2 and structure No. 263;
	PKh-2 (148,000 m^3)	Pre-decommissioning stage completed (2015), shutdown (2020), isolation (2025)	

			Feasibility assessment focused on the safety barrier installation methods proposed to upgrade the facilities for non-retrievable RW into isolation facilities and provided for in the developed design documentation – Isolation of SRW SF 263 and PKh-1,2; Pre-isolation operations at pulp storage facilities PKh-1, PKh-2; Studies focused on radionuclide transport from pulp storage facilities PKh-1,2.
	B-1 (65,000 m^3)	Pre-decommissioning stage completed (2015), isolation (2020)	Survey and long-term safety assessment of the B-1 pool considering the survey findings, including the development of a safety analysis report supporting the changes in the legal status of the facility.
	B-2 (135,000 m^3)	Isolation efforts completed (2012)	Survey and long-term safety assessment of the B-2, B-25 pools considering the survey findings, including the development of a safety analysis report supporting the changes in the legal status of the facilities.
	B-25 depth – 2.5 m, pulp sediment thickness – 2.25 m	Pre-decommissioning stage completed (2015), isolation (2020)	
MCC	Pool 354a - 150,000 m^3 (bottom sediment volume — 34,800 m^3)	Decommissioning expected after 2030	Continuous onsite monitoring of all water bodies, including: -monitoring the changes in groundwater levels, -monitoring the impact of the facilities on surface and ground water. In 2022-2023, observation wells and the security system were upgraded.
	Pool 366 - 360,000 m^3 (bottom sediment volume — 16,400 m^3)		
	Pool 365 - 204,000 m^3 (bottom sediment volume —3,400 m^3)	Undergoing decommissioning (2020-2025)	
	Facility 354	Decommissioned, officially recognized as a storage facility for contaminated soil	

Facilities holding SRW. Non-retrievable RW held in tailings contain naturally occurring radionuclides and are referred to very low-level RW. Due to the large RW volumes, the option providing for RW removal from the existing tailings has never been considered.

The rest of the non-retrievable SRW inventory accounts for the PA Mayak, SCC, MCC and PDC UGR sites. The non-retrievable RW storage designs include subsurface repositories, capital storage facilities, as well as the sites of shutdown production uranium-graphite reactors undergoing decommissioning.

D.3.2.2. Retrievable RW

Retrievable RW are stored in 54 regions of the Russian Federation, namely, at 163 sites and in 933 storage facilities including the RW collection and/or temporary storage sites. Moreover, there are 53 sites holding an inventory of over 1,000 m^3 each. Table L.2.1 presents the list of Retrievable RW storage facilities (Annex L).

D.3.3. RW disposal facilities

D.3.3.1. Near-surface disposal facilities for RW Class 3 and 4

Table D.3.2 provides a list of near-surface RW disposal facilities.

Table D.3.2 – Near-surface disposal facilities for RW Class 3 and 4

Name	Section	Total capacity, thousand m^3	Start of waste acceptance for disposal	Operational status
Novouralsk RWDF	(first section)	15	2016	Under operation
	(second section)	39.6	2022	Under operation
Ozersk RWDF	(first section)	45	2026	Under construction
	(second section)	30	2029	Planned
	(third section)	30	2032	Planned
	(fourth section)	30	2035	Planned
	(fifth section)	30	2038	Planned
Seversk RWDF	(first section)	47.6	2026	Under construction
	(second section)	31.7	2031	Planned
	(third section)	31.7	2034	Planned
	(fourth section)	31.7	2037	Planned

D.3.3.2. Deep well injection facilities for LRW

Table D.3.3 provides a list of deep well injection facilities for LRW.

Table D.3.3 – Deep-well injection facilities for LRW

Name	Operational status
DWIF LRW Zheleznogorsk	Under operation

DWIF LRW Seversk	Under operation
DWIF LRW Dimitrovgrad	Under operation

D.4. RW inventories (Article 32.2 (iv))

D.4.1. RW generation

D.4.1.1. SRW generation

In 2020-2023, the total SRW generation amounted to over 2.9 million m^3 of SRW with a total activity of 4.37E+17 Bq.

In 2020 – 2023, most of the SRW volumes generated in the territory of the Russian Federation resulted from uranium ore mining operations (mainly by PIMCU). In 2020-2023, PIMCU operation resulted in over 2.8 million m^3 of SRW amounting to over 96% as regards the total generation volumes of SRW requiring no further processing.

Retrievable RW (to be handed over for disposal):

1) Nuclear power plants operated by the Rosenergoatom Concern: the SRW volume generated in 2020-2023 by NPP accounted for 25,220 m^3 (Table D.4.1).

Table D.4.1 – SRW generation at NPP by RW categories, thousand m^3

RW categories	2020	2021	2022	2023
Total generation in thousand m^3, incl.	6.84	6.84	5.74	6.16
VLLW, thousand m^3	6.17	5.69	5.04	5.44
LLW, thousand m^3	0.30	0.28	0.37	0.33
ILW, thousand m^3	0.34	0.35	0.15	0.31
HLW, thousand m^3	0.03	0.16	0.18	0.08

2) TVEL fuel company: the SRW volume generated in 2020-2023 amounted to 21,590 m^3 (Table D.4.2).

Table D.4.2 – SRW generation by the TVEL fuel company according to RW categories, thousand m^3

RW categories	2020	2021	2022	2023
Total generation in thousand m^3, incl.	4.17	5.29	6.32	5.81
VLLW, thousand m^3	3.71	4.84	5.92	5.40
LLW, thousand m^3	0.29	0.33	0.27	0.25
ILW, thousand m^3	0.07	0.03	0.01	0.08
HLW, thousand m^3	0.10	0.09	0.12	0.08

3) Back-end division: the SRW volume generated in 2020-2023 accounted for 7,590 m^3 (Table D.4.3).

Table D.4.3 – SRW generation by BE division according to RW categories, thousand m^3

RW categories	2020	2021	2022	2023
Total generation in thousand m^3, incl.	1.74	2.31	2.42	1.12
VLLW, thousand m^3	1.38	1.51	1.56	0.92
LLW, thousand m^3	0.30	0.68	0.44	0.11
ILW, thousand m^3	0.05	0.12	0.41	0.08
HLW, thousand m^3	0.01	0.00	0.01	0.01

D.4.1.2. LRW generation

In 2020 – 2023, the generated LRW inventory with a total activity of 4,33E+19 Bq totaled 2,840,000 m^3.

1) NPP operated by the Rosenergoatom Concern: the LRW volume generated in 2020-2023 by NPP totaled 14,550 m^3 (Table D.4.4).

Table D.4.4 – LRW generation at NPP by RW categories, thousand m^3

RW categories	2020	2021	2022	2023
Total generation, thousand m^3, including	3.08	4.03	3.26	4.18
LLW, thousand m^3	0.36	0.44	0.31	0.55
ILW, thousand m^3	2.72	3.59	2.95	3.63

2) Other organizations: the LRW volume generated in 2020-2023 amounted to 2,700,000 m^3.

The main LRW generation source (by volume – over 95%, by activity – over 99%) accounts for the production operations performed at four enterprises, namely, PA Mayak, MCC, SCC and RIAR.

D.4.2. RW processing

D.4.2.1. SRW processing

A total SRW inventory of 65,800 m^3 was processed in 2020 – 2023 (Table D.4.5).

Table D.4.5 – RW inventory processed in 2020 – 2023, thousand m^3

Operation/volume	Total	2020	2021	2022	2023
Processed RW, thousand m^3	65.8	17.94	19.24	13.72	14.90

Disused SRS account for an additional RW generation source.

Section J discusses disused SRS management in Russia.

D.4.2.2. LRW processing

A total LRW inventory of 1,717,000 m^3 was processed in 2020-2023 (Table D.4.6).

Table D.4.6 – LRW inventory processed in 2020 – 2023, thousand m^3

Operation/volume	2020	2021	2022	2023
The total inventory of SRW resulted from processing, thousand m^3	0.42	0.49	2.05	0.70

D.4.3. RW storage

By the end of 2023, the RW volume stored at the sites of Russian enterprises amounted to 560,940,000 m^3 (Table D.4.7).

Table D.4.7 – Breakdown of RW accumulated at SC Rosatom enterprises, by categories

Organization, RW category	Volume, thousand m^3
SRW	
HLW	72.47
ILW	849.42

LLW	479.65
VVLW	81,243.9
LRW	
HLW	34.24
ILW	17,401.76
LLW	460,734.24

The volume of low-level LRW amounts to over 96% of the total LRW volume, whereas their total activity accounts for less than 1%. Most of the waste is held in surface storage reservoirs operated by PA Mayak.

The volume of intermediate-level LRW accounts for less than 4% of the total LRW volume with a considerable inventory that has been disposed of in DWIF LRW.

High-level LRW inventory amounts to about 0.01% of the total LRW volume with its activity accounting for about 93% of the total LRW activity. The largest high-level LRW inventory has been accumulated due to SNF reprocessing at PA Mayak.

Very-low level SRW accounts for the biggest part of the SRW inventory.

By volume, 78% of this inventory accounts for the waste stocked in PIMCU tailings.

Low- and intermediate-level SRW account for about 1.6% of the total SRW amount. Class 3 and 4 RW are disposed of in near-surface disposal facilities.

80% of the high-level SRW inventory accounts for MCC, SCC, PA Mayak sites.

D.4.4. RW disposal

In 2020 – 2023, the total SRW and LRW inventories subjected to disposal accounted for 16,200 m^3 and 1,801,120 m^3 respectively (Table D.4.8).

Table D.4.8 – RW disposal in 2020 – 2023

RW category	2020	2021	2022	2023
SRW, thousand m^3	4.31	1.30	4.89	5.70
LRW, thousand m^3	427.51	457.21	450.00	421.40

D.5. Decommissioning of nuclear facilities (Article 32.2 (v))

Pre-decommissioning operations are ongoing at nuclear facilities (i.e., nuclear installations and storage facilities according to the Russian legal terminology), including NPP units, research reactors, production uranium-graphite reactors, NFC facilities, storage facilities and nuclear icebreaker fleet facilities.

D.5.1. Power reactor units

Table D.5.1 - List of power reactors that were permanently shut down, were undergoing decommissioning and the decommissioning of which was completed in 2020 – 2023

NPP	Reactor type	Final shutdown (decommissioning license is expected), pcs.	Undergoing decommissioning, pcs.	Decommissioning completed, pcs.

Novovoronezh NPP, unit № 1	VVER-210	-	1	-
Novovoronezh NPP, unit № 2	VVER-365	-	1	-
Novovoronezh NPP, unit № 3	VVER-440	1	-	-
Beloyarsk NPP, unit № 1	AMB-100	1	-	-
Beloyarsk NPP, unit № 2	AMB-200	1	-	-
Leningrad NPP, unit № 1	RBMK-1000	1	-	-
Leningrad NPP, unit № 2	RBMK-1000	1	-	-
Bilibino NPP, unit № 1	EGP-6	1	-	-
Kursk NPP, unit № 1	RBMK-1000	1	-	-

Until 2030, final shutdown and decommissioning are scheduled for the following NPP units:

— RBMK-1000 unit No. 2 at Kursk NPP;

— EGP-6 units No. 2, 3, 4 at Bilibino NPP;

— RBMK-1000 units No. 3, 4 at Leningrad NPP.

The following pre-decommissioning operations have been implemented at shutdown NPP units:

Novovoronezh NPP:

Units No. 1, 2:

— comprehensive engineering radiation surveys (KIRO) were completed for Units No. 1 and 2 of the Novovoronezh NPP;

— decommissioning design documentation for Units No. 1&2 of the Novovoronezh NPP was adjusted;

— in 2023, decommissioning licenses for Units No. 1, 2 of the Novovoronezh NPP valid until December 31, 2035 were issued.

Unit No. 3:

— physical separation of process systems at power units No. 3 and 4 was completed.

Beloyarsk NPP:

— facility designed for bottom sediment extraction from storage pools BV-1, 2 was commissioned;

— maintenance operations launched to restore the performance of lining in the BV-2 cooling pool were completed.

Bilibino NPP:

— in 2022 – 2023, efforts were completed on deploying infrastructure for the safe shutdown and decommissioning of units No. 2 – 4 at Bilibino NPP.

Leningrad NPP:

— fuel unloading from reactor cores of units No. 1 and 2 was completed;

— KIRO studies were performed at Units No. 1 and 2;

— completed was the development of decommissioning design documentation for Leningrad NPP Units No. 1 & 2.

Kursk NPP:

— necessary efforts preceding the development of decommissioning design documentation for Kursk NPP Units No. 1 and 2 were completed;

— in 2023, fuel was unloaded from the reactor core of Unit No. 1.

D.5.2. Research reactors

Pre-decommissioning efforts are ongoing at RR BR-10 at the IPPE site (Obninsk, Kaluga region). Work is underway to remove and process the liquid metal reactor coolant. Its effective removal is required to reduce radiation risks associated with further dismantling of main reactor structures and contaminated equipment.

Upon completing coolant removal and recycling operations, one may directly proceed with BR-10 decommissioning, namely, to dismantle its main structures and equipment and to complete its decommissioning by 2030.

D.5.3. Production uranium-graphite reactors

The following production uranium-graphite reactors (PUGR) were decommissioned at the MCC site:

— PUGR AD: operations were completed in the out-of-reactor rooms that were backfilled with a barrier material (~9,500 m^3), inter-floor slabs were dismantled (~1,200 m^3), infrastructure facilities were dismantled and a final radiation survey was completed;

— PUGR ADE-1: inter-floor slabs were dismantled (~300 m^3), operations were completed in the out-of-reactor rooms that were backfilled with a barrier material (~2,800 m^3), infrastructure facilities were dismantled and a final radiation survey was completed.

Decommissioning license was issued for ADE-2 PUGR decommissioning at MCC and relevant design documentation was developed.

Figure D.5.1 presents the schedule for PUGR decommissioning in Tomsk region and the Krasnoyarsk Territory.

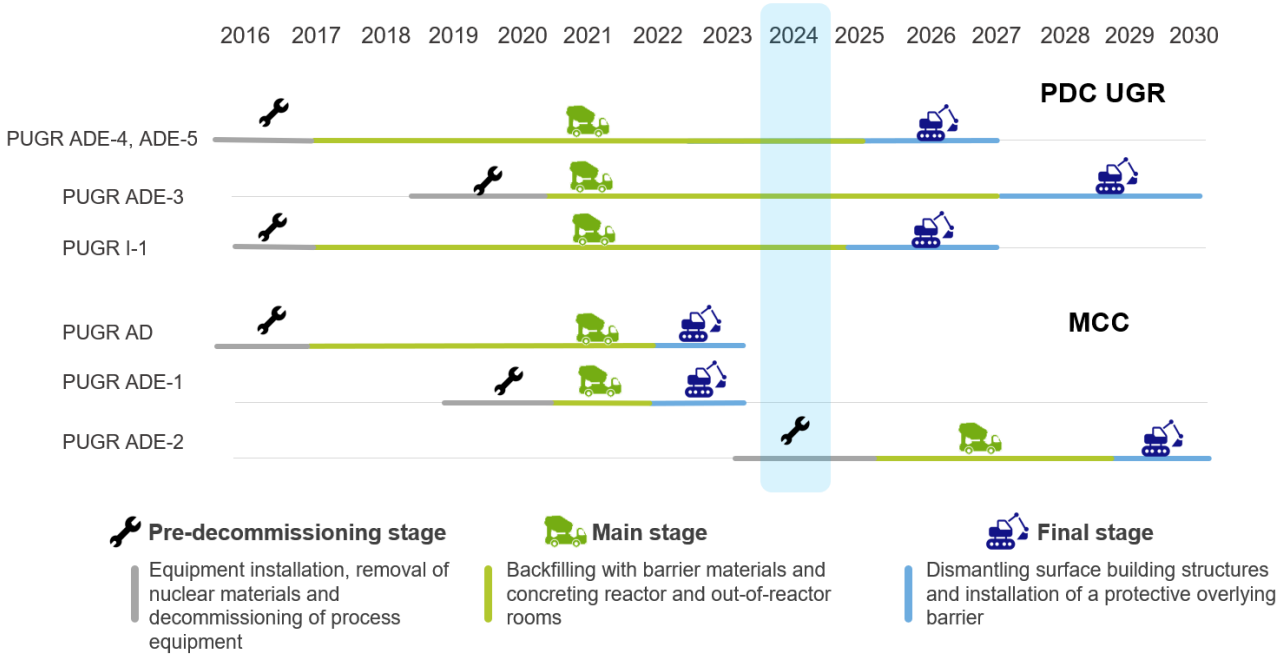


Figure D.5.1 – PUGR decommissioning schedule

D.5.4. Nuclear fuel cycle facilities

In 2020-2023, the following facilities were decommissioned:

— U-5 facility at the VNIINM site;
— building «Zh» at the VNIINM site;
— structures 136, 137, 135a, 135b, 135c, buildings 135, 199, 199a, 145, 121, 131-134, 120/6, 173, 102a, 102c at the site of the radiochemical plant operated by PA Mayak;
— building 4aS at the site of the chemical and metallurgical plant operated by PA Mayak;
— building 401E at the site of the reactor plant operated by PA Mayak.

Pre-decommissioning and decommissioning operations are ongoing at a few facilities, including:

— NF at the radiochemical plant site (SCC);
— NF at the radiochemical plant site (MCC);
— building 802 of the diffusion production (AECC);
— building A, sites No. 2.9 with uranium contamination (VNIINM);
— building 242 (MSZ);
— buildings 1, 2, 2a, 6 at site 1 and buildings A, B, C, D at site 2 (RI);
— RR BR-10 (IPPE);
— buildings 60A, 116A (RISI);
— section of SCC discharge networks extending from the chemical and metallurgical plant to the pressure collectors operated by Seversk Voldokanal JSC (SCC);
— building 233 of the refining production facility (SCC);
— special sewerage sections (SCC);

— building 182 (UECC);
— buildings 17/3, 17/5/ 17b belonging to workshop No. 1 (NCCP);
— building No. 2 at the uranium tetrafluoride production site (CMP);
— nuclear material warehouse, building 242 (CMP);
— facilities No. 120/1, 172, 102, 170, 120/3, 120/2, 120/4, 25/4 operated as part of the radiochemical plant at PA Mayak;
— facilities No. 626, 81A, 18 operated as part of the chemical and metallurgical plant at PA Mayak;
— facilities 992-993 operated by PA Mayak's environmental service;
— radiochemical building No. 8 operated by the Moscow branch of RADON.

D.5.5. Storage facilities

D.5.5.1. Facilities holding non-retrievable RW

Isolation and reconstruction activities are ongoing to upgrade facilities holding non-retrievable RW into disposal facilities, including:
— pool B-1 at SCC;
— pool B-2 at SCC;
— pool B-25 at SCC;
— pulp storage facilities PKh-1, PKh-2 at the site of the radiochemical plant operated by SCC;
— surface SRW storage facilities at site No. 16 belonging to the Chemical and Metallurgical Plant operated by SCC;
— SRW storage facilities No. 757a, 757c, 757d, 781/1 at SCC's site No. 16;
— tailing No. 1 operated by CMP;
— 15 facilities for long-term RW storage operated at the PA Mayak site.

D.5.5.2. Temporary RW storage facilities

Pre-decommissioning and decommissioning operations are ongoing at a few facilities, including:
— RW storage facilities constituting to the complex of structures No. 310 at the AECC site;
— RW storage facilities *Repository No. 1* and *Sludge Field* operated by UECC;
— structure № 21 of the sublimation plant at the SCC site;
— structure № 34 of the sublimation plant at the SCC site;
— a few facilities constituting to RW storage reservoir No. 365 (MCC).

D.5.6. Icebreaker fleet facilities

In 2021, dismantling of the nuclear icebreaker Sibir was completed at the Nerpa shipyard (Snezhnogorsk, Murmansk region).

It took 2 years to dismantle and decontaminate its equipment. The icebreaker is no longer considered as a radiation hazardous facility and was handed over to Atomflot for scrap metal cutting.

D.5.7. Remediation of contaminated territories

Nuclear cleanup operations proceed in parallel with NF decommissioning. In 2020-2023, the following nuclear cleanup operations were completed:

— remediation of contaminated areas as part of U-5 decommissioning at the VNIINM site;

— remediation of contaminated areas as part of efforts implemented to decommission the research building «Zh» at the VNIINM site;

— remediation of a radioactively contaminated site No. 9 at VNIINM with over 3,500 m^2 of contaminated areas that have been remediated under these activities;

— remediation of radioactively contaminated areas within the plant 235 site operated by PA Mayak with a total area of 160,000 m^2.

— remediation of radioactively contaminated areas within the PA Mayak's sanitary protection zone with a total area of 50,000 m^2;

— 500 m^2 radioactively contaminated areas were remediated at the RADON site operated by its Moscow branch, the applied cleanup approach provided minimum RW generation volumes.

D.5.8. Advanced decommissioning technologies

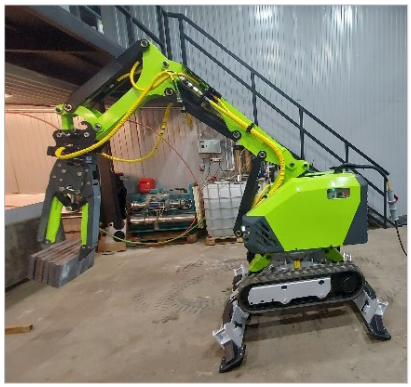
The Russian Federation has all necessary capabilities, expertise and potential enabling the development and production of robotic devices required to address its nuclear decommissioning needs.

Rosenergoatom Concern has scheduled an R&D Program on the Development of a Technology and Corresponding Robotic Complex for the Dismantlement of RBMK-1000 Graphite Stack and its Metal Structures. The R&D program is expected to result in a robotic complex prototype designed to dismantle the graphite stack and the metal structures of the RBMK-1000 reactor unit and also provides for its manufacturing and testing.

The methods being developed provide for some robotic devices designed to cut the absorber parts and bundle screens stored at the Novovoronezh NPP in the PDEC.

For several years, the decommissioning technologies have been tested and refined at a pilot RADON site operated by its Moscow branch. Tests of Russian dismantling robotic complexes with a curb weight of 2.3 – 4.5 tons have been run successfully. The considered selection criteria were based on such factors as successful application in related industries and at relevant pilot facilities and the possibility of their retrofitting with specialized attachments. The tests have demonstrated high performance and functionality of the equipment declared by their manufacturers. Relevant technical parameters required to forecast the costs of decommissioning operations involving such equipment were specified.

ROIN RST R-100



Betonolom-2000

ATLANT 4000

Robotic mobile platforms have been tested under comprehensive nuclear site surveys to evaluate the feasibility of their introduction within KIRO activities.

Mobile platform with xenon gamma detector

Robodog with RC

Small-sized platform Captain

Advanced technologies (spherical photography, laser scanning, etc.) with the measurement results saved in a digital form are going to be implemented under KIRO activities scheduled for Units No. 1, 2 at Kursk NPP.

Section E. Legislative and Regulatory System

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E.1. Implementing measures (Article 18)

> ***Article 18. Implementing Measures***
> *Each Contracting Party shall take, within the framework of its national legislation, its legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.*

With the adoption of the Federal law № 139-FZ On the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management of November 4, 2005 provisions of the Joint Convention became binding for all executive authorities and organizations, including those directly involved in SNF and RW management.

Current legislation of the Russian Federation in the field of SNF and RW management provides compliance with the obligations arising from the Convention.

Furthermore, the Joint Convention provides a background for further improvement of Russian regulatory and legal instruments regulating safe SNF and RW management in compliance with the obligations of the Russian Federation.

E.2. Legislative and regulatory framework (Article 19)

> ***Article 19. Legislative and Regulatory Framework***
> *19-1 Each Contracting Party establishes and maintains a legislative and regulatory framework to ensure the safety of spent fuel and radioactive waste management.*
> *19-2 This legislative and regulatory framework provides for:*
> *I) the establishment of appropriate national safety requirements and regulations for the radiation safety;*
> *II) a system of licensing the activities of spent fuel and radioactive waste management;*
> *III) a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a license;*
> *IV) a system of appropriate administrative and regulating control, documentation and reporting;*
> *V) the enforcement measures to comply with valid regulations and license conditions;*
> *VI) a distinct distribution of responsibilities of the authorities involved in the different steps of spent fuel and of radioactive waste management.*
> *19-3 When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall duly take into account the objectives of this Convention.*

E.2.1. Legislative, legal and normative regulation

The following instruments govern relations in the field of SNF and RW management: Constitution of the Russian Federation, international agreements and conventions (including the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Convention on Nuclear Safety, Vienna Convention on Civil Liability for Nuclear Damage, Convention on Early Notification of a Nuclear Accident, Convention on Physical Protection of Nuclear Materials), federal laws, normative legal acts approved by the President of the Russian Federation and the Government of the Russian Federation, federal norms and rules in the

field of atomic energy use, sanitary rules and radiation safety standards, regulatory provisions issued by state safety regulatory authorities and state management authorities in the field of atomic energy use, state and industry-wide standards and technical regulations.

In keeping with provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, the legislation of the Russian Federation in the field of atomic energy use is based on the Constitution of the Russian Federation, generally recognized principles and norms of international law and international agreements of the Russian Federation governing the use of atomic energy for peaceful and defense purposes.

Constitution of the Russian Federation stipulates that generally recognized principles and norms of international law, which include the above-mentioned Conventions and international agreements of the Russian Federation, form an integral part of its legal framework.

The following federal laws establish the legislative framework for safety regulation in the field of atomic energy use in the Russian Federation:

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;

— Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011;

— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;

— Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996.

Provisions of Federal laws are elaborated based on normative legal acts (by-laws) approved by the President of the Russian Federation and the Government of the Russian Federation in the form of Presidential Decrees and Decrees and Orders of the Government of the Russian Federation.

Safety in the field of atomic energy use is regulated based on federal rules and regulations (FRR) in line with relevant provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995.

According to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, FRR in the field of atomic energy use set forth the requirements for the safe use of atomic energy, including safety requirements for nuclear facilities and activities in the field of atomic energy use, in particular, safety objectives, principles and criteria that shall be observed when performing activities in the field of atomic energy use. FRR are developed and approved according to the procedure established by the Government of the Russian Federation.

Pursuant to provisions of the Federal Law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, namely, Article 8, federal norms and rules regulating RW management activities establish safety requirements for RW management.

FRR provisions shall be abided by all legal entities and private persons implementing activities in the field of atomic energy use and are valid throughout the territory of the Russian Federation.

In keeping with relevant provisions of the Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996, state legal regulation of radiation safety is effectuated through the establishment of sanitary rules, standards, hygienic standards, radiation safety rules, codes of rules, occupational safety rules and other regulations associated with the radiation safety. Sanitary rules, norms and hygienic standards for radiation safety are approved in accordance with a procedure established by the Russian legislation.

Moreover, safety requirements are also established in the guideline papers of state safety regulatory authorities, documents developed by state management authorities in the field of atomic energy use (departmental documents), national and industry-wide standards.

To promote compliance with safety requirements set forth in FRR, the safety regulatory authority approves safety guidelines for atomic energy use (hereinafter, safety guidelines) providing recommendations on the compliance with FRR provisions, including those concerning the applied methods, approaches, expert reviews and safety assessments, as well as clarifications and other recommendations on the compliance with the safety requirements in field of atomic energy use, as well as those discussed in documents on standardization.

Since the presentation of the sixth National Report, some important amendments have been introduced to legal and regulatory instruments, including FRR provisions, as well as technical documents in the field of atomic energy use. The most important amendments are discussed in Section E.2.1.3.

E.2.1.1. Federal laws

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 is considered as a fundamental act regulating relations in the field of atomic energy use in Russia. It specifies the legal framework and the legal principals regulating relations arising from atomic energy use. Its provisions were established to protect the environment, human health, life and property when using the atomic energy; to promote sustainable development of nuclear science and technologies; to contribute to international undertakings assuring safe use of atomic energy.

Key provisions of federal laws, namely, № 170-FZ On Atomic Energy Use of November 21, 1995; № 3-FZ On the Radiation Safety of Population of January 9, 1996; № 184-FZ On Technical Regulation of December 27, 2002; № 7-FZ On the Environmental Protection of January 10, 2002; № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, the Criminal Code of the Russian Federation and the Code of Administrative Violations in their parts regulating relations in the field of atomic energy use were discussed in the fourth, fifth and sixth National Reports of the Russian Federation.

Framework legal acts on SNF and RW management including those adopted in the reporting period are listed in Annex L of the Report.

E.2.1.2. Normative legal acts (by-laws) of the President of the Russian Federation and the Government of the Russian Federation

In furtherance of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 and other federal laws associated with atomic energy use, the President of the Russian Federation and the Government of the Russian Federation adopt relevant normative legal acts (by-laws) in the form of Presidential decrees, as well as Government decrees and orders.

Since the presentation of the sixth National Report, a number of new by-laws concerning the atomic energy use have been issued and a number of amendments have been introduced to already existing regulations of the President and the Government of the Russian Federation:

— Decree of the President of the Russian Federation No. 640 of November 11, 2021 On Amendments to the Decree of the President of the Russian Federation No. 556 On Restructuring the NPGC of the Russian Federation of April 27, 2007;

— Decree of the President of the Russian Federation No. 200 of April 11, 2022 On Amendments to the Decree of the President of the Russian Federation No. 556 On Restructuring the NPGC of the Russian Federation of April 27, 2007 and Decree of the President of the Russian Federation No. 369 On the Steps for the Establishment of the State Atomic Energy Corporation Rosatom of March 20, 2008;

— Decree of the President of the Russian Federation No. 484 of July 3, 2023 On Amendments to the Decree of the President of the Russian Federation No. 556 of April 27, 2007 On Restructuring the NPGC of the Russian Federation and the list of joint-stock companies with shares owned by the federal Government and subject to transfer to the State Atomic Energy Corporation Rosatom as a property contribution to the Russian Federation approved by the Decree of the President of the Russian Federation No. 1534 of November 23, 2011;

— Decree of the President of the Russian Federation No. 25 of January 5, 2024 On Amendments to the Decree of the President of the Russian Federation No. 556 On Restructuring the NPGC of the Russian Federation of April 27, 2007;

— Decrees of the Government of the Russian Federation No. 1705 On Amendments Introduced to Part 1 of the State Program of the Russian Federation NPGC Development in the Russian Federation of September 28, 2022, No. 1017 On Amendments Introduced to the State Program NPGC Development in the Russian Federation and Invalidating p.2 of Amendments Introduced to the State Program NPGC Development in the Russian Federation of June 21, 2023 approved by the Decree of the Government of the Russian Federation N 2525-90 of December 29, 2021 introducing amendments to the State Program (approved by the Government Decree No. 506-12 On the Approved State Program for NPGC Development of June 2, 2014);

— Decree of the Government of the Russian Federation No. 1774 On Introducing Amendments to the Regulation on Arranging the System of State Accounting and Control of Radioactive Materials and Radioactive Waste of October 19, 2021;

— Decree of the Government of the Russian Federation No. 1935 On Amendments to Clause 44 of the Provisions on State Regulation of RW Disposal Tariffs of November 12, 2021;

— Decree of the Government of the Russian Federation No. 2208 On Amendments Introduced to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Invalidating Some Regulations of the Government of the Russian Federation of December 6, 2021;

— Decree of the Government of the Russian Federation No. 2533 On the Approved Rules for Granting the Right to Use a Subsoil Plot for the Construction and Operation of Underground Structures for the Disposal of Radioactive Waste, Production and Consumption Waste of Hazard Classes I and II and Invalidating Certain Regulations of the Government of the Russian Federation and Certain Provisions of Certain Regulations of the Government of the Russian Federation of December 29, 2021;

— Decree of the Government of the Russian Federation No. 661 On Approved Regulation for Arranging and Implementing State Control Over Safe Transportation (Shipment) of Nuclear Material, Radioactive Materials and Relevant Products with the Exception of Nuclear Materials Transferred as Part of Products to the Russian Defense Ministry of April 14, 2022;

— Decree of the Government of the Russian Federation No. 984 On Amendments Introduced to the Regulation on Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations of May 30, 2022;

— Decrees of the Government of the Russian Federation No. 1630 On Amendments to the Regulation on the Development and Approval of Federal Norms and Rules in the Field of Atomic Energy Use of September 16, 2022 and No. 1372 On Amendments Introduced to Clause 21 of the Regulation on the Development and Approval of Federal Norms and Rules in the Field of Atomic Energy Use of August 22, 2023, according to which amendments were introduced to the Regulation on the Development and Approval of Federal Norms and Rules in the Field of Atomic Energy Use (approved by Decree of the Government of the Russian Federation No. 1511 of December 1, 1997 On the Approved Regulation on the Procedure for the Development and Approval of Federal Norms and Rules in the Field of Atomic Energy Use);

— Decree of the Government of the Russian Federation No. 1637 On Amendments Introduced to the Regulation on Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations of September 17, 2022;

— Decree of the Government of the Russian Federation No. 1870 On Introducing Amendments to the List of Operating Organizations Covered by the Federal Law on the Discipline Regulations for Employees of Organizations Operating Particularly Hazardous Radiation and Nuclear Productions and Facilities in the Field of Atomic Energy Use of October 20, 2022;

— Decree of the Government of the Russian Federation No. 227 On the Specific Aspects Associated with Certain Types of Federal State Control (Supervision) Implemented in the Territories of Donetsk People's Republic, Lugansk People's Republic, Zaporozhye region and Kherson region of February 15, 2023;

— Decree of the Government of the Russian Federation No. 2002 On Amendments Introduced to the Government Decree of the Russian Federation № 544 of June 15, 2016 On Specific Aspects Accounted For in the Compliance Assessment of Products that Shall Comply with the Safety Requirements in the Field of Atomic Energy Use, as well as the Processes Associated with Design Development (Including Surveys), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal of the Abovementioned Products of November 28, 2023;

— Decree of the Government of the Russian Federation No. 99 On the Approved Rules for the Development and Establishment of Standards Specifying Permissible Releases and Discharges of Radioactive Substances, as well as the Issuance of Permits for Releases and Discharges of Radioactive Substances of February 2, 2024.

Key regulations of the Government of the Russian Federation effective in this field are listed in Annex L of the Report.

E.2.1.3. Federal norms and rules in the field atomic energy use, sanitary rules and radiation safety standards

Framework FRR, sanitary rules and radiation safety standards establishing safety requirements in SNF and RW management and amendments introduced to them in the reporting period are discussed below.

Framework FRR, sanitary rules and radiation safety standards effective in the considered area are listed in Annex L of the Report.

Federal norms and rules in the field of atomic energy use serve a basis for the legal framework regulating NF safety.

Pursuant to Article 6 of Federal Law No. 170-FZ On Atomic Energy Use of November 21, 1995, FRR are regulatory legal acts establishing requirements for the safe atomic energy use, including safety requirements for nuclear facilities, safety requirements for activities performed in the field of atomic energy use, in particular, safety objectives, principles and criteria that shall be observed when performing activities in the field of atomic energy use.

In keeping with provisions of Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, namely, Article 8, FRR regulating RW management aspects set forth the requirements for the safe RW management, including:

— RW acceptance criteria for disposal;
— requirements for intermediate RW storage;
— safety requirements for siting, construction, operation, decommissioning or closure of RW storage facilities;
— requirements to RW certificates;
— requirements for collection, transportation, storage and disposal of spent sealed sources of ionizing radiation;
— categories of facilities holding non-retrievable RW and isolation facilities for non-retrievable RW;
— safety requirements for facilities holding non-retrievable RW and isolation facilities for non-retrievable RW also accounting for some specific design features of particular SF;
— RW disposal flow chart;
— requirements to the methods implemented to protect the public and the environment against radiation exposure risks associated with RW at all RW management stages;
— design development requirements for RW management facilities, in particular those associated with the comprehensive assessment of their safety and evaluation of as-designed facility;
— requirements regarding the reporting procedure followed by RW management organizations when notifying about incidents associated with RW management;
— requirements regarding the procedure followed to submit the decommissioning plans developed for RW management facilities and their contents;
— requirements to the procedure followed to submit RWDF closure plans and their contents.

Regulation on FRR Development and Approval approved by the Government Decree of the Russian Federation № 1511 of December 1, 1997 stipulates that FRR are developed by state safety regulatory authorities and/or management authorities in the field of atomic energy use in accordance with their competences.

Regulation on the Federal Service for Environmental, Technological and Nuclear Supervision approved by the Government Decree of the Russian Federation № 401 of July 30, 2004 states that Rostechnadzor acting as safety regulator in the field of atomic energy use shall adopt on its own authority regulatory legal acts in the considered field of activity, including FRR.

FRR are developed based on by-laws of the Russian Federation, provisions of the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and pursuant to relevant recommendations provided by those international agencies, which the Russian Federation is party to.

The established procedure provides for preliminary publication of the above-mentioned norms and rules in official press (unless these norms and rules in the field of atomic energy use constitute a state secret) and opportunities for their public discussion.

FRR provisions account for the recommendations provided by those international agencies, which the Russian Federation is party to.

Upon being enacted, FRR are recognized as binding for any entity performing activities in the field of atomic energy use and are effective throughout the territory of the Russian Federation.

Requirement 33 of the IAEA Safety Standards GSR Part 1 Governmental, Legal and Regulatory Framework for Safety states that regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration of relevant international safety standards and technical standards and relevant experience gained.

Rostechnadzor's activities focused on legal framework upgrading are performed in accordance with the Concept for Enhancing the Legal Framework for Safety Regulation and Standardization in the Field of Atomic Energy Use (hereinafter, the Concept). Activities implemented under the Concept shall increase the efficiency of functions associated with the development and implementation of the state policy in the field of nuclear safety regulation and provide efficiency and high performance of measures specified in relevant provisions of the State Policy Fundamentals in the Field of Nuclear and Radiation Safety of the Russian Federation for the period of up to 2025 and beyond.

To achieve these goals, continuous efforts have been put in place to improve the legal framework regulating safety in the field of atomic energy use. To ensure the completeness of safety requirements for nuclear facilities and different types of activities in this area, FRR system has been updated with some new regulations adopted and certain amendments and additions introduced to current regulations.

FRR updating is performed with due account of:

— provisions of international regulations ratified by the Russian Federation, papers issued by IAEA, OECD Nuclear Energy Agency and the Eurasian Economic Union;

— requirements set forth by the legal framework of the Russian Federation;

— reports on the law enforcement practice implemented by Rostechnadzor's Interregional Territorial Departments Supervising Nuclear and Radiation Safety;

— state-of-art in science and technologies associated with the areas regulated by relevant FRR;

— investigated accidents and incidents at nuclear facilities in Russia and abroad caused by violations of requirements set forth in relevant FRR or similar international and foreign instruments;

— experience gained from accomplished safety reviews.

To date, the system of federal rules and norms in the field of atomic energy use involves over 100 documents, the requirements of which apply to such nuclear facilities as nuclear power plants, research nuclear facilities, nuclear fuel cycle facilities, RM, NM and RW storage facilities, RW disposal facilities, nuclear installations of ships, radiation sources, spacecrafts fitted with nuclear units.

General provisions on NF safety (NP-001-15, NP-016-05, NP-038-16, NP-033-11) set forth principles, criteria and general requirements for nuclear and radiation safety of nuclear facilities (NPP, NFC facilities, radiation sources, NM and RW storage facilities, research installations and etc.) at all stages of NF life cycle (siting, construction, commissioning, operation, decommissioning, including accidents, mitigation of their consequences and SNF and RW management).

Safety issues considered specific for SNF reprocessing facilities are regulated by FRR **Spent Nuclear Fuel Reprocessing Facilities. Safety Requirements (NP-013-99)**. NP-013-99 establishes safety principles, criteria and requirements for design development, construction and operation of SNF reprocessing facilities (SNF from power and research reactors, propulsion transport installations).

Safety issues considered specific for dry SNF storage facilities are regulated by FRR **Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements (NP-035-02**). NP-035-02 establishes safety requirements for design development, construction, operation and decommissioning of dry SNF storage facilities at NFC enterprises.

FRR on **Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities (NP-064-17)** set forth the requirements on the accounting of external natural and man-induced impacts at NF siting, design development, construction, operation and decommissioning stages. NP-064-17 includes a list of natural and man-induced features, events and processes that shall be identified at the exploration and research stages within the area and at the site proposed for NF construction and accounted for to demonstrate its safety and stability.

Requirements to Quality Assurance Programs for Nuclear Facilities (NP-090-11) specify the requirements concerning the structure and the contents of quality assurance programs for NI, RS, SF and SNF and RW management at all stages of NF life cycle.

Regulations on the procedures for investigating and accounting violations (NP-004-08, NP-027-10, NP-047-11, NP-014-16, NP-088-11) specify the procedures followed to investigate and account for NF operational disorders, categories of such disorders, information content and the procedure for its reporting, as well as the reporting requirements.

Requirements on the contents of action plans for personnel protection in the event of accidents (NP-015-12, NP-075-19, NP-077-06, etc.) specify general requirements to the development of action plans aimed at personnel protection in the event of accidents at different NI, RS, SF, the procedure for their implementation, relevant arrangements for personnel protection in the event of accidents, human actions (personnel and administration) under abnormal operation and the response measures.

Requirements to the studies supporting safe NF design lifetime extension (NP-017-18, NP-024-2000) set forth the main criteria and safety requirements that shall be met to extend the initially designated NF operating lifetime and to obtain the corresponding operating license.

Rules for the safe decommissioning of nuclear facilities (NP-057-17, NP-012-16, NP-028-16, NP-091-14 and etc.) specify safety requirements for NF decommissioning, relevant decommissioning programs, comprehensive engineering and radiation surveys and the decommissioning designs.

Requirements to the Safe Decommissioning of Radioactive Waste Storage Facilities (NP- 097-16) specify safety provisions for SF decommissioning at each stage of their life cycle.

Safety requirements for the predisposal RW management (NP-002-15, NP-019-15, NP-020-15, NP-021-15) specify safety requirements for collection, processing, storage and conditioning of liquid, solid and gaseous RW at NPP and other NF.

RW Management Safety. General Provisions (NP-058-14) specify safety objectives, principles and general safety requirements for RW management, including the requirements for Retrievable and non-retrievable RW management.

Radioactive Waste Disposal. Principles, Criteria and General Safety Requirements (NP-055-14) set forth objectives, principles, criteria and general safety requirements for RW disposal.

Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14) specify safety requirements for near-surface RW disposal facilities, namely, concerning their design development, construction, operation and closure.

Safety Requirements for Facilities Holding Non-retrievable RW and Isolation Facilities for Non-retrievable RW (NP-103-17) establish the categories of facilities holding non-retrievable RW and isolation facilities for non-retrievable RW, as well as the requirements that shall be followed to upgrade the former ones to isolation facilities for non-retrievable RW and/or RW disposal facilities. Furthermore, the FRR sets forth safety requirements for various categories of facilities holding non-retrievable RW and isolation facilities for non-retrievable RW (LRW storage reservoirs and tailings, SRW storage facilities, sites contaminated due to peaceful nuclear explosions, etc.).

In 2022, amendments introduced to the federal rules and regulations in the field of atomic energy use, namely, **Safety in Radioactive Waste Management. General Provisions (NP-058-14), Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14), Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14), Safety Requirements for Facilities Holding Non-retrievable RW and Isolation Facilities for Non-retrievable RW (NP-103-17)** addressing specifically the management of RW generated from uranium mining operations, as well as from activities not related to atomic energy use associated with mining and milling of mineral and organic raw materials high in natural radionuclides were enacted.

RW Acceptance Criteria for Disposal (NP-093-14) set forth general RW acceptance criteria for disposal, requirements on the establishment of RW acceptance criteria for specific RW disposal facilities, requirements regarding the validation of RW conformity with the specified RW acceptance criteria, requirements to provisions of RW certificates issued for waste transferred for disposal. Since the presentation of the sixth

National Report of the Russian Federation, the FRR provisions have been upgraded to improve the legal framework regulating safety in the field of atomic energy use, namely, the requirements for the safe disposal of RW generated from mining and milling of uranium ores, as well as mineral and organic raw materials high in naturally occurring radionuclides, in particular:

— safety requirements for tailings intended for such RW disposal were elaborated;

— general waste acceptance criteria for RW Class 6 (unpackaged) generated from mining and milling of mineral and organic raw materials high in naturally occurring radionuclides were established.

NP-093-14 requirements were refined to respond to further deployment of the Unified State System for RW Management, namely, the practical efforts required to upgrade facilities holding non-retrievable RW to RW disposal facilities. Amendments to NP-093-14 are believed to provide safe disposal of RW containing naturally occurring radionuclides including those generated due mining and milling of rare earth metal ores.

Basic Rules for Accounting and Control of Nuclear Material and Radioactive Waste in Organizations (NP-067-16) set forth the requirements for accounting and control of RM, special non-nuclear material, NM, unless the NM is accounted for exclusively under the state system for NM accounting and control, and RW in organizations managing RM and RW.

Rules to Define Nuclear Material as Radioactive Material or Radioactive Waste (NP-072-23) specify the requirements that shall be met to categorize nuclear material available in the form of elementary substances or compounds, mixtures, alloys, items, accounting units containing NM registered under the State System for Accounting and Control of NM, as RM or RW.

Rules for the Safe Transportation of Radioactive Material (NP-053-16) establish safety requirements to the transportation of radioactive material (including RW and SNF), the requirements to operations and conditions associated with RM movement and constituting to this process (design development, manufacturing, maintenance and repair of transportation casks; preparation, loading, forwarding, transport, including temporary (transit) storage; unloading and receipt of RM and packages at the terminal destination).

Requirements for the Safe Storage of Radioactive Material (NP-061-05) specify basic engineering and managerial requirements to the systems designed to provide safe NM, RM and RW storage, including SNF storage, at NF.

Requirements to safety analysis reports on nuclear facilities (NP-006-16, NP-018-05, NP-049-17, NP-051-04, NP-023-2000, NP-066-05) set forth the requirements to the procedure followed in the development of safety analysis reports considering different types of NF, their layout, typical structure providing system description, as well as the contents of their individual sections.

In 2022, **Rules for the Safe Transportation of Radioactive Material at Nuclear Facilities (NP-025-22)** were approved. NP-025-22 establish safety requirements for onsite transportation (load movement outside industrial buildings and structures

excluding public transport routes, also as part of operations and work related to the movement involving preparation, loading, dispatch, unloading and acceptance) of radioactive material containing radionuclides the specific activity and total activity levels of which exceed those specified in paragraphs 1–7 of Appendix No. 2 to the federal rules and regulations in the field of atomic energy use Rules for the Safe Transportation of Radioactive Material (NP-053-16) with the exception of materials specified in NP-053-16, namely, paragraph 1.1.5, subparagraphs *a* - *e*, nuclear fuel, spent nuclear fuel, nuclear reactor fuel assemblies, nuclear reactor SFA and fuel elements. NP-025-22 provisions are not applied to onsite transportation of radioactive material by pipeline transport and the transportation of radioactive material within industrial buildings and structures, as well as to activities associated with the development, manufacturing, testing, operation and disposition of nuclear weapons and military nuclear power facilities.

In 2022, **Container-type Spent Nuclear Fuel Storage Facilities. Safety Requirements (NP-039-22)** were approved establishing safety requirements for SNF container storage facilities at designed development, siting, construction, operational and decommissioning stages. NP-039-22 requirements shall be observed by operating organizations, as well as organizations performing operations and providing services in the field of atomic energy use associated with container engineering, design development, siting, construction, operation and decommissioning of SNF container-type storage facilities.

Exhaustive list of federal rules and regulations is presented in Annex L of the Report.

Article 9 of the Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996 stipulates that state regulatory standardization in the field of radiation safety is provided through the adoption of sanitary rules, norms, hygienic standards, radiation safety rules, codes of rules, occupational safety and health rules and other regulations addressing the radiation safety.

Pursuant to the Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996, Federal Service for the Oversight of Consumer Protection and Welfare is authorized to develop and approve the sanitary rules.

Provisions of the Federal law № 52-FZ On the Sanitary and Epidemiological Welfare of Population establish the binding nature of sanitary rules for individuals, individual entrepreneurs and legal entities. By-laws concerning sanitary and epidemiologic welfare of population approved by federal executive authorities, executive authorities of constituent entities of the Russian Federation and local authorities, as well as relevant decisions made by legal entities, state standards, building standards and rules, occupational safety and health rules, veterinary and phytosanitary rules shall not contravene the sanitary rules.

State sanitary and epidemiological rules, norms and hygienic standards approved by the RF Chief Public Health Official specify the safety and (or) harmlessness criteria of certain environmental factors for public and the mandatory requirements the non-compliance with which may endanger human life or health.

Basically, there are three fundamental sanitary regulations establishing general radiation safety provisions for the population of the Russian Federation:

— SanPiN 2.6.1.2523-09 Radiation Safety Standards (NRB-99/2009);
— SP 2.6.1.2612-10 Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);
— SanPiN 2.6.1.1281-03 Sanitary Rules for the Radiation Safety of Personnel and Public During Transportation of Radioactive Material (Substances).

Provisions of these sanitary rules and standards were discussed in the fourth National Report of the Russian Federation.

E.2.1.4. Guideline documents and safety guides in the field of atomic energy use

Safety guides for atomic energy use are developed, approved and enacted to promote compliance with the requirements set forth in federal rules and regulations in the field of atomic energy use. Safety guides involve relevant recommendations concerning the compliance with the requirements of federal rules and regulations in the field of atomic energy use, including:

— methods used to perform certain activities;
— expert reviews and safety assessments;
— clarifications and other recommendations on meeting safety requirements in the field of atomic energy use.

Provisions of safety guides are developed based on the experience from past FRR enforcement practices, as well as recommendations provided by those international agencies, which the Russian Federation is party to.

Rostechnadzor is also responsible for updating and revising the existing system of safety guides. In 2020, to enhance the system of the safety guides, Rostechnadzor approved a Strategic Plan for Updating Safety Guide Framework in the Field of Atomic Energy Use in 2020 – 2025 seeking to improve the Rostechnadzor's legal framework in the field of atomic energy use.

Safety guides involving recommendations on the safe SNF and RW management are listed in Annex L of the Report.

Guideline documents set forth procedural standards establishing relevant rules and procedures for operations performed in different fields of activities supervised by Rostechnadzor.

Guideline documents and administrative regulations, in particular, specify the requirements to document portfolios required to demonstrate the safety of NI, RS and SNF and RW storage facilities, requirements regarding their contents, the procedure applied to verify the data presented in license applications, as well as the procedure for NRS expert reviews.

Rostechnadzor's administrative regulations are developed and approved in accordance with the rules specified in the Government decree of the Russian Federation

№ 373 On the Development and Approval of Administrative Regulations on the State Functions and Administrative Regulations for State Service Supply of May 16, 2011.

Rostechnadzor's guideline documents are listed in Annex L of the Report.

E.2.2. Licensing activities in the field of spent nuclear fuel and radioactive waste management (Article 19-2 (ii, iii))

Article 26 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 specifies the types of activities in the field of atomic energy use subject to licensing by state safety regulatory authorities that cannot be implemented without an appropriate license.

Article 14.1 of the RF Code on Administrative Violations declares that implementation of activities without appropriate licenses, if such licenses are mandatory, shall result in administrative fines imposed on citizens, officials, legal entities.

Article 171 of the Criminal Code of the Russian Federation provides for a criminal punishment for those implementing activities without proper licenses, if such licenses are required.

Licensing conditions and procedures followed in the field of atomic energy use are specified in the Regulation on Licensing Activities in the Field of Atomic Energy Use № 280 approved by the Government decree of the Russian Federation of March 29, 2013.

The following activities fall under the scope of the Convention:

— siting, construction, operation and decommissioning of NI, RS, NM, RM and RW storage facilities;

— closure of RW disposal facilities;

— NM and RM management, including milling and mining of uranium ores, production, application, processing, transportation and storage of NM and RM;

— management of RW during its storage, processing, transportation and disposal;

— use of NM and/or RM in R&D;

— design development and engineering of NI, RS, NM, RM and RW storage facilities;

— engineering and manufacturing of equipment for NI, RS, NM, RM and RW storage facilities;

— expert review of design documentation, engineering and process flow documentation and documents demonstrating NRS of NI, RS, NM, RM and RW storage facilities, as well as NM, RM and RW management activities.

Rostechnadzor is the authority responsible for licensing activities in the field of atomic energy use (Government decree of the Russian Federation № 401 of July 30, 2004).

Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Provision of its State Service on Licensing Activities in the Field of Atomic Energy Use approved by Rostechnadzor's order № 453 of October 8, 2014 (hereinafter Administrative Regulation) specifies relevant procedures followed by

Rostechnadzor when providing its state licensing services in the field of atomic energy use.

Administrative regulation specifies relevant timeframes, organizational and procedural matters (administrative procedures and operational sequences) that Rostechnadzor and its territorial bodies shall comply with. These regulations also elaborate on the coordination mechanisms between Rostechnadzor's central and territorial bodies, their officials, as well as Rostechnadzor's interaction with applicants/licensees, other state authorities and organizations involved in the licensing process. The following matters are also discussed in this regulation: maximum duration of license application reviews, requirements concerning the structure of submitted document portfolios demonstrating nuclear and radiation safety at NI, RS, and SF siting, construction, operational and decommissioning (closure) stages.

License applications are reviewed by Rostechnadzor. The process involves preliminary review of all required documents attached to the application, compliance verification of the submitted documents with the submission guidelines established under relevant legislative provisions of the Russian Federation. The review process includes credibility assessment of data presented in these documents.

The following aspects shall be evaluated by Rostechnadzor when reviewing a license application:

— compliance of design and engineering solutions and methods with relevant legislative provisions of the Russian Federation and requirements specified in federal rules and regulations established in the field of atomic energy use, as well as the compliance with the requirements set for the safe RW management when implementing the declared activity subject to licensing;

— comprehensiveness of technical and administrative arrangements provided to ensure nuclear and radiation safety when implementing the declared activity subject to licensing;

— compliance with the requirements for safe storage and proper accounting and control of NM, RM and RW, physical protection of NI, RS, as well as NM, RM and RW storage facilities, availability of action plans on the protection of NF employees and the public in the event of accidents and preparedness to their implementation, as well as availability of an adequate quality assurance system and necessary technical and engineering support for the declared activity;

— ability of the applicant to ensure adequate conditions for the safe implementation of the declared activities subject to licensing, to ensure safety of the nuclear facility and implemented activities provided that the quality of performed activities and supplied services complies with relevant provisions set forth in federal rules and regulations in the field of atomic energy use;

— availability of necessary resources and preparedness to the mitigation of emergencies associated with possible nuclear and radiation accidents at the nuclear facility;

— ability of the applicant to ensure safe completion of the declared activity subject to licensing and safe NF decommissioning (RWDF closure), as well as availability of appropriate design materials.

During the review of documents demonstrating safety of a nuclear facility and (or) type of activity subject to licensing, Rostechnadzor evaluates the credibility of data presented in these documents that may be judged in two ways:

— an expert safety review of the nuclear facility and (or) activity subject to licensing (safety case review);

— an evaluation of the applicant and inspection at the facility that is expected to be involved in the declared activity subject to licensing.

In keeping with annex to the Administrative regulation, licenses for siting, construction, operation and decommissioning of buildings/structures having regional importance and designed for RW storage and RW management activities shall be issued by interregional Rostechnadzor territorial authorities. Operations associated with siting, construction, operation and decommissioning (RWDF closure) of SNF storage facilities, as well as structures designed for RW storage of interregional importance, and RW disposal facilities (irrespective of RWDF status) shall be licensed by Rostechnadzor's central authorities.

Positive statement of the state environmental assessment is an essential condition for acquiring SNF and RW management licenses.

If previously unknown circumstances associated with the safety of already licensed activities are revealed or new normative legal acts in the field of atomic energy use are adopted, including new federal rules and regulations, the licensing authority may require some additional documents from the applicant to demonstrate the adequate safety level of the corresponding NF and (or) activities subject to licensing and make a decision on amending the conditions of already issued licenses. Such amendments to license conditions based on the above reasons may be introduced upon licensee's application.

E.2.3. System of administrative and regulating control, documentation and reporting (Article 19-2 (iv))

E.2.3.1. Administrative control

Administrative control over SNF and RW management activities, documentation maintenance and relevant reporting is executed by the management bodies in the field of atomic energy use and operating organizations in accordance with the assigned responsibilities.

Operating organization is an organization established under the legislation of the Russian Federation, recognized by relevant state management body in the field of atomic energy use following a procedure and under the conditions specified by the Government of the Russian Federation as being able to operate a NI, RS or SF and to perform, on its own or by subcontracting other organizations, activities associated with siting, design development, construction, operation and decommissioning of NI, RS or SF, closure of RW disposal facilities, as well as NM and RM management.

At the same time, management bodies in the field of atomic energy use and operating organizations have some common functions, which are as follows:

— planning, arranging and performing inspections;

— development of industry-wide norms, rules, safety requirements;

— evaluation of plans, inconsistencies and violations, development of recommendations;

— engagement in the permit issuance process and its management;

— arranging personnel training and certification;

— implementation of R&D and introduction of their findings.

Article 35 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that operating organization shall develop and implement activities to maintain NI, RS or SF safety. If necessary, it can establish special services tasked with certain safety control arrangements. The operator shall also provide information on the safety of relevant NI, RS or SF to the state safety regulatory authorities.

Conditions of licenses issued by the state safety regulatory authority stipulate that the operating organization shall take appropriate steps to ensure that control, inspections and testing of safety important equipment and systems are implemented in accordance with the established procedures and schedules.

If the operating organization fails to provide safety, a competent management authority in the field of atomic energy use becomes responsible for the safe and proper management of such facilities until a new operating organization is established.

E.2.3.2. Regulating control

State safety supervision in the field of atomic energy use involves efforts of state safety regulatory authorities and their regional bodies focused on acquisition and analysis of safety-important information, arranging for and performing inspections, relevant decision-making and imposing sanctions if non-compliances with the safety requirements applied in the field of atomic energy use are revealed. By virtue of its authority, Rostechnadzor approved and enacted Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Provision of its State Function Associated with Federal State Supervision in the Field of Atomic Energy Use (Rostechnadzor's decree № 248 of June 7, 2013), as well as other guiding Rostechnadzor documents specifying inspection procedures and the issues considered under such inspections.

Government decree of the Russian Federation № 401 of July 30, 2004 stipulates that Rostechnadzor shall provide control and supervision over:

— compliance with rules and regulations in the field of atomic energy use, as well as with the conditions of permits (licenses) authorizing certain activities in the field of atomic energy use;

— nuclear, radiation and engineering safety (at nuclear facilities);

— physical protection of NI, RS and SF, state systems for integrated NM, RM and RW accounting and control;

— compliance with international obligations of the Russian Federation associated with the safe use of atomic energy;

— observance (within the scope of its competence) of SNF and RW management requirements established by the Russian legal framework;

— timely return of spent fuel assemblies removed from nuclear reactors and their reprocessing by-products to the State of origin having an international agreement with the Russian Federation providing for such SFA import to the Russian Federation for the purposes of their temporary storage and (or) reprocessing given that the by-products from their reprocessing are returned back to the State of origin (within the scope of Rostechnadzor's competence).

Inspection departments have been established within the structure of Rostechnadzor's interregional territorial authorities implementing federal state supervision in organizations and at enterprises of the nuclear sector. These departments are staffed with inspectors having necessary competences in the appropriate areas of expertise and authorized by the state to supervise the safety of all NI, RS and SNF and RW SF on a regular basis.

On a yearly basis, Rostechnadzor and its territorial bodies draw up plans for scheduled inspections. Comprehensive inspections are carried out by commissions engaging officials from Rostechnadzor's central office and its territorial bodies. Targeted inspections are performed by officials or commissions involving officials from Rostechnadzor's central office or its territorial authority. These can be both field and documentary inspections performed either in a planned or unscheduled manner.

Federal Service for the Oversight of Consumer Protection and Welfare implementing the functions of a federal state sanitary and epidemiologic supervision body and its authorities supervise the compliance of activities performed with the requirements set forth in sanitary and hygienic standards and rules, including those associated with the radiation safety. They issue statements on the compliance of SNF and RW management facilities or conveyances with the requirements of sanitary standards and rules.

Article 3 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that items containing or applying NM and RM in quantities and with the activity levels and/or emitting ionizing radiation with the intensity or energy less than the values established in the federal rules and regulations effective in the field of atomic energy use shall not be covered by this law. Thus, they are exempted from the safety regulations effective in the field of atomic energy use.

The procedure and criteria for exempting activities from regulatory control are set forth in the Radiation Safety Standards NRB-99/2009 and the Basic Sanitary Rules of Radiation Safety OSPORB 99/2010.

It should be noted that the requirements set forth in the Sanitary Rules do not cover ionizing radiation sources (as well as relevant activities) meeting the following requirements under any management conditions:

— individual annual effective dose is less than 10 μSv;

— collective annual effective dose is either less than 1 manSv or greater than 1 manSv if its further reduction is not considered feasible in accordance with the optimization principle;

— individual annual equivalent skin dose is less than 50 mSv and the one in a lens of an eye is less than 15 mSv.

Provisions of OSPORB-99/2010 specify criteria providing for the exemption of solid materials from regulatory control. Expected individual annual effective radiation dose is considered as a criterion for decision making on the possible use of raw materials, materials and items containing radionuclides in economic activities: this dose shall be less than 10 μSv considering the planned type of their use. According to paragraph 3.11.3 of OSPORB-99/2010, no restrictions are imposed in the economic sector on the use of any material, raw material and items if the corresponding specific activity of man-made radionuclides is less than the values provided in Annex 3 of OSPORB-99/2010.

E.2.3.3. Documentation and reporting

According to relevant provisions of federal rules and regulations in the field of atomic energy use, operating organization shall prepare periodic reports discussing NF safety and submit them for review to state safety regulatory authority and state management authority in the field of atomic energy use. These reports shall provide information on:

— nuclear and radiation safety;
— RM discharges and releases, SNF and RW management;
— personnel training and issued work permits;
— emergency preparedness;
— abnormal operation and its consequences.

Information on violations shall involve an evaluation discussing why and how the safety requirements were breached, the efficiency of arrangements implemented by the operating organizations to avoid the reoccurrence of such violations in the future, causes and conditions of these violations.

Rostechnadzor establishes the reporting procedures put in place in case of operational disorders and the procedures followed when submitting NF safety reports to Rostechnadzor and its territorial authorities.

All submitted information and NF safety reports shall be registered and reviewed by authorized departments of the Rostechnadzor's central office and its regional authorities.

Categories of violations, relevant reporting contents and procedures, the procedure for investigating and accounting such violations, as well as the reporting requirements are established in relevant FRR provisions.

Operating organization shall keep design documentation and all relevant records on construction, maintenance and repair of safety-important systems (components) and investigation files providing information on any violations identified all through the NF operating lifetime.

If some amendments that may potentially affect nuclear and radiation safety are introduced to design, engineering, process flow and operational documentation, relevant materials on introduced amendments that may require alterations of license conditions shall be submitted by the license holder (operating organization) together with the revised safety documentation (reports, supplements to reports and etc.) to Rostechnadzor for further review; following the review Rostechnadzor decides about the necessary changes to be introduced to license conditions.

E.2.4. Enforcement measures to comply with valid regulations and license conditions (Article 19-2(v))

Pursuant to provision of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, state safety regulatory authorities are entitled to apply administrative enforcement measures within their competence according to the procedure established by the legislation of the Russian Federation.

According to the in-force legislation of the Russian Federation and the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service, its officials are authorized to implement the following measures of administrative enforcement (sanctions):

— to suspend or terminate licenses issued by Rostechnadzor and its territorial authorities to organizations (legal entities) for the declared types of activities in the field of atomic energy use, if nuclear and radiation safety requirements or license conditions were breached when performing relevant activities;

— to prohibit the use of equipment and methods not complying with nuclear and radiation safety requirements;

— to issue orders on corrective actions if certain provisions of federal rules and regulations in the field of atomic energy use were breached, and to disqualify the personnel according to the Code of Administrative Violations;

— to impose administrative penalties on organizations (legal entities) and officials employed at relevant facilities such as warnings and fines for violated rules and regulations in the field of atomic energy use;

— to communicate to law enforcement authorities the information revealing the violations of the Russian legal framework in the field of atomic energy use, relevant provisions of federal rules and regulations in the field of atomic energy use, conditions of issued licenses (permits) containing evidence of crime according to the criminal legislation of the Russian Federation.

Rostechnadzor may suspend or cancel already issued licenses in the following cases:

— the license holder commits a gross violation of license conditions discovered in the course of an inspection performed under federal state supervision in the field of atomic energy use;

— the license holder fails to present findings of a periodic safety assessment upon the expiration of a 10-year period set for NI or SF operation or fails to observe proper timing;

— findings of a periodic safety assessment performed for a NI or SF show that the safety of the activity subject to licensing, NI, SF and (or) conducted operations is not provided and no proper documentary safety evidence is provided;

— the license holder fails to comply with the order issued to rectify the identified violations of the license conditions;

— the permit recognizing the organization as able to operate a NI, RS or SF, to perform siting, design development, construction, operation and decommissioning of NI, RS or SF, disposal facility closure, as well as to manage NM, RM and RW using its own resources or subcontracting other organizations, was terminated.

The Code of Administrative Violations of the Russian Federation stipulates that an administrative fine shall be imposed on individuals, officials and legal entities if they fail to carry out legal orders or claims of officials representing state supervision authorities or obstruct them from performing their duties, as well as if the declared activity is carried out in violation of corresponding license conditions. The Code also envisages administrative suspension of relevant activities for the time of up to 90 days either if there's a threat to human life or health or it may result in a radiation accident, man-induced disaster or cause substantial damage to the environment.

E.2.5. Distribution of responsibilities of the authorities involved in the different steps of SNF and RW management (Article 19-2 (vi))

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 sets forth the principles of legal regulation in the field of atomic energy use. The law specifies the powers, rights and responsibilities of different parties engaged in the legal regulation of atomic energy uses; it also specifies the responsibilities and obligations of operating organizations for the safety of NI, RS and SF.

Relevant provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 state that management authorities in the field of atomic energy use are authorized in particular:

— to implement state scientific, technical, investment and structural policy in the field of atomic energy use;

— to develop safety measures in the field of atomic energy use;

— to establish and implement RW management programs.

Pursuant to the Government decree of the Russian Federation № 412 On Federal Executive Authorities and Authorized Organizations Exercising State Management and State Regulation of Safety in the Field of Atomic Energy Use of July 3, 2006, the following institutions are recognized as state management authorities in the field of atomic energy use:

— State Atomic Energy Corporation Rosatom (State Corporation Rosatom);

— Ministry of Industry and Trade of the Russian Federation (Minpromtorg of Russia);

— Ministry of Healthcare of the Russian Federation (Minzdravsocrazvitiya of Russia);

— Ministry of Energy of the Russian Federation (Minenergo of Russia);

— Ministry of Higher Education and Science of the Russian Federation (Minobrnauki of Russia);

— Federal Agency for Subsoil Use (Rosnedra);

— Federal Agency for Technical Regulation and Metrology (Rosstandart);

— Federal Agency for Marine and River Transport (Rosmorrechflot);

— Federal Medical and Biological Agency (FMBA of Russia).

Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 regulates the status and the powers of different parties engaged in RW management, specifies the ownership rights over RW and RW disposal facilities, as well as the procedure for the cession of rights from one party to another. The Federal law sets forth:

— powers of the Government of the Russian Federation in the field of RW management;

— powers of federal executive authorities in the field of RW management;

— powers of state authorities in the constituent entities of the Russian Federation, powers of local authorities in the field of RW management;

— powers and function of the state management authority in the field of RW management;

— powers and functions of state safety regulatory bodies in the field of RW management;

— powers of the National Operator for RW Management;

— general requirements to organizations generating RW.

Government decree of the Russian Federation № 384-r On the National Operator for Radioactive Waste Management of March 20, 2012 recognized the Federal State Unitary Enterprise National Operator for RW Management (Moscow) – NO RAO as the national operator for RW management in Russia.

According to the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, the National Operator:

— provides safe management of RW that it accepts for disposal;

— provides safe operation and closure of RW disposal facilities;

— acts as customer for design development and construction of RW disposal facilities;

— forecasts the expected RW inventories subject to disposal and the development needs as regards the required RW management infrastructure, it also posts relevant information on its web-site and the web-site of the state management authority in the field of RW management;

— provides technical and information support to the state service for RM and RW accounting and control;

— implements other activities in line with the legal framework of the Russian Federation.

National Operator for RW management:

— shall accept RW for disposal. The waste accepted for disposal shall comply with the established acceptance criteria, and relevant disposal costs shall be covered. When the National Operator accepts waste for disposal, waste transfer and acceptance act is drawn;

— when the RW is transferred to the National Operator by organizations not pertaining to those operating particularly hazardous nuclear and radiation productions and facilities, it shall divert some funds coming from such organizations to a special reserve fund. The procedure for making such deductions is established by the Government of the Russian Federation;

— shall provide nuclear, radiation, engineering and fire safety, environmental protection and comply with legal provisions regulating sanitary and epidemiologic welfare of public at operational, closure and post-closure stages of disposal facilities;

— shall implement radiation control at RW disposal sites, including periodic radiation monitoring at the post-closure stage;

— shall provide information on its own activities when requested by members of public, legal entities, including nonprofit organizations, state authorities, other state bodies and local authorities, unless the legislation of the Russian Federation recognizes it as a state secret;

— inform public, state authorities, other state bodies and local authorities on RW management safety and radiation environment at RW storage sites operated by NO RAO.

Pursuant to Article 20 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, NO RAO is responsible for RW acceptance for disposal. Currently, NO RAO's structure involves a central office and its branches in regions with operating DWIF LRW, namely:

— Zheleznogorsk (Zheleznogorsk, Krasnoyarsk Region);

— Seversk (Seversk, Tomsk region);

— Dimitrovgrad (Dimitrovgrad, Ulyanovsk Region);

— Ozersk (Ozersk, Chelyabinsk Region);

— Novouralsk branch (Novouralsk, Sverdlovsk Region) pertaining to the Seversk division.

The state system for RM and RW accounting and control was established in the Russian Federation (SGUK RV and RAO) pursuant to Article 22 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995.

The system is designed to identify the stocked RM and RW inventories kept at industrial sites, in storage facilities and repositories; prevent their losses, unauthorized use and thefts; provide information concerning RM and RW stocks, their transportation, export and import to state authorities, state management authorities in the field of atomic energy use and state safety regulatory authorities.

Under the SGUK RV and RAO, the State Corporation Rosatom exercises its functions of a management body both at federal and institutional levels.

SGUK RV and RAO shall:

— ensure RM and RW accounting and control at the federal level;

— provide collection and evaluation of information concerning RM and RW accounting and control at regional and institutional levels;

— maintain data bases on the national RW inventory, RW storage and disposal facilities, radioactively contaminated territories within the areas supervised by relevant organizations;

— promote information exchange between SGUK RV and RAO management authorities at federal, regional and institutional levels;

— provide scientific and methodological support and promote software and hardware development required for the establishment, operation and upgrading of SGUK RV and RAO and communicating relevant findings to organizations responsible for RM and RW accounting and control at all levels;

— engage the concerned federal executive authorities in the development of regulatory documents (reference forms for RM and RW accounting and control, methods used to evaluate their amounts and the radionuclide inventories, etc.), provide unified information support and compatible software for data base maintenance;

— coordinate efforts at the federal level;

— provide information to state authorities, state management authorities in the field of atomic energy use and other interested executive authorities on stocked RM and RW inventories and their transport, export and import in an amount required for these authorities to execute their powers;

— ensure operation of information and research organizations and the center for data collection, processing and transfer (Central Analytical Center for State Accounting and Control of RM and RW) supporting the operation of this system at the federal level;

— promote cooperation with other countries on the matters associated with RM and RW accounting and control under relevant international agreements and programs (projects).

The system operation is supervised by Rostechnadzor, which is also responsible for licensing relevant types of activities and supervising the compliance with the established rules and regulations in RM and RW management.

NP-093-14 sets forth general RW acceptance criteria for disposal. RW acceptance criteria tailored for specific RW disposal facilities shall be established and justified by NO RAO at the repository design development stage. Relevant designs and RW acceptance criteria shall be submitted for review to Rostechnadzor as part of a license application.

E.3. State regulation of safety in the field of atomic energy use (Article 20)

Article 20. Regulatory Body
20-1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.
20-2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.

E.3.1. Regulatory bodies (Article 20-1)

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that state regulation of safety in the field of atomic energy use provides for certain measures implemented by federal executive authorities aimed at the development, approval and implementation of rules and regulations in the field of atomic energy use, issuance of permits (licenses) authorizing particular activities in the field of atomic energy use, standardization in accordance with legislative provisions of the Russian Federation on standardization, accreditation, compliance assessment, safety supervision, expert reviews and inspections, oversight over the development and implementation of measures providing the protection of NF personnel, public and the environment in the event of accidents associated with atomic energy uses.

Article 24 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that federal executive authorities, i.e., state safety regulatory authorities, are responsible for state safety regulation in the field of atomic energy use.

In accordance with the Government decree № 412 On Federal Executive Authorities Exercising State Management in the Field of Atomic Energy Use and State Regulation of Safety in the Field of Atomic Energy Use of July 3, 2006, the following authorities shall exercise state regulation of safety in the field of atomic energy use:

— Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor);

— Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM of Russia);

— Ministry of Natural Resources and the Environment of the Russian Federation (Minprirody);

— Federal Service for Supervision of Natural Resources (Rosprirodnadzor);

— Federal Service for the Oversight of Consumer Protection and Welfare (Rospotrebnadzor);

— Federal Medical and Biological Agency (FMBA of Russia).

In 2007, following the adoption of the Federal law № 317-FZ On the State Atomic Energy Corporation Rosatom, certain amendments were introduced to Article 23 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, according to which state regulation of safety in the field of atomic energy use shall also involve certain efforts of Rosatom promoting the development of new rules and regulations in the field of atomic

energy use, certification, standardization, compliance assessment, control over the development and implementation of measures providing the protection of NF personnel, public and the environment in the event of accidents associated with atomic energy uses.

Powers of state safety regulatory authorities are specified in Article 25 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995.

Responsibilities, as well as requirements to the structure and human resources of the state safety regulatory authorities are set forth in relevant Government decrees of the Russian Federation.

The State Duma of the Russian Federation and the Federation Council of the Russian Federation approve the amount of funds allocated to state safety regulatory authorities in the current year.

In 2011, a new amendment to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 introduced the following principle of legal regulation: delineation of responsibilities and functions of state safety regulatory authorities, state management authorities in the field of atomic energy use and organizations performing relevant activities in this field.

Another amendment stipulates that measures implemented by state safety regulatory authorities within the scope of their competence shall be appropriate to the potential hazard level associated with the NF and relevant activities in the field of atomic energy use.

On December 28, 2010, Rostechnadzor and FMBA of Russia signed an agreement On Cooperation for State Regulation of Radiation Safety in the Field of Atomic Energy Use; and on March 19, 2012 a joint order № 52/169 On the Approved Administrative Regulation for the Cooperation Between the Federal Medical and Biological Agency and the Federal Environmental, Industrial and Nuclear Supervision Service when Performing Joint Scheduled Audits of Legal Entities and Individual Entrepreneurs was approved.

These two instruments provide for cooperation in the following areas:

— increasing the efficiency of measures addressing the radiation safety of personnel working at radiation hazardous facilities of the State Corporation Rosatom and the public residing in the areas supervised by the abovementioned organizations, and the environmental protection;

— elimination of duplicating functions;

— enhanced collaboration in the following areas: licensing activities in the field of atomic energy use, joint inspections at radiation hazardous facilities; state accounting and control of RM and RW; assessments and expert reviews in the field of radiation safety; establishing regulatory standards specifying acceptable limits for RM releases and discharges to the atmosphere and water bodies.

Joint Decree of Rostechnadzor and Rospotrebnadzor № 315/588 of May 30, 2012 On the Approved Administrative Regulation on Cooperation between the Federal Environmental, Industrial and Nuclear Supervision Service and the Federal Service for the Oversight of Consumer Protection and Welfare Associated with Federal State Sanitary and Epidemiological Supervision of Construction Activities was signed. In 2016,

some amendments were introduced to it to update the composition and details of Rostechnadzor and Rospotrebnadzor territorial bodies.

The document provides for cooperation on the following matters:

— provision of information on regulations and guides discussing the arrangement and implementation of federal state supervision activities;

— setting the inspection goals, scope and schedule;

— provision of information on the performed inspections and their results, data demonstrating the compliance of the declared activities with legislative provisions of the Russian Federation and the overall effectiveness of federal state supervision activities;

— development of proposals on upgrading the national legal framework in its part addressing the activities associated with federal state supervision, its management and implementation.

Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor) is the federal executive authority exercising functions of the state safety regulatory body in the field of atomic energy, regulatory body pursuant to relevant provisions of the Convention on Nuclear Safety and the Joint Convention on the Safety of SNF and RW Management and competent authority of the Russian Federation in keeping with the Amendment to the Convention on the Physical Protection of Nuclear Material. According to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service (hereinafter Regulation), Rostechnadzor exercise the following powers in the field of atomic energy use:

— submits for review drafts of federal laws, regulations of the President of the Russian Federation and the Government of the Russian Federation to the Government of the Russian Federation;

— in keeping with the Constitution of the Russian Federation, federal constitutional laws, federal laws, regulations of the President of the Russian Federation and the Government of the Russian Federation and within the scope of its responsibility, on its own initiative approves the following by-laws:

- federal rules and regulations in the field of atomic energy use in accordance with the legal framework of the Russian Federation;
- the procedures for issuing work permits to personnel engaged in activities associated with atomic energy use at NF in accordance with the list of job titles approved by the Government of the Russian Federation;
- the requirements to the structure and the contents of documents demonstrating the safety of NI, RS, SF and (or) performed activities in the field of atomic energy use required to acquire licenses for such activities; as well as to the procedure for the expert review of the above documents;
- the procedure followed by operating organizations when submitting the findings of safety assessments performed for NI, NM and RM storage facilities, RW storage facilities and demonstrating their operational safety, as well as the requirements to the contents and structure of such documents;

- the procedure for expert safety reviews (safety case reviews) performed for nuclear facilities and (or) types of activities implemented in the field of atomic energy use;
- the procedure for the expert review of computer software used to build computational models of processes important for the safety of NF and (or) types of activities implemented in the field of atomic energy use;
- the procedure for arranging and performing supervision over the state NM accounting and control system;
- the codes of rules in line with the legal framework of the Russian Federation in its part addressing technical regulation;
- the methods applied to develop and introduce regulatory standards specifying acceptable limits for RM releases and discharges into the atmosphere and water bodies;
- the procedure followed to issue permits for RM releases and discharges and their reference forms;
- some specific aspects associated with the compliance assessments performed to evaluate the products falling under the safety requirements in the field of atomic energy use, as well as relevant design development (including surveys), production, construction, installation, setup, operation, storage, transportation, sales, recycling and disposal processes;

— exercises control (supervision) over:

- compliance with rules and regulations in the field of atomic energy use, conditions of licenses (permits) authorizing certain activities in the field of atomic energy use;
- nuclear, radiation and engineering safety (at nuclear facilities);
- physical protection of NI, RS, NM, RM and RW SF, as well as state accounting and control of NM, RM and RW in organizations;
- compliance with international obligations of the Russian Federation concerning the safety in the field of atomic energy use;
- compliance with legal requirements of the Russian Federation in the field of RW management (within the scope of its competence);
- timely return of spent fuel assemblies removed from nuclear reactors and byproducts resulting from their reprocessing to the State of origin having an international agreement with the Russian Federation providing for SFA import to the Russian Federation for the purposes of their temporary storage and (or) reprocessing provided that the resulting by-products are returned back to the State of origin (within the scope of its competences).

— licenses activities in the field of atomic energy use in accordance with the legal framework of the Russian Federation;

— issues the following types of permits:

- permits for NP employees authorizing certain activities in the field of atomic energy use;

- permits for releases and discharges of radioactive substances into the environment.

— establishes the limits for maximum acceptable RM discharges and releases to the atmosphere and water bodies;

— harmonizes:

- provisions of qualification reference guides for managers and specialists (employees) establishing job specifications for the workers granted with permits authorizing them to perform certain types activities in the field of atomic energy use;
- lists of isotope products requiring special licenses authorizing their import or export.

— arranges for and maintains operation of a system providing control over NF in the event of accidents;

— establishes, develops and maintains the operation of an automated system for information and analytical support;

— manages functional subsystems providing monitoring at chemically hazardous and explosive facilities, as well as NRHF under the unified system for emergency prevention and response;

— issues statements on compliance of constructed, reconstructed or refurbished capital facilities with the requirements set forth in design documentation;

— generalizes the law enforcement practice in this field of activity;

— develops, approves and enacts safety guidelines in the field of atomic energy use (within its competence);

— takes part in the certification of activities in the field of atomic energy use.

In keeping with the requirements of the Regulation on the Quality Assurance System of the Federal Service for Environmental, Technological and Nuclear Supervision for State Safety Regulation in the Field of Atomic Energy Use approved by Rostechnadzor's order No. 557 of December 11, 2014, Rostechnadzor implements its activities under the support provided by a quality assurance system promoting quality and efficiency of Rostechnadzor's state safety regulatory functions in the field of atomic energy use. This system complies with IAEA standards, namely, No. GSR Part 2 Leadership and Management for Safety and No. GS-G-3.1 Application of the Management System for Facilities and Activities, as well as the provisions established by GOST ISO 9001-2011 Quality Management Systems. Requirements; reflects the current management structure and provides a clear description of the regulatory review processes, inspection procedures and the procedure followed to evaluate the recorded events.

Rostechnadzor adopted the Policy Statement on the Safety Culture in the Field of State Safety Regulation in Atomic Energy Use providing for a self-assessment focused on the safety culture. A pilot safety culture self-assessment in the scientific and technical support organization SEC NRS was implemented in 2022 to refine the methods applied by the safety regulatory body under such self-assessment. In 2021, a self-assessment of safety culture was implemented by the Office for the Safety Regulation at NPP and Research Nuclear Facilities.

Rostechnadzor's central office and its interregional territorial authorities supervising nuclear and radiation safety and arranged in accordance with an established procedure execute the functions assigned to Rostechnadzor.

Rostechnadzor's central office and its interregional territorial authorities supervising nuclear and radiation safety are staffed with personnel having required qualifications. Relevant qualification requirements are set forth in the Federal law № 79-FZ On State Civil Service of July 27, 2004 and the Presidential decree of the Russian Federation № 16 On Qualification Requirements to the Length of State Civil Service or the Length of Employment in Specific Areas and Fields of Study Required to Fill the Vacancies in the State Civil Service of January 16, 2017 and other regulations.

Competences of Rostechnadzor's public officials are maintained continuously under the existing advanced training system that involves:

— supplementary vocational training programs, advanced training courses;

— educational institutions responsible for the required supplementary vocational training programs as regards their contents and quality;

— Rostechnadzor's subdivisions managing the advanced training system.

Rostechnadzor's progress reports are published annually. These reports provide information on control, supervisory, licensing and permitting activities, safety evaluations and emergency vulnerability assessments of NF and enterprises supervised by Rostechnadzor, including the assessment of adverse man-induced impacts on the environment and expert review findings. These reports also contain information on operational disorders at NF supervised by Rostechnadzor including RW and SNF management facilities. These reports are publicly available at Rostechnadzor's website and are published in a quarterly issued research magazine Nuclear and Radiation Safety (published since 1998).

Rostechnadzor's public relations service works closely with mass media promoting unbiased coverage of activities and existing problems in the field of industrial and nuclear supervision. Press releases communicating information on Rostechnadzor's activities are published on its website (www.gosnadzor.ru) updated on a weekly basis. All applications filed by mass media are reviewed within a timeframe specified by relevant legislative provisions. In addition to this, Rostechnadzor cooperates continuously with journalists providing its comments to news agencies, print media, radio and television. A pool of specialized journalists was established to cover the activities performed by Rostechnadzor's officials and its management team. Publications are monitored on a daily basis.

IRRS mission of 2009 and the follow-up IRRS mission of 2013, as well as the measures implemented to address the expressed recommendations were discussed in previous National Reports of the Russian Federation.

There are two NRS technical support organizations providing scientific and technical support to Rostechnadzor in the field of NRS regulation, namely, the Federal State-Funded Institution Scientific and Engineering Center for Nuclear and Radiation

Safety (SEC NRS) (www.secnrs.ru) and Federal State Unitary Enterprise VO Bezopasnost (www.vosafety.ru).

Previous national Reports of the Russian Federation provided detailed information on the functions of Rostechnadzor's scientific and technical support organizations.

Further effective development of scientific and technical support for Rostechnadzor's activities in the field of nuclear and radiation safety is prompted by SEC NRS international cooperation with foreign organizations, including foreign technical support organizations. In 2012, SEC NRS became an associated member of the European Technical Safety Organizations Network (ETSON).

Development and improvement of the system providing public information on emergencies at nuclear facilities, including the already emerged and the projected ones, through mass media and other information channels by authorized federal executive bodies is considered as an urgent task to be accomplished under the state NRS policy.

In accordance with Government decree of the Russian Federation № 322 On the Approved Regulation on the Federal Service for the Oversight of Consumer Protection and Welfare of June 30, 2004, **Federal Service for the Oversight of Consumer Protection and Welfare (Rospotrebnadzor)** is the federal executive authority responsible for the state sanitary and epidemiological supervision over the compliance with relevant provisions of the sanitary legislation.

Rospotrebnadzor is a federal executive authority performing the state functions associated with the development and implementation of the state policy and regulation in the field of consumer protection, development and approval of state sanitary and epidemiological rules and hygienic standards, as well as arranging for and exercising federal state sanitary and epidemiological supervision and federal state supervision for consumer protection.

Rospotrebnadzor implements its functions via its territorial authorities that are present in all constituent entities, regions and large settlements of the Russian Federation.

To ensure the radiation safety of the population, Rospotrebnadzor:

— develops and approves sanitary rules for the radiation safety of population and personnel concerning all types of activities involving all main types of ionizing radiation sources, as well as guidelines and guides explaining how the requirements of the sanitary rules shall be met in practice;

— licenses activities associated with the management of sources generating ionizing radiation;

— performs compliance assessment of conditions when managing man-made sources of ionizing radiation with the provisions of sanitary rules, the findings of which are used to develop sanitary and epidemiologic statements, i.e. permits authorizing relevant activities;

— exercises federal state sanitary and epidemiological supervision over the radiation safety of population covering all uses of ionizing radiation sources and remedial efforts at radioactively contaminated territories.

Federal Medical and Biological Agency (FMBA of Russia) was established by the Presidential decree of the Russian Federation № 1304 On the Federal Medical and Biological Agency of October 11, 2004 to deploy a system of specialized sanitary and epidemiological supervision and provide health and sanitary service support to the employees engaged in certain industrial sectors with particularly hazardous working environments.

Responsibilities and powers of the Federal Medical and Biological Agency are set forth in the Government decree of the Russian Federation № 206 On the Federal Medical and Biological Agency of April 11, 2005, according to which control and supervision in the field of sanitary and epidemiologic welfare of employees working at enterprises with particularly hazardous working environment and the population residing in particular territories is seen as a priority task for FMBA.

As it comes to the radiation safety, state regulation of safety in the field of atomic energy use is stated as a key focus area for FMBA. FMBA of Russia executes its powers through a state system of sanitary and epidemiologic standards – FMBA's subordinate scientific and research organizations develop sanitary rules and hygienic standards that shall be observed by all operating organizations.

FMBA's research institutions provide scientific, medical and hygienic support under activities involving radiation hazards and perform expert reviews of the corresponding design documentation.

FMBA of Russia implements federal state sanitary and epidemiological control (supervision) in organizations pertaining to certain industries with particularly hazardous working conditions and in certain territories of the Russian Federation, including the facilities and territories of restricted administrative units, both directly and via its territorial bodies (interregional departments).

Radiation control over working environment at NRHF, including RW and SNF management facilities, is implemented by FMBA of Russia via its centers for hygiene and epidemiology.

Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM of Russia). According to the Presidential decree of the Russian Federation № 868 of July, 11, 2004, Competences of the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters, EMERCOM is responsible for state regulation of fire safety in the field of atomic energy use.

The following functions are implemented by EMERCOM under the integrated supervision system:

— federal state fire supervision in accordance with the procedure established by the Government decree of the Russian Federation № 290 On the Federal State Fire Supervision of April 12, 2012;

— state supervision over the protection of public and territories against natural and man-induced emergencies in accordance with the procedure established by the Government decree of the Russian Federation № 1418 On the State Supervision over the

Protection of Public and Territories Against Natural and Man-Induced Emergencies of December 24, 2015;

— state supervision of civil defense in accordance with the procedure established by the Government decree of the Russian Federation № 305 On the Approved Regulation on the State Supervision in Civil Defense of May 21, 2007.

Pursuant to provisions of the Federal law №184-FZ On Technical Regulation of December 27, 2002, technical regulation of fire safety at NPP is considered as a key focus area for EMERCOM. The Federal law № 117-FZ On Amendments Introduced to the Federal Law On Technical Regulation of Fire Safety Requirements of July 10, 2012 extended the provisions of the Federal law №123-FZ Technical Regulation on Fire Safety Requirements of July 22, 2008 on NPP.

Code of rules SP 13.13130.2009 Nuclear Power Plants. Fire Safety Requirements developed by EMERCOM provides a background for the implementation of relevant provisions presented in the Federal law №123-FZ Technical Regulation on Fire Safety Requirements of July 22, 2008. It specifies relevant requirements for the NPP fire safety that shall be met at different stages of nuclear reactor life cycle (all types of nuclear reactors excluding special purpose transport, research and reactor units). Amendments to this paper are now being prepared based on the feedback from its pilot application by EMERCOM.

In accordance with the Government decree of the Russian Federation № 1219 On the Approved Regulation on the Ministry of Natural Resources and the Environment of the Russian Federation and Amended or Currently Invalid Legal Acts of the Government of the Russian Federation of November 11, 2015, **Ministry of Natural Resources and the Environment of the Russian Federation (Minprirodi of Russia)** is responsible for the development of the state policy and legal regulation in the following areas: exploration, use, recovery and conservation of natural resources, including subsoil, water bodies, forests, biota and relevant environments; land-use relations arising from the conversion of land use from water bodies, forests or specially protected territories and facilities (as part of specially protected territories) to other land uses; forestry and hunting relations; hydrometeorology and other related areas; state ecological monitoring (state environmental monitoring) involving state monitoring of radiation environment performed across the territory of the Russian Federation. Minprirodi is also responsible for the development and implementation of the state policy and regulation in the field of environmental protection, including the issues associated with the management of domestic waste, protection of the atmospheric air, state environmental supervision, specially protected nature conservation areas and state environmental expert reviews.

In accordance with the Government decree of the Russian Federation № 400 of July 30, 2004 On the Approved Regulation on the Federal Supervision Service for Natural Resources and Amendments to the Government Decree of the Russian Federation № 370 of July 22, 2004, **Federal Supervision Service for Natural Resources (Rosprirodnadzor)** is responsible for control and supervision over the management of natural resources, and within the scope of its competence, over the matters related to the

environmental protection including those associated with the limitation of negative man-induced impacts, waste management (except for RW management) and state environmental expert review.

E.3.2. Independence of safety regulatory bodies (Article 20-2)

According to the legislation of the Russian Federation and more specifically Article 24 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, safety regulatory bodies are independent from other state authorities, as well as organizations involved in atomic energy use.

Since 2010, the activities of Rostechnadzor have been managed by the Government of the Russian Federation.

EMERCOM activities are managed by the President of the Russian Federation.

Rospotrebnadzor's activities are managed by the Government of the Russian Federation.

FMBA's activities are managed by the Health Ministry of the Russian Federation.

Activities of the Russian Ministry of Natural Resources are managed by the Government of the Russian Federation.

Rosprirodnadzor's activities are managed by the Ministry of Natural Resources and Environment of the Russian Federation.

Pursuant to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, state safety regulatory authorities are funded from the federal budget.

In 2011, an amendment was introduced to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 introducing the independency of state safety regulatory authorities in their decisions and implementation of their powers from management authorities in the field of atomic energy use, the authorized management authority in the field of atomic energy use and the organizations performing activities in the field of atomic energy use.

Summarized below are the steps enabling effective independence of regulatory and management authorities involved in the field of atomic energy use:

— responsibilities and functions of management and regulatory authorities are clearly delineated based on legislative provisions;

— the Government of the Russian Federation sets the required staff size for the central office and the territorial divisions of relevant regulatory authorities;

— safety regulatory authorities are funded from the federal budget;

— open and transparent procedures are put in place to develop new regulations (requirements), to license all types of activities in the field of atomic energy use, to provide state safety supervision in the field of atomic energy use;

— enforcement instruments are applied to organizations engaged in SNF and RW management providing for some administrative sanctions that can be imposed if any breaches of legal requirements and provisions of other safety regulations are revealed.

Section F. Other General Safety Provisions

Section F. Other General Safety Provisions

F.1. Responsibility of the license holder (Article 21)

> ***Article 21. Responsibility of the Licence Holder***
> *21-1 Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.*
> *21-2 If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.*

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 (Article 34) stipulates that operating organization is fully responsible for the safety of its nuclear facilities, as well as for the proper management of SNF, RW and other radioactive material. The Russian Federation takes appropriate steps to ensure that operating organizations discharge all duties assigned to them.

Organization is recognized as an operating organization based on a corresponding decision made by the management authority in the field of atomic energy use, whereas licensing services are provided by state safety regulatory authorities in the field of atomic energy use.

According to Article 34 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, operating organizations shall have adequate authority, financial, material and other resources to fulfill the functions assigned to them.

According to Article 35 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, operating organization shall ensure:

— that NI, RS and SF are used only for the intended purposes;

— that administrative arrangements and coordination of efforts on the development and implementation of quality assurance programs are provided at all stages of NI, RS and SF design development, operation and decommissioning (closure);

— that measures are developed and implemented to prevent accidents at NI, RS and SF and, in case of their occurrence, to mitigate the adverse impacts produced on NI, RS and SF employees, public and the environment;

— that NF employees exercise their rights for social and economic benefits;

— that individual doses received by NF employees are recorded;

— that measures seen to protect employees and the public in the event of accidents at NI, RS and SF are developed and implemented (within its competence);

— that NM, RM and RW accounting and control is provided;

— that physical protection of NI, RS, SF, NM, RM and RW is provided;

— that fire safety arrangements are developed and implemented;

— that radiation monitoring in the surveillance zones and sanitary-protection zones is implemented;

— that NI, RS and SF employees are recruited, trained and their competences are maintained with good social environment and all proper conveniences provided at work places;

— that information concerning radiation environment in the controlled areas and surveillance zones is communicated to the public;

— that other powers are exercised in accordance with relevant legal provisions.

Operating organization bears full responsibility for:

— nuclear and radiation safety;

— development and implementation of safety enhancement measures in SNF and RW management;

— radiation protection of personnel, public and the environment;

— financial coverage of civil liability for nuclear damage.

Article 26 of the Federal Law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that operating organization shall be licensed (have a proper permit) for each type of activity it performs. The license (permit) shall be issued by the state safety regulatory authority and shall formally specify the conditions that the operating organization shall comply with when performing the declared activities in the field of atomic energy use.

Rostechnadzor is responsible for licensing activities in the field of atomic energy use (Government decree of the Russian Federation № 280 On the Approved Regulation on Licensing Activities in the Field of Atomic Energy Use of June 29, 2013).

According to the above decree, the following aspects shall be evaluated by Rostechnadzor when reviewing a license application:

— compliance of design and engineering solutions with relevant provisions of federal rules and regulations in the field of atomic energy use, compliance of staff qualifications with the established criteria and availability of proper conditions for their maintenance at an appropriate level, as well as the availability of appropriate systems for collection, storage, processing and disposal of RW when performing the declared activities;

— availability of comprehensive technical and managerial arrangements ensuring nuclear and radiation safety during the implementation of the declared activities;

— proper conditions for storage, accounting and control of NM, RM, RW, physical protection of NF, NI, SF, NM, RM, RW, action plans providing protection of NF employees and public in the event of accidents and preparedness to their implementation, availability of quality assurance programs and required engineering and technical support of the declared activity;

— ability of the applicant to ensure the safety of the declared activity, NF and performed operations, as well as the adequate quality of performed operations and delivered services meeting relevant provisions of federal rules and regulations in the field of atomic energy use;

— ability of the applicant to ensure safe termination of the declared activity and decommissioning of relevant nuclear facilities (closure of RW disposal facility), as well as availability of appropriate design documentation.

Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor) exercises federal state supervision over the compliance of license conditions by the license holder and is empowered to impose sanctions in accordance with the legislation of the Russian Federation in case of their violation.

If the operating license (permit) is revoked, the operating organization remains responsible for NI, RS or SF safety until the responsibility is transferred to another operating organization or a new license (permit) is issued. If the operating organization is unable to ensure the safety of the facilities, management authority in the field of atomic energy use becomes responsible for NI, RS or SF safety and all relevant management activities (Article 35 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995).

Article 14 of the Federal law 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 stipulates that RW management activities may be executed by organizations issued with appropriate permits (licenses) authorizing such activities in the field of atomic energy use. According to Article 21 of the law, organizations generating RW are responsible for the safe management of the waste prior to its transfer to the National Operator.

National Operator for RW management (Article 20) shall ensure safe management of all RW received for disposal, as well as nuclear, radiation, engineering and fire safety, protection of the environment, compliance with regulatory provisions concerning sanitary and epidemiological welfare of the population at the stages of RW disposal facility operation, closure and at the post-closure stage, and implement radiation control at RW disposal sites, including periodic post-closure radiation monitoring.

Provisions of Basic Sanitary Rules OSPORB-99/2010 stipulate that all management activities involving sources of ionizing radiation including radiation monitoring are allowed only if an appropriate sanitary and epidemiologic statement claiming that the work environment meets relevant sanitary rules established for operations involving sources of ionizing radiation is available. Such statements are issued by authorities exercising state sanitary and epidemiologic supervision on the application of a legal entity or an individual.

F.2. Human and financial resources (Article 22)

Article 22. Human and Financial Resources
Each Contracting Party shall take the appropriate steps to ensure that:
i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;
ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;
iii) financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

F.2.1. Human resources (Article 22 (i))

According to Article 35 of the Federal law №170-FZ On Atomic Energy Use of November 21, 1995, operating organization shall recruit, train and maintain competences of NI, RS and SF employees and ensure good social environment and all proper conveniences at the work places.

According to relevant provisions of federal rules and regulations in the field of atomic energy use (NP-001-15, NP-033-011, NP-022-17, NP-016-05, NP-038-16), operating organizations engaged in SNF, RW or RM management shall provide:

— adequate staff number having required competences and appropriate work permits prior to NI, RS or SF commissioning;

— recruitment, training and maintaining the required competences of NI, RS or SF employees;

— an adequate recruitment and training system to achieve, monitor and maintain employees' competences as required for safe NI, RS and SF operation;

— arrangement of a permit-to-work system for employees with required competences authorizing them to perform the permitted activities;

— regular emergency drills implemented to enhance employees' response in case of operational disorders, including accidents, as well as accounting of "lessons learned" from previous accidents and faults;

— safety culture development.

According to NP-001-15 provisions, the requirement for safety culture development and maintenance has been considerably extended to reflect all essential elements, including the establishment of the "safety first" principle as an internal necessity. The new definition of the *safety culture* given in NP-001-15 corresponds more closely to those provided in international papers, in particular, INSAG-15. Additional requirements on the safety culture development and maintenance were introduced by NP-038-16 also elaborating on the ways contributing to the safety culture development in part of activities associated with radiation sources.

State Corporation Rosatom is the authorized state management authority in the field of atomic energy use in the Russian Federation that is most actively engaged in various areas associated with the abovementioned activities, functions and responsibilities.

Rosatom's support to the established multilevel system for safety training, advanced training and certification of personnel involved in the nuclear power and industry sectors is an essential element of its mission.

Specialized educational organizations training young specialists for the nuclear sector have been integrated into the Consortium of Supporting Higher Educational Institutions of the State Corporation Rosatom. The Consortium involving 18 specialized universities covers 60-70% of the nuclear industry's general demand in young professionals.

National Research Nuclear University MEPhI, the main higher education facility of the State Corporation Rosatom, has an extensive network of branches in regions of Russia with nuclear organizations.

The university unites 12 higher educational institutions: 9 of them are also providing secondary vocational education and 4 of them are exclusively engaged in secondary vocational education. The institutions are located in 15 cities and 13 regions of the Russian Federation and in Tashkent.

MEPhI's higher and secondary vocational educational programs cover correspondingly 89 and 31 major disciplines and professions demanded by the nuclear sector. Extended target training is considered a most important trend providing staff supply to organizations of the sector. Thus, in 2019, the total number of students trained under such target programs at the request of atomic energy enterprises amounted to over 2,000 people. Its educational programs involve multi-level trainings including pre-university profession-oriented tutorials; vocational professional education programs; undergraduate, specialist, master, postgraduate, doctoral training programs, additional education programs, refresher and advanced training courses.

Regulatory documents specify the mandatory nature of advanced trainings in areas associated with safety and their frequency. The major goal of the professional training system is to achieve and maintain the appropriate personnel skill level for safe, robust and effective operation of the Russian nuclear sector.

Independent non-profit organization of Continuing Professional Education Technical Academy of Rosatom (NPO CPE Technical Academy of Rosatom) is the key educational institution within the corporate system for advanced personnel training in safety areas. The Academy involves 4 branches operating in Moscow, St. Petersburg, Novovoronezh, Sosnovy Bor. Its headquarters is located in the city of Obninsk.

The Academy provides courses in 38 fields of study, 12 of which are related to safety, in particular:

- safety in nuclear weapons complex;
- safety of nuclear facilities;
- civil defense and emergency response;
- safety and its monitoring in the field of atomic energy use;
- radiation safety;
- environmental safety;
- energy security;
- nuclear safety;
- labor protection;
- fire safety;
- industrial safety;
- physical protection.

A total of 169 educational programs are being run in these areas.

In 2023, a total of 26,753 managers and specialists employed in SC Rosatom organizations enrolled on the Academy's courses with 8,863 participants that signed up

for safety-related courses including 1,203 people that took the courses devoted to nuclear and radiation safety in particular.

Based on successful training and final certification, 50 managers employed in organizations operating nuclear and radiation hazardous facilities were awarded with certificates authorizing them to perform relevant activities in the field of atomic energy use.

In general, the personnel development system meets the needs of industrial and scientific organizations engaged in the nuclear sector.

F.2.2. Financial resources supporting the safety of SNF and RW management facilities (Article 22 (ii))

In the Russian Federation, efforts, including those associated with the financial support in SNF and RW management and nuclear decommissioning, are planned at two levels:

— Federal target programs with predefined measures for the medium- and long-term perspective and corresponding funding provisions. The Government of the Russian Federation approved and is currently funding FTP NRS-2 expected to be completed in 2035;

— three-year plans addressing the measures pursuant to provisions approved by the President and the Government of the Russian Federation and stipulated in the State Policy Fundamentals in NRS, activities scheduled under the third USS RW development stage.

At both levels, activities proposed under relevant programs and plans are interrelated and mutually agreed upon.

The Russian Federation takes necessary steps to ensure that appropriate financial resources are available to provide adequate safety of SNF and RW management facilities at the stages of their operation and decommissioning.

The following measures are put in place to ensure that adequate financial resources are available to provide the safety of SNF and RW management facilities at the stages of their operation and decommissioning:

— operating organizations are required to have adequate financial, material and other resources necessary to fulfill their functions (Article 34 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995);

— enterprises and organizations shall establish adequate reserves to ensure the safety of particularly hazardous nuclear and radiation productions and facilities (subparagraph 33, paragraph 1, Article 264 of the Tax Code of the Russian Federation (Part 2) №117-FZ of August 5, 2000);

— operator bears civil liability for nuclear damage (not less than 5 million USD) (the Vienna Convention on Civil Liability for Nuclear Damage of 1963 that came into effect for the Russian Federation on August 13, 2005);

— special reserve funds of the State Corporation Rosatom (Article 20 of the Federal law № 317-FZ On the State Atomic Energy Corporation Rosatom of December 1, 2007);

— RW disposal costs are covered by organizations generating the waste (Articles 10 and 21 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011);

— evaluation of costs required for RW/SNF management and nuclear decommissioning;

— state programs for nuclear and radiation safety.

Statement on compliance with these requirements for the adequacy of financial, material and other resources shall be made both when the organization is recognized as an operating organization and when the organization applies for an operating license authorizing it to perform the declared activity in the field of atomic energy use (Government decrees of the Russian Federation № 88 of February 17, 2011 and № 208 of March 29, 2013).

Deductions into reserve funds are made in accordance with a procedure set forth in the provisions of Government decrees of the Russian Federation № 576 of September 21, 2005 and № 68 of January 30, 2002. Deductions into these reserves are associated with the prime costs.

These reserves of enterprises and organizations are intended to cover:

— the costs associated with nuclear, radiation, engineering and fire safety;

— the costs associated with the physical protection, NM, RM and RW accounting and control;

— the costs associated with the decommissioning of NPP and other nuclear installations, radiation sources, NM, RM and RW storage facilities, R&D required to demonstrate and upgrade the safety of these facilities;

— the costs associated with newbuilding, expansion, reconstruction and technical upgrading of operating production facilities, procurement of machines, equipment, tools, instruments, design and survey activities and other capital expenditures;

— RW disposal costs.

Since August 13, 2005, provisions of the Vienna Convention on Civil Liability for Nuclear Damage of 1963 have been effective on the territory of the Russian Federation, pursuant to which:

— liability of the operator for possible nuclear damage caused to the third party due to a radiation accident (nuclear incident) at nuclear facilities is absolute (full and exclusive);

— operator's liability is limited to no less than USD 5 million in terms of gold on 29 April 1963;

— during the review of operating license application, the operator of the nuclear facility shall provide documentary evidence of financial security covering his liability for nuclear damage (financial guarantee to cover his liability for nuclear damage). Financial security may be provided in the form of civil liability insurances.

The Government of the Russian Federation shall partially cover the costs associated with losses and damage caused by radiation exposure and being under the operator's

liability so far as the losses and damage caused are greater than the liability limit specified for the operating organization.

Availability of adequate financial provisions against civil liability for losses and damage caused by radiation exposure is an essential condition for acquiring licenses from Rostechnadzor (parts 1 and 2, Article 56 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995).

Federal law № 317-FZ On the State Atomic Energy Corporation Rosatom of December 1, 2007 specifies the procedure for the establishment of adequate financial resources for the safe RW and SNF management.

Special reserve funds were established within the State Corporation Rosatom to ensure the safety of RW and SNF management facilities all through their operation and at the decommissioning stage:

— a fund covering the costs associated with the steps taken to ensure nuclear, radiation, engineering and fire safety, maintenance and outfitting of emergency rescue teams, and relevant remunerations for activities (services) associated with emergency prevention and response;

— a fund covering the costs associated with physical protection, NM, RM and RW accounting and control;

— a fund covering the costs associated with NI, RS and SF decommissioning, SNF management, R&D required to demonstrate and enhance the NI, RS and SF safety;

— a fund covering the costs associated with the initiatives on upgrading organizations of the Russian nuclear power generation complex, development of nuclear science and technologies, design development and survey activities and other investment projects;

— the RW disposal fund.

Rosatom's special funds are established through deductions from enterprises and organizations operating particularly hazardous nuclear and radiation productions and facilities.

The funds intended to cover RW disposal costs are accumulated by the State Corporation Rosatom in a special reserve fund, i.e., the RW Disposal Fund.

RW disposal costs are estimated based on the RW inventory and relevant disposal tariffs approved in accordance with an established procedure.

The tariffs are set by the federal executive body authorized to establish RW disposal tariffs at the suggestion of the state RW management authority as fixed-rate tariffs per 1 cubic meter of disposed RW, including the package and the container volume (gross volume). RW disposal tariffs are set in RUB/m^3.

The funds required for SNF, RW management and nuclear decommissioning are evaluated in compliance with the International Financial Reporting Standards (IFRS).

For these purposes, in keeping with the Order of the State Corporation Rosatom 1/1176-P On the Approved Provision on the System of Regulating Documents of the State Corporation Rosatom of December 4, 2015, on December 16, 2015 the Director for Public

Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning enacted the guidelines on the integrated evaluation of nuclear back-end costs, including:

— Unified Industry-Wide Guidelines on Integrated Assessment of Irradiated and Spent Nuclear Fuel Management Costs;

— Unified Industry-Wide Guidelines on Integrated Assessment of Radioactive Waste Management Costs;

— Industry-Wide Guidelines on Integrated Assessment of Nuclear Decommissioning Costs;

— Industry-Wide Guidelines on Integrated Assessment of Nuclear Cleanup Costs.

These guidelines specify the process for input data pre-processing and the cost evaluation procedure.

Moreover, the costs for SNF and RW management and nuclear decommissioning are also covered from the federal budget of the Russian Federation. In particular, activities contributing to the nuclear and radiation safety of SNF and RW management are funded under FTP NRS-2.

F.2.3. Financial resources enabling institutional controls and monitoring following the closure of a disposal facility (Article 22 (iii))

Nuclear and radiation control over RW disposal facilities at the stages of their operation, closure and at the post-closure stage is exercised by the National Operator for RW Management (NO RAO). Relevant costs are covered from the RW disposal fund established via regular deductions made by organizations according to the established RW disposal tariffs (Articles 18, 20 and 21 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011).

F.3. Quality assurance (Article 23)

> ***Article 23. Quality Assurance***
> *Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.*

F.3.1. Quality assurance programs

According to Article 35 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, operating organization shall arrange for and coordinate activities associated with the development and implementation of quality assurance programs at all stages of NI, RS and SF development, operation and decommissioning and exercise control over their implementation.

Availability of an appropriate quality assurance program and a plan for its implementation is essential for acquiring a license authorizing operations in the field of atomic energy use and meeting its conditions (Article 35 of the Federal law On Atomic Energy Use of November 21, 1995 and the Regulation on Licensing Activities in the Field

of Atomic Energy Use approved by Government decree of the Russian Federation № 280 of March 29, 2013). Issues relevant for the quality assurance are also reviewed under Rostechnadzor inspections of organizations engaged in the field of atomic energy use.

A number of FRR and safety guides (NP-090-11, RB-086-13, RB-114-16) provide requirements and recommendations regarding the contents and structure of quality assurance programs. These requirements have been developed based on provisions of the Federal law On Atomic Energy Use and comply with IAEA safety standards, namely, GSR Part 2 Leadership and Management for Safety, GS-R-3 The Management System for Facilities and Activities. Safety requirements, GS-G-3.1 Application of the Management System for Facilities and Activities, as well as provisions of international standards ISO-9000.

Federal rules and regulations state that the quality assurance policy shall set forth the high priority of nuclear and radiation safety, main quality assurance objectives, tasks to be addressed in order to accomplish these objectives, appropriate ways of addressing these tasks and relevant liabilities of the organization responsible for the development of such QA programs (program).

Operating organization shall perform quality assurance activities, arrange for the development of a general quality assurance program (programs), exercise control over quality assurance activities carried out by its subcontractors. All quality assurance programs shall be reviewed at least once every 5 years and amended and complemented if necessary.

FTP NRS-2 provisions also state the compliance with the requirements stipulated in the quality assurance program as a must.

F.3.2. Standardization and compliance assessment

In addition to the development and implementation of quality assurance programs, the quality assurance initiatives are dealing with standardization and compliance assessment of production goods (operations, services), as well as of processes associated with their development (including surveys), production, construction, installation, setup, operation, storage, transportation, sales, disposition and disposal (Federal law № 184-FZ On Technical Regulation of December 27, 2002, Federal law № 162-FZ On Standardization in the Russian Federation of June 29, 2015).

Rostechnadzor is authorized to establish rules for product compliance assessment in accordance with the specific nature of relevant activities performed in the field of atomic energy use (p.5.2.2.16(3) of the Rostechnadzor's regulation approved by the Government decree of the Russian Federation № 401 of July 30, 2004).

Specific aspects considered when assessing product compliance with the safety requirements established in the field of atomic energy use, as well as when assessing the compliance of processes associated with its design development (including surveys), production, construction, installation, setup, operation, storage, transportation, sales, disposition and disposal are established in the Regulation on the Specific Aspects Accounted for in the Conformity Assessment of Products that Shall Comply with the

Safety Requirements in the Field of Atomic Energy Use, as well as the Processes Associated with their Design Development (Including Surveys), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal (hereinafter – Regulation on the Specific Aspects of Product Conformity Assessment) approved by the Government decree of the Russian Federation № 544 of June 15, 2016 (enacted on January 1, 2018).

Conformity assessments are performed via:

- testing;
- control;
- acceptance;
- decision to use the imported products at a nuclear facility;
- registration;
- expert review of technical documentation;
- mandatory product certification;
- federal state supervision in the field of atomic energy use;
- other forms established by technical regulations.

Regulation on the Specific Aspects of Product Conformity Assessment establishes the requirements to the procedure followed when assessing the compliance of products according to each of the abovementioned assessment forms.

The standardization procedure applied to products (implemented activities, services) that should comply with certain safety requirements in the field of atomic energy use, as well as the requirements for the standardization of design development (including surveys), production, construction, installation, setup, operation, storage, transportation, sales, disposition and disposal processes and other subjects of standardization related to such products is set forth in the Regulation on the Standardization Procedure for Products (Activities, Services) Subject to Safety Requirements in the Field of Atomic Energy Use, as well as Processes and Other Subjects of Standardization Associated with such Products approved by the Government decree of the Russian Federation № 669 of July 12, 2016.

In accordance with the Regulation on the Standardization in the Russian Federation, the following papers establish standardization requirements for products, processes and other subjects of standardization in the field of atomic energy use:

- national standards of the Russian Federation;
- codes of rules;
- industry-wide standards and guidelines;
- standards of organizations, including those of SC Rosatom;
- international standards, regional standards, regional codes of practice, standards and codes of rules of other countries registered in the Federal Information Fund of Standards;
- preliminary national standards of the Russian Federation;
- engineering specifications;
- information and technical reference books.

In keeping with the Regulation on the Standardization, Rosatom forms, maintains and updates a consolidated list of standardization documents. Provisions of these documents (their sections) setting forth standardization requirements concerning products, processes and other subjects of standardization in the field of atomic energy use included into a consolidated list of documents on standardization are enforced since the date when relevant notification is posted on the official website of the State Corporation Rosatom.

In accordance with the Regulation, a consolidated list of standardization documents shall be compiled by the State Corporation Rosatom based on decisions made inter alia by Rostechnadzor in coordination with SC Rosatom on the inclusion of certain standardization documents (their sections) into the consolidated list of adopted documents.

F.4. Operational radiation protection (Article 24)

Article 24. Operational Radiation Protection

24-1 Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:

i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;

ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and

iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.

24-2 Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:

i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and

ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

24-3 Uncontrolled and Unplanned Releases

Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

The following federal laws and regulations are the main instruments governing radiation protection of personnel, public and the environment during NI, RS and SF operation in the Russian Federation:

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;

— Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011;

— Federal law № 68-FZ On the Protection of Population and Territories Against Natural and Man-Induced Emergencies of December 21, 1994;

— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;

— Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996;

— Federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-058-14, NP-038-16 and etc.);

— Federal sanitary rules and regulations. Radiation Safety Standards (NRB-99/2009), Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010), etc.

These documents reflect the internationally recognized principles of radiation protection consistent with the recommendations of the International Commission for Radiation Protection (ICRP) and the IAEA Safety Standards SF-1 Fundamental Safety Principles and others.

The Federal Law № 170-FZ On Atomic Energy Use of November 21, 1995 (Article 2) stipulates that the fundamental principle of legal regulation in the field of atomic energy use is to ensure safety and protection of individuals, pubic and the environment against radiation hazards.

According to relevant provisions of Federal Law № 170-FZ On Atomic Energy Use of November 21, 1995 (Article 35), operating organization shall develop and implement measures to provide NI, RS and SF safety, establish specialized services (if necessary) exercising control over NI, RS and SF safety, provide information on NI, RS and SF safety to state safety regulatory authorities.

The procedure that the operating organization follows when performing activities aimed at the protection of NF employees and the public in case of accidents, as well as the one describing its coordination with different authorities shall be specified in the corresponding action plans.

Federal Law № 170-FZ On Atomic Energy Use of November 21, 1995 also stipulates that if an accident results in RM release (discharge) into the environment exceeding the established limits, the operating organization shall ensure prompt and timely exchange of information on the radiation situation with relevant state authorities, local authorities, state management authorities in the field of atomic energy use, state safety regulatory authorities, units of the system for the state radiation monitoring on the territory of the Russian Federation and the national system for emergency prevention and response.

Operating organization shall ensure that:

— nuclear and radioactive materials, RW are managed and stored in a proper way to provide safely of both NF employees and the public;

— individual doses received by NF personnel are recorded;

— radiation control is implemented in surveillance and controlled areas established to protect the public residing in regions with NI, RS and SF sites;

— the public is duly informed on the radiation situation in surveillance zones and controlled areas.

Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996 indicates the following three principals as fundamental for the radiation protection and specifies relevant mechanisms for their implementation:

— limitation principle – the dose limits set for public and employees shall not be exceeded;

— justification principle – any activity involving radiation sources, public and individual benefits from which do not outweigh possible risks (caused by additional exposure above natural background) to which it gives rise shall be prohibited;

— optimization principle – individual doses and the number of individuals exposed due to the use of any radiation sources shall be kept as low as reasonably achievable with economic and social factors being taken into account.

Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996 specifies the following fundamental hygienic standards (acceptable dose limits) for the radiation exposure caused by the use of RS in the territory of the Russian Federation (including the one associated with SNF and RW management):

— for the public – annual effective dose limit equals to 0.001 Sv, whereas the lifetime effective dose limit (70 years) is equal to 0.07 Sv; higher annual effective doses are acceptable in certain years only if the average annual effective dose during five subsequent years does not exceed 0.001 Sv;

— for the employees – annual effective dose limit equals to 0.02 Sv, whereas the effective dose limit for the employment period (50 years) is equal to 1 Sv; annual effective doses of up to 0.05 Sv are considered acceptable only if the average annual effective dose during five subsequent years does not exceed 0.02 Sv.

The following key instruments were established in Russia: Unified State System for Accounting and Control of Public Exposure in the Russian Federation (ESKID), Unified State Automated System for Radiation Monitoring on the Territory of the Russian Federation (EGASMRO). ESKID and EGASMRO, as well as their functions were discussed in previous National Reports of the Russian Federation.

In 2023, annual effective dose of personnel exposure accounted for 1.34 mSv. Thus, an acceptable radiation exposure level has been provided with an ongoing trend towards lower annual effective radiation exposure of personnel engaged in the nuclear sector.

Provisions of Basic Sanitary Rules OSPORB-99/2010 establish a classification system for nuclear facilities in accordance with the corresponding potential hazard (risk) levels. Such classification enables the differentiation of requirements set for NF siting, design development, operation, decommissioning (closure), as well as the requirements to the measures implemented to prevent the radiation accidents and mitigate their consequences. Potential risk levels are estimated based on potential radiation effects that are likely to be produced on the personnel and the public in case of a radiation accident at the facility. Thus, facilities are categorized based on potential accidents and their consequences.

F.5. Emergency preparedness (Article 25)

> ***Article 25. Emergency Preparedness***
> *25-1 Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate onsite and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.*
> *25-2 Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.*

Federal laws and regulations address personnel and public protection in the event of accidents at NI, RS and SF in Russia, in particular:

— Federal law № 170-FZ On Atomic Energy of November 21, 1995;

— Federal law № 68-FZ On the Protection of Population and Territories Against Natural and Man-Induced Emergencies of December 21, 1994;

— Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996;

— Regulation on the Unified State System for Emergency Prevention and Elimination (approved by the Government decree of the Russian Federation № 794 of December 30, 2003), as amended;

— federal rules and regulations specifying general safety requirements for NI, RS and SF (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-038-16, NP-058-14, NP-053-16);

— federal rules and regulations specifying the requirements to action plans for personnel and public protection in the event of accidents at NI, RS and SF (NP-015-12, NP-075-19, NP-077-06, NP-079-18);

— federal rules and regulations specifying the procedure for the declaration of emergency preparedness, emergency situation, prompt exchange of information in the event of radiation hazardous situations at NI, RS and SF (NP-005-16, NP-078-06, NP-106-19, NP-079-18);

— federal rules and regulations specifying the requirements for planning response activities in the event of accidents during NM and RM transportation and the emergency preparedness (NP-074-23);

— federal rules and regulations specifying the requirements to criteria applied to set the boundaries of emergency planning zones (NP-032-19, NP-050-03, NP-075-19);

— sanitary rules and regulations (OSPORB-99/2010, NRB-99/2009).

These documents were developed with due consideration to Russian and international best practices and relevant requirements and recommendations provided in IAEA safety standards:

— Preparedness and Response for a Nuclear or Radiological Emergency Series No. GSR Part 7 (2015);

— Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency. No GSG-2 (2011);

— Arrangements for Preparedness for a Nuclear and Radiological Emergency. Safety Guide Series No. GS-G-2.1 (2007);

— Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material. Safety Guide Series No. TS-G-1.2 (2002).

The above regulations are aimed at preventing the occurrence and further development of emergencies resulting from atomic energy uses and mitigating the damage caused by such emergencies and practices associated with the peaceful uses of NI, RS and SF. They provide a background for the establishment of standards for the protection of employees (personnel), public and the environment in the event of nuclear and radiation emergencies during NI, RS and SF operation, requirements for planning and preparedness to response activities, principles of relevant administrative arrangements, composition of response forces and interactions between different members of such units, requirements concerning emergency-alert procedures and information exchange.

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 sets forth the liabilities of operating organizations on the protection of NF employees, public and the environment in the event of accidents at NI, RS or SF.

Operating organization develops and implements measures to prevent accidents at NI, RS and SF and mitigate their adverse effects, as well as appropriate action plans to protect the personnel (employees) in the event of accidents at NF, RS and SF that shall be approved prior to NI, RS and SF commissioning.

Action plans for personnel and public protection in the event of accidents and relevant response activities are developed with an account taken of the facility's category set according to the corresponding potential radiation hazard levels. Instructions to be followed by employees in case of emergencies shall be developed for facilities considering all possible levels of their potential radiation hazard.

Federal rules and regulations stipulate that action plans for the protection of employees (personnel) and public in the event of accidents at NF and accounting for the radiation consequences of possible accidents shall be developed and be ready for implementation before the fissile nuclear materials are loaded into NF of categories I and II (according to corresponding potential hazard levels). Such plans are developed based on design features and parameters of the NF in question and specific criteria for making decisions on public protection arrangements in the event of accidents at NF with due consideration of economic, natural and other characteristics and features of the site.

Operating organizations shall develop action plans providing employees (personnel) protection in the event of accidents at NF. These plans shall provide for coordination of efforts by the operating organization, NF administration, law enforcement agencies, the state fire-fighting service, management authorities dealing with civil defense and emergencies, medical institutions, local authorities within the site boundaries and the emergency response planning area enabling mandatory evacuation of residents. NF administration shall maintain instant readiness and is responsible for the implementation of these action plans.

Local authorities jointly with the bodies exercising federal state sanitary and epidemiological supervision shall develop action plans to protect the population in the event of radiation accidents at radiation facilities referred to categories I - II according to the corresponding potential radiation hazard levels. Such plans shall provide for the coordination between the bodies specifically authorized to protect the population and territories from emergency situations, as well as ministries and departments engaged in the implementation of measures seen to protect the population and mitigate the consequences of accidents.

Operating organizations shall ensure the development of guidelines and (or) programs for emergency response drills to work through employee's response in case of accidents and arrange for such regular trainings.

Under the license review process, the regulator shall assess the feasibility and the adequacy of all technical and administrative arrangements put in place to ensure the readiness of the operating organization for all required response activities.

Such readiness inspections are performed both under inspection visits by Rostechnadzor taking place throughout NI, RS and SF lifetime and under Rosatom inspections (institutional control at Rosatom enterprises).

Unified State System for Emergency Prevention and Elimination (RSChS) covering the entire territory of the Russian Federation is managed both institutionally and operationally by EMERCOM of Russia. RSChS involves an Industry-Wide System for Prevention and Elimination of Emergencies at Facilities of the Nuclear Sector (OSChS) that was established to manage and perform activities protecting personnel and industrial sites against emergencies, to ensure the preparedness to response in case of potential nuclear or radiation emergencies at the sites of organizations operating particularly hazardous radiation and nuclear productions and facilities.

OSChS of the State Corporation Rosatom unites management authorities, response forces and services of Rosatom emergency rescue units and operates both at the federal and the facility level. The first National Report discussed in detail the management system, units, equipment and OSChS preparedness to emergency response and the mitigation efforts. A regular program for arranging and implementing the emergency response drills has been constantly running under the OSChS to drill the management bodies, units and means of emergency rescue teams at an industry-wide level under conditions specific for accidents that may potentially arise both at SC Rosatom sites and beyond their boundaries.

Figure F.5.1 – Remote robotic unmanned complex for operational aerial gamma photography using general-purpose measuring equipment

According to the Regulation on the Functional Control Sub-System Covering Nuclear and Radiation Hazardous Facilities of the Unified State System for Prevention and Elimination of Emergencies approved by Rostechnadzor's decree № 318 of August 17, 2015, this sub-system is viewed as an integral part of the Unified State System for Emergency Prevention and Elimination integrating all resources and capabilities of Rostechnadzor in addressing the following issues:

— monitoring NRHF preparedness for actions that would contain nuclear and radiation accidents and mitigate their consequences;

— identification of violations that may result in emergencies at NRHF, relevant conditions and causes, as well as taking appropriate steps for their elimination;

— ensuring Rostechnadzor's preparedness for emergency response actions at NRHF.

The Program for the Development of the Emergency Preparedness and Response System of the State Corporation Rosatom for the period up to 2035 and beyond has been approved and is being implemented following the Order of the State Corporation Rosatom No. 1/1279-P of September 28, 2022.

Hygienic support for medical aid delivered in the event of radiation accidents is provided by FMBA of Russia. Therefore, FMBA has established an exhaustive regulatory and procedural database for emergency response in the event of radiation accidents.

Practical experience in delivering medical aid during radiation accidents and incidents prompted the establishment of special emergency response units tasked with emergency medical assistance provided to victims and mitigating the consequences of radiation accidents for the population.

F.6. Decommissioning (Article 26)

Article 26. Decommissioning
Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:
i) qualified staff and adequate financial resources are available;
ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;
iii) the provisions of Article 25 with respect to emergency preparedness are applied; and
iv) records of information important to decommissioning are kept.

The following provisions regulate NF decommissioning in the Russian Federation:

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;

— federal rules and regulations setting safety requirements concerning NI, RS and SF decommissioning (NP-091-14, NP-012-16, NP-028-16, NP-057-17, NP-038-16 and etc.).

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 (Article 33) stipulates that the procedure and measures providing safe NI, RS and SF decommissioning (closure) shall be discussed in the NF designs in accordance with federal rules and regulations in the field of atomic energy use.

Federal rules and regulations in the field of atomic energy use stipulate that administrative and technical measures during NI, RS and NF design development, construction and operation shall be implemented with due account of its subsequent decommissioning (closure). In particular, during the entire period of NF operation, appropriate operating condition of structures, systems and equipment required for the safe NF decommissioning (closure) shall be maintained.

Decommissioning (closure) planning efforts shall be implemented at all stages of NF life cycle preceding its decommissioning (closure), including siting, design development, construction and operation, which involves the development of a decommissioning (closure) concept and its further revision. At the same time, decommissioning concepts are not required for RS referred to categories 4 and 5 according to their radiation hazard levels, as well as mobile RS.

Pursuant to relevant provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, decommissioning is considered as a type of activity implemented in the field of atomic energy use that is subject to licensing. Operating organizations shall obtain licenses for NI, RS, NM, RM, RW SF decommissioning. This law also states that licenses shall be obtained for RWDF closure.

NI, RS and SF decommissioning (RWDF closure) shall be performed in accordance with a decommissioning (RWDF closure) program and relevant decommissioning (RWDF closure) designs.

Comprehensive engineering and radiation survey of NI, RS and SF shall be performed prior to decommissioning to evaluate the technical and radiation state of engineering systems and equipment, building structures and the territories adjacent to NI, RS and SF sites. Based on its findings, operating organization shall develop relevant

decommissioning (closure) designs and the safety analysis reports for the decommissioning (closure) stage.

Operating organization shall ensure safe decommissioning, including the development and implementation of administrative and technical measures foreseen to prevent accidents and mitigate their consequences, provide safe NM, RM and RW management, its accounting and control, as well as the physical protection of NI, RS and SF, the environmental monitoring at the site, in surveillance zones and within sanitary-protection zones.

Administrative and technical measures being part of pre-decommissioning (pre-closure) activities and decommissioning (closure) itself shall reduce radiation exposure of employees (personnel), public and the environment to a minimum practicable level with due regard of relevant social and economic aspects.

At the decommissioning (closure) stage, NI, RS and SF shall be properly staffed; the employees (personnel) shall have appropriate qualifications and permits for self-guided work granted under an established procedure. Recruitment, training, authorization to self-guided work and maintenance of employees' (personnel) qualifications shall be provided by relevant operating organizations. NI, RS and SF recruitment and training system shall maintain the appropriate level of personnel qualifications required to perform safe NI, RS and SF decommissioning (RWDF closure).

At the stage of NI, RW and SF operation, operating organization shall keep all relevant records and information considered important for the safe NF decommissioning (RWDF closure), including the design and operational documentation, in appropriate decommissioning (RWDF closure) data bases.

According to FRR provisions, prevention of radiation accidents at the stage of NF decommissioning (RWDF closure) and mitigation of their consequences, in case if such accidents occur, are recognized as a fundamental safety principle for NF decommissioning (RWDF closure).

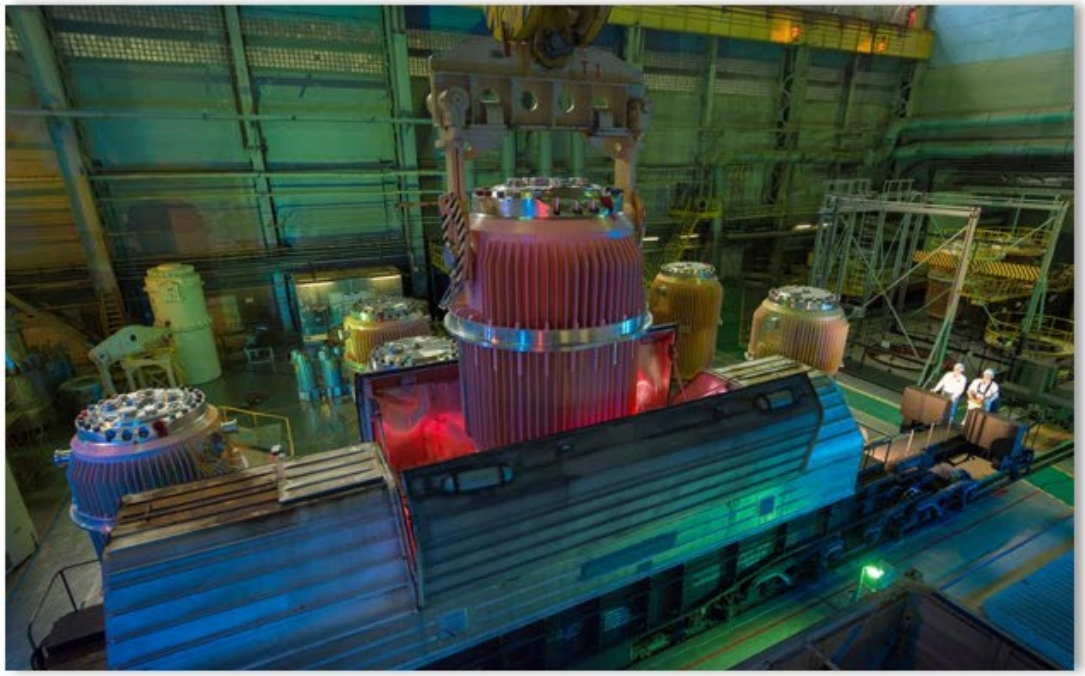
Under the license application review process, Rostechnadzor shall evaluate whether the operating organization is able to ensure safe completion of declared activities and NF decommissioning (RWDF closure) and whether it has the required design documentation. Rosatom has developed and approved the Concept for NI, RS and SF Decommissioning presenting the basic provisions for the establishment of a unified decommissioning system covering all nuclear and radiation hazardous facilities the SC Rosatom is in charge of.

This goal has been achieved through:

— further development and improvement of the legal and regulatory framework regulating the development of decommissioning plans and pre-decommissioning efforts at all stages of NF life cycle, inter alia following the final shutdown;

— development of economic and financial instruments providing effective NF decommissioning and RW management;

— adequate scientific, engineering and technical support for decommissioning and RW management activities.



Section G. Safety of Spent Fuel Management

Section G. Safety of Spent Fuel Management

G.1. General safety requirements (Article 4)

Article 4. General Safety Requirements
Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management, individuals, society and the environment are adequately protected against radiological hazards.
In so doing, each Contracting Party shall take the appropriate steps to:
i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;
ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted;
iii) take into account interdependencies among the different steps in spent fuel management;
iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;
v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;
vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;
vii) aim to avoid imposing undue burdens on future generations.

Legal framework of the Russian Federation provides for certain measures to be taken at all stages of SNF management in order to ensure adequate protection of employees (personnel), population and the environment against radiation impacts associated with SNF management.

The following federal laws and FRR set forth basic requirements for the safe SNF management and the safety of SNF management facilities:

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;
— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;
— Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996;
— federal rules and regulations:
- General safety provisions for NI, RS and SF (NP-001-15, NP-033-11, NP-022-17, NP-016-05);
- Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities (NP-064-17);
- Spent Nuclear Fuel Reprocessing Facilities. Safety Requirements (NP-013-99);
- Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements (NP-035-02);
- Rules for the Safe Storage and Transportation of Nuclear Fuel at Nuclear Facilities (NP-061-05);
- Container-type Spent Nuclear Fuel Storage Facilities. Safety Requirements (NP-039-22).

— Radiation Safety Standards (NRB-99/2009);
— Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010).

Complete list of regulatory documents is presented in Annex L of this Report.

G.1.1. Criticality and removal of residual heat (Article 4 (i))

Provisions of federal rules and regulations of the Russian Federation in the field of atomic energy use set forth a comprehensive set of measures providing nuclear safety in SNF management, inter alia so that the issues associated with the criticality and removal of residual heat generated in the SNF management process are adequately addressed at all management stages, including SNF onsite storage, transportation, storage and reprocessing at SNF reprocessing plants.

Federal rules and regulations, namely, NP-063-05, NP-013-99, NP-016-05, NP-035-02, NP-039-22 and Rules for the Safe Storage and Transportation of Nuclear Fuel at Nuclear Facilities (NP-061-05) establish nuclear safety requirements for SNF management covering NPP, including standalone storage facilities at NPP sites, SNF storage facilities outside of NF sites and SF, research nuclear installations, coastal and floating SNF storage facilities at ships and other waterborne vehicles.

SFA distribution in shrouds, racks, packages and the mutual disposition of shrouds, racks, packages and containers shall be such that the effective neutron multiplication factor during SF storage and transportation shall not exceed 0.95 in case of normal operation, operational disorders, including design basis accidents (as provided for in NP-061-05).

According to the Russian legal framework, the effective neutron multiplication factor (K_{eff}) during SNF management shall be kept as low as practicable and shall not exceed 0.95 under normal operation. In case of any single failure, K_{eff} shall not exceed 0.98 (NP-063-05).

Development of technologies, designs of equipment, engineering, construction, operation and decommissioning of SNF management facilities shall ensure the following:

— prevention of self-sustained chain fission reactions (SCR) both under normal operation and any initiating events discussed in the safety case;

— prevention of any uncontrolled and unauthorized reprocessing, accumulation, movement, transfer and transportation of nuclear fissile material (substances);

— adherence to nuclear safety conditions and requirements set forth in design, engineering and operational documentation, nuclear safety regulations specified both for normal operation and the initiating events;

— preferential use of safe equipment, safe technical tools and automated equipment;

— monitoring of nuclear safety parameters;

— conservative approach to nuclear safety justification.

Design solutions shall provide for the preferential use of such equipment the designs and the geometry features of which rule out the possibility of an SCR.

Nuclear safety of SNF storage is ensured through:

— restrictions imposed on the distribution of SNF in shrouds, racks, stacks and transportation casks (TUK);

— restrictions imposed on the number of fuel rods and assemblies in shrouds, racks, canisters with SNF and TUK;

— restrictions imposed on the number of packages, shrouds in a group and packages in a stack;

— restrictions imposed on the distribution of shroud groups, stacks, racks, SNF canisters, onsite TUK;

— the use of neutron absorbers;

— control over the location of fuel rods and assemblies, heterogeneous absorbers, packages, shrouds, racks, stacks;

— control over the availability of cooling media, its state and composition, as well as over the occurrence of moderator in SNF dry storage facilities;

— compliance with the process parameters set for SNF storage and transportation systems.

Nuclear safety at SNF reprocessing facilities is achieved through:

— restrictions imposed on the equipment geometry and size;

— restrictions imposed on the mass of nuclear hazardous fissile nuclides, substances, materials, their isotopic composition and concentrations;

— restrictions imposed on the concentration of nuclear hazardous fissile nuclides;

— the use of neutron absorbers;

— restrictions imposed on the isotopic composition of nuclear hazardous fissile materials;

— restrictions imposed on the mass fraction of neutron moderators in a nuclear hazardous fissile material;

— restrictions imposed on the reflectors and equipment layout;

— combination of the abovementioned methods and restrictions.

Residual heat removal systems (passive and active) shall be provided for at all SNF management stages ensuring compliance with normal operational limits so that passive systems are preferred over the active ones.

SNF storage and transportation system designs shall provide for certain measures or devices avoiding cladding temperature increase higher than the temperature limits established for normal storage and transportation conditions, as well as abnormal operation and design basis accidents.

SNF pools shall be fitted with special systems removing heat from the cooling media required for nuclear safety.

Heat removal system designs shall ensure that the temperature of the cooling media in the spent fuel pools does not exceed the design limits set for normal operation and operational disorders, including design basis accidents.

Designs of SNF dry storage facilities shall specify the cooling method (forced circulation and (or) natural convection) preventing fuel cladding temperature increase higher than the design values set for normal operation and operational disorders, including design basis accidents.

Lists of initiating events for design basis accidents and list of beyond design basis accidents, including relevant initiating events, accident sequences and the potential

consequences, shall be specified during design development, construction and operation of SNF management facilities and installations.

These lists shall include accidents associated with SCR and heat removal failures.

G.1.2. Minimization of radioactive waste generation (Article 4 (ii))

Federal rules and regulations set forth the requirements according to which generation and accumulation of RW shall be kept to the minimum practicable (principle of control over RW generation and accumulation).

In practice, adherence to these requirements is prompted by operating organizations, namely, by the opportunities at hand for optimizing RW management activities, inter alia through the development of technologies contributing to minimal RW generation taking into account their liabilities for paying fees to cover subsequent RW management activities, including RW disposal.

Advanced SNF reprocessing methods that are being developed now are expected to reduce RW generation in a considerable way. Construction of a pilot demonstration center (PDC) for advanced SNF reprocessing is ongoing at the MCC site under FTP NRS-2.

FTP NRS-2 also covers a work package focused on the safety of RW inventories accumulated due to past activities and timely processing of newly generated RW.

G.1.3. Interdependence among the different steps in spent fuel management (Article 4 (iii))

The existing system regulating activities associated with design development, construction, operation, maintenance, inspection and testing of SNF facilities, as well as accounting and review of relevant operational disorders ensures safety at all stages and steps of SNF management in Russia.

Having in mind the realistic figures of projected future SNF generation, the Russian nuclear sector continued the program for the establishment of centralized SNF storage and reprocessing facilities under FTP NRS-2. These efforts are aimed at arranging an SNF management system providing safe and well-timed transition from one life cycle stage to another.

Certain efforts aimed at deploying SNF management infrastructure were implemented under FTP NRS and part of them was continued under FTP NRS-2. Some issues associated with the management of some specific SNF types have been also covered under FTP NRS-2 (see Section B).

G.1.4. Protection of individuals, society and the environment (Article 4 (iv))

Section F.4 of the Report provides a detailed discussion of the following aspects: regulatory control over radiation safety and the existing regulatory requirements for the protection of personnel, public and the environment, evaluation of radiation impacts on the population and the environment, the established procedures for the radiation monitoring of personnel exposure and environmental contamination caused by releases

and discharges resulting from SNF management, as well as state supervision over the radiation protection of personnel, public and the environment.

Federal law № 7-FZ On the Environmental Protection of January 10, 2002 establishes a legal framework for the environmental protection. Observance of the human right for a healthy environment and mandatory consideration of EIA findings in the decision-making on economic and other activities are viewed as fundamental principles of environmental protection in Russia.

Issues concerning the tolerability of certain environmental impacts are addressed in the course of state environmental assessments and reviews of license (permit) applications for certain types of activities.

To ensure operational safety control over SNF management facilities, operating organizations shall perform radiation monitoring, inter alia to monitor radioactive discharges and releases into the environment and limit them in accordance with the established levels; whereas local and/or federal competent authorities shall implement their own independent monitoring programs.

Real-time data on the radiation situation in the regions with Rosatom enterprises can be accessed via the automated radiation monitoring system (http://www.russianatom.ru).

G.1.5. Taking into account the biological, chemical and other hazards that may be associated with spent fuel management (Article 4 (v))

According to Federal law № 7-FZ On the Environmental Protection of January 10, 2002, observance of the human right for a healthy environment and mandatory consideration of environmental impact assessment findings in the decision-making process on economic and other activities are viewed as fundamental principles of environmental protection.

According to the above law, all factors associated with adverse effects resulting from the performed activities and affecting the environment, including relevant physical, chemical, biological and other indicators shall be addressed in the SNF management plans and all through the SNF management process.

Decisions on SNF management activities shall be made following an impact assessment to identify, evaluate and account for direct, indirect and other effects produced by planned activities on the environment.

Positive statement of the state environmental assessment is an essential condition for acquiring siting, construction, operating and decommissioning licenses for SNF management facilities.

It should be noted that biological, chemical and other risks associated with SNF management are viewed as negligible as compared to the radiation risks.

Risks associated with chemical, biological and other (non-radiation) impacts are regulated by relevant federal and institutional regulations.

G.1.6. Analysis of actions that impose reasonably predictable impacts on future generations (Article 4 (vi))

Protection of future generations is ensured through the fulfillment of requirements applied to the evaluation of forecasted radiation impacts on future generations resulting from SNF management; these impacts shall not exceed the in-force acceptable public exposure limits established by existing regulations (Annex L).

G.1.7. Minimizing burdens on future generations (Article 4 (vii))

Provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 and federal rules and regulations in the field of atomic energy use stipulate that undue burdens associated with the need of providing safe SNF management shall not be imposed on future generations so that reliable protection of NF employees (personnel), public and the environment against unacceptable radiation impacts and radioactive contamination is provided during NM and RM storage and processing (including SNF storage and reprocessing). The principle of avoiding undue burdens associated with SNF management is implemented via SNF reprocessing and pre-disposal management of the resulting RW. SNF Management Concept of the State Corporation Rosatom and Institutional Target Program for the Infrastructure Development and Spent Nuclear Fuel Management in 2011–2030 provide for administrative and financial arrangements supporting the establishment of a SNF management system aimed at avoiding the undue burdens on future generations, negative environmental effects associated with accumulated SNF inventories, as well as timely and safe management of newly generated SNF.

Practical measures aimed at addressing and attenuating current and future SNF management challenges were discussed in Section B of the Report.

G.2. Existing facilities (Article 5)

> ***Article 5. Existing Facilities***
> *Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Joint Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.*

The Russian Federation takes appropriate steps to review the safety of any spent fuel management facility that existed at the time the Joint Convention entered into force for the Russian Federation.

Current management and regulatory system covering siting, design development, construction, operation, including maintenance, decommissioning of SNF management facilities, continuous control over current safety levels, as well as accounting and review of operational disorders ensures safety at all SNF management stages and steps.

All operating NF and SF engaged in SNF management have appropriate licenses issued by Rostechnadzor authorizing their operation and NM management. Operating licenses are issued following a safety assessment based on the review findings, evaluation

of submitted documents demonstrating the operational safety of the facility and operational safety inspections. A similar procedure is put in place when the license conditions are amended.

The following papers shall be submitted by the operating organization as part of its application for an operating license:

— safety analysis report;

— report summarizing the commissioning results;

— engineering designs of the facility (upon agreement with Rostechnadzor);

— guidelines on the elimination of accidents, safety guides on beyond design basis accident management; action plans for the protection of personnel in the event of an accident;

— data on personnel recruitment, training, maintenance of qualifications, permits to self-guided work and permits issued by Rostechnadzor authorizing certain activities in the field of atomic energy use;

— quality assurance program for commissioning (operation);

— list of operating procedures, instructions, programs and schedules for maintenance, repair, testing and checks of safety-important systems;

— commissioning program (for facilities commissioned following their construction), program of pre-commissioning testing operations (for facilities commissioned following their construction), pilot-industrial operation program (for facilities commissioned following their construction);

— measures to make up for deviations from NRS provisions set forth in relevant rules and regulations and a program focused on the elimination of such deviations;

— documentary evidence on RM accounting and control;

— documentary evidence on NI physical protection;

— data on the availability of sanitary and epidemiologic statements confirming that the activities involving RM are performed in accordance with relevant sanitary rules;

— data on the availability of a paper establishing standards (limits, if limits are established) for acceptable releases and discharges of RM, permits for such discharges and releases and plans for their reduction;

— list of organizations performing activities for and providing their services to the applicant and data on such activities (or delivered services).

Reviews of license applications by Rostechnadzor involve inspections that are implemented:

— to assess the safety of NI and SF;

— to check the reliability of submitted data;

— to evaluate whether the applicant is able to conduct the declared activities and all necessary conditions are in place.

Thus, each SNF management facility is operated based on and in keeping with conditions specified in the license issued by Rostechnadzor to the operating organization

and authorizing the operation of relevant facilities, NM management and SNF transportation; compliance with these provisions is evaluated in the course of inspections.

According to Article 35 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, operating organizations exercise control over NI and SF safety and shall submit all relevant safety data to state safety regulatory authorities.

According to federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05), operating organization shall perform continuous monitoring of all activities important for NI and SF safety. Moreover, operating organization shall collect, process, analyze, systematize and store information on failures of safety-important systems and their components, and inadequate personnel (employees) response to such failures. Operating organization shall investigate operational disorders occurring at NI and SF, including accidents; develop and implement relevant measures to avoid their reoccurrence in the future.

Furthermore, operating organizations shall prepare periodic safety reports on NI and SF state and submit them for review to the state safety regulatory authority and the state management authority in the field of atomic energy use. All enterprises operating SNF management facilities shall submit such annual reports, requirements to the contents and structure of which are specified in Rostechnadzor's guidelines (for example, RD-043-13). These reports shall evaluate the current safety levels at SNF management facilities in keeping with provisions of a safety regulation Evaluation of the Current Safety Levels at Nuclear Facilities (RB-091-13).

According to Article 26.1 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 enacted in 2011, organizations operating NI and SF under a permit (license) issued for more than 10 years shall perform periodic safety assessments. Such assessments shall evaluate NI and SF safety with regard to their operational life and aging of equipment. Relevant findings shall be applied to ensure the operational safety of the facility until the next periodic safety assessment takes place or the expiration of its operating lifetime. The first periodic NI and SF assessment shall be carried out 10 years after NI and SF commissioning with further reassessments repeated every 10 years until the expiration of the facility's operating lifetime.

Upon the expiration of the operating life (30 years), operating organization shall evaluate if it can be extended on condition that all provisions of federal rules and regulations are met.

G.3. Siting of proposed facilities (Article 6)

> ***Article 6. Siting of Proposed Facilities***
> *6-1 Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:*
> *(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;*
> *(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;*
> *(iii) to make information on the safety of such a facility available to members of the public;*
> *(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.*
> *6-2 In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.*

G.3.1. Safety of proposed facilities

A number of federal laws, federal rules and regulations (see Section E) and other regulations, in particular, building codes and regulations (SNIP), govern siting of SNF management facilities and the procedure followed to recognize such sites suitable for construction and safe operation of such facilities. The key regulations in this area are as follows:

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;

— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;

— Government decree of the Russian Federation № 306 On the Rules for Making Decisions on Siting and Construction of Nuclear Installations, Radiation Sources and Storage Facilities of March 14, 1997;

— federal rules and regulations specifying NF siting requirements, as well as relevant basic criteria and safety requirements (NP-031-01, NP-032-19, NP-050-03, NP-060-05) and requirements on accounting external natural and man-induced impacts produced on NF (NP-064-17);

— sanitary rules (OSPORB-99/2010, SP AS-03, SPP PUAP-03).

According to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, decision regarding siting and construction of NI, RS and SF that either are federally owned, are of federal or interregional significance or are to be sited and constructed in restricted-access entities shall be made by the Government of the Russian Federation in accordance with the procedure established by the Government of the Russian Federation.

Siting decisions on the abovementioned facilities are made by the Government of the Russian Federation upon approval by the authorities of constituent entities of the Russian Federation where such facilities are proposed to be sited and constructed. Siting decisions on facilities, including SNF management facilities, owned by the entities of the Russian Federation are made by government bodies of the constituent entities of the Russian Federation being in charge of the territories proposed for such siting and construction. Site selection decisions concerning siting and construction of municipally

owned nuclear facilities are made by local authorities being in charge of the territories proposed for such siting and construction.

Land and subsoil plots intended for NF siting are allocated in keeping with the procedure and the conditions established by the legal framework of the Russian Federation. Decisions on NF siting and construction are made in keeping with the land, urban development and environmental laws and with due consideration of reviews performed by public organizations.

Decisions on NI, RS and SF siting and construction shall be made with an account taken of relevant environmental impact assessments.

Decisions on NI, RS and SF siting and construction shall be made in keeping with the provisions of the Federal law № 174-FZ On the Environmental Assessment of November 23, 1995, based on corresponding statements of the state environmental assessment and the findings of reviews performed by public organizations.

According to the law, the procedure established by the law shall provide for the following principles and their implementation:

— integrity and comprehensiveness of the environmental impact assessment performed to evaluate economic and other activities and their effects;

— transparency, engagement of public organizations (associations) and consideration of public opinion in the decision-making process.

For the purposes of the state environmental assessment, relevant state management authority in the field of atomic energy use or operating organization shall submit papers estimating the radiation impacts produced on the environment supported by other required design documentation.

The following shall be taken into account when making a siting decision:

— the facility addresses the economic needs of the Russian Federation and its regions;

— availability of proper siting conditions meeting the requirements of federal rules and regulations in the field of atomic energy use;

— absence of safety threats to NI, RS and SF posed by nearby civil industrial facilities;

— potential social and economic effects from siting of the abovementioned nuclear facilities on industrial, agricultural, social and cultural development of the region.

The following federal rules and regulations in the field of atomic energy specify how relevant investigations and studies of natural and man-induced impacts in the NI, RS and SF siting regions and NI, RS and SF sites are to be performed:

— NPP Site. Safety Requirements (NP-032-19);

— Design Development Standards for Seismic Resistant NPP (NP-031-01);

— Siting of Nuclear Fuel Cycle Facilities. Basic Criteria and Safety Requirements (NP-050-03);

— Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities (NP-064-17);

— Siting of Storage Facilities for Nuclear and Radioactive Materials. Basic Criteria and Safety Requirements (NP-060-05);

— as well as Building Codes and Regulations (SNiP).

Feasibility studies for NI and SF construction involve engineering surveys and investigations focused on safety-related features, events and processes.

Compliance of the considered site with the following safety criteria shall be demonstrated in NI and SF feasibility studies:

— effects of natural and man-induced features, events and processes identified in the siting region and at the site on the safety of a new-build NI and SF with an account taken of their adverse combinations shall be limited;

— man-induced impacts on NI and SF exerted by nearby operating NI (located in the same region) shall be limited;

— radiation impacts produced by NI and SF on the environment and the population residing within the emergency response planning area taking into consideration the contribution from NF operating in the NI/SF siting region shall be limited;

— environmental characteristics contributing to RM transport or accumulation shall be accounted for;

— safe SNF, RM and RW transportation shall be ensured;

— decisions on the size of emergency response planning areas and emergency response planning area for mandatory evacuation of residents shall be made with due consideration of medical, biological, demographic and other characteristics of the region;

— adequate conditions for timely evacuation of the population shall be provided;

— opportunities for adequate response to potential consequences of design basis and beyond design basis accidents, as well as for taking prompt measures seen to prevent unauthorized actions against NI and SF shall be demonstrated.

Adequacy of a site proposed for NI or SF construction is evaluated in terms of NI and SF safety taking into consideration the identified natural and man-induced features, events and processes, as well as the safety of population and protection of the environment from radiation impacts resulting from normal operation and design basis accidents.

According to FRR regulating NF siting and accounting of external effects, NI and SF shall not be sited or constructed at the sites which are considered unsuitable for such NI and SNF SF construction according to provisions of the environmental legislation and particular requirements on the radiation safety of population, civil defense and fire safety.

Ministry of Construction, Housing and Utilities of the Russian Federation in coordination with Rostechnadzor specifies the scope of operations that should be performed in the course of engineering surveys to investigate natural setup at the sites (Government decree of the Russian Federation № 20 On Engineering Surveys Supporting Design Development, Construction and Refurbishment of Capital Structures of January 19, 2006).

Adequacy of a site and compliance of the site conditions with legal requirements and relevant provisions of federal rules and regulations shall be demonstrated by the operating organization in the NI or SF safety analysis report submitted as a part of a siting license application in accordance with relevant provisions of federal rules and regulations and Administrative Regulation on the Federal Environmental, Industrial and Nuclear

Supervision Service and Provision of its State Function on Licensing Activities in the Field of Atomic Energy Use (Order of the Federal Environmental, Industrial and Nuclear Supervision Service № 453 of October 8, 2014).

Rostechnadzor evaluates the compliance of NI or SF site conditions, the adequacy of performed engineering surveys and investigations and relevant justifications and decides whether it should grant a siting license or not.

G.4. Design and construction of facilities (Article 7)

> ***Article 7. Design and Construction of Facilities***
> *Each Contracting Party shall take the appropriate steps to ensure that:*
> *(i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;*
> *(ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;*
> *(iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.*

Design development and construction of NF, including SNF management facilities (NI or SF), is a licensable activity and is regulated in accordance with the Russian legal framework (see Section E.2.2).

The following federal rules and regulations and sanitary rules set forth the basic principles and requirements that shall be met at the design development and construction stages:

— General safety provisions (NP-001-15, NP-033-11, NP-022-17, NP-016-05);
— Design Development Standards for Seismic Resistant NPP (NP-031-01);
— Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities (NP-064-17);
— Dry SNF Storage Facilities. Safety Requirements (NP-035-02);
— SNF Container Storage Facilities. Safety Requirements (NP-039-22);
— Spent Nuclear Fuel Reprocessing Facilities. Safety Requirements (NP-013-99);
— Hygienic Provisions Concerning the Design Development of Enterprises and Facilities Pertaining to the Nuclear Sector (SPP PUAP-03).

In accordance with relevant FRR provisions (NP-001-15, NP-033-11, NP-016-05, NP-013-99, NP-035-02), SNF management facility shall be sited, designed, constructed and operated so that its radiation impacts on personnel, public and the environment during normal operation, operational disorders, including design basis accidents, never exceed the established limits for personnel and public exposure, radioactive release and discharge limits, limits set for RM concentrations in the environment, and limit such effects in the event of beyond design basis accidents.

Provisions of federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-013-99, NP-035-02) stipulate that NF safety shall be generally provided via consistent implementation of the defense-in-depth and multi barrier principles based

on the application of physical barriers preventing the spread of ionizing radiation, NM and RM into the environment, a system of administrative and technical provisions established to protect such physical barriers and to maintain their performance, as well as to protect the employees (personnel), public and the environment.

Provisions of federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-013-99, NP-035-02) stipulate that administrative and technical arrangements implemented during design development and construction of SNF management facilities shall account for their subsequent decommissioning.

Engineering solutions and administrative arrangements ensuring the safety of SNF management facilities shall be made based on previous experience or justified by studies, investigations or prototype operation. This approach is applied during design development, development and testing of equipment, construction, reconstruction and upgrading of different systems (their components).

Compliance of design, engineering and technical solutions and relevant conditions for safe NM, RM and RW storage and management with federal rules and regulations in the field of atomic energy use shall be demonstrated by the licensee in NI/SF safety analysis report submitted as part of a construction and operating license application.

G.5. Assessment of safety of facilities (Article 8)

> ***Article 8. Assessment of Safety of Facilities***
> *Each Contracting Party shall take the appropriate steps to ensure that:*
> *(i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;*
> *(ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).*

According to the legal framework of the Russian Federation, NF safety assessment and assessment of its radiation impact on the environment is viewed as an essential condition for making siting and construction decisions, in particular, when it comes to SNF management facilities.

Positive statement of the state environmental assessment is required to obtain a license for the declared activity. EIA materials shall be submitted as part of papers subject to state environmental assessment.

Statement of the state environmental assessment shall be submitted to Rostechnadzor as part of relevant construction or operational license application for SNF management facility.

Documents submitted to Rostechnadzor as part of a license application shall include papers demonstrating nuclear and radiation safety of the facility and (or) of the declared activities. Relevant requirements are set forth by Rostechnadzor depending on the type of facility and activity subject to licensing.

At the siting stage, SAR for a SNF management facility presenting all site justifications required by the current legal framework shall be submitted. The report shall discuss all safety-related issues; provide a general description of the facility and its safety for the environment and the population, including a preliminary analysis of safety and physical protection.

As it comes to construction and operation of SNF management facilities, relevant safety analysis reports submitted for review shall provide corresponding data in the amount established by federal rules and regulations in the field of atomic energy use.

SAR for an SNF management facility shall discuss a system of technical and administrative arrangements ensuring its safety. SAR shall present the findings of NF safety evaluation, a list of initiating events for design basis accidents and a list of beyond design basis accidents, findings of deterministic and probabilistic NF safety analysis. It shall also provide a list of techniques and software used to demonstrate NF safety. The software used for NF safety demonstration shall be validated in accordance with the procedure established by Rostechnadzor (the Procedure for the Validation of Software Used to Build Computational Models of Processes Affecting the Safety of Nuclear Facilities and (or) Activities in the Field of Atomic Energy Use approved by Rostechnadzor's Order № 141 of April 4, 2023).

Requirements to NF SAR, including those developed for SNF management facilities, and SNF storage facilities, in particular, are set forth in the provisions of federal rules and regulations (NP-006-16, NP-018-05, NP-051-04, NP-066-05 and etc.).

In general, SAR shall provide the following data:

— general description of NF;
— characteristics of the considered region and NF site;
— safety demonstration for the design development stage (buildings, structures, systems and their components);
— NM management system and other relevant systems;
— management and control;
— RW management;
— radiation safety during normal operation and radiation control;
— nuclear safety;
— commissioning;
— operational management (management arrangements, training and employees' (personnel) qualifications, guidelines, maintenance, control arrangements and reporting safety-related information, fire and occupational safety);
— physical protection;
— NM, RM and RW accounting and control;
— emergency preparedness and response;
— safety analysis, including:
    - evaluation of design basis accidents;
    - evaluation of beyond design basis accidents;

— measures to manage beyond design basis accidents;
— limits and conditions for safe operation, operational limits and conditions;
— quality assurance;
— NF decommissioning.

According to Article 26.1 of the Federal law № 170-FZ On Atomic Energy Use, organization operating NI and SF under a permit (license) issued for more than 10 years shall perform periodic safety assessments. Such assessments are performed to evaluate NI and SF safety with regard to its operating lifetime and aging of its equipment based on relevant legal provisions of the Russian Federation effective in the field of atomic energy use. Its findings shall be applied to ensure operational safety of the facility until the next periodic safety assessment or expiration of its operating lifetime.

If necessary, the following aspects can be addressed in the conditions of a sitting and operating license for a SNF management facility: requirements to the development and implementation of measures proposed to eliminate and (or) make up for discrepancies from current/effective regulatory provisions, to comply with the remarks expressed in expert reviews and (or) to take corrective actions in response to the remarks. Corrective actions may involve a follow-up or more detailed safety assessment, a program of additional surveys and investigations, or amendments introduced to the SAR in accordance with the findings of reviews and inspections, as well as other identified safety-related factors. Relevant implementation schedules and the timeframes for reporting and document submittal to Rostechnadzor shall be indicated as well.

G.6. Operation of facilities (Article 9)

Article 9. Operation of Facilities
Each Contracting Party shall take the appropriate steps to ensure that:
(i) the license to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;
(ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary;
(iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;
(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;
(v) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;
(vi) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;
(vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

G.6.1. Safety justification and issuance of licenses to operate SNF management facilities

The procedure followed to obtain a license to operate NF and SNF management facilities, in particular, is set forth in the Regulation on Licensing Activities in the Field of Atomic Energy Use (Government decree of the Russian Federation № 280 of March 29, 2013). Rostechnadzor decides to issue a license to operate a SNF management facility based on an expert review demonstrating the NRS.

The contents of the document portfolio demonstrating nuclear and radiation safety of NI/SNF SF commissioned following NI/SNF SF construction is specified in the Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Provision of its State Function on Licensing Activities in the Field of Atomic Energy Use (Rostechnadzor's order № 453 of October 8, 2014). The following main documents shall be submitted by an operating organization as part of a license application:

— safety analysis report;

— quality assurance program for NI/SF operation;

— data on personnel recruitment, training, maintenance of qualifications and issued permits for self-guided work;

— guide on the elimination of accidents;

— guidelines on the management of beyond design basis accidents;

— action plans for personnel protection in the event of an accident at the facility;

— guides on the safe storage, transportation and reloading of nuclear fuel;

— documentary evidence on NM and (or) RW accounting and control;

— documentary evidence on physical protection;

— NI and SF commissioning program;

— technical regulation for NF operation;

— guides on the operation of main engineering systems of a nuclear fuel storage facility;

— sanitary and epidemiologic statement confirming that the occupational conditions for operations involving RS meet relevant provisions of sanitary rules.

An expert review is performed to evaluate the adequacy of nuclear and radiation safety demonstration provided by operating organization for a NF and (or) declared activity. Expert review of documents submitted as part of a license application is performed by organizations having appropriate licenses issued by Rostechnadzor authorizing them to perform reviews of design, engineering and process flow documentation and documents demonstrating nuclear and radiation safety of NI, RS, NM, RM and RW storage facilities, NM, RM and RW management activities. Information on expert organizations awarded with appropriate Rostechnadzor licenses is posted online on its web-site (www.gosnadzor.ru) by the coordinating division of the Rostechnadzor's central office.

Operation of a NI or an SNF SF can be started only upon successful completion of all pre-commissioning testing activities including the comprehensive testing of its systems (components); upon completing and revising SAR with an account taken of pre-commissioning testing findings and the comprehensive testing of systems (their components).

G.6.2. Setting and adjusting safe operational limits and conditions

According to FRR provisions (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-013-99, NP-035-02), operating organization shall ensure the development of NI and SNF SF operational documentation based on the documentation provided by those who have designed the equipment, operational processes and the designs available at the time before the comprehensive testing of systems (components) is launched.

Operational documentation shall discuss safe-operation guides and techniques, general procedures for executing safety-related operations, safe operational limits and conditions, specific instructions for employees (personnel) elaborating on the ways certain operations are executed under normal operation and in case of operational disorders, including near miss incidents, actions of employees (personnel) promoting safety in the event of design basis and beyond design basis accidents.

Operational documentation on SNF management facilities shall be revised with due account of the commissioning results.

Procedures for keeping, storing and reviewing the operational documentation are established by operating organizations in accordance with relevant regulatory requirements.

The frequency of safety assessments performed for SNF management facilities when safe operational limits and conditions are validated or revised (taking into account past operational experience and available scientific and technical provisions) depends on some specific aspects of their operation and their condition. Such assessments shall be implemented each time the license renewal is required, if amendments to the license conditions are introduced following facility's overhaul or reconstruction or due to NI / SNF SF periodic safety assessment.

G.6.3. Regulatory system for maintenance, inspection and testing of nuclear installations

Maintenance, inspections and testing shall be performed for safety-important systems in accordance with FRR provisions (NP-001-15, NP-033-11, NP-022-17, NP-016-05) to maintain their performance. These operations are implemented in keeping with relevant provisions of operational documentation, programs and schedules developed according to the procedures established by operating organizations based on design requirements.

Based on effective regulatory and institutional standards, NI and SNF SF supervisory personnel develops maintenance programs implemented in accordance with the developed and approved schedules.

Operating organization shall arrange for planned and preventive maintenance and (or) overhaul of equipment at NI and SNF SF in accordance with the approved schedules.

All operations are performed in conformity with the instructions on the maintenance and repair of safety-important systems and in keeping with relevant schedules approved by management teams of operating organizations.

During SNF management facility operation, and, in particular, during its maintenance and overhaul, the operating organization shall ensure that all required operations are performed by personnel having appropriate qualifications and (if necessary) contract properly licensed organizations to perform the required activities and to deliver their services.

Following technical maintenance, performance of systems and their components is checked against design characteristics and the results obtained are recorded.

At the NI/SNF SF commissioning stage, following their maintenance and periodically throughout their operating lifetime, safety-important systems (their components) are normally subject to direct and complete checks against relevant design characteristics.

Decision on whether unscheduled maintenance and repairs of the equipment and systems are needed is made based on their state identified in the course of inspections.

At the operational stage, appropriate control and supervision is provided by Rostechnadzor along with institutional controls and inspections.

G.6.4. Engineering, technical and scientific support of operation

Pursuant to FRR provisions (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-013-99, NP-035-02), operating organization shall provide the required engineering, technical and scientific support for SNF management facility operation throughout its operating lifetime using its own resources or subcontracting other organizations.

Forms and types of engineering and technical support may vary depending on the specific tasks faced by the operating organization at the stages of NI/SNF SF siting, construction, commissioning and operation.

Article 37 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that organizations involved in scientific research and investigations, design development, construction and decommissioning of NI / SNF SF, design development and manufacturing of NI or SF equipment, or performing other activities or delivering services in the field of atomic energy use shall ensure that the scope and the quality of relevant activities and services comply with federal rules and regulations in the field of atomic energy use. These organizations shall bear the responsibility for the quality of performed activities and delivered services throughout the operating lifetime of NI/SNF SF, or the service life of the manufactured equipment. Leading design development and engineering organizations are selected by the management body in the field of atomic energy use according to an established procedure.

Normally, operating organizations subcontract specialized scientific and research, design development and engineering, repair, commissioning and other organizations and

enterprises manufacturing equipment for NI and SNF SF. These organizations shall have appropriate experience and licenses authorizing them to provide services in the field of atomic energy use.

G.6.5. Accounting of safety-significant operational incidents at NI and SF

In keeping with relevant provisions of the Federal law № 170-FZ On Atomic Energy Use, operating organization shall exert continuous control over the safety of NF operation throughout its lifetime.

Provisions of the following federal rules and regulations regulate the procedure for accounting and control of operational disorders at NI and SNF SF, including nuclear and radiation safety significant incidents:

— provisions on the procedures followed to investigate and account for operational disorders (NP-004-08, NP-047-11, NP-027-10 and other);

— general safety provisions for nuclear facilities (NP-001-15, NP-033-01, NP-016-05),

— as well as internal documents of operating organizations establishing the procedures followed to investigate and account for operational disorders at NI and SNF SF.

According to the requirements of the above federal rules and regulations, operational disorders at SNF management facilities, including accidents, shall be investigated in accordance with the procedure set forth in relevant provisions of federal rules and regulations. Operating organizations shall develop and arrange for measures to avoid the reoccurrence of operational disorders. In case of their occurrence at NI or SNF SF, operating organization shall submit relevant information to the state safety regulatory authority in the field of atomic energy use.

Investigation files shall be stored throughout the NI or SNF SF operating lifetime.

The systems for accounting and investigating operational disorders put in place by operating organizations shall provide early detection and prevention of operational failures at SNF management facilities and their timely elimination.

G.6.6. Programs for collection and analysis of NI and SF operational experience

According to relevant provisions of federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-013-99, NP-035-02), organization operating a NI/SNF SF shall ensure collection, processing, analysis, systematization and storage of relevant data on NI or SNF SF and relevant operational experience, including the information on investigated operational disorders, failures of safety-important system components and improper actions of employees (personnel), violations of safe operational limits and conditions; it shall ensure timely and proper exchange of all information with organizations authorized to perform its further analysis.

Operating organization shall store NI/SNF SF design documentation, as-built documentation on NI and SNF SF construction, test certificates and as-built documentation on the maintenance of safety-important systems (and their components)

throughout the operational lifetime of SNF management facilities, whereas certain documents shall be stored until NI/SNF SF decommissioning is completed.

G.6.7. Decommissioning plans

According to federal rules and regulations (NP-001-15, NP-033-11, NP-016-05, NP-012-16, NP-057-17 and etc.), administrative and technical arrangements implemented at design development, construction and operational stages shall account for subsequent decommissioning of relevant SNF management facilities.

Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, other relevant regulations, federal rules and regulations in the field of atomic energy use establish the decommissioning requirements for SNF management facilities.

According to Article 20 of the Regulation on Licensing of Activities in the Field of Atomic Energy Use (approved by the Government decree of the Russian Federation № 280 of March 29, 2013), during the review of a license application for NI or SNF SF siting, construction and operation and the set of documents demonstrating nuclear and radiation safety of NI or SNF SF and (or) declared activities, Rostechnadzor shall analyze the ability of the applicant to ensure proper conditions for the safe completion of the declared activities and NF decommissioning, as well as the availability of appropriate design documentation.

Provisions of federal rules and regulations NP-091-14 stipulate that at all stages of NF (NI or SNF SF) life cycle preceding its decommissioning, relevant decommissioning activities shall be planned based on a decommissioning concept, i.e., via its development and upgrading. The concept is submitted for review as part of NF (NI or SF) design documentation and SAR.

Pursuant to relevant provisions of NP-012-16, NP-057-17, etc., the decommissioning concept shall present the conditions under which the concept is subject to review (refining) to keep it up to date.

As part of NF (NI or SF) pre-decommissioning efforts, namely, at the stage of its operation (usually 5-10 years prior to the expiration of its service life and (or) its final shutdown), the operating organization shall develop a decommissioning program.

The decommissioning program is an administrative and engineering document discussing the main activities and operations, established procedures, conditions and schedules proposed for the pre-decommissioning and decommissioning stages.

Decommissioning operations at a SNF management facility (NI or SF) shall be preceded by a comprehensive engineering and radiation survey (KIRO).

Based on the KIRO findings, the operating organization shall update the decommissioning program, develop relevant decommissioning designs and SAR.

Decommissioning program and designs shall be developed with due consideration of performed improvements or upgrading, as well as the effects of occurred incidents.

All decommissioning efforts at SNF management facilities (NI or SF) shall be performed in keeping with the decommissioning program and the decommissioning design documentation (designs).

G.7. Disposal of spent fuel (Article 10)

Article 10. Disposal of Spent Fuel
If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

In the Russian Federation, SNF is neither subject to disposal nor such plans exist.

Section H. Safety of Radioactive Waste Management

Section H. Safety of RW Management

H.1. General safety requirements (Article 11)

Article 11. General Safety Requirements
Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.
In so doing, each Contracting Party shall take the appropriate steps to:
(i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;
(ii) ensure that the generation of radioactive waste is kept to the minimum practicable;
(iii) take into account interdependencies among the different steps in radioactive waste management;
(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;
(v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;
(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;
(vii) aim to avoid imposing undue burdens on future generations.

In the Russian Federation, safety of RW management is regulated by a number of federal laws, two of which, namely the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 and the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 being of fundamental importance, as well as legal acts and federal rules and regulations in the field of atomic energy use, sanitary rules and other regulations.

Legal framework of the Russian Federation stipulates that adequate protection of employees (personnel), public and the environment from radiation impacts associated with RW management shall be ensured at all RW management stages (collection, segregation, processing, conditioning, storage, transportation, disposal).

Article 48 of the Federal law 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that adequate isolation of RW from the environment, protection of current and future generations, biological resources from radiation impacts exceeding the limits established by relevant rules and regulations in the field of atomic energy use shall be ensured during RW storage and disposal.

Protection of human life and health, current and future generations, and the environment against adverse impacts produced by RW set as a priority and the liability of RW generating organizations for the safe management of waste prior to its transfer to the National Operator are stated among the fundamental principles of the USS RW (pp.1 and 3, part 3, Article 10 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011).

Organizations generating RW shall ensure its safe management, including its safe storage for the time periods set for intermediate RW storage (pp.2, part 2, Article 21 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to

Certain Legislative Acts of the Russian Federation of July 11, 2011) by the state management authority in field of RW management (State Corporation Rosatom).

The following regulations establish basic requirements for the safe RW management (Section E):

— Law № 2395-1 On Subsoil of February 21, 1992;
— Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996;
— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;
— federal rules and regulations in the field of atomic energy use:
  - General provisions for NI, RS and SF safety (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-058-14, NP-038-16);
  - Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities (NP-064-17);
  - Safety in RW Management. General Provisions (NP-058-14);
  - Rules for the Safe Management of RW from Nuclear Power Plants (NP-002-15);
  - Collection, Processing, Storage and Conditioning of Liquid Radioactive Waste. Safety Requirements (NP-019-15);
  - Collection, Processing, Storage and Conditioning of Solid Radioactive Waste. Safety Requirements (NP-020-15);
  - Management of Gaseous Radioactive Waste. Safety Requirements (NP-021-15);
  - Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14);
  - Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14);
  - Radioactive Waste Acceptance Criteria for Disposal (NP-093-14);
  - Safety Requirements for Facilities Holding Non-retrievable RW and Isolation Facilities for Non-retrievable RW (NP-103-17);
— Sanitary rules and regulations:
  - Radiation Safety Standards (NRB-99/2009);
  - Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010).

According to NP-058-14, safety objectives in RW management are viewed as follows:

— to ensure reliable protection of employees (personnel) and public against radiation exposure from RW exceeding the limits established by radiation safety standards;
— to ensure reliable isolation of RW from the environment, protection of current and future generations, biological resources from radiation impacts exceeding the limits established by radiation safety standards;
— to prevent radioactive discharges (releases) into the environment in concentrations exceeding acceptable discharge (release) limits.

According to NP-058-14, the following principles shall be met during RW management:

— adequate protection of employees (personnel) and public from radiation impacts associated with RW shall be provided in accordance with the principles of justification, limitation and optimization;

— adequate protection of the environment against adverse radiation impacts associated with RW shall be provided;

— interdependencies between different steps of RW generation and management shall be accounted for;

— future generations shall be protected, i.e., the projected exposure of future generations associated with RW disposal shall not exceed the acceptable levels of public exposure established by current regulations;

— undue burden associated with the need of providing RW management safety shall not be imposed on future generations;

— generation and accumulation of RW shall be monitored and kept to the minimum practicable;

— accidents shall be eliminated and, in case of their occurrence, their consequences shall be mitigated.

H.1.1. Criticality and removal of residual heat (Article 11 (i))

Nuclear safety during collection, processing, storage and conditioning of RW containing hazardous fissile nuclear materials is regulated by provisions of relevant federal rules and regulations in the field of atomic energy use specifying NRS rules (NP-063-05, NP-019-15, NP-020-15, NP-021-15, NP-058-14 and other).

According to NP-019-15, NP-020-15, NP-021-15, design and geometry of equipment for RW collection, processing, storage and conditioning, contents of hazardous fissile nuclear materials in conditioned RW and RW package geometry, as well as relevant handling procedures shall prevent SCR occurrence.

Premises housing equipment for collection, processing, storage and conditioning of RW containing hazardous fissile nuclear materials shall be fitted with automated alarm systems for SCR detection. The system shall be operated in the instant readiness mode for SCR detection. Compaction shall be avoided for SRW containing such amounts of hazardous fissile nuclear materials that its compaction may result in SCR.

According to NP-058-14 and NP-055-14, special technical provisions and administrative arrangements preventing SCR occurrence shall be put in place when disposing of RW containing hazardous fissile nuclear materials (substances). Properties of engineered and natural safety barriers shall exclude SCR due to possible concentration of radionuclides that may be caused by their migration in the RW disposal system. NP-093-14 provisions limit the content of hazardous fissile nuclear materials in RW subject to disposal, thus, eliminating the potential of SCR occurrence.

Requirements of federal rules and regulations (NP-019-15, NP-020-15) stipulate that heat generation from RW shall be accounted for in the decision-making on the waste conditioning methods. The volume of conditioned RW shall be reduced to a minimum

estimated, in particular, based on acceptable specific heat generation and heat dissipation levels.

During RW disposal, the host rocks shall stay resistant to thermal effects produced by heat generating RW, preserve their isolating properties and ensure proper thermal conditions in deep RW disposal facilities to avoid failure (integrity loss) of engineered and natural safety barriers.

H.1.2. Protection of individuals, society and environment (Article 11 (iv))

Section F.4 (Article 24) provides a detailed discussion of the following issues: radiation safety regulation and effective regulatory requirements for the protection of employees (personnel), public and the environment; the procedure followed to estimate radiation impacts on employees (personnel), public and the environment, the procedure implemented to monitor personnel exposure and environmental contamination (radiation control) due to releases and discharges from RW management activities, as well as state supervision for the protection of employees (personnel), public and the environment at the predisposal stage of RW management.

Federal rules and regulations (NP-058-14) stipulate that the following principles shall be observed at all RW management stages: adequate protection of employees (personnel) and public from the radiation impacts associated with RW in accordance with justification, limitation and optimization principles and adequate protection of the environment against adverse radiation impacts associated with RW.

According to NP-058-14, reliable protection of employees (personnel), public and the environment from radiation impacts associated with RW and exceeding the established limits is viewed as the main safety objective in RW management.

Measures implemented at the pre-disposal stage of RW management to protect individuals, society and the environment are, in general, similar to those discussed in Section G.1.4.

Furthermore, Federal law № 92-FZ On Special Environmental Programs for the Remediation of Radioactively Contaminated Sites and Territories of July 10, 2001 presents specific measures focused on the radiation safety of public, general reduction of risks associated with radiation impacts and enhancing the environmental conditions at radioactively contaminated sites (see Section G).

Principles, criteria and general safety requirements for RW disposal, including those concerning the long-term safety of RWDF, are set forth in relevant federal rules and regulations (NP-055-14, NP-069-14). According to NP-055-14 provisions, RWDF, including DWIF LRW, comply with safety requirements established for the post-closure stage, if:

— under normal operating conditions and abnormal operation up to and including the design basis accidents, its radiation impact on employees (personnel), population and the environment causes no exceedance of acceptable exposure limits established by legal provisions of the Russian Federation in the field of radiation safety and the standards for

radioactive releases and discharges into the environment set forth by relevant regulations in the field of atomic energy use;

— at the post-closure stage, the natural processes in the repository (DWIF LRW) siting area evolve according to normal (evolution) scenario (possible scenarios describing disposal system evolution), the system of safety barriers ensures the predicted radiation impact on the population associated with the disposed RW inventory constituting to no more than 0.3 of the basic limit set for public exposure by the legal framework of the Russian Federation in the field of radiation safety. When predicting the radiation impact on the population, the contribution of all systems holding RW (RW disposal systems) producing radiation impact on the population shall be taken into account.

At the post-closure stage, the safety target for a RW disposal facility (DWIF LRW) under unlikely, including catastrophic, external natural and man-induced impacts in the RWDF (DWIF LRW) siting area (unlikely disposal system evolution scenarios) is to ensure that the predicted radiation impact on the population associated with the disposed RW does not exceed the basic limit set for public exposure by the legal framework of the Russian Federation in the field of radiation safety.

Adequacy of engineering designs adopted to provide the disposal safety shall be demonstrated for the entire period while the disposed RW is expected to remain potentially hazardous and with due consideration of possible external natural and man-induced impacts in the RWDF siting region and at its site, as well as of physical and chemical processes evolving in the RWDF.

RWDF long-term safety, safety of public and the environment shall be demonstrated for the entire period during which the disposed waste is expected to remain hazardous. Long-term safety shall be demonstrated based on relevant safety assessments, involving prediction calculations focused on the long-term safety of RWDF at the post-closure stage. Adequacy of the safety demonstration, including the long-term safety assessment, is evaluated by Rostechnadzor under the licensing process.

H.1.3. On taking into account the biological, chemical and other hazards that may be associated with radioactive waste management (Article 11 (v))

Measures implemented by the Russian Federation to account the biological, chemical and other risks that may be associated with the predisposal management of RW are, in general, similar to those discussed in Section G.1.5.

As for RW disposal, the biological, chemical and other risks are accounted through the establishment of RW acceptance criteria for disposal. According to NP-093-14 provisions, the following RW are unsuitable for disposal:

— explosive materials capable of detonating when heated, due to shock or friction;

— capable of spontaneous ignition;

— hazardous gases capable of ignition and/or explosion (self-inflammable, inflammable or explosive) upon their interaction with water, air or other substances;

— resulting in explosion, inflammation or high heat output upon their interaction with water, air or other substances;

— generating toxic gases or aerosols upon their interaction with water, air or other substances;

— containing infecting (pathogenic) materials (substances).

Effective federal norm and rules discussing RW disposal requirements (NP-055-14, NP-069-14) stipulate that RWDF designs shall specify RW acceptance criteria for disposal including the requirements to RW packages and physical and chemical properties of the waste.

Radioecological monitoring of environmental medium (water, air, soil, vegetation) covering not only the radiation factors, but also the chemical contamination shall be performed at the sites of storage facilities holding large amounts of RW (water reservoirs – LRW storage facilities, tailings, deep LRW storage facilities and SRW storage facilities), their sanitary protection zones and the environment.

H.1.4. Analysis of actions that impose predictable impacts on future generations (Article 11(vi))

Protection of future generations is provided through the observance of requirements applied to the analysis of forecasted radiation impacts on future generations associated with RW management; these impacts shall not exceed the acceptable public exposure limits set forth in existing regulations (Annex L).

Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 stipulates that protection of human health and life, present and future generations and the environment from adverse impacts associated with RW management is a priority and is stated as a USS RW operating principle.

According to the Federal law № 7-FZ On the Environmental Protection of January 10, 2002, observance of the human right for a healthy environment and mandatory consideration of EIA findings when making decisions on economic and other activities are viewed as fundamental principles of environmental protection.

Federal rules and regulations (NP-058-14) stipulate that effective isolation of LRW and SRW from the environment, protection of present and future generations, biological resources from radiation impacts exceeding the limits established in radiation safety standards is a key safety objective for RW management.

Provisions of NP-058-14 stipulate that the following principles concerning future generations shall be met during RW management:

— protection of future generations is provided so that the projected exposure of future generations due to RW disposal shall not exceed the acceptable public exposure limits established under current regulations;

— undue burden associated with the safe RW management shall not be imposed on future generations.

Operating organization involved in RW management shall demonstrate its compliance with the abovementioned principles under the SAR submitted as part of a

license application for relevant activities. Adequacy of presented RWDF safety demonstration shall be evaluated by Rostechnadzor under the license review process.

H.2. Existing facilities (Article 12)

> ***Article 12. Existing Facilities and Past Practices***
> *Each Contracting Party shall in due course take the appropriate steps to review:*
> *(i) the safety of any radioactive waste management facility existing at the time the Joint Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;*
> *(ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.*

Compliance with legal provisions and regulations of the Russian Federation, including the requirements of federal rules and regulations regulating RW management safety, the observance of which is evaluated under the licensing process, ensures the safety of RW management facilities and RW management activities at existing facilities.

Federal rules and regulations set forth safety requirements for NF including operating RW management facilities and SF holding accumulated RW inventories, in particular, as well as facilities holding non-retrievable RW and isolation facilities for non-retrievable RW.

During the review of an operating license application for an existing RW management facility, Rostechnadzor evaluates if the operating facility complies with the established safety requirements. In general, the licensing procedure, as well as the procedure for the development and review of submitted materials demonstrating the safety of existing facilities for the predisposal RW management, their expert evaluation and specification of license conditions is similar to the one discussed in Section G.2.

Existing RW management facilities (including facilities operated as part of NI, RS and SF) can operate only if issued with appropriate licenses and shall comply with conditions of these licenses issued by Rostechnadzor to operating organizations and authorizing them to operate relevant facilities and manage the waste. Inspections are conducted to check the observance of license conditions.

Requirements to the safety supervision at existing RW management facilities and over relevant RW management activities performed at existing facilities, development and submittal of safety analysis reports for such facilities and activities to state safety regulatory authorities, as well as the requirements concerning periodic safety assessments of NI and SF operated under permits (licenses) issued for more than 10 years are similar to those discussed in Section G.2.

According to NP-055-14 provisions, current safety level shall be evaluated and the long-term safety assessment shall be performed for operated (isolated) RW disposal facilities to determine whether some technical and administrative arrangements are required to ensure the safety of employees (personnel), public and the RW disposal system. All necessary reasonably practicable improvements identified based on

evaluation findings shall be implemented to meet the existing requirements set forth in federal rules and regulations. For RWDF operated under permits (licenses) issued for more than 10 years, periodic safety assessments shall be performed in accordance with the program developed and approved by the operating organization.

Principles established in NRB-99/2009 govern the decision-making process on protective arrangements (intervention) proposed to improve the safety of SF holding accumulated RW inventories:

— public benefits from the proposed intervention shall outweigh the associated damage, i.e., reduction in the detriment due to lower exposure should be sufficient to justify the harm and the costs, including the social costs, of the intervention (principle of justified intervention);

— form and scope of the intervention, as well as its duration shall be optimized so that ultimate benefits from lower exposure, i.e., the benefit from the reduced radiation detriment after deducing the detriment from the intervention, are maximized (principle of optimized intervention).

Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 provides for certain efforts aimed at bringing the accumulated *legacy* RW generated from past practices associated with atomic energy use either for peaceful or defense purposes to an environmentally sound state. The law stipulates that decisions regarding the accumulated RW inventory and its management shall be made based on a comparison between the risks associated with the radiation impacts and other risks and costs due to waste removal from the storage facility, its further management, including disposal, and risks and costs in case if the RW remains in place.

FTP NRS has addressed lots of challenges associated with RW management facilities, their upgrading and reconstruction to enhance their safety level and reduce the risks associated with the adverse effects. Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 stipulates that deep disposal of liquid LLW and ILW in subsoil shall be permitted exclusively in deep well injection facilities constructed and operated prior to its enactment (i.e. before July 15, 2011).

Operation of existing DWIF LRW is ongoing in line with the conditions of relevant operating licenses issued by Rostechnadzor.

H.3. Siting of proposed facilities (Article 13)

Article 13. Siting of Proposed Facilities
13-1 Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:
(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;
(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;
(iii) to make information on the safety of such a facility available to members of the public;
(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.
13-2 In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.

H.3.1. Safety of proposed facilities

In general, the decision-making procedure on siting and construction of RW management facilities, relevant EIA procedures, the contents and structure of documents discussing NI, RS and SF radiation impacts on the environment, as well as the submittal procedures are similar to those discussed in Section G.3 of the Report.

Specific siting requirements applied to RWDF are established in relevant provisions of federal rules and regulations, namely, NP-055-14 and NP-069-14.

According to NP-055-14, a site is considered suitable for RWDF construction if it can be demonstrated that the safety of the disposed RW is ensured for the entire period while the waste potentially remains hazardous taking into account all relevant natural events and processes, as well as natural and man-induced features. Siting decision shall be justified in SAR taking into account the research and investigations carried out in the proposed siting region and relevant RWDF safety assessments. Safety of RW transportation shall be also considered and demonstrated when making a siting decision.

In general, procedures followed to acquire siting licenses in case of facilities intended for the pre-disposal RW management and RWDF, and the requirements to the contents and structure of relevant materials demonstrating their safety are similar to those discussed in Section G.3 of the Report.

During the license review of RWDF siting activities, the submitted long-term safety demonstration shall evaluate the post-closure safety within the period while the disposed RW potentially remains hazardous. Recommendations on how the safety assessments are to be performed, as well as the requirements regarding the contents and structure of SAR for near-surface and deep SRW disposal facilities are established by Rostechnadzor in relevant provisions of federal rules and regulations and safety guides (NP-100-17, RB-117-16, RB-139-17 and etc.).

H.4. Design and construction of facilities (Article 14)

Article 14. Design and Construction of Facilities
Each Contracting Party shall take the appropriate steps to ensure that:
(i) the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;
(ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account;
(iii) at the design stage, technical provisions for the closure of a disposal facility are prepared;
(iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

Activities associated with design development and construction of RW management facilities are regulated by the following sanitary rules and federal rules and regulations in the field of atomic energy use:

— General safety provisions for nuclear facilities (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-038-16);

— RW Management Safety. General Provisions (NP-058-14);

— Rules for the Safe Management of Radioactive Waste from Nuclear Power Plants (NP-002-15);

— Collection, Processing, Storage and Conditioning of Liquid Radioactive Waste. Safety Requirements (NP-019-15);

— Collection, Processing, Storage and Conditioning of Solid Radioactive Waste. Safety Requirements (NP-020-15);

— Management of Gaseous Radioactive Waste. Safety Requirements (NP-021-15);

— Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14);

— Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14);

— Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);

— Sanitary Rules for Design Development and Operation of Nuclear Power Plants (SP AS-03).

According to relevant provisions of federal rules and regulations (NP-058-14), facilities for the predisposal RW management shall be designed and constructed so that the associated radiation impacts on personnel, public and the environment during normal operation, abnormal operation, including design basis accidents, shall be not greater than the limits established for personnel and public exposure, radioactive discharge and release limits, as well as the limits set for RM concentrations in the environment.

Federal rules and regulations regulating RW disposal safety (NP-055-04, NP-058-14, NP-069-14) establish safety requirements for RWDF that shall be observed at the design development stage. According to the abovementioned regulations, the long-term safety of a disposal facility at the post-closure stage shall be provided by a system of

barriers (engineered and natural) preventing the spread of ionizing radiation and RM into the environment.

RWDF barrier system shall:

— ensure RW disposal safety all through the time period while the waste potentially remains hazardous with due account of all possible external natural and man-induced impacts in the RWDF (DWIF LRW) siting region, as well as relevant physical and chemical processes evolving in the repository (DWIF LRW);

— prevent inadvertent human or animal intrusion into the disposal system;

— maintain its isolating functions under the impacts produced by the host rocks;

— maintain its isolating functions under thermal impacts produced by RW.

Failure (integrity loss) of a single safety barrier or some likely external natural or man-induced impact shall not reduce the long-term safety of the RW disposal facility (multi-barrier principle). Engineered barriers in the RW disposal facility shall implement their functions at the post-closure stage without any maintenance or repairs required within a time period specified and justified in the repository designs.

Requirements of federal rules and regulations (NP-055-14, NP-058-14, NP-069-14) stipulate that administrative arrangements and technical provisions during design development, construction and operation of RW management and RW disposal facilities shall be put in place with due regard to their subsequent decommissioning (closure).

Engineering and administrative decisions made to ensure the safety of RW management facilities, including RWDF, shall rely on the past experience or testing, investigations or operation of prototypes. This approach shall be applied to design development, manufacturing and development of equipment, construction, reconstruction and upgrading of systems (their components).

Design and operational documentation shall provide for some specific engineering designs and administrative arrangements to ensure the safe management for each particular RW category.

Design documentation is approved only if the state sanitary and epidemiologic supervision authorities issue the corresponding sanitary and epidemiologic statements.

When applying for construction or operating license for a RW management facility, the operating organization shall demonstrate and present relevant information in the safety analysis report evidencing that the applied design and engineering solutions and RW storage and management conditions comply with the requirements established by federal rules and regulations in the field of atomic energy use.

H.5. Assessment of safety of facilities (Article 15)

> ***Article 15. Assessment of Safety of Facilities***
> *Each Contracting Party shall take the appropriate steps to ensure that:*
> *(i) before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;*
> *(ii) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;*
> *(iii) before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).*

The procedure followed to assess the safety of RW management facilities is, in general, similar to the one discussed in Section G.5 of the Report.

SAR for a RW management facility shall describe a system of technical provisions and administrative measures put in place to ensure NF safety (NP-058-14), present the findings of relevant safety assessments, including the list of initiating events for design basis accidents and the list of beyond design basis accidents, findings of deterministic and probabilistic safety assessments, as well as the methods and the software used for NF safety demonstration. SAR for a RW disposal facility shall demonstrate its long-term safety, including prediction calculations performed to assess the long-term safety of the RW disposal system at the post-closure stage within a time period while the disposed waste potentially remains hazardous (NP-055-14, NP-069-14). Software used to demonstrate NF safety shall be validated in accordance with established procedures.

Requirements to SAR developed for RW management facilities and RWDF are set forth in relevant provisions of relevant federal rules and regulations in the field of atomic energy use (NP-006-16, NP-018-05, NP-051-04, NP-066-05, NP-099-17, NP-100-17 and etc.) and safety guides (RB-139-17).

Conditions of siting and operational licenses issued for RW management facilities and RWDF may specify, if necessary, the requirements on the development and implementation of activities on eliminating and (or) making up for discrepancies from current/effective regulatory provisions, compliance with remarks from expert reviews and (or) introducing corrective measures to make up for the remarks expressed in the expert findings. Corrective actions may involve a follow-up or more detailed safety assessment, a program of additional surveys and investigations, or corrections introduced to SAR in accordance with the findings of reviews and inspections, as well as other identified safety-important factors. Relevant implementation and reporting schedules for document submittal to Rostechnadzor shall be indicated as well.

H.6. Operation of facilities (Article 16)

Article 16. Operation of Facilities
Each Contracting Party shall take the appropriate steps to ensure that:
(i) the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;
(ii) operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;
(iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;
(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;
(v) procedures for characterization and segregation of radioactive waste are applied;
(vi) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;
(vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;
(viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body;
(ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

H.6.1. Safety demonstration and acquisition of licenses to operate RW management facilities

The procedure followed to acquire a license to operate a RW management facility is established in the Regulation on Licensing Activities in the Field of Atomic Energy Use (Government decree of the Russian Federation № 280 of March 29, 2013). Rostechnadzor issues a license to operate a RW management facility based on a review of a license application demonstrating the safety of the declared activity.

Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Provision of its State Function on Licensing Activities in the Field of Atomic Energy Use (order of the Federal Environmental, Industrial and Nuclear Supervision Service № 453 of October 8, 2014) specifies the list of documents that shall be submitted to demonstrate the safety of RW management facilities commissioned following their construction.

The following documents are required to be submitted by operating organization as part of an operating license application:

— safety analysis report;

— quality assurance program supporting the operation of the RW management facility;

— data on personnel recruitment, training, maintenance of qualifications and issued permits for self-guided work;

— guide on the elimination of accidents;
— guidelines on the management of beyond design basis accidents;
— action plans for personnel protection in the event of accidents at the facility;
— documentary evidence on RW accounting and control;
— documentary evidence on physical protection;
— commissioning program for the RW management facility;
— technical regulation for the operation of the RW management facility;
— technical regulation for RW management during facility operation;
— data on the availability of a paper establishing the standards for acceptable RM releases and discharges;
— data on the permits issued for RM releases and discharges;
— plan for decreasing RM releases and discharges;
— guides on the operation of the main process systems.

Federal Law No. 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 states that facilities holding non-retrievable RW and isolation facilities for non-retrievable RW shall be upgraded to RW disposal facilities if the considered facility is fitted with safety barriers isolating the waste from the environment all through the period while the waste potentially remains hazardous. The procedure followed to obtain licenses to operate such RW disposal facilities is similar to the procedure established for RW disposal facilities.

Basically, the procedures followed to review the safety of RW management activities and subsequent RW management facility commissioning are similar to those discussed in Section G.6.1 of the Report.

H.6.2. Setting and adjusting safe operational limits and conditions

Operating organization shall ensure the development of operational documentation for RW management facilities based on the design documentation on the equipment, operational processes and designs available before the comprehensive testing of systems (components) is launched.

In general, the procedure followed to set and adjust safe operational limits and conditions is similar to the one discussed in Section G.6.2 of the Report.

H.6.3. Regulation of maintenance and repairs, inspection and testing of RW management facilities

In general, the procedure put in place to regulate the processes associated with maintenance and repairs, inspections and testing of RW management facilities is similar to the one discussed in Section G.6.3 of the Report.

H.6.4. Engineering, technical and scientific support of operation

Operating organization shall provide the required engineering, technical and scientific support for RW management facility operation throughout its operating lifetime using its own resources or subcontracting other organizations.

Operating organization shall arrange for planned and preventive maintenance and (or) overhaul of equipment at RW management facilities in accordance with the approved schedules. Maintenance, repairs, testing and inspections are performed to maintain the performance of safety important systems and to avoid dangerous failures.

At construction, commissioning and operational stages, forms and types of engineering and technical support may vary depending on the specific tasks faced by operating organization or particular facility.

Normally, according to the common best practices established in Russia that have already demonstrated their feasibility and effectiveness, operating organizations, as well as management teams of enterprises subcontract specialized scientific, research, design and engineering, repair, commissioning and other organizations and enterprises manufacturing equipment for RW management facilities issued with appropriate licenses authorizing them to perform relevant activities and provide relevant services.

H.6.5. Accounting of safety significant operational incidents at RW management facilities

The procedure followed to account for safety significant operational incidents at RW management facilities is, in general, similar to the one discussed in Section G.6.5 of the Report.

H.6.6. Programs for collection and analysis of operational experience at RW management facilities

The procedure followed to collect and analyze data on the operational experience at RW management facilities is, in general, similar to the one discussed in Section G.6.6 of the Report.

H.6.7. Decommissioning program

Requirements concerning safe decommissioning (closure) of NF, including RW management facilities, are established in provisions of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995, by-laws, federal rules and regulations in the field of atomic energy use (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-057-17, NP-091-14, NP-097-16, NP-012-16, NP-028-16, NP-055-14, NP-069-14) and sanitary rules (OSPORB-99/2010).

According to Article 20 of the Regulation on Licensing Activities in the Field of Atomic Energy Use (approved by the Government decree of the Russian Federation № 280 of March 29, 2013), during the review of a license application for NI or SF siting, construction and operation and the set of documents demonstrating NI or SF safety and (or) the safety of declared activities, Rostechnadzor shall evaluate the ability of the operating organization to ensure proper conditions for the safe completion of the declared activities and NF decommissioning (closure), as well as the availability of appropriate plans, programs and design documentation.

Appropriate technical provisions and administrative arrangements put in place during design development, construction and operation of RW management facilities, including RWDF shall account for their subsequent decommissioning (RWDF closure).

As part of pre-decommissioning efforts implemented at the operational stage of a RW management facility (normally 5 years before the expiration of its service life), a decommissioning program shall be developed by the operating organization.

Decommissioning (closure) of a RW management facility shall be preceded by its comprehensive engineering and radiation survey (KIRO).

Based on the KIRO findings, the operating organization updates the decommissioning (closure) program for the RW management facility, develops decommissioning (closure) design documentation (designs) and the SAR for the decommissioning (closure) stage.

Decommissioning (closure) program and designs shall be developed with due account of performed reconstructions and technical re-equipment, as well as the emerged accidents and their consequences.

After the activities envisaged in the NF decommissioning (closure) program and (or) the decommissioning (closure) design documentation are completed, the operating organization shall perform the final inspection of the NF, involving engineering and radiation surveys of buildings, structures, premises, systems and their components, as well as a radiation survey of the NF site, including the radiation examination of materials remaining at the NF site.

Pursuant to Rostechnadzor's order of October 8, 2014 № 453, administrative procedure for making decisions on license termination can be launched based on a review completed to check the reliability of information presented in the documents supporting safe termination of licensee's activities. These documents also include a report presenting the findings of the final (radiation) survey. The decision to terminate a license is made by Rostechnadzor based on a review performed to check the reliability of information contained in the documents supporting safe completion of the licensee's activities attached to the application. The decision is made by Rostechnadzor based on an audit (inspection).

H.7. Institutional measures after closure (Article 17)

> ***Article 17. Institutional Measures after Closure***
> *Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:*
> *(i) records of the location, design and inventory of that facility required by the regulatory body are preserved;*
> *(ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and*
> *(iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.*

The following requirements for arranging and implementing the institutional control (monitoring) are set forth in the Federal law № 190-FZ On Radioactive Waste

Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011:

— RWDF designs shall provide for periodic post-closure radiation monitoring at the RWDF site;

— at the post-closure stage and upon the expiration of a period within which the waste potentially remains hazardous, the state management authority in the field of RW management in coordination with state safety regulatory authorities shall justify and make a decision on the termination of periodic radiation monitoring service at the RWDF site and on amendments to the RW SF registry.

Federal rules and regulations regulating RW disposal safety (NP-055-14, NP-069-14) specify the requirements to the safe closure of RWDF, relevant closure procedures and the procedures for post-closure controls.

Pursuant to the Federal law № 190 On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, National Operator is responsible for the radiation control at RWDF sites and periodic radiation control at the post-closure stage.

NP-058-14, NP-055-14 and NP-069-14 establish the requirements to the post-closure institutional control at RWDF. At the post-closure stage, institutional control of the RW disposal system (DWIF LRW) shall be implemented covering inter alia the engineered and natural safety barriers, their state and the environment. At the post-closure stage, the state of engineered and natural barriers shall be monitored to a level provided for the repository system monitoring in the RWDF designs taking into account the state-of-art in science and technology; as it comes to deep RW disposal facilities, it shall also consider the R&D implemented in underground laboratories. Such monitoring surveys are implemented to identify the dynamic patterns of RW component release, to monitor the changes in the geological medium, to provide early detection of incidents and prompt response. The monitoring results shall be recorded and stored in relevant data bases.

Duration of monitoring surveys and their frequency shall be specified in RWDF (DWIF LRW) closure designs and depend on the total activity of disposed RW and the radionuclide inventory.

Part of existing monitoring wells shall be kept for the post-closure monitoring purposes, and if some wells are found to be technically inadequate, new monitoring wells shall be constructed.

The existing requirements provide for the following:

— drafting and submittal of RW disposal accounting documents (certificates) to the state RM and RW accounting and control system;

— input of RW disposal data into the RWDF registry;

— permanent storage of data on RW inventory, RWDF registry and RW certificates.

According to relevant requirements of federal rules and regulations, a RWDF (DWIF LRW) monitoring system shall involve a computer model designed to forecast the migration of waste components in the geological medium considering the processes

that may potentially alter the geological medium due to RW disposal, as well as the potential impacts on the population and the environmental medium.

As for DWIF LRW, radionuclide transport models focused on the processes evolving in reservoir beds shall account for the generation of piezometric surfaces, RW interactions with rocks and ground water, temperature changes, gas generation, microbiological and other processes important for radionuclide transport. Computer model shall be validated and certified by the regulatory authority in keeping with established procedures.

The most important safety indicators that can be forecasted for DWIF LRW are as follows:

— concentrations of radionuclides within the mining allotment and accessible biosphere;

— the plume formed due to the transport of radioactive components released from the waste;

— temperature and pressure in the reservoir bed;

— exposure doses for individuals and environmental medium.

The following shall be considered in the forecasts:

— geological structure and geological setting at the disposal site;

— radionuclide and chemical composition of waste;

— waste injection mode;

— sorption, chemical and biological processes;

— RW heat generation;

— flow processes, including those occurring in low-permeability rocks.

It should be noted, that new items can be added to the list of important factors along the process of DWIF LRW closure design development.

If the monitoring reveals some non-conformities with the RWDF (DWIF LRW) end state established in the RWDF (DWIF LRW) closure designs that can undermine its safety, all practicable efforts shall be put in place to ensure the safety of the closed repository, including those contributing to less intensive radionuclide transport, soil decontamination, surface and ground water treatment, water removal from disposal cells, as well as other necessary measures. Detailed program of possible and required actions shall be developed at the stage of RWDF (DWIF LRW) closure design development.

RWDF (DWIF LRW) post-closure monitoring shall be performed in accordance with a program developed and implemented by operating organization. The program shall indicate the procedures, conditions and schedules for the following arrangements:

— post-closure monitoring of RWDF (DWIF LRW) safety;

— monitoring of the RW disposal system, and, in particular, the state of its engineered and natural safety barriers;

— environmental monitoring;

— protection of engineered barriers from degradation caused by animal and root intrusion;

— dismantlement and disposition of systems and equipment designed to monitor the RW disposal system;

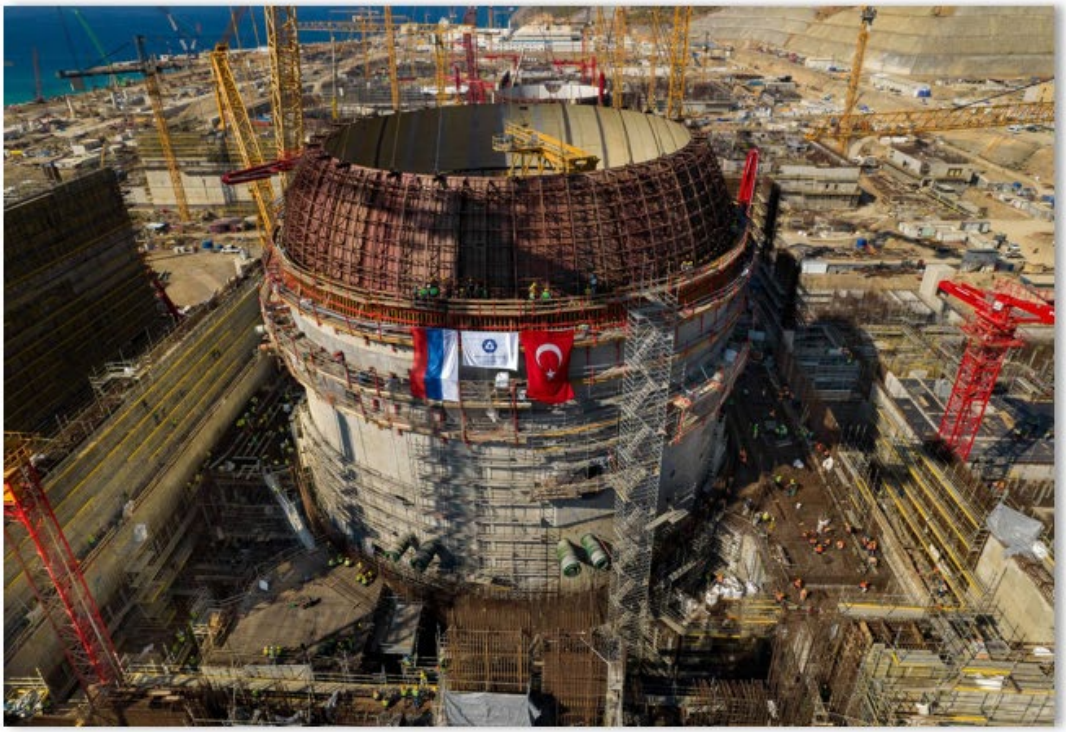
— prevention of inadvertent human intrusion;

— elimination/mitigation of consequences associated with advertent actions undermining RWDF safety.

The RWDF (DWIF LRW) program shall specify:

— the procedure followed to store the records on closed RWDF (DWIF LRW);

— the end state of RWDF (DWIF LRW) upon completing the monitoring activities within the RW disposal system.



Section I. Transboundary Movement

Section I. Transboundary movement (Article 27)

Article 27. Transboundary Movement

27-1 Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Joint Convention and relevant binding international instruments.

In so doing:

(i) a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination;

(ii) transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;

(iii) a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;

(iv) a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;

(v) a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

27-2 A Contracting Party shall not license the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

27-3 Nothing in this Joint Convention prejudices or affects:

(i) the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;

(ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;

(iii) the right of a Contracting Party to export its spent fuel for reprocessing;

(iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.

The following instruments regulate transboundary SNF and RW movement, including SNF import to the Russian Federation:

— Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;

— Vienna Convention on Civil Liability for Nuclear Damage;

— Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;

— Convention on Physical Protection of Nuclear Material;

— Federal law № 170-FZ On Atomic Energy Use of November 21, 1995;

— Federal law № 7-FZ On the Environmental Protection of January 10, 2002;

— Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011;

— Federal law №3-FZ On the Radiation Safety of Population of January 9, 1996;

— Federal law № 92-FZ On Special Environmental Programs for the Remediation of Radioactively Contaminated Territories of July 10, 2001;

— Federal law № 174-FZ On the Environmental Review of November 23, 1995;

— Government decree of the Russian Federation № 456 Rules for the Physical Protection of Nuclear Materials, Nuclear Installations and Storage Facilities for Nuclear Materials of July 19, 2007;

— Government decree of the Russian Federation № 421 On the Approved Regulation on the Development of Special Environmental Programs on the Remediation of Radioactively Contaminated Sites of June 14, 2002;

— Government decree of the Russian Federation № 418 On the Importation of Irradiated Nuclear Reactor Fuel Assemblies to the Russian Federation of July 11, 2003;

— Government decree of the Russian Federation № 587 On the Rules for Approving Costs Associated with the Management of Spent Fuel Assemblies Removed from Nuclear Reactors and their Reprocessing By-Products of September 22, 2003;

— Government decree of the Russian Federation № 588 On the Approved Funding Provisions for Special Environmental Programs on the Remediation of Radioactively Contaminated Sites of September 22, 2003;

— Government decree of the Russian Federation № 204 On the State Competent Nuclear and Radiation Safety Authority for the Transportation of Nuclear Materials, Radioactive Materials and Relevant Products of March 19, 2001, as amended on September 15, 2009 (№ 751) and on July 8, 2023 (№1129).

Article 63 of the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 stipulates that export and import of nuclear materials, including nuclear fuel, radioactive materials and radiation sources shall be subject to international obligations of the Russian Federation on non-proliferation of nuclear weapons and international agreements of the Russian Federation in the field of atomic energy use.

The procedure for the importation of nuclear reactor SFA to the Russian Federation, as well as for the return of SFA or their reprocessing by-products (including RW) to the country of origin is established by the Government decree of the Russian Federation № 418 On the Importation of Irradiated Nuclear Reactor Fuel Assemblies to the Russian Federation of July 11, 2003. According to its provisions, SFA importation to the territory of the Russian Federation, as well as export of previously imported SFA or relevant reprocessing products shall be performed under intergovernmental agreements of the Russian Federation and foreign trade contracts concluded to assign the implementation of the abovementioned intergovernmental agreements to organizations specially authorized by the Government of the Russian Federation.

SFA import to the territory of the Russian Federation is authorized only if the statement of the state environmental review on the unitary project developed by the authorized organizations and agreed upon with the State Corporation Rosatom and the Ministry of Natural Resources and Environment of the Russian Federation is positive and if the authorized organizations have appropriate licenses issued by the Federal Engineering and Export Supervision Service and the Federal Environmental, Industrial and Nuclear Supervision Service.

Unitary project is a document portfolio developed for a proposed foreign trade contract on providing certain services associated with the importation of SNF unloaded from foreign reactors; subject to state environmental review; developed and approved in accordance with the established requirements, including:

— draft of the foreign trade contract;

— SEP the cost of which is covered by funds raised from foreign trade operations involving the imported SNF;

— papers demonstrating the overall reduction of radiation risks and higher environmental safety due to the implementation of the unitary project, as well as justifying the time limits for the temporary storage of SNF and the byproducts envisaged by the foreign trade contract.

Foreign trade contract on the importation of SNF (SFA) of Russian (Soviet) production may stipulate conditions providing no further return of RW resulting from the SNF reprocessing to the country of origin except as otherwise stated in the intergovernmental agreements of the Russian Federation.

The return of reprocessing by-products to the state of origin is provided on the following terms:

— it shall be carried out in compliance with the international obligations of the Russian Federation on non-proliferation of nuclear weapons;

— foreign contract with the Russian Federation shall involve provisions on obligations and liabilities of the country of origin associated with the receipt of the by-products, as well as on providing opportunities for checking if appropriate conditions for such receipt and the safe management of the by-products are in place;

— foreign trade contract shall specify the following data: inventory, composition, aggregate state and amounts of by-products; types of packages intended for the return.

Additional services on the management of reprocessing by-products may be provided to the State of origin if it is consistent with the principles of non-proliferation of nuclear weapons, which is specifically stated in relevant intergovernmental agreements of the Russian Federation.

To specify the amounts of RW and by-products to be returned to the country of origin, special procedures approved by both Parties are implemented assuming that the activity of the irradiated assemblies previously imported for reprocessing is equivalent to the activity of the returned by-products resulting from SFA reprocessing with an account taken of natural decay due to temporary storage of the irradiated assemblies and the reprocessing by-products, as well as during SFA reprocessing.

SNF import to the Russian Federation is performed in compliance with intergovernmental agreements and provisions of the Russian legal framework.

Transportation of SNF (SFA) and its reprocessing by-products within the territory of the Russian Federation is performed in keeping with relevant provisions of federal rules and regulations in the field of atomic energy use, special transport rules, regulations governing the transportation of dangerous goods, as well as with due consideration to

existing international standards on the safe transportation of radioactive material, including:

— Rules for the Safe Transportation of Radioactive Materials (NP-053-16);

— General Rules for Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations (NP-067-16);

— General Rules for Accounting and Control of Nuclear Materials (NP-030-19);

— Rules for the Physical Protection of Radioactive Materials and Radiation Sources During their Transportation (NP-073-11);

— Requirements to Physical Protection Systems for Nuclear Materials, Nuclear Installations and NM Storage Facilities (NP-083-15);

— Sanitary Rules for the Radiation Safety of Personnel and Public During the Transportation of Radioactive Materials (Substances) (SanPiN 2.6.1.1281-03);

— Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);

— Radiation Safety Standards (NRB-99/2009);

— European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) of 30 September 1957 as amended. UN, New York and Geneva;

— European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) of May 26, 2000, as amended. UN, New York and Geneva;

— International Maritime Dangerous Goods Code of September 27, 1965 as amended. IMDG. London;

— Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF Code) of May 27, 1999;

— Technical Instructions for the Safe Transportation of Dangerous Goods by Air (doc 9284-AN / 905) rev. ICAO, Montreal;

— Agreement on International Goods Transport by Rail (SMGS). Valid from November 1, 1951 with amendments and additions, etc.

The carrier responsible for the transportation of nuclear and radioactive materials shall have an appropriate permit (license) issued by a corresponding state safety regulatory authority authorizing it to perform relevant activities in the field of atomic energy use.

The Government of the Russian Federation specifies annual amounts of SNF importation to the territory of the Russian Federation.

On May 27, 2004, a bilateral agreement on cooperation for the return of Russian-origin research reactor fuel to Russia was signed in Moscow by the Government of the Russian Federation and the Government of the United States of America. In compliance with this agreement in 2005 – 2017, Russian-origin SNF (highly-enriched SNF) potentially suitable for nuclear weapons production was returned back to Russia from Uzbekistan, the Czech Republic, Latvia, Bulgaria, Hungary, Kazakhstan, Romania, Libya, Poland, Belarus, Ukraine, Serbia, Vietnam; spent fuel from research reactors operated in Ghana and Nigeria was also transported through the territory of the Russian Federation to China. This program has been almost completed.

SNF transport from abroad and within the territory of the Russian Federation is carried out by rail, by sea, by air and by road.

All shipments are performed in full compliance with the international law, as well as legal and regulatory frameworks of Russia and its partner states and only if appropriate transportation permits issued by relevant competent authorities of these states are available.

Transportation within the territory of the Russian Federation is permitted if the carrier/consignee has appropriate transportation licenses issued by Rostechnadzor.

In keeping with the above Russia-USA agreement, SNF from research reactors is shipped (returned) to Russia and through the territory of the Russian Federation in TUK-19 and TUK-145/S casks manufactured in Russia, as well as those produced in the Czech Republic - SKODA VPVR/M.

Federal Law № 139-FZ On the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management of November 4, 2005 ensures, in particular, the compliance with provisions of Article 27-2 of the Joint Convention stating that the Russian Federation shall not license the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

RW export from and import to the Russian Federation for the purposes of its storage, processing and disposal is prohibited except for the cases referred to in Article 31 of the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, namely:

— RW resulting from the reprocessing of SNF imported to the Russian Federation is allowed to be returned to the country of origin if this is provided for in the corresponding international agreement of the Russian Federation;

— spent sealed radiation sources are allowed to be returned to the country of origin, if these were imported to the Russian Federation;

— spent sealed radiation sources produced in the Russian Federation are allowed to be returned to Russia including for the purposes of their processing and disposal.

To ensure response in the event of nuclear/radiation accidents in the member states of the Commonwealth of Independent States (CIS), including those associated with the transportation of radioactive materials, including SNF and RW, the Agreement on the Interaction of CIS Member States on the Preparedness in the Event of a Nuclear Accident or a Radiation Emergency and Mutual Assistance During Clean-Up Operations was signed in 2019.

Transit of nuclear materials and nuclear installations through the territory of the Russian Federation is carried out based on written permits issued by the State Atomic Energy Corporation Rosatom in accordance with the Administrative Regulation of State Atomic Energy Corporation Rosatom on Providing its State Service, authorizing it to issue written permits for the movement of nuclear materials, nuclear installations across the state border of the Russian Federation (through its territory for transit purposes) № 1/25-NPA approved by Order of the State Corporation Rosatom on August 23, 2017. The

Russian Federation guarantees that the level of physical protection provided for nuclear materials and nuclear installations being transported across the territory of the Russian Federation is not lower than the one specified in the Convention on the Physical Protection of Nuclear Material.

Section J. Disused Sealed Sources

Section J. Disused Sealed Sources (Article 28)

Article 28. Disused Sealed Sources
28-1 Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.
28-2 A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

J.1. Safe management of disused sealed sources

Sealed sources are used widely in scientific, educational and medical institutions.

In 2020-2023, 29,200 pieces of sealed sources were withdrawn from use in organizations of the Russian Federation.

J.1.1. Legal framework and regulatory control

The national legal framework in the field of atomic energy use refers disused sealed sources to the RW category.

Provisions of the Federal law 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 states that disused sealed sources shall be handed over either for disposal to the National Operator for Radioactive Waste Management or for processing to their manufacturer in accordance with a procedure established by the government body responsible for RW management in coordination with the state safety regulatory authorities.

Organizations are responsible for disused SRS accounting and control in accordance with the Procedure for Arranging the State Accounting and Control System for Radioactive Materials and Radioactive Waste approved by the Government Decree of the Russian Federation No. 542 of June 15, 2016 and the requirements set forth in federal rules and regulations, namely, NP-067-16 General Rules for Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations.

The following operations are part of the disused SRS management practice in Russia:

— SRS unloading from radiation installations and equipment, instruments and devices containing radiation sources;
— dismantlement of radioisotope thermoelectric generators (RTG);
— storage in specialized organizations;
— processing of sealed sources;
— disposal of disused sealed sources.

J.1.2. RTG dismantling

Federal rules and regulations in the field of atomic energy use NP-038-16 General Safety Provisions for Radiation Sources, namely paragraph 110, state that radioisotope thermoelectric generators with expired design life or upon expiration of their extended

service life, as well as faulty RTG shall be decommissioned and handed over either to manufacturer or a RW management organization for storage or processing.

All 1,007 RTG of the Northern Sea Route were decommissioned.

J.1.3. Storage of disused sealed sources at NFC facilities

By the end of 2023, a total inventory of about 3,000,000 of disused SRS was stored in organizations of the Russian Federation. Table J.1.1 summarizes data on the accumulated disused SRS inventory.

Table J.1.1 – Number of disused sealed sources as of the end of 2019 (sixth National Report of the Russian Federation) and 2023, thousand pcs.

Enterprise	Number of disused SRS as of 2019, thousand pcs.	Number of disused SRS as of 2023, thousand pcs.
FEO	2,268	- (handed over to RADON)
RADON	597	2,878
PA Mayak	61	65
MCC	46	46
RIAR	30	31
SCC	24	25

In accordance with an established procedure, upon being withdrawn from service, disused SRS are handed over for long-term storage to specialized organizations, conditioned to meet relevant waste acceptance criteria and then sent for disposal.

All movements of disused sealed sources can be tracked via the State Accounting System for RM and RW.

J.1.4. Processing by SRS manufactures

To minimize RW generation volumes, disused sealed sources can be handed over for processing to SRS manufacturing organization. In this case, the manufacture is entirely responsible for their safe management and transfer of waste generated from such processing to the National Operator for RW Management.

J.1.5. Disposal of disused sealed sources

If the disused sealed sources cannot be processed, they are handed over for temporary storage to a specialized organization (J.1.4) provided their subsequent transfer for disposal to the National Operator for RW Management.

Requirements for the safe management of disused sealed sources, including their disposal, are set forth in federal rules and regulations in the field of atomic energy use, in particular: NP-058-14 Safety in Radioactive Waste Management. General Provisions, NP-055-14 Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements, NP-069-14 Near-Surface Disposal of Radioactive Waste. Safety Requirements, NP-093-14 RW Acceptance Criteria for Disposal, NP-038-16 General Safety Provisions for Radiation Sources.

J.2. Return of disused sealed sources to the territory of the Russian Federation

Federal Law 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011, in particular, Article 31 authorizes the return of disused sealed sources produced in the Russian Federation to the Russian Federation, including for the purpose of their processing or disposal.

The return of disused sealed sources produced in the Russian Federation is funded by the organization responsible for SRS export.

The procedure regulating the return of disused sealed sources produced in the Russian Federation to the Russian Federation, including for the purpose of their processing or disposal, is established by the Regulation Concerning the Return of Disused Sealed Source of Ionizing Radiation of Russian Production to the Russian Federation approved by the Government Decree of the Russian Federation No. 1186 of December 19, 2012.

Section K. General Efforts to Improve Safety

Section K. General Efforts to Improve Safety

K.1. Addressing the challenges noted at the seventh Review Meeting

Tasks, the relevance of which was noted at the seventh Review Meeting	Current State
Shipment of accumulated SNF inventories for centralized storage and reprocessing	1. In 2020-2023, shipped to centralized storage facilities were: • 944 pcs. of VVER-1000 SFA for wet storage at the MCC site; • 3,108 pcs. of VVER-1000 SFA for dry storage at the MCC site; • 30,527 pcs. of RBMK-1000 SFA for dry storage at the MCC site. 2. In 2020-2023, 525.8 tons of SNF were reprocessed. 3. A prototype TUK-137T.R cask was manufactured, necessary preparations preceding cold operational tests are underway.
Development of an advanced reprocessing method for the main types of accumulated SNF	The second startup SNF reprocessing complex of the pilot-demonstration center (PDC) with a design capacity of 220 SNF tons per year is under construction at the MCC site
Closure of RW storage reservoirs at SCC, PA Mayak and MCC sites	1. Pre-decommissioning operations are ongoing at surface LRW storage reservoir № 365 (MCC) and reservoir V-17 (PA Mayak). 2. Operations on upgrading storage reservoirs B-1, B-2, B-25 and pulp storage facilities PKh-1, PKh-2 into disposal facilities are ongoing at the SCC site.
Decommissioning of nuclear facilities	1. In 2020-2023, the following facilities were decommissioned: – facility U-5 and structure Zh (VNIINM); – structures 136, 137, 135a, 135b, 135c, buildings 135, 199, 199a, 145, 121, 131-134, 120/6, 173, 102a, 102s at the radiochemical plant (PA Mayak); – building 4aS at the chemical and metallurgical plant (PA Mayak); – building 401E at the reactor plant (PA Mayak). 2. Pre-decommissioning operations are ongoing at the following sites: – reactor unit BR-10 (IPPE); – RU at the radiochemical plant (SCC); – RU at the radiochemical plant (MCC); – building 802 at the diffusion production site (AECC); – A buildings, buildings № 2,9 (VNIINM); – radiochemical building № 8 operated by the Moscow branch of RADON

Cleanup of contaminated sites	In 2020-2023, the total surface area of remediated territories accounted for 246,000 m^2: – cleanup operations were completed as part of U-5 facility and building «Zh» decommissioning operations at the VNIINM site; – cleanup of radioactively contaminated areas was competed at the site of plant 235 (PA Mayak); – cleanup of a radioactively contaminated site within the PA Mayak's sanitary protection zone was completed; – cleanup operations were completed at sites operated by the Moscow branch of RADON.
Implementation of the IAEA peer-review recommendations on the deep well injection of LRW	A special Program approved by SC Rosatom and Rostechnadzor is being implemented. This Program has enabled successful completion of a basic work package. The work summary was presented in a press release distributed to the Contracting Parties at the seventh Review Meeting held in 2022.
Decommissioning of icebreakers approaching the end of their service life and maintenance ships	In 2020-2023, decommissioning was completed for the following facilities: – icebreaker Arktika; – icebreaker Sibir; – FMB Lepse.
Construction of near-surface disposal facilities for LLW and ILW	Since 2022, RW has been disposed of in the second RWDF section in Novouralsk (Sverdlovsk region) with a total design capacity of 55,000 m^3. Construction and installation operations are underway at the following sites: – RWDF Ozersk (Chelyabinsk region), commissioning scheduled for 2026; – RWDF Seversk (Tomsk region), commissioning scheduled for 2026. By 2035, further phased RWDF construction is expected to provide infrastructure necessary for RW Class 3 and 4 disposal with a total design capacity of 420,000 m^3.
Construction of an underground research laboratory	URL construction is underway: – construction of the main power supply infrastructure facilities has been almost completed; – construction and installation operations are underway at the sites of auxiliary buildings and structures; – construction, installation and excavation operations have been started in the ventilation and auxiliary shafts.
Development of a RW classification system based on the RW disposal routes	Decree of the Government of the Russian Federation No. 1929 of October 29, 2022 amended the Decree of the Government of the Russian Federation No. 1069 of October 19, 2012 On the Criteria Used to Categorize Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Categorize Radioactive Waste as Non-retrievable Radioactive Waste and Retrievable

	Radioactive Waste, Classification Criteria for Retrievable Radioactive Waste.
Impact produced by the SARS-CoV-2 pandemic on the safety of spent fuel management and the safety of radioactive waste management	During the pandemic, all nuclear enterprises were implementing and strictly enforcing the measures against COVID-19: temperature monitoring at checkpoints; mandatory requirement to wearing face masks at workplaces; enhanced sanitization of work vehicles and premises; employees from risk groups were shifted to remote working; constant PCR testing at the expense of the employer, etc. By the end of 2021, the rate of Rosatom personnel vaccination against COVID-19 amounted to 83%. The implemented measures managed to provide safe and uninterrupted operation of all nuclear enterprises. The COVID-19 pandemic modified the work environment, but nevertheless produced no notable negative impact on the safety of nuclear facilities and activities related to SNF and RW management and nuclear decommissioning.

K.2. Planned measures to improve safety

A large-scale comprehensive work package providing for certain managerial and technical measures is planned to be implemented in Russia in the medium- and long-term perspective. These measures are aimed at increasing the capacities in RW conditioning and disposal, SNF reprocessing, nuclear decommissioning and cleanup. The plans are financially supported by the Government.

In terms of safety regulation, it is planned:

— to support the URL research, including systematic review and evaluation of the research findings aimed at demonstrating the observance of relevant requirements set forth in federal rules and regulations in the field of atomic energy use, as well as recommendations of international organizations;

— to develop permanent geological flow and transport near-surface RWDF models supporting the independent compliance assessment of repository siting, construction, operation and closure activities with legal requirements and provisions of federal rules and regulations in the field of atomic energy use under control and supervision implemented by Rostechnadzor;

— to set forth the requirements regarding the RWDF (DWIF LRW) closure concept, as well as the requirements for the RWDF (DWIF LRW) safety at closure and post-closure stages;

— to further improve the system of federal rules and regulations, in particular, with an account taken of the best international practices.

K.3. Good practice

We have no proposals regarding the identification of good practices.

K.4. Good performance

1. The work package implemented to decommission the floating maintenance base (FMB) Lepse (Murmansk region).

2. The work package implemented to decommission the nuclear icebreaker Sibir (Murmansk region).

3. Decommissioning of production uranium-graphite reactors AD and ADE-1 at the MCC site (Krasnoyarsk Territory).

4. Decommissioning of the U-5 facility designed to work through the process of plutonium extraction and treatment from irradiated uranium, and research buildings at the VNIINM site (Moscow).

5. Application of robotic mobile platforms and digital methods at the decommissioning stage.

K.5. Suggestions

We have no suggestions on the matter.

K.6. Overview matrix

Type of liability	Long-term management policy	Funding of liabilities	Current practice/facilities	Future facilities
SNF	– Technological storage; – Reprocessing	– Government; – Operating organization (operator)	– Dry and wet storage (onsite and centralized storage facilities at MCC and PA Mayak sites); – Reprocessing (RT-1 plant at PA Mayak, testing and refinement of reprocessing technologies under R&D implemented at the startup complex of the pilot-demonstration center operated at the MCC site).	Second startup PDC complex for SNF reprocessing at the MCC site
Nuclear fuel cycle RW	– Processing, transfer for disposal to the National Operator; – Remediation of sites operated by uranium mining and milling enterprises; – Upgrading facilities holding non-retrievable RW and isolation facilities for non-retrievable RW into RW disposal facilities	– Government; – Operating organization (operator); – Special reserve fund.	– RW processing and storage at the sites of operating organizations (operators); – RW transfer for processing and storage to specialized organizations (RADON and others); – SRW disposal (LLW and ILW) in a RWDF at the UECC site; – Deep-well injection of LRW.	– RWDF (RW Class 3 and 4) in Ozersk (Chelyabinsk region) and Seversk (Tomsk region); – Underground research laboratory (URL).
Non-nuclear fuel cycle wastes		– Government;	RW transfer for processing and storage to specialized organizations (RADON and others)	RWDF (LLW and ILW SRW) in Ozersk

	Processing, transfer for disposal to the National Operator	– Operating organization (operator); – Special reserve fund.		(Chelyabinsk region) and Seversk (Tomsk region).
Decommissioning liabilities	Decommissioning program	– Government; – Operating organization (operator); – Special reserve fund.	– 2 pilot-demonstration centers for decommissioning were established: • for uranium-graphite reactor decommissioning; • for VVER-1000 NPP decommissioning. – In 2020-2023, a total of 27 nuclear facilities were decommissioned.	A total of 82 facilities are going to be decommissioned by 2030.
Disused sealed sources	Processing, transfer for disposal to the National Operator	– Government; – Operating organization (operator); – Special reserve fund.	As of the end of 2023, organizations in the Russian Federation stored some 3,000,000 pcs. of disused SRS (including RADON – 2,878,000 pcs.; PA Mayak – 65,000 pcs.; MCC – 46,000 pcs., RIAR – 31,000 pcs.; SCC – 25,000 pcs.).	RW disposal facilities

Section L. Annexes

Annex L.1. SNF management

Table L.1.1 – Infrastructure facilities for SNF management

Site		Facility type
NPP		
Kola NPP	VVER-440	Storage facility/onsite spent fuel pool
Novovoronezh NPP	VVER-440	
	VVER-1000	
	VVER-1200	
Balakovo NPP	VVER-1000	
Rostov NPP	VVER-1000	
Kalinin NPP	VVER-1000	
Kursk NPP	RBMK-1000	
Leningrad NPP	RBMK-1000	
	VVER-1200	
Smolensk NPP	RBMK-1000	
Beloyarsk NPP	BN-600	
	BN-800	
	AMB	
Bilibino NPP	EPG-6	
Zaporozhye NPP	VVER-1000	
FTNPP	KLT-40S	
NFC		
PA Mayak	VVER-440	Reprocessing plant with a storage pool
	VVER-1000	
	RBMK-1000	

	AMB	
	Research reactors	
	Icebreaker fleet	
MCC	VVER-1000	Storage facility (KhOT-1)
	RBMK-1000, VVER-1000	Storage facility (KhOT -2)
	VVER-1000	Reprocessing plant (PDC)
Research reactors		
NRC Kurchatov Institute	MR	Storage facility
	IR-8	
IPPE	BR-10	
IRM	IVV-2M	
RIAR	MIR.M1	
	SM-3	
	RBT-10/2	
	BOR-60	
	VK-50	
Petersburg Nuclear Physics Institute (PNPI)	VVR-m	Storage facility
Branch of Karpov Research Institute of Physical Chemistry (NIFHI)	VVR-ts	
MEPhI	IRT-MEPhI	
FTI Tomsk Polytechnic University (TPU)	IRT-T	
Joint Institute for Nuclear Research (JINR)	IBR-2	
	IBR-30	
	IREN	

Table L.1.2 – SNF inventories from different reactor units and the accumulation rates in 2006 – 2024 as of January 1, 2024

Site	Fuel type	SNF inventory, tons						
		2006, tons	2008, tons	2011, tons	2014, tons	2017, tons	2020, tons	2024, tons
Kola NPP	VVER-440	116	75.4	96.9	84.5	97.4	90.4	79.9
Novovoronezh NPP	VVER-440	74.5	73.9	76.2	2.9	40.1	27.4	13.9
	VVER-1000	133	138.5	200.9	154.3	101.9	141.4	87.8
	VVER-1200	-	-	-	-	-	-	207.2
Balakovo NPP	VVER-1000	407	400.3	420.8	349.7	358.3	475.5	488.5
Rostov NPP	VVER-1000	84	98.2	101.2	149.1	211.1	342.5	454.3
Kalinin NPP	VVER-1000	189	222.1	253	308.1	368.7	456.6	468.9
Kursk NPP	RBMK-1000	3,808	4,612	5,023.9	4,733.8	4,387.8	3,585.9	3,205.3
Leningrad NPP	RBMK-1000	4,240	4,485.2	4,906.6	4,776.3	4,332	3,626.7	2,942.6
	VVER-1200	-	--	-	-	-	22.3	121.0
Smolensk NPP	RBMK-1000	2,240	2,372.1	2,662	2,960	3,288.3	3,577.2	3,004.3
Beloyarsk NPP	BN-600, BN-800	47 (BN-600)	35.9 (BN -600)	29.1 (BN -600)	30.7 (BN -600)	26.7	55.7	71.9
	AMB	192	190.9	190.9	190.9	190.15	73.2	72.66
Bilibino NPP	EPG-6	136	140.9	150.4	159.3	168.9	185.7	195.6
Zaporozhye NPP	VVER-1000	-	-	-	-	-	-	2,561
PA Mayak	VVER-440, AMB	360	463.5	319.8	453	325.4	616***	752
MCC	VVER-1000	4,300	4,671.6**	6,029.7	6,582	6,670.6	7,896.9	7,793.9**
	RBMK-1000	-	-		344	1,820.4	3,437.2	7,368.3

IPPE	AM-1	12	12	12	10.5	8.6	5.084	-
RIAR	MIR, SM, VK-50, BOR-60	No data available	No data available	No data available	63.6	41.2	40.9	32.8
Atomflot:						11.2	9.7	12.9
FMB Lepse	SFA, pcs.*	639*	639*	2.52**	2.52**	-	-	-
FMB Lotta	SFA, pcs.*	3,768*	3,768*	3.58**	3.58**	-	-	-
FMB Imandra	SFA, pcs.*	1,134*	1,134*	1.01**	1.01**	-	--	-

*- SFA pcs.

**- in terms of uranium metal

***- as of 2020, PA Mayak inventory features the following SNF types: VVER-440, AMB, BN-600, RR, icebreaker SNF

Table L.1.3 – SNF generation and transportation from NPP sites

Site/inventory, tHM	2014-2016	2017-2019	2020-2023
SNF RBMK-1000, transported total, t	**1,538**	**2,204**	**3,436**
Kursk NPP, transported, t	711	1,172	1,228
Leningrad NPP, transported, t	827	1,032	1,233
Smolensk NPP, transported, t	-	-	975
SNF VVER-1000, transported total, t	**567**	**467**	**742**
Novovronezh NPP, transported, t	59	53	95
Balakovo NPP, transported, t	218	153	262
Rostov NPP, transported, t	113	46	179
Kalinin NPP, transported, t	177	215	206
SNF VVER -440, transported total, t	**133**	**144**	**155**
Kola NPP, transported, t	64	78	108
Novovronezh NPP, transported, t	69	66	47
BN-600 (Beloyarsk NPP), transported total, t	**44**	**157**	**80**
BN-800 (Beloyarsk NPP), transported total, t	**-**	**-**	**7**

Table L.1.4 – Research reactor units

Organization	Reactor	Status
NRC Kurchatov Institute	IR-8	Operating
	GAMMA	Operating
	OR	Operating
	ARGUS	Operating
	GIDRA	Operating
	MR	Decommissioning
RIAR	SM-3	Operating
	MIR-M1	Operating
	BOR-60	Operating
	RBT – 6	Operating
	RBT-10/2	Operating
	AST-1 (ARBUS)	Decommissioning
IPPE (Obninsk)	BR-10	Decommissioning
	BARS-6	Operating
IRM (Zarechny)	IVV-2M	Operating
RISI (Lytkarino)	IRV-2M	Reengineering
NIFHI Branch (Obninsk)	VVR-Ts	Operating
PNPI RAS (Gatchina)	VVR-M	Operating
MEPhI (Moscow)	IRT	Operating
FTI Tomsk Polytechnic University (Tomsk)	IRT-T	Operating

JINR (Dubna)	IBR-2	Operating
Krylov State Research Center (St. Petersburg)	U-3	Shut down

Annex L.2. RW management

Table L.2.1 - RW storage facilities holding an accumulated waste inventory of over 1,000 m^3

№	Organization	Number of storage facilities with a design capacity of over 1,000 m^3, pcs.
1	Kalinin NPP, Branch of Rosenergoatom Concern	5
2	Novovoronezh NPP, Branch of Rosenergoatom Concern	16
3	AECC	3
4	BSC Chemicals	1
5	RIAR	4
6	IPPE	8
7	ZVEZDA Far Eastern Plant	1
8	EVRAZ West Siberian Metallurgical Plant	1
9	MSZ (Machine-Building Plant)	3
10	NIFHI	1
11	PDC UGR	5
12	PA Sevmash	1
13	NERC (North-Eastern Ship Repair Center)	1
14	UECC	3
15	Ship Repairing Center Zvezdochka	7
16	Ecomet-S	1
17	Beloyarsk NPP, Branch of Rosenergoatom Concern	2
18	Bilibino NPP, Branch of Rosenergoatom Concern	4
19	RADON's Kirovo-Chepetsk division in the Volga Territorial District	1
20	Kursk NPP, Branch of Rosenergoatom Concern	9

21	RADON's Leningrad division in the North-West Territorial District	21
22	RADON's Nizhny Novgorod division in the Volga Territorial District	2
23	RADON's Novosibirsk division in the Siberian Territorial District	1
24	Research and Production Complex-RADON's Sergiev Posad division	41
25	Solikamsk Magnesium Plant	1
26	RADON's North-West Centre SevRAO in Andreev Bay	8
27	Fokino division of RADON's Far Eastern Centre DalRAO	15
28	Novosibirsk Chemical Concentrates Plant (NCCP)	1
29	Amur Shipbuilding Plant	1
30	GAZPROM Geotechnologies Astrakhan	4
31	RADON's Saratov division in the Volga Territorial District	1
32	RADON's Sverdlovsk division in the Ural Territorial District	1
33	Sevastopol State University	1
34	FMBA's Southern Urals Biophysics Institute	1
35	Atomflot	2
36	MCC	3
37	Elektrokhimpribor Combine	1
38	Alexandrov Research Institute of Technology (NITI)	1
39	PA Mayak	24
40	PSZ	1
41	Russian Federal Nuclear Centre – E. I. Zababakhin All-Russian Research Institute of Technical Physics (VNIITF)	3
42	Russian Federal Nuclear Centre – All-Russian Research Institute of Experimental Physics (VNIIEF)	3
43	Zheleznogorsk Branch of the National Operator for Radioactive Waste Management (NO RAO)	1
44	RADON's Branch in the Siberian Territorial District, RW storage facility	1
45	RADON's Branch in the Southern Territorial District	2
46	Balakovo NPP, Branch of Rosenergoatom Concern	5
47	Kola NPP, Branch of Rosenergoatom Concern	6
48	Rostov NPP, Branch of Rosenergoatom Concern	2

49	Smolensk NPP, Branch of Rosenergoatom Concern	5
50	Izhora, branch of AEM-Technologies	1
51	Pilot and Demonstration Engineering Centre for Decommissioning (Rosenergoatom)	5
52	RADON's Khabarovsk division in the Siberian Territorial District, RW storage facility	1
53	Centre for Radioactive Waste Management – RADON's North-West Centre SevRAO in Saida Bay	1
54	Operator of the Zaporozhye NPP	3

Table L.2.2 – RW processing facilities operated by Rosenergoatom Concern, RADON, MCC, TVEL

№	Region	Enterprise	Name	Design capacity, m^3/year
1	Voronezh Region	Rosenergoatom Concern	Conditioning facility for spent ion exchange resins	15 m^3/year
2			Strong evaporation facility UGU-500	0.5 m^3/h
3			LRW concentration facility	84 m^3/year
4			Strong evaporation facility UGU-500	0.5 m^3/h
5			Cementation facility for LRW immobilization	100 m^3/year
6			Cementation facility for LRW immobilization	100 m^3/year
7			Cementation facility for LRW immobilization	15.5 m^3/year
8			Incineration facility	220 m^3/year
9			Compaction facility (950 kN)	221 m^3/year
10			High pressure compaction facility (20,000 kN)	74 m^3/year
11			Compaction facility for radioactive heat insulation TM-12-TK-M	n/a
12			Fragmentation facility	n/a
13			Plasma treatment complex	n/a
14	Kursk Region	Rosenergoatom Concern	Strong evaporation unit UGU-500	0.5 m^3/h
15			Incineration facility with a cementation unit	500-600 m^3/year
16			Compaction facility (950 kN)	2,000 m^3/year
17			Heat insulation melting facility	864 m^3/year
18	Leningrad Region	Rosenergoatom Concern	LRW immobilization facility (still bottoms /SIER, sludge)	80.5/25.1 m^3/year
19			LRW immobilization facility (still bottoms /SIER)	80.5/25.1 m^3/year
20			Incineration facility	7 m^3/day
21			Compaction facility (20,000 kN)	1,920 m^3/year
22			Compaction facility (950 kN)	162 m^3/year
23	Murmansk Region		Ion-selective treatment facility	3,600 m^3/year

24			Cementation facility for filter materials, sludge, ion exchange resins	n/a
25			Incineration facility with a cementation unit	n/a
26			Compaction facility D-90S	n/a
27			SRW fragmentation facility WLK6S	7,200 m^3/year
28	Rostov Region	Rosenergoatom Concern	Cementation facility	n/a
29			Incineration facility	1,800 m^3/year
30			Segregation and compaction facility (950 kN)	4,800 m^3/year
31			Fragmentation facility	1,200 m^3/year
32	Saratov Region	Rosenergoatom Concern	Strong evaporation facility UGU-500	0.5 m^3/h
33			Incineration facility	n/a
34			Compaction facility (20,000 kN)	1.2 m^3/h
35			SRW cementation facility	4.2 m^3/day
36	Sverdlovsk Region	Rosenergoatom Concern	Cementation facility for still bottoms, filter materials, sludge, ion exchange resins	345 m^3/year
37			Incineration facility	25 kg/h
38			SRW compaction facility	1.0 m^3/h
39			SRW fragmentation facility	1.0 m^3/h
40	Smolensk Region	Rosenergoatom Concern	Cementation facility for still bottoms, filter materials, sludge, ion exchange resins	384
41			Ion-selective treatment facility	364
42			Incineration facility	826
43			Bottom ash cementation facility	n/a
44			Segregation and compaction facility (950 kN)	980 m^3/year
45			Super compactor facility (15,000 kN)	3,920 m^3/year
46			Plastic crushing unit	165 m^3/year
47			Liquid decontamination unit (LDU)	301 m^3/year
48	Tver Region	Rosenergoatom Concern	Bituminization facility	180±30 l/h
49			Incineration facility with a cementation unit	50 kg/h
50			SRW segregation and compaction facility (950 kN))	up to 3 m^3/h
51			Fragmentation facility	0.5 m^3/h

52	Chukotka Autonomous Region	Rosenergoatom Concern	Press Compactor PKM40WH	2.0 m^3/h
53	Moscow Region	RPC-RADON's Sergiev Posad division	Active drain treatment station	8,320.00
54			LRW concentration facility	1,620.0
55			SIER conditioning facility	180.0
56			Baling-press facility	2,400.0
57			PLUTON facility	800.0
58			FAKEL facility	360.0
59			Miniblock mortar mixing plant (LRW conditioning)	800.0
60			Miniblock mortar mixing plant (SRW conditioning)	3,500.0
61			Segregation and fragmentation box	1,000.0
62			Metal RW decontamination facility	400.0
63	Siberian Federal District, Irkutsk Region	RADON division in the Siberian Territorial District	Balling press hydraulic Y81-250	200 m^3
			Drum compactor MacFab	50 m^3
			Hydraulic alligator shears for scrap ferrous metal cutting Q43-315	50 m^3
			Vibration table VS-10	200 m^3
64	Leningrad Region	RADON's Leningrad division in the North-West Territorial District	SPETSKHIMVODOOCHISTKA (special chemical water treatment) facility	up to 2.5 m^3/h
65			BITUMINIZATION facility	250 l/h
66			INCINERATION facility	For SRW - 35 kg/h; for LRW - 7 l/h
67			CEMENTATION facility	0.14 m^3/h
68			COMPACTION facility	0.45 m^3/h
69			Mobile SRW compaction facility	250 m^3/year
18	Kirov Region	RADON's Kirovo-Chepetsk division in the Volga Territorial District	Mobile LRW RS treatment facility	1 m^3/h
70	Rostov Region	RADON's division in the Southern Territorial District (Rostov-on-Don)	Part of UVMT-400 processing unit: PURM-400VA device for semi-automatic air plasma metal cutting	350-400 m^3/year
71			Part of UVMT-400 processing unit: equipment	350-400 m^3/year

			for solid radioactive waste compaction S-2100-300	
72			Part of UVMT-400 processing unit: single-shaft shredder WS22 - shredding equipment	350-400 m^3/year
73			Part of UVMT-400 processing unit: press for solid waste compaction PM-1	350-400 m^3/year
74			Part of a mobile processing unit: air plasma cutting machine Multiplaz 15000	3 m^3/day
75			Part of a mobile processing unit: baling press PP-250	3 m^3/day
76	Primorsky territory	Far Eastern Centre DalRAO	LRW processing facility Bar'yer (Barrier)	230 m^3/year
77			LRW processing facility Bar'yer (Barrier)	230 m^3/year
78			LRW processing complex	600 m^3/year
79	Murmansk Region	NWC SevRAO	KAN metal cutting facility	~3.5 t/h
80			Thermal cutting cabin	S8-4.0 m/min S20-1.5 m/min S30-1.1 m/min S40-0.7 m/min S70-0.125 m/min
81			Vertical Band Saw Machine	~10 mm/min
82			High-pressure compactor FAKIR	~4 m^3/h
83			Drying unit PETRA	1.6 m^3 in 25 hours
84			Hydrotreating decontamination facility RST	~3 m^3 of SRW per shift
85			Single-chamber sand blasting machine ABREX	~1 m^3 of SRW per shift
86			Unit for preliminary mechanical solution decontamination	375.3 m^3/year
87			Capacity vessel (neutralization and precipitation of heavy metals, phosphates and oxalates)	731.5 m^3/year
88			Capacity vessel (neutralization and precipitation of heavy	125.0 m^3/year

			metals, phosphates and oxalates)	
89			TopTec 1850 remote hydraulic machine with a stand and attachments	~100 m^3/year
90			Radiation measurement unit RADOS	10 m^3/h
91	Krasnoyarsk Region	MCC	Cementation facility APR.300.00.000.000	112 (by LRW)
92			LRW processing flowchart (ion exchange treatment)	2,000,000
93			Silt deposit conditioning complex (UORIO facility)	500
94			Compaction facilities	300
95			Incineration facility	200
96	Tomsk Region	SCC	Facilities for waste segregation, fragmentation, decontamination, melting in induction furnaces, grinding (shredder), compaction, cementation	5,000 (t/year) 500 (t/year) 205 (t/year) 100 (t/year) 180 (t/year)
97	Krasnoyarsk Region	PA ECP	Compaction and incineration facilities	150
98	Novosibirsk Region	NCCP	Complex for solid and liquid waste processing	9,000 (by distillate)
99	Irkutsk Region	AECC	RW management unit 804/1	620
100			Unit for pyrometallurgical MRW decontamination	1,000
101			Equipment of the radioactively contaminated soil segregation unit FREMES	3,500
102			Pilot industrial facility (PIF)	10
103	Sverdlovsk Region	UECC	Incineration facility	25 t / 150 m^3
104			Compaction facility	270 t / 450 m^3
105			Shredder VIKSMAX-400	70 t / 125 m^3
106			Cementation facility	3 t / 3.5 m^3
107	Republic of Udmurtia	CMP	Liquid decontamination of scrap metal (pickling baths)	700
108	Moscow	VNIINM	Liquid radioactive waste processing facility	50 m^3/h
109	Moscow Region	MSZ	LRW processing complex	20,000

Annex L.3. Framework normative and legal acts

Annex L.3. lists framework legal acts (international agreements, federal laws, decrees and orders of the President of the Russian Federation and decrees of the Government of the Russian Federation) regulating RW and SNF management activities, as well as basic regulations.

Table L.3.1 – Fundamental international agreements of the Russian Federation

№	Title of the document	Year
1	International Convention for the Safety of Life at Sea	1974
2	Convention on Early Notification of a Nuclear Accident	1986
3	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1986
4	Convention on the Physical Protection of Nuclear Material	1987
5	Convention on Environmental Impact Assessment in a Transboundary Context	1991
6	Convention on Nuclear Safety	1996
7	Vienna Convention on Civil Liability for Nuclear Damage	1963
8	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2005

Table L.3.2 – Federal laws

№	Title of the document	Reference number, date of signature
1	On Atomic Energy Use	№ 170-FZ of November 21,1995
2	On Subsoil	№ 2395-1 of February 21, 1992
3	On the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	№ 139-FZ of November 4, 2005
4	On the Uniformity of Measurements	№ 102-FZ of June 26, 2008
5	On the Protection of Population and Territories Against Natural and Man-Induced Emergencies	№ 68-FZ of December 21, 1994
6	On the Fire Safety	№ 69-FZ of December 21, 1994

№	Title of the document	Reference number, date of signature
7	Water Code of the Russian Federation	№ 74-FZ of May 26, 2006
8	On the Environmental Assessment	№ 174-FZ of November 23, 1995
9	On the Radiation Safety of Population	№ 3-FZ of January 9, 1996
10	On Funding Particularly Hazardous Nuclear and Radiation Productions and Facilities	№ 29-FZ of April 3, 1996
11	On Industrial Safety of Hazardous Production Facilities	№ 116-FZ of July 21, 1997
12	On the Safety of Hydraulic Facilities	№ 117-FZ of July 21, 1997
13	On Counteracting Terrorism	№ 35-FZ of March 6, 2006
14	On Sanitary and Epidemiological Welfare of Population	№ 52-FZ of March 30, 1999
15	On the Departmental Security Service	№ 77-FZ of April 14, 1999
16	On Special Environmental Programs for the Remediation of Radioactively Contaminated Sites and Territories	№ 92-FZ of July 10, 2001
17	Code of the Russian Federation on Administrative Violations	№ 195-FZ of December 30, 2001
18	On the Environmental Protection	№7-FZ of January 10, 2002
19	On Technical Regulation	№ 184-FZ of December 27, 2002

№	Title of the document	Reference number, date of signature
20	On Amendments and Supplements to the Criminal Code of the Russian Federation, Procedural Criminal Code of the Russian Federation and Code of the Russian Federation on Administrative Violations	№ 133-FZ of October 31, 2002
21	Urban Development Code of the Russian Federation	№190-FZ of December 29, 2004
22	On the State Atomic Energy Corporation Rosatom	№ 317-FZ of December 1, 2007
23	On Special Aspects in Managing and Disposing Property and Stocks of Organizations Engaged in the Field of Atomic Energy Use, and Amendments to Certain Legislative Acts of the Russian Federation	№ 13-FZ of February 5, 2007
24	Technical Regulation on Fire Safety Requirements	№ 123-FZ of July 22, 2008
25	On the Protection of Rights of Legal Entities and Individual Entrepreneurs in the Course of State Control (Supervision) and Municipal Control	№ 294-FZ of December 26, 2008
26	On the Procedure for Foreign Investments into Economic Entities of Strategic Importance for the National Defense and Security	№ 57-FZ of April 29, 2008
27	Technical Regulation on the Safety of Buildings and Structures	№ 384-FZ of December 30, 2009
28	On Amendment to the Convention on the Physical Protection of Nuclear Material	№ 130-FZ of July 22, 2008
29	Discipline Regulations for Employees of Organizations Operating Particularly Hazardous Radiation and Nuclear Productions and Facilities in the Field of Atomic Energy Use	№ 35-FZ of March 8, 2011
30	On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation	№ 190-FZ of July 11, 2011
31	On Amendments to Certain Legislative Acts of the Russian Federation Concerning State Control (Supervision) and Municipal Control	№ 242-FZ of July 18, 2011

№	Title of the document	Reference number, date of signature
32	On Amendments to Certain Legislative Acts of the Russian Federation for the Purposes of Safety Regulation in the Field of Atomic Energy Use	№ 347-FZ of November 30, 2011
33	On Amendments to Articles 25 and 26 of the Federal Law On Atomic Energy Use	№ 159-FZ of July 2, 2013
34	On Amendments to Certain Legislative Acts of the Russian Federation for the Purposes of Safety Regulation in the Field of Atomic Energy Use	№ 74-FZ of March 30, 2016
35	On Standardization in the Russian Federation	№ 162-FZ of June 29, 2015
36	On Amendments to the Federal Law On the State Corporation Rosatom and Certain Legislative Acts of the Russian Federation	№ 188-FZ of July 2, 2013
37	The Criminal Code of the Russian Federation	№ 63-FZ of June 13, 1996
38	On Amendments to the Federal Law On the Protection of Rights of Legal Entities and Individual Entrepreneurs in the Course of State Control (Supervision) and Municipal Control	№ 246-FZ of July 13, 2015
39	On Amendments to Article 26 of the Federal Law On Atomic Energy Use and Invalidating Certain Provisions of Legislative Acts of the Russian Federation	№ 118-FZ of May 23, 2018
40	On Amendments to the Urban Development Code of the Russian Federation and Certain Legislative Acts of the Russian Federation	№ 342-FZ of August 3, 2018

Table L.3.3 – Decrees and Orders of the President of the Russian Federation

№	Title of the Decree/Order	Reference number, date of signature
1	On the Export Control Over Nuclear Material, Equipment and Technologies from the Russian Federation	№ 312 of March 27, 1992
2	On the Organization Operating Nuclear Power Plants in the Russian Federation	№ 1055 of September 7, 1992

№	Title of the Decree/Order	Reference number, date of signature
3	On Complying with Obligations Arising from Intergovernmental Agreements on the Cooperation on NPP Construction Abroad Assumed by the Russian Federation	№ 472 of April 21, 1993
4	On the State Support of Structural Reorganization and Re-Engineering of Nuclear Sector in Zheleznogorsk (the Krasnoyarsk territory)	№ 72 of January 25, 1995
5	On the Follow-up Steps to Strengthen Control Over the Compliance with the Environmental Safety Requirements in SNF Reprocessing	№389 of April 20, 1995
6	On More Advanced Management of Nuclear Fuel Cycle Enterprises	№ 166 of February 8, 1996
7	On the Approved List of Nuclear Material, Equipment, Special Non-Nuclear Material and Relevant Technologies Falling Under the Export Control	№ 202 of February 14, 1996
8	Competences of the Ministry of Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters of the Russian Federation	№ 868 of July 11, 2004
9	On the Improvement of State Administration in Fire Safety	№ 1309 of November 9, 2001
10	On the Ad-Hoc Commission for the Importation of Foreign-Made Spent Fuel Assemblies to the Territory of the Russian Federation	№ 828 of July 10, 2001
11	On the Approved Statute on the Ad-Hoc Commission for the Importation of Foreign-Made Spent Fuel Assemblies to the Territory of the Russian Federation and its Composition	№ 858 of July 31, 2003
12	On Restructuring the Nuclear Power and Industry Complex of the Russian Federation	№ 556 of April 27, 2007
13	On the Steps for the Establishment of the State Atomic Energy Corporation Rosatom	№ 369

№	Title of the Decree/Order	Reference number, date of signature
		of March 20, 2008
14	On Systems and Structures of Federal Executive Authorities	№ 724 of May 12, 2008
15	On Amendments to Certain Regulations of the President of the Russian Federation due to the Establishment of the State Atomic Energy Corporation Rosatom	№ 460 of April 8, 2008
16	Competences of the Federal Environmental, Industrial and Nuclear Supervision Service	№ 780 of June 23, 2010
17	On Headcount Optimization Concerning Federal Public Officials and Employees of Federal State Authorities	№ 1657 of December 31, 2010
18	On the Approved State Policy Fundamentals in the Field of Nuclear and Radiation Safety in the Russian Federation for the Period of up to 2025 and beyond	№ 585 of October 13,2018
19	On Amendments Introduced to the Decree of the President of the Russian Federation № 556 On Restructuring Nuclear Power and Industry Complex of the Russian Federation of April 27, 2007	№ 640 of November 11, 2021
20	On Amendments Introduced to the Decree of the President of the Russian Federation № 556 On Restructuring Nuclear Power and Industry Complex of the Russian Federation of April 27, 2007 and the Decree of the President of the Russian Federation № 369 On the Steps for the Establishment of the State Atomic Energy Corporation Rosatom of March 20, 2008	№ 200 of April 11, 2022
21	On Amendments Introduced to the Decree of the President of the Russian Federation № 556 On Restructuring Nuclear Power and Industry Complex of the Russian Federation of April 27, 2007 and the list of joint stock companies with federally owned shares that should be transferred to the State Atomic Energy Corporation Rosatom as a property contribution of the Russian Federation approved by the Decree of the President of the Russian Federation № 1534 of November 23, 2011	№ 484 of July 3, 2023

№	Title of the Decree/Order	Reference number, date of signature
22	On Amendments Introduced to the Decree of the President of the Russian Federation № 556 On Restructuring Nuclear Power and Industry Complex of the Russian Federation of April 27, 2007	№ 484 of January 5, 2024

Table L.3.4 – Decrees and Orders of the Government of the Russian Federation

№	Title	Reference number, date of signature
1	On the Approved Procedure Applied to Inventory the Sites and Facilities Involved in Mining, Transportation, Processing, Use, Collection, Storage and Disposal of Radioactive Materials and Ionizing Radiation Sources in the Territory of the Russian Federation	№ 505 of July 22, 1992
2	On the Steps Constituting to a Comprehensive Approach Addressing the Problems Associated with the Management of Radioactive Waste and Cessation of their Disposal in Seas	№ 710 of July 23, 1993
3	On the Approved Regulation on the State Environmental Assessment	№ 942 of September 22, 1993
4	On the Approved Regulation Concerning the Procedure for the State Environmental Assessment	№ 698 of June 11, 1996
5	On the Procedure for Drawing Up Radiation and Hygienic Certificates for Organizations and Territories	№ 93 of January 28, 1997
6	On Rules for Making Decisions on Siting and Construction of Nuclear Installations, Radiation Sources and Storage Facilities	№ 306 of March 14, 1997
7	On the Steps Taken Pursuant to the Decree of the President of the Russian Federation № 166 On More Advanced Management of Nuclear Fuel Cycle Enterprises of February 8, 1996	№ 677 of June 11, 1996

№	Title	Reference number, date of signature
8	On the Approved Regulation on the Procedure for the Development and Approval of Federal Rules and Regulations in the Field of Atomic Energy Use	№ 1511 of December 1, 1997
9	On Export and Import of Nuclear Material, Equipment, Special Non-Nuclear Material and Relevant Technologies	№ 973 of December 15, 2000
10	On the Approved Regulation Concerning the State Sanitary and Epidemiologic Supervisory Service of the Russian Federation and the Regulation on the State Sanitary and Epidemiological Standardization	№ 554 of July 24, 2000
11	On the State Competent Nuclear and Radiation Safety Authority for the Transportation of Nuclear Materials, Radioactive Materials and Relevant Products	№ 204 of March 19, 2001
12	On the Importation of Irradiated Nuclear Fuel Reactor Assemblies to the Territory of the Russian Federation	№ 418 of July 11, 2003
13	On the Approved Funding Provisions for Special Environmental Programs on the Remediation of Radioactively Contaminated Sites	№ 588 of September 22, 2003
14	On the Approved Regulation on the Development of Special Environmental Programs on the Remediation of Radioactively Contaminated Sites	№ 421 of June 14, 2002
15	On the Federal Environmental, Industrial and Nuclear Supervision Service	№ 401 of July 30, 2004
16	On the Federal Medical and Biological Agency	№ 206 of April 11, 2005
17	On Federal Executive Authorities Exercising State Management in the Field of Atomic Energy Use and State Regulation of Safety in the Field of Atomic Energy Use	№ 412 of July 3, 2006

№	Title	Reference number, date of signature
18	On Engineering Investigations for the Development of Design Documentation, Construction and Reconstruction of Capital Facilities	№ 20 of January 19, 2006
19	On the Approved General Requirements to Organizations and Regional State Building Supervision and Amendments to the Decree of the Government of the Russian Federation № 1087 of June 30, 2021 and Invalidating Certain Regulations of the Government of the Russian Federation	№ 2161 of December 1, 2021
20	On the Procedure and Conditions for the Transfer of Ownership Rights for Nuclear Material to a Foreign State or a Foreign Legal Entity	№ 724 of October 31, 2007
21	On the Federal Target Program Nuclear and Radiation Safety in 2016 – 2030	№ 1248 of November 19, 2015
22	On the Approved Rules for the Physical Protection of Nuclear Material, Nuclear Installations and Storage Facilities for Nuclear Material	№ 456 of July 19, 2007
23	On the Structure of Particular Sections of Design Documentation and Requirements to their Contents	№ 87 of February 16, 2008
24	On the Approved Regulation on the System for Nuclear Material Accounting and Control	№ 352 of May 6, 2008
25	On the Approved Regulation on the State Atomic Energy Corporation Rosatom	№ 888 of November 26, 2008
26	On the List of Organizations Operating Particularly Hazardous Nuclear and Radiation Productions and Facilities	№ 1311-r of September 14, 2009
27	On Amendments Introduced to Certain Government Decrees of the Russian Federation	№ 717

№	Title	Reference number, date of signature
	Concerning the Competences of the Russian Ministry of Natural Resources and the Environment, the Federal Service for Supervision of Natural Resources, the Federal Environmental, Industrial and Nuclear Supervision Service	of September 13, 2010
28	On Amendments to Certain Government Decrees of the Russian Federation	№ 48 of February 4, 2011
29	On the Approved Regulation on Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations	№ 88 of February 17, 2011
30	On the National Operator for Radioactive Waste Management	№ 384-r of March 20, 2012
31	On the Approved Regulation on Continuous State Supervision of Nuclear Facilities	№ 373 of April 23, 2012
32	On the Approved List of Nuclear Facilities Subjected to Continuous State Supervision	№ 610-r of April 23, 2012
33	On the Primary Registration of Radioactive Waste	№ 767 of July 25, 2012
34	On the Approved Regulation on the Transfer of Radioactive Waste for Disposal, Including Waste Resulting from Development, Manufacturing, Testing, Operation and Disposition of Nuclear Weapons and Military Nuclear Power Installations	№ 899 of September 10, 2012
35	On the Federal State Supervision in the Field of Atomic Energy Use	№ 1044

№	Title	Reference number, date of signature
		of October 15, 2012
36	On the Criteria Used to Categorize Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Categorize Radioactive Waste as Non-retrievable Radioactive Waste and Retrievable Radioactive Waste, Classification Criteria for Retrievable Radioactive Waste	№ 1069 of October 19, 2012
37	On the Registration of Organizations Operating Radiation Sources Exclusively Containing Radionuclide Sources Referred to the Fourth and the Fifth Radiation Hazard Categories	№ 1184 of November 19, 2012
38	On the Procedure and Timeframes for the Establishment of a Unified State System for RW Management	№ 1185 of November 19, 2012
39	On the Approved Regulation Concerning the Return of Disused Sealed Source of Ionizing Radiation of Russian Production to the Russian Federation and the Return of Disused Sealed Sources of Ionizing Radiation to the Countries of Origin	№ 1186 of November 19, 2012
40	On the Approved Rules Governing National Operator's Deductions from the Fees Paid by RW Generating Organizations not Operating Particularly Hazardous Nuclear and Radiation Facilities to the RW Disposal Fund	№ 1187 of November 19, 2012
41	On Amendments Introduced to Certain Government Regulations of the Russian Federation	№ 1189 of November 19, 2012
42	On the Procedure for the State Regulation of Radioactive Waste Disposal Tariffs	№ 1249 of December 3, 2012
43	On Federal Rules and Regulations in the Field of Atomic Energy Use	№ 1265 of December 6, 2012

№	Title	Reference number, date of signature
44	On the Approved Regulation on the Standardization Procedure for Products (Activities, Services) Subject to Safety Requirements in the Field of Atomic Energy Use, as well as for the Processes and Other Subjects of Standardization Associated with Such Products	№ 669 of July 12, 2016
45	On Licensing Activities in the Field of Atomic Energy Use	№ 280 of March 29, 2013
46	On Special Aspects of Technical Regulation Concerning the Development and Adoption of Mandatory Requirements by State Customers, Federal Executive Authorities Authorized in the Field of State Management of Atomic Energy Use and State Regulation of Safety in the Field of Atomic Energy Use, and the State Atomic Energy Corporation Rosatom Applied to Products Subject to Safety Requirements Effective in the Field of Atomic Energy Use, as well as the Design Development (Including Surveys), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal of the Abovementioned Products	№ 362 of April 23, 2013
47	On the Approved Regulation on Assigning a Legal Entity as a Scientific and Technical Support Organization Providing its Services to the State Safety Regulatory Authority in the Field of Atomic Energy Use	№ 387 of April 30, 2013
48	On the Accreditation in the Field of Atomic Energy Use	№ 612 of July 20, 2013
49	On Fire Prevention Conditions	№ 390 of April 25, 2012
50	On Federal State Metrological Supervision	№ 246 of April 6, 2011
51	On the Procedure for Arranging the State Accounting and Control System for Radioactive	№ 542

№	Title	Reference number, date of signature
	Materials and Radioactive Waste	of June 15, 2016
52	On the Use of Risk Informed Approach Under Certain Types of State Control (Supervision) and Amendments to Certain Regulations of the Government of the Russian Federation	№ 806 of August 17, 2016
53	On the Approved List of Nuclear Facilities Providing for the Establishment of Safety Zones with a Special Legal Regime Providing Higher Level of Anti-Terrorist Security	№ 862-r of May 4, 2017
54	On the Approved Rules on Subsidies from the Federal Budget to Legal Entities Reimbursing the RW Management Costs and Invalidating Some Regulations of the Government of the Russian Federation	№ 643 of May 27, 2017
55	On the Standards for Acceptable Releases and Discharges of Radioactive Substances, as well as on the Issuance of Permits for Releases and Discharges of Radioactive Substances	№ 731 of June 26, 2018
56	On Amendments to the Rules on Subsidies from the Federal Budget to Legal Entities Reimbursing the RW Management Costs	№ 892 of July 13, 2019
57	On Amendments to the Regulation on Arranging the System of State Accounting and Control of Radioactive Material and Radioactive Waste	№ 1475 of November 20, 2019
58	On Introducing Amendments to the Order of the Government of the Russian Federation № 610-r of April 23, 2012	№ 189-r of March 3, 2020
59	On Introducing Amendments to the Regulation on Arranging the System of State Accounting and Control of Radioactive Material and Radioactive Waste	№ 1774 of October 19, 2021
60	On the Amendments to Clause 44 of the Regulation on the State Regulation of RW Disposal Tariffs	№ 1935 of November 12, 2021
61	On Amendments Introduced to the Regulation on the Federal Environmental, Industrial and	№ 2208

№	Title	Reference number, date of signature
	Nuclear Supervision Service and Invalidating Some Regulations of the Government of the Russian Federation	of December 6, 2021
62	On the Approved Rules for Granting the Right to Use a Subsoil Plot for the Construction and Operation of Underground Structures for the Disposal of Radioactive Waste, Production and Consumption Waste of Hazard Classes I and II and Invalidating Certain Regulations of the Government of the Russian Federation and Certain Provisions of Certain Regulations of the Government of the Russian Federation	№ 2533 of December 29, 2021
63	On the Approved Regulation for Arranging and Implementing State Control Over Safe Transportation (Shipment) of Nuclear Material, Radioactive Materials and Relevant Products with the Exception of Nuclear Materials Transferred as Part of Products to the Russian Defense Ministry	№ 661 of April 14, 2022
64	On Amendments Introduced to the Regulation on Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations	№ 984 of May 30, 2022
65	On Amendments to the Regulation on the Development and Approval of Federal Rules and Regulations in the Field of Atomic Energy Use	№ 1630 of September 16, 2022
66	On Amendments Introduced to the Regulation on Recognizing an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design Development, Construction, Operation and Decommissioning of Nuclear Installation, Radiation Source or Storage Facility, as well as to Manage Nuclear and Radioactive Materials Using its Own Resources or Subcontracting Other Organizations	№ 1637 of September 17, 2022
67	On Introducing Amendments to the List of Operating Organizations Covered by the Federal Law	№ 1870

№	Title	Reference number, date of signature
	on the Discipline Regulations for Employees of Organizations Operating Particularly Hazardous Radiation and Nuclear Productions and Facilities in the Field of Atomic Energy Use	of October 20, 2022
68	On the Specific Aspects Associated with Certain Types of Federal State Control (Supervision) Implemented in the Territories of Donetsk People's Republic, Lugansk People's Republic, Zaporozhye Region and Kherson Region	№ 227 of February 15, 2023
69	On Amendments Introduced to Clause 21 of the Regulation on the Development and Approval of Federal Rules and Regulations in the Field of Atomic Energy Use	№ 1372 of August 22, 2023
70	On Amendments Introduced to the Government Decree of the Russian Federation № 544 of June 15, 2016 On Specific Aspects Accounted For in the Compliance Assessment of Products that Should Comply with Safety Requirements in the Field of Atomic Energy Use, as well as the Processes Associated with the Design Development (Including Surveys), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal of the Abovementioned Products	№ 2002 of November 28, 2023
71	On the Approved Rules for the Development and Establishment of Standards Specifying Acceptable Releases and Discharges of Radioactive Substances, as well as the Issuance of Permits for Releases and Discharges of Radioactive Substances	№ 99 of February 2, 2024
72	On the Federal State Sanitary and Epidemiological Control (Supervision)	№ 1100 of June 30, 2021

Table L.3.5 – Federal rules and regulations in the field of atomic energy use, sanitary norms and rules

№	Title	Reference number
1	General Safety Provisions for Nuclear Power Plants	NP-001-15
2	Rules for the Safe Management of Radioactive Waste from Nuclear Power Plants	NP-002-15

№	Title	Reference number
3	Regulation on the Procedure for Investigating and Accounting Operational Disorders at Nuclear Power Plants	NP-004-08
4	Regulation on the Procedure for the Declaration of an Emergency Situation, Prompt Exchange of Information and Emergency Support to Nuclear Power Plants in the Event of Radiation Hazardous Situations	NP-005-16
5	Requirements to the Contents of Safety Analysis Reports for NPP with VVER Units	NP-006-16
6	Rules for the Safe Decommissioning of Production Uranium-Graphite Reactors	NP-007-17
7	Rules for the Safe Decommissioning of NPP Units	NP-012-16
8	Spent Nuclear Fuel Reprocessing Facilities. Safety Requirements	NP-013-99
9	Rules for Investigating and Accounting Violations Associated with the Management of Radiation Sources and Radioactive Materials Applied in National Economy	NP-014-16
10	Standard Contents of Action Plans for Personnel Protection in the Event of Accidents at NPP	NP-015-12
11	General Safety Provisions for Nuclear Fuel Cycle Facilities (GSP NFCF)	NP-016-05
12	General Requirements for NPP Unit Life Extension	NP-017-2018
13	Requirements to the Contents of Safety Analysis Reports for NPP with BN Units	NP-018-05
14	Collection, Processing, Storage and Conditioning of Liquid Radioactive Waste. Safety Requirements	NP-019-15
15	Collection, Processing, Storage and Conditioning of Solid Radioactive Waste. Safety Requirements	NP-020-15
16	Management of Gaseous Radioactive Waste. Safety Requirements	NP-021-15
17	General Safety Provisions for Marine Nuclear Propulsion Units	NP-022-17

№	Title	Reference number
18	Requirements to Safety Analysis Reports on Marine Nuclear Propulsion Units	NP-023-2000
19	Requirements to the Assessments Supporting Possible Design Life Extension for Nuclear Facilities	NP-024-2000
20	Rules for the Safe Transportation of Radioactive Material at Nuclear Facilities	NP-025-22
21	Regulation on the Procedure for Investigating Operational Disorders at Research Nuclear Facilities	NP-027-10
22	Rules for the Safe Decommissioning of Research Nuclear Facilities	NP-028-16
23	General Rules for Accounting and Control of Nuclear Materials	NP-030-19
24	Design Development Standards for Seismic Resistant NPP	NP-031-01
25	NPP Site. Safety Requirements	NP-032-19
26	General Safety Provisions for Research Nuclear Facilities	NP-033-11
27	Rules for the Physical Protection of Radioactive Materials, Radiation Sources, Particular Nuclear Materials and Storage Facilities	NP-034-23
28	Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements	NP-035-02
29	Rules for the Safe Decommissioning of Vessels and Other Waterborne Vehicles with Nuclear Installations and Radiation Sources	NP-037-11
30	General Safety Provisions for Radiation Sources	NP-038-16
31	Container-Type Spent Nuclear Fuel Storage Facilities. Safety Requirements	NP-039-22
32	Regulation on the Procedures for Investigating and Accounting Operational Disorders at Nuclear Fuel Cycle Facilities	NP-047-11
33	Requirements to the Contents of Safety Analysis Reports for Research Nuclear Facilities	NP-049-17
34	Siting of Nuclear Fuel Cycle Facilities. Basic Criteria and Safety Requirements	NP-050-03

№	Title	Reference number
35	Requirements to the Contents of Safety Analysis Reports for Nuclear Fuel Cycle Facilities	NP-051-04
36	Safety Requirements for the Temporary Storage of Radioactive Waste Resulting from Mining, Processing and Use of Minerals	NP-052-04
37	Rules for the Safe Transportation of Radioactive Materials	NP-053-16
38	Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements	NP-055-14
39	Rules for the Safe Decommissioning of Nuclear Fuel Cycle Facilities	NP-057-17
40	Safety in Radioactive Waste Management. General Provisions	NP-058-14
41	Siting of Storage Facilities for Nuclear Materials and Radioactive Materials. Basic Criteria and Safety Requirements	NP-060-05
42	Rules for the Safe Storage and Transportation of Nuclear Fuel at Nuclear Facilities	NP-061-05
43	Nuclear Safety Rules for Nuclear Fuel Cycle Facilities	NP-063-05
44	Accounting External Natural and Man-Induced Impacts Produced on Nuclear Facilities	NP-064-17
45	Requirements to the Contents of Safety Analysis Reports on RD&D Involving Operations with Plutonium Containing Materials at Nuclear Fuel Cycle Facilities	NP-065-05
46	Requirements to Safety Analysis Reports on Storage Facilities for Nuclear Materials	NP-066-05
47	General Rules for Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations	NP-067-16
48	Near-Surface Disposal of Radioactive Waste. Safety Requirements	NP-069-14
49	Rules for the Safe Configuration and Operation of Equipment and Pipelines at Nuclear Fuel Cycle Facilities	NP-070-06
50	Rules for Compliance Assessment of Equipment, Components, Materials and Semi-Finished	NP-071-06

№	Title	Reference number
	Material Supplied to Nuclear Facilities	
51	Rules for Assessing the Conformity of Products Subject to Safety Requirements in the Field of Atomic Energy Use, as well as the Processes Associated with Design Development (Including Research), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal of the Abovementioned Products	NP-071-18
52	Rules Used to Define Nuclear Materials as Radioactive Materials or Radioactive Waste	NP-072-23
53	Rules for the Physical Protection of Radioactive Materials and Certain Nuclear Materials During their Transportation	NP-073-23
54	Requirements to Planning and Ensuring Preparedness to Post-Accident Clean-up in Case of Accidents During the Transportation of Radioactive Material Freights	NP-074-23
55	Requirements to the Contents of Action Plans on the Personnel Protection in the Event of an Accident at a Research Nuclear Facility	NP-075-19
56	Installations Providing Immobilization of Transuranic Radioactive Waste. Safety Requirements	NP-076-06
57	Requirements to the Contents of Action Plans for Personnel Protection in the Event of Accidents at Nuclear Fuel Cycle Enterprises	NP-077-06
58	Regulation on the Procedure for Declaring Emergency Preparedness, Emergency Situation and Prompt Exchange of Information in the Event of Radiation Hazardous Conditions at Nuclear Fuel Cycle Enterprises	NP-078-06
59	Requirements for Action Planning and Protection of Employees (Personnel) in the Event of Radiation Accidents at Nuclear-Powered Vessels and (or) Other Waterborne Vehicles	NP-079-18
60	Requirements to the Physical Protection of Nuclear Materials, Nuclear Installations and Storage Facilities for Nuclear Materials	NP-083-23
61	Regulation on the Procedure for Investigating and Accounting Operational Disorders at Vessels with Nuclear Installations and Radiation Sources	NP-088-11

№	Title	Reference number
62	Requirements to the Quality Assurance Programs for Nuclear Facilities	NP-090-11
63	Safe Decommissioning of Nuclear Facilities. General Provisions	NP-091-14
64	RW Acceptance Criteria for Disposal	NP-093-14
65	Requirements for the Safe Decommissioning of Radioactive Waste Storage Facilities	NP-097-16
66	Facilities for Plutonium Nuclear Fuel Fabrication. Safety Requirements	NP-098-17
67	Requirements to the Contents and Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities	NP-099-17
68	Requirements to the Contents and Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities	NP-100-17
69	General Safety Provisions for Spacecrafts with Nuclear Reactors	NP-101-17
70	Safety Requirements for Facilities Holding Non-retrievable RW and Isolation Facilities for Non-retrievable RW	NP-103-17
71	Regulation on the Procedure for Declaring the State of Emergency, Prompt Exchange of Information in Case of Radiation Hazardous Situations at Research Nuclear Facilities	NP-106-19
72	General Safety Provisions for Nuclear Maintenance Service Ships	NP-109-20
73	Radiation Safety Standards	NRB-99/2009
74	Basic Sanitary Rules of Radiation Safety	OSPORB-99/2010
75	Hygienic Requirements for Enterprises and Facilities in the Nuclear Sector at the Design Development Stage	SPP PU AP-03
76	Sanitary Protection Zones and Surveillance Zones of Nuclear Facilities. Operational Conditions and Justification of their Boundaries	SP SZZ and ZN-07

№	Title	Reference number
77	Sanitary Rules for Design Development and Operation of Nuclear Power Plants	SP AS-03
78	Sanitary Rules for the Radiation Safety of Personnel and Public During Transportation of Radioactive Material (Substances)	SanPiN 2.6.1.1281-03
79	Fire Safety at Enterprises. General Requirements	NPB 201-96

Table L.3.6 – Safety Guides of Rostechnadzor

№	Title	Reference number
1	Identification of Initial Seismic Vibrations of Soil for Design Basis	RB-006-98
2	Recommendations on the Safe Management of Radioactive Waste at Ships and other Waterborne Vehicles Fitted with Nuclear Reactors and Nuclear Maintenance Service Ships	RB-010-16
3	Recommendations on Arranging and Implementing Radionuclide Source Categorization Based on Radiation Hazard Levels	RB-011-22
4	Requirements to the Contents of a Decommissioning Program for a NPP Unit	RB-013-22
5	Safe Management of Radioactive Waste Resulting from Mining, Milling and Use of Minerals	RB-014-2000
6	Assessing the Initial Seismicity of NF Siting Area and NF Site at the Stage of Engineering Surveys and Studies	RB-019-18
7	Contents and Structure of Safety Analysis Reports for the Decommissioning of a Nuclear Power Plant Unit	RB-031-04
8	Comments to the Federal Rules and Regulations in the Field of Atomic Energy Use. Safety in Radioactive Waste Management. General Provisions (NP-058-14)	RB-032-23
9	Recommendations on the Contents and Structure of Reports on the Comprehensive Survey of Ships and other Waterborne Vehicles with Nuclear Reactors and Nuclear Maintenance Service Ships Supporting their Life Extension	RB-033-22

№	Title	Reference number
10	Recommendations on Recruiting and Training Operating Personnel at Nuclear Fuel Cycle Facilities and Maintaining and Enhancing their Competence	RB-034-05
11	Recommendations on the Structure and Content of Life Management Programs for Containers Designed for Radioactive Material Storage and Transportation	RB-035-24
12	Engineering and Geological Conditions Monitored at the Sites of Nuclear Fuel Cycle Facilities	RB-036-06
13	Contents and Structure of Annual Reports on Nuclear and Radiation Safety of Nuclear Fuel Cycle Facilities	RB-043-13
14	Dynamic Monitoring of Building Structures at Nuclear Facilities	RB-045-22
15	Meteorological and Aerological Conditions Monitored at the Sites of Nuclear Facilities	RB-046-21
16	Safety Culture Assessment Methods at Nuclear Fuel Cycle Facilities	RB-047-16
17	Extending the Service Life of Transportation Casks Designed for SNF Transportation	RB-048-09
18	Regulation Concerning the Re-Categorization of Nuclear Materials as Radioactive Waste	RB-052-15
19	Recommendations on the Contents and Structure of Radiation Safety Reports Submitted by Organizations Operating Radiation Sources	RB-054-20
20	Regulation on the Fire-Explosion Safety Assessment of Work Flows at Radiochemical Productions	RB-060-10
21	Recommendations on the Contents and Structure of Safety Analysis Reports on Radiation Sources	RB-064-11
22	Recommendations on the Procedure for Acquiring Data on the Amount of Nuclear Material Required for Accounting and Summarizing the Physical Inventory	RB-065-17
23	Regulation on the Application of Mathematical Statistics in Accounting and Control of Nuclear Material	RB-066-11
24	Regulation on Inventorying Radioactive Waste in Organizations	RB-071-11
25	Regulation on Inventorying Radioactive Materials in Organizations	RB-072-11
26	Safe Decommissioning (Closure) of Tailings	RB-078-12

№	Title	Reference number
27	Contents and Structure of Reports Summarizing the Findings of Comprehensive Engineering and Radiation Surveys for NPP Unit Decommissioning	RB-081-13
28	Recommendations on the Contents of Document Portfolio Supporting the Limits Set for Radioactive Discharges into the Atmosphere and Water Bodies	RB-085-21
29	Recommendations on the Development of Quality Assurance Programs in Radioactive Waste Management	RB-086-13
30	Recommendations on the Procedures Applied to Ensure the Robustness of Equipment at Nuclear Facilities	RB-087-13
31	Evaluation of the Current Safety Level at Nuclear Facilities	RB-091-13
32	Recommendations on the Safe Return of By-Products Resulting from SFA Reprocessing to the State of Origin	RB-092-21
33	Radiation, Thermal and Physical Characteristics of Spent Nuclear Fuel from VVER and RBMK Units	RB-093-20
34	Recommendations on the Sealing Equipment and its Application Under the Radioactive Material and Radioactive Waste Accounting and Control System	RB-095-20
35	Structure and Contents of Guidelines on Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations	RB-096-14
36	Recommendations on Access Controls and their Use Within the Nuclear Material Accounting and Control System	RB-098-23
37	Recommendations on the Contents and Structure of Safety Analysis Reports for the Decommissioning of Nuclear Fuel Cycle Facilities	RB-099-14
38	Recommendations on the Contents and Structure of Safety Analysis Reports for the Decommissioning of Ships and other Waterborne Vehicles Fitted with Nuclear Reactors and Nuclear Maintenance Service Ships	RB-103-15

№	Title	Reference number
39	Recommendations on the Contents and Structure of Decommissioning Programs for Ships and other Waterborne Vehicles Fitted with Nuclear Reactors and Nuclear Maintenance Service Ships	RB-105-15
40	Methods Recommended to Calculate the Parameters Required for the Development and Establishment of Standards Setting the Threshold Releases of Radioactive Substances into Atmosphere	RB-106-21
41	Recommendations on the Contents and Structure of Safety Analysis Reports for Dual-Purpose Containers Designed for Spent Nuclear Fuel Storage and Transportation	RB-107-15
42	Recommendations Regarding the Form of Certificates and Relevant Data on Radiation Sources Required for the State Accounting and Control of Radioactive Materials and Radioactive Waste	RB-109-16
43	Recommendations on the Development of Quality Assurance Programs for the Transportation of Radioactive Material	RB-110-16
44	Safe Closure of Near-Surface Disposal Facilities for Radioactive Waste	RB-111-16
45	Safe Remediation of Sites Contaminated due to Uranium and Thorium Ore Mining and Milling	RB-113-16
46	Recommendations on the Development of Quality Assurance Programs Supporting Nuclear Facility Decommissioning	RB-114-16
47	Recommendations on the Contents and Structure of Facility-Level Documents Concerning the Physical Protection of Radioactive Materials, Radiation Sources and Storage Facilities	RB-115-16
48	Recommendations on the Probabilistic Safety Assessment of Spent Nuclear Fuel Storage Facilities	RB-116-17
49	Long-Term Safety Assessment of Near-Surface Disposal Facilities for Radioactive Waste	RB-117-16
50	Recommendations on the Institutional Control Implemented in Organizations under the Radioactive Materials and Radioactive Waste Accounting and Control System	RB-119-17
51	Recommendations on the Vulnerability Evaluation of Radiation Facilities	RB-120-16
52	Safety Assessment for the Pre-Disposal Management of Radioactive Waste	RB-122-16

№	Title	Reference number
53	Recommendations on the Final Evaluation of a Nuclear Facility Subject to Decommissioning	RB-124-16
54	Assessment of Fire and Explosion Hazards Associated with Sorption Systems at Spent Nuclear Fuel Reprocessing Facilities	RB-125-17
55	Methods Recommended to Calculate the Parameters Required to Set the Standards for Threshold Discharges of Radioactive Substances into Water Bodies	RB-126-17
56	Contents and Structure of Radiation Protection Programs for the Transportation of Radioactive Material	RB-127-17
57	Recommended Methods for Assessing and Predicting the Radiation Consequences of Accidents at Nuclear Fuel Cycle Facilities	RB-134-17
58	Recommendations on the Methods and Means Designed to Monitor Radioactive Release into the Atmospheric Air	RB-135-17
59	Contents and Structure of Safety Analysis Reports on Deep Well Injection Facilities for Liquid Radioactive Waste	RB-139-17
60	Recommendations on the Development of RW Acceptance Criteria for Near-Surface RW Disposal Facilities at the Design Development Stage	RB-141-18
61	Seismological Monitoring at the Sites of Nuclear and Radiation Hazardous Facilities	RB-142-18
62	Recommendations on Accounting the Changes in the Operating Conditions of Systems and Elements Pertaining to Shutdown Nuclear Fuel Cycle Facilities Supporting the Assessment of Possible Maintenance Reduction and Amendments to the Operational Documentation on Nuclear Fuel Cycle Facilities	RB-144-18
63	Recommendations on Upgrading Facilities Holding Non-retrievable RW into Non-retrievable RW Isolation Facilities and RW Disposal Facilities	RB-146-18
64	Recommendations on Demonstrating the Feasibility of a Proposed NF Decommissioning Option	RB-153-18
65	Recommendations on the Radionuclide Vector Method and its Application in the Assessment of	RB-154-19

№	Title	Reference number
	Difficult-to-Measure Radionuclide Inventories in Radioactive Waste from Nuclear Fuel Cycle Facilities	
66	Recommendations on the Supervision over RW in Terms of its Procedure, Scope, Methods and Means Aimed at Demonstrating its Compliance with Waste Acceptance Criteria for Disposal	RB-155-20
67	Recommendations on the Vulnerability Evaluation of Nuclear Facilities	RB-156-19
68	Recommendations on the Performance Assessment of Physical Protection Systems at Nuclear Faculties	RB-157-19
69	Recommendations for Planning and Assessing the Feasibility of Reduced Maintenance, Decommissioning of Individual Systems and Components, Changes in the Number of Operating Personnel at an NPP Unit Shut Down for Decommissioning	RB-158-19
70	Recommendations on the Comprehensive Engineering and Radiation Surveys at Nuclear Facilities	RB-159-19
71	Recommendations on the Development of Programs for Comprehensive Engineering and Radiation Surveys at Nuclear Facilities	RB-160-19
72	Recommendations on the Fire and Explosion Safety Under Processes Involving Pyrophoric Materials at Nuclear Fuel Cycle Facilities	RB-161-19
73	Recommendations for Meeting the Requirements Associated with the Physical Protection of Nuclear Facilities and Radioactive Material Storage Facilities at the Design Development and Construction Stages	RB-162-20
74	Recommendations on the Structure and Content of Safety Analysis Reports on the Management of Nuclear Materials, Radioactive Materials and Radioactive Waste during their Transportation	RB-163-19
75	Recommendations on the Safety Assessment of Storage Facilities and Assessing their Non-Compliance with the Requirements of Current Federal Rules and Regulations in the Field of Atomic Energy Use	RB-164-20
76	Recommendations for Investigating and Recording Anomalies and Violations Associated with Radioactive Material and Radioactive Waste Accounting and Control in Organizations	RB-165-20

№	Title	Reference number
77	Recommendations Supporting the Residual Life Assessment of Nuclear Facilities and their Building Structures	RB-167-20

Table L.3.7 – Guideline Documents of Rostechnadzor

№	Title	Reference number
1	Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service Recognizing its Right for Issuing Permits Authorizing Nuclear Facilities' Employees to Perform Certain Activities in the Field of Atomic Energy Use	№ 623 of December 19, 2018
2	Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and Provision of its State Function Associated with Federal State Supervision in the Field of Atomic Energy Use	№ 248 of June 7, 2013
3	Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service and the State Service for Licensing Activities in the Field of Atomic Energy Use	№ 453 of October 8, 2014
4	Guideline on the Information Support of Activities Performed by the Federal Environmental, Industrial and Nuclear Supervision Service	RD-22-06-2007
5	On Arranging Cooperation with the Media in the Federal Service for Environmental, Technological and Nuclear Supervision Service	№ 224 of April 3, 2012
6	Method for the Development and Setting the Standards for Threshold Releases of Radioactive Substances into the Atmosphere	№ 639 of November 7, 2012
7	Method for the Development and Setting the Standards for Threshold Discharges of Radioactive Substances into Water Bodies	№ 551 of December 22, 2016