THE SIXTH NATIONAL REPORT OF THE RUSSIAN FEDERATION

ON COMPLIANCE WITH THE OBLIGATIONS OF THE JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

Prepared for the seventh Review Meeting in frames of the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management

Moscow 2020

This sixth National Report of the Russian Federation is developed in accordance with Article 32 of the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management.

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

The Report is prepared by the State Atomic Energy Corporation Rosatom and the Federal Environmental, Industrial and Nuclear Supervision Service with the involvement of:

- Nuclear Safety Institute of the Russian Academy of Science (IBRAE RAN);
- Federal budgetary enterprise Scientific and Engineering Center for Nuclear and Radiation Safety (FBE SEC NRS).

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List of Abbreviations

AMB	—	Atomic Peaceful Large (abbreviation for water-cooled graphite-moderated channel type thermal neutron reactor, operated at Beloyarsk NPP)
ASA	—	acceptable specific activity
BE	—	back-end
BN	—	fast neutron reactor with Na-cooling
CMP	—	Joint Stock Company Chepetsky Mechanical Plant
DWIF	—	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
FRR	—	federal rules and regulations
FR	—	fuel rod
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
DD	—	directive document
GRW	—	gaseous radioactive waste
GSP NFCF	—	General Safety Provisions for Nuclear Fuel Cycle Facilities
HLW	—	high-level waste
IAEA	—	International Atomic Energy Agency
ICRP	—	International Commission on Radiological Protection
IER	—	Ion exchange resin
ILW	—	intermediate-level waste
IPPE	—	Federal State Unitary Enterprise State Scientific Centre of the Russian Federation — Institute of Physics and Power Engineering named after A.I. Leipunsky (FSUE SSC IPPE)
IRRS	—	Integrated Regulatory Review Service
IRS	—	ionizing radiation source
ITP SNF	—	Institutional Target Program for the Infrastructure Development and Spent Nuclear Fuel Management in 2011 – 2030
JSC	—	joint stock company
LLW	—	low-level waste
LRW	—	liquid radioactive waste
MCC	—	Federal State Unitary Enterprise Mining and Chemical Combine (FSUE MCC), Zheleznogorsk
MSSA	—	minimum significant specific activity
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 Physics and Chemistry (JSC NIFHI)
NITI	—	Federal State Unitary Enterprise Research and Technological Institute named after A.P. Aleksandrov (FSUE NITI)
NM	—	nuclear material
NO RAO	—	Federal State Unitary Enterprise National Operator for Radioactive Waste Management
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
PDC UGP	—	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
RBMK	—	high power graphite moderated channel-type reactor
RF	—	the Russian Federation
RIAR	—	Open-Type Joint Stock Company State Research Centre Research Institute of Atomic Reactors (JSC SRC RIAR)
RM	—	radioactive material
Rostechnadzor	—	Federal Environmental, Industrial and Nuclear Supervision Service
RR	—	research reactor
RS	—	radiation source
RSS	—	radiation safety standards
RTG	—	radioisotope thermoelectric generator
RW	—	radioactive waste
RW DF	—	disposal facility for radioactive waste
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[1]
SNF	—	spent nuclear fuel[1]
SNF SF	—	storage facility for spent nuclear fuel
SPZ	—	sanitary protection zone
SRS	—	sealed radioactive source
SRW	—	solid radioactive waste
TUK	—	transportation package
UECC	—	Joint Stock Company Ural Electrochemical Combine (JSC UECC)
USS	—	Unified State System
VNIINM	—	Joint Stock Company A.A. Bochvar High-Technology Scientific Research Institute for Inorganic Materials (JSC VNIINM)
WWER	—	water-cooled water-moderated power reactor

[1] *termed «irradiated» in a number of regulations of the Russian Federation*

Section A. Introduction

A.1. Purpose of the Report

The sixth National Report of the Russian Federation on compliance with obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter Convention) was compiled taking into account the developments in the field of spent nuclear fuel and radioactive waste management that occurred in the Russian Federation since April 2017 till July 2020.

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

This National Report focuses on issues and challenges highlighted by the Contracting Parties in the course of the review and discussion of national reports at the sixth Review Meeting held in the IAEA Headquarters (Vienna, Austria) on May 21 – June 1, 2018.

A.2. Structure of the Report

The report was prepared in accordance with the requirements of the Guidelines Regarding the Form and Structure of National Reports (INFCIRC/604/rev.3) for the Convention.

The Report demonstrates how the Russian Federation is complying with obligations arising from provisions and requirements discussed in relevant Articles of the Convention.

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A.3. Conclusions Drawn from the Discussion of the Fifth National Report of the Russian Federation Presented at the Sixth Review Meeting

Significant progress and milestones achieved by the Russian Federation in addressing urgent tasks associated with the regulation and enhancement of SNF and RW management safety were highlighted at the Sixth Meeting of the Contracting Parties on the review of obligations implemented under the Joint Convention, namely:

- Construction of a "dry" interim SNF storage facility at MCC site (KhOT-2) was completed and the facility was put into operation;
- Accumulated SNF had been being shipped to centralized storage facility. Some 21,000 RBMK-1000 SFAs were shipped for centralized storage and processing;
- Construction of a start-up PDC complex for SNF reprocessing was completed and the facility was commissioned;
- Development of advanced technologies designed to reprocess the main types of accumulated SNF and to manage the RW.
- Follow-up efforts on nuclear decommissioning:
  - Pre-decommissioning operations at shutdown NPP units;
  - 53 nuclear facilities being decommissioned (under the FTP NRS).
- Commissioning of the first RW DF for low- and intermediate-level SRW;
- Follow-up efforts on the backfilling of industrial reservoirs at PA Mayak, MCC and SCC sites. Three industrial reservoirs were backfilled;
- Continued remediation of contaminated territories – some 2,700,000 m^2 of contaminated areas have been cleaned up;
- Fulfillment of IAEA peer review recommendations on deep-well LRW injection practice in accordance with a work program being specially developed to address the recommendations given by the peer review team;
- Continued dismantlement of ships and floating maintenance bases of the nuclear icebreaker fleet: progress in decommissioning of nuclear fleet facilities.

Staffing and staff development:

- Federal rules and regulations establish requirements for staffing NFs with adequately trained personnel;
- 15 specialized higher educational institutions of vocational education were engaged in personnel training programs;
- About 2,000 people were studying under the target recruitment program (2016);
- Regular training and personnel qualification assessment was performed (over 108,000 people in a three-year period);
- A three-tier procedure for executive staff selection was in place.

Maintaining and enhancing public engagement and public confidence in the field of SNF and RW management:

- Federal executive authorities provide interaction with non-governmental organizations, civil, regional and local authorities during NF siting, design development, construction, operation and decommissioning;
- Rostechnadzor and Rosatom Public Councils are engaged in the alignment of interests expressed by public, business, public associations, government bodies and exercise public control;
- The public has the right to participate in the discussion of draft legal acts and programs in the field of atomic energy use, as well as in consultations on NF and SF siting, design development, construction, operation and decommissioning.

Development and implementation of an integrated SNF and RW management approach starting from the early stages of the strategy implementation:

- Development and commissioning of infrastructure for centralized SNF management, including interim storage and reprocessing facilities;
- Construction of near-surface DFs for low- and intermediate-level SRW and continued construction of underground research laboratory;
- Development of advanced SNF and RW processing technologies.

Management of spent sealed radioactive sources (SSRSs):

- Spent sealed radioactive sources are currently stored in interim SFs of various types;
- Management strategy provides for RTG dismantlement and storage prior to their transfer to the National Operator for disposal;
- Federal Law № 190-FZ On Radioactive Waste Management ... allows the return of disused domestically produced SRSs to the Russian Federation.

Pending issues associated with the safe SNF and RW management and nuclear decommissioning:

- Backfilling of industrial reservoirs at PA Mayak, MCC and SCC sites;
- Decommissioning of NRHFs;
- Remediation of contaminated areas;
- Decommissioning of nuclear icebreakers after the expiration of their service life.

The following milestones and achievements of the Russian Federation were endorsed as examples of "good performance" at the Sixth Review Meeting of the Contracting Parties on the implementation of the obligations arising from the Convention:

1. Construction of an integrated centralized SNF management complex in MCC area, involving:

- centralized "wet" and "dry" type storage;
- SNF reprocessing;
- fabrication of uranium-plutonium fuel;
- underground research laboratory.

2. Ranking principle for prioritizing decommissioning activities based on the assessment of the condition of the facility and its location.

3. Development of regulatory requirements concerning:

- safety requirements for facilities holding non-retrievable RW and non-retrievable RW DFs;
- federal rules and regulations establishing general RW acceptance criteria for disposal;
- federal rules and regulations in the field of atomic energy use are developed accordingly with the development of IAEA standards.

4. Completed primary registration of RW inventories and RW sites (RW storage conditions), including important and large-scale measures implemented to verify the data on the accumulated RW inventory and relevant conditions of its storage at all facilities in the Russian Federation enabling the development of long-term safety measures.

5. Establishment of decommissioning competence centers providing comprehensive analytical services to operating organizations before the start of relevant decommissioning operations.

6. Holistic approach implemented to address a wide range of nuclear legacy issues is provided for by relevant provisions of the Federal Target Program Nuclear and Radiation Safety in 2016–2030.

7. Further development of the Unified State System for RW Management.

8. Backfilling of LRW storage reservoirs and their upgrading to environmentally safe state.

9. Development of a centralized SNF management system.

The following SNF and RW management tasks planned to be addressed by the Russian Federation were specified as the urgent ones:

- continued efforts on providing safe storage configuration (backfilling) of surface LRW storage reservoirs at SCC, PA Mayak, MCC sites;
- continued dismantlement of ships and floating maintenance bases of the nuclear icebreaker fleet;
- continued remediation of contaminated areas;
- shipment of accumulated SNF inventory for centralized storage;
- implementation of IAEA peer-review recommendations on deep-well LRW injection practice;
- construction of near-surface LLW and ILW disposal facilities;
- construction of an underground research laboratory;
- further improvement and development of a modern system integrating federal rules and regulations in the field of atomic energy use and scientific and methodological support in SNF and RW management;
- development of advanced reprocessing technologies addressing the main types of accumulated SNF.

Following the Report presentation, some key milestones were highlighted:

- recommendations of the Sixth Review Meeting have been continuously and efficiently implemented by the Russian Federation;
- regulatory and legal framework for the safe SNF and RW management being consistent with relevant modern requirements and accounting for the latest best practices in nuclear science and technologies has been established in the Russian Federation;
- the highest priority given to the safe management of SNF and RW, safety of nuclear facilities and addressing “nuclear legacy” challenges was legally stated in the Russian Federation.

Actions taken to comply with the Review Meeting recommendations, as well as planned and implemented efforts on enhancing SNF and RW management safety, the necessity of which was highlighted in the findings of the Review Meeting on the fifth National Report of the Russian Federation, are presented in relevant sections of this Report.

A.4. Main Guideline Documents on the Safe Management of SNF and RW and the Introduced Amendments

A.4.1. National Policies of the Russian Federation in Nuclear Power Development and Nuclear and Radiation Safety

State Program of the Russian Federation on the Development of Russian Nuclear Power Generation Complex (the latest version was approved by Government decree of the Russian Federation № 289-13 on March 16, 2020) (hereinafter Development Program) provides for continued construction of nuclear power units in Russia. The planned layout of future NPPs at the territory of the Russian Federation was set forth in the Government Order of the Russian Federation № 1634-r of August 1, 2016. The list of NPPs planned for construction until 2030 includes new power units at 10 NPP sites.

Goals and tasks for further long-term development of national power sector, priorities and milestones, as well as specific mechanisms ensuring the implementation of the national energy policy at particular stages focused on achieving the specified goals and objectives were set forth in the provisions of the Energy Strategy of the Russian Federation for a period of up to 2035 approved by Government decree of the Russian Federation № 1523-r on June 9, 2020.

Transition to environmentally friendly and resource-saving energy is seen as a priority of the national energy policy under the Energy Strategy of the Russian Federation. Russian Federation develops new nuclear power technologies, involving simultaneous operation of

thermal and fast neutron reactors consolidated under combined closed nuclear fuel cycle. Such a system will help to nuclear fuel breeding and recycling , minimization of RW generation and non-proliferation of nuclear materials.

State Policy Fundamentals of the Russian Federation in the Field of Nuclear and Radiation Safety for the period up to 2025 and for Further Perspective were approved by Presidential decree № Pr-585 of October 13, 2018 (hereinafter State Policy Fundamentals) specifying the long-term objective, basic goals, fundamental principles and urgent tasks of the national nuclear and radiation safety policy of the Russian Federation.

According to the State Policy Fundamentals, the goals of the national policy in the field of nuclear and radiation safety involve the following:

- to ensure the safety of NFs used for peaceful and defense purposes, nuclear legacy facilities, materials with an increased content of naturally occurring radionuclides in keeping with legislative and other regulatory provisions of the Russian Federation;
- to maintain minimum practicable level of radiation exposure risk for employees (personnel) in organizations operating NFs for peaceful and defense purposes, nuclear legacy facilities and organizations applying materials with an increased content of naturally occurring radionuclides in accordance with application of dose limits, justification and optimization principles;
- to provide phased decommissioning and disposal of nuclear legacy facilities;
- to provide protection of public and the environment from radiation exposure in compliance with current requirements;
- to maintain the priority and the high level of nuclear and radiation safety at nuclear facilities operated for peaceful and defense purposes, nuclear legacy facilities by means of upgrading the measures implemented for the state management of nuclear power uses and state regulation of safety in the field of atomic energy use taking into account relevant scientific, technological and industrial developments and advances;
- to increase the responsibility for nuclear and radiation safety assumed by federal executive bodies being in charge of state management and state regulation of safety in the field of atomic energy use, State Atomic Energy Corporation Rosatom, organizations operating NFs for peaceful and defense purposes, nuclear legacy facilities, as well as organizations applying materials with an increased content of naturally occurring radionuclides;
- prevention of radiation accidents and catastrophes in the Russian Federation or containment and minimization of their consequences.

The tasks in the field of nuclear and radiation safety can be summarized as follows:

- to prevent proliferation and unauthorized use of RMs, products fabricated based on them, NM and RW;
- to improve state management and state regulation of safety in the field of atomic energy use;
- to upgrade the system for staff recruitment, professional training, retraining, advanced training, certification and work admission for employees (personnel) of organizations involved in the field of atomic energy use;
- to ensure decommissioning of nuclear legacy facilities, SNF reprocessing, RW conditioning and disposal, remediation of radioactively contaminated areas in the Russian Federation;
- to provide effective information support for nuclear and radiation safety;
- to maintain continuous availability of workforce and means to mitigate the consequences of radiation accidents and catastrophes;
- to develop regional and industry-specific radiation monitoring systems;
- to ensure safety during handling operations involving RM and RM-based products, NM, RW, SNF, in particular, during transportation (shipment);

- to prevent and suppress terrorist acts and unauthorized actions towards NFs operated for peaceful and defense purposes, nuclear legacy facilities, as well as terrorist acts involving the use of NM, RM, materials with an increased content of naturally occurring radionuclides;
- to strengthen the measures aimed at preventing and suppressing illegal movement of RM, RM-based products, NM, RW across the state border of the Russian Federation and their illegal turnover on the territory of the Russian Federation.

The State Policy Fundamentals recognize nuclear and radiation safety assurance objective as a top priority task for social and economic development of the Russian Federation and a key element of its national security and safety.

To address the priority tasks associated with nuclear and radiation safety in the Russian Federation, including the safety of nuclear legacy facilities, federal target programs are developed and implemented in Russia.

Federal Target Program Nuclear and Radiation Safety in 2016 – 2030 (hereinafter - FTP NRS-2) approved by Government decree of the Russian Federation № 1248 of November 19, 2015 has been developed and is now being implemented. FTP NRS-2 is aimed at providing comprehensive nuclear and radiation safety in the Russian Federation by addressing most urgent challenges associated with nuclear legacy and the development of infrastructure facilities for SNF and RW management required to ensure an adequate level of nuclear and radiation safety at nuclear legacy facilities and their further cleanup.

In accordance with the decree of the President of the Russian Federation № 270 of April 16, 2020, development and approval of a comprehensive program on the Development of Equipment, Technologies and Scientific Research in the Field of Atomic Energy Use in the Russian Federation for the period of up to 2024 is currently underway. The comprehensive program is designed to accelerate the development of research, equipment and technologies in the field of atomic energy use, to ensure energy security of the Russian Federation in nuclear power sector. It provides for the establishment of elements constituting to a safe and efficient energy system based on advanced nuclear, thermo-nuclear, plasma and other technologies, introduction of advanced technologies in high-tech sectors of the economy, fabrication of products that would prove to be competitive in the external and internal markets. Development and implementation of technologies constituting to a two-component nuclear power with a closed nuclear fuel cycle is seen as a key focus area in this regard.

A.4.2. Organizational and Legal Developments in the Nuclear Sector and Safety Regulation in the Field of Atomic Energy Use

In the reporting period, the Government and the Federal Assembly of the Russian Federation have continued their efforts on upgrading the legal framework to ensure sustainable and effective regulation of nuclear and radiation safety in the field of atomic energy use. Certain amendments were introduced to the Federal law № 170-FZ On Atomic Energy Use of November 21, 1995 to improve the legal framework for the state regulation of nuclear and radiation safety (Federal law № 118-FZ of May 23, 2018). According to the above amendments, computational models of processes affecting the NFs safety and (or) types of activities implemented in the field of atomic energy use (hereinafter computational models) should be built as part of the license application development process and demonstration of nuclear facilities safety and (or) types of activities implemented in the field of atomic energy use, and (or) to demonstrate that the actual state of a NFs complies with legal provisions of the Russian Federation, rules and regulations in the field of atomic energy use, the current level of scientific, technological and industrial development. To build such models, appropriate software validated by an organization providing scientific and technical support to a state safety regulatory authority and indicated as such by this authority should be used. The indicated review should be

performed at the expense of the applicant. The review procedure is established by authorized state safety regulatory authority.

The above mentioned expert validation should demonstrate whether the reviewed software can be used to build appropriate computational models or not.

Furthermore, Federal Law № 170-FZ On Atomic Energy Use was amended on March 18, 2019 (№ 40-FZ), stating that the following persons/individuals cannot be admitted to work at NF, RS, SF, as well as to operations involving NM and RM:

- those having an outstanding criminal record or unexpunged conviction for committed intentional crime;
- those listed as legal entities and individuals with records suggesting their involvement in extremist activity or terrorism in accordance with the Federal Law of August 7, 2001 № 115-FZ On Combating the Legalization (Laundering) of Criminally Obtained Income and Funding of Terrorism.

It should be noted that key regulatory legal acts elaborating on the provisions of the Federal Law of July 11, 2011 № 190-FZ On Radioactive Waste Management ... were discussed in the Fourth and Fifth National Reports of the Russian Federation (Section A.4.3).

Government decree of the Russian Federation № 297 of March 15, 2017 has amended provisions concerning the State Regulation on RW Disposal Tariffs. Section E.2.1.3.2 of this Report discusses relevant amendments introduced to the FNP system.

Section B. Policies and Practices (Article 32)

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

SNF reprocessing providing ecologically sound management of fission products and return of recycled nuclear material in the nuclear fuel cycle is viewed as the core principle of the state policy of the Russian Federation in the field of SNF management.

Transition to a two-component structure of nuclear power generation based on thermal and fast reactor technologies involving closed nuclear fuel cycle (NFC) is considered as a key trend under the nuclear power development strategy.

Research and technical policy, as well as the key provisions on development and implementation of engineering and administrative arrangements at all SNF management stages are stated in the Spent Nuclear Fuel Management Concept of the State Corporation Rosatom approved by Order № 721 of the State Corporation Rosatom of December 29, 2008 (as amended on September 15, 2014 (№ 1/871-P)).

Administrative, engineering and financial arrangements put in place to implement the State Policy are specified under relevant provisions of the Institutional Target Program for Infrastructure Development and SNF Management in 2011 – 2030.

Priority tasks associated with the management of accumulated SNF inventory, in particular, completing the program on the establishment of SNF management infrastructure facilities, are planned to be addressed under FTP NRS-2.

B.2. Practices of SNF Management

Current national SNF management practices involve controlled SNF storage and reprocessing and address the priority tasks relevant for safe management of the accumulated SNF inventory under FTP NRS-2.

B.2.1. Spent Nuclear Fuel from NPPs

As of January 1, 2020, a total of 36 nuclear power units was operated in Russia with an overall installed capacity of 30.25 GW, as well as a floating nuclear power plant Akademik Lomonosov. Data on SNF accumulation accounting for different reactor types are summarized in Annex B1.

Up to present time, SNF resulting from nuclear reactor operations has been managed in the following ways:

- SNF from WWER-440 and BN-600 reactor units: following interim storage in at-reactor pools (usually for 3 years in case of BN-600 SNF and from 3 to 5 years for WWER-440SNF), SNF is shipped to RT-1 plant (PA Mayak) for its further reprocessing;
- SNF from WWER-1000/1200 reactor units: SNF is subject to interim storage in at-reactor pools and in situ storage facilities (usually for over 3 years), WWER-1000 SNF is shipped to centralized storage facility KhOT-1 at MCC site, pilot SNF batch has been

reprocessed. In 2017, PA Mayak started industrial-scale reprocessing of WWER-1000 SNF;

- SNF from RMBK-1000 reactor units: following interim storage in at-reactor pools, SNF is placed into at-plant "wet" SFs. Further on, SFAs from these at-plant storage facilities are transferred to at-plant cutting facilities, packaged into TUK-109 casks and shipped to the centralized dry storage facility at MCC site. Damaged RMBK-1000 SNF not meeting MCC acceptance criteria for dry storage is shipped to the reprocessing plant RT-1 (PA Mayak);
- SNF from EPG-6 reactor units: following its storage in at-reactor pool, SNF is emplaced into at-plant "wet" and "dry" storage facilities. A decision was made to implement the long-term storage strategy by keeping EPG-6 SNF in at-reactor SFs with its subsequent shipment to PA Mayak for reprocessing. In 2019, development of TUK cask designs for EGP-6 SNF shipment to PA Mayak was started;
- AMB SNF was removed from the reactors, partially shipped from the site of Beloyarsk NPP, packaged into canisters and placed into "wet" storage facility at PA Mayak site. The rest of the SNF inventory is stored in at-reactor NPP pools. In 2017, AMB SNF from Beloyarsk NPP was started to be shipped to PA Mayak for its further reprocessing.

The following practical SNF management activities are being performed at the moment:

- construction of the second start-up complex of the Pilot Demonstration Center for SNF reprocessing at MCC site is still underway;
- in 2018 – 2019, SNF was removed from pool No. 2 of Beloyarsk NPP to enable its further storage and reprocessing, which will be started following the establishment of SFA cutting infrastructure at PA Mayak;
- construction of an upgraded SNF management complex for AMB SNF is underway at PA Mayak site;
- WWER-1000 SNF has been shipped for reprocessing to PA Mayak in TUK-141O casks being purposely designed for SNF with increased initial enrichment and higher burnup;
- reloading of WWER-1000 SNF from "wet" SF to a "dry" one at MCC site is underway: 732 spent WWER-1000 SFAs have been relocated;
- continued efforts are being implemented to master the production of mixed uranium-plutonium fuel for NPPs (MOX and REMIX). The plant designed for MOX-FA fabrication located at MCC site has manufactured the first batch of FAs with MOX-fuel intended to be loaded into BN-800 reactor unit at Beloyarsk NPP. Industrial production of MOX-fuel for BN-800 has been started;
- in 2018, "cold" run tests of dual-purpose TUK-137D casks were carried out at MCC site. TUK-137D is designed for transportation and long-term storage of SNF from WWER-1000/1200 reactor units;
- in 2020, development for a new TUK 137T casks designed for WWER-1200 SNF transportation was started;
- in 2019, newly manufactured and certified TUK-140 casks designed for WWER-440 SNF transportation have undergone "cold" testing. Hot tests with SNF loading are scheduled for 2022;
- work is underway on SNF removal from the sites of research institutes and production reactor units.

B.2.2. SNF from Marine Nuclear Reactors

As for the 1st of January, 2020, six nuclear-powered icebreakers were operated in Russia including several icebreakers pertaining to the nuclear icebreakers fleet, namely, Taimyr (since 1988), Vaigach (since 1990), Yamal (since 1992), 50 Let Pobedy (since 2007), nuclear light container carrier Sevmorput (since 1988) and a floating nuclear power plant Akademik

Lomonsov (commissioned on June 30, 2019 and put into industrial operation on the 1st of January, 2020).

All ships of the nuclear icebreaker fleet are operated by FSUE Atomflot. The floating nuclear power plant Akademik Lomonosov is operated by JSC Rosenergoatom Concern. Both operating organizations belong to the structure of the State Atomic Energy Corporation Rosatom.

Five nuclear icebreakers of a novel design are under construction at JSC Baltiyskiy Zavod with the nuclear icebreaker flagship Arktika to be commissioned in 2020. Moreover, in 2020, SSK Zvezda (Far-Eastern region of Russia) will start the construction of a pilot nuclear icebreaker under novel increased power designs (120 MW), with possible further construction of 3 more units.

SNF removed from nuclear icebreakers is temporary stored aboard Lotta and Imandra nuclear service ships and in onshore container-type SF (SNF with uranium-zirconium fuel composition).

As the SNF inventory from the nuclear icebreaker fleet grows, it is continuously shipped by purpose designed railway vehicles from the Atomflot SFs to PA Mayak site for reprocessing.

Part of the SNF is stored at the nuclear maintenance service ship Lepse currently undergoing decommissioning at the site of a specialized ship repair enterprise: part of the fuel (about 60%) was sent to PA Mayak for reprocessing.

B.2.3. SNF from Research Reactors (RR)

18 RRs are currently operated in Russia. Besides that, 3 RRs were mothballed, 7 RRs are undergoing decommissioning and 2 RRs are under construction. RRs are operated by organizations pertaining to different institutions, including the State Corporation Rosatom – 17, NRC Kurchatov Institute – 9, Ministry of Education and Science of Russia – 2 and the Joint Institute for Nuclear Research – 1.

After temporary at-reactor storage, RR SNF is reprocessed at RT-1 facilitiy (PA Mayak). Efforts on SNF shipment to PA Mayak for reprocessing have been considerably intensified under state targeted funding provisions. In 2017 - 2019, a total of 2,051 RR SFAs were shipped for reprocessing.

B.2.4. SNF from Foreign Reactors

A number of NPPs with WWER-1000 and WWER-440 reactor units, as well as some research reactors using nuclear fuel of Russian production have been operated abroad.

In the reporting period, the Russian Federation was engaged in international cooperation providing its SNF management services to Ukrainian and Bulgarian nuclear power reactors. SNF from Ukrainian and Bulgarian reactors of WWER-1000 type has been shipped to MCC site for temporary storage and reprocessing, whereas SNF from WWER-440 reactors has been shipped for reprocessing to PA Mayak.

Highly enriched SNF from Russian-built (Soviet-built) research reactors has been returned to Russia for reprocessing under the framework of Russian Research Reactor Fuel Return Program. In 2017, 153 RR SFAs were shipped from Kazakhstan for further reprocessing at PA Mayak.

B.2.5. SNF Reprocessing and Storage at Specialized Enterprises

SNF centralized storage and reprocessing services are provided by two enterprises of the State Corporation Rosatom, namely, PA Mayak (temporary SNF “wet” storage and industrial reprocessing) and MCC (centralized “wet” and “dry” storage, pilot SNF reprocessing (industrial SNF reprocessing will be started in the future) (see Section D.1).

B.3. Policy in the Field of Radioactive Waste Management

Safe management of RW is considered to be, on the one hand, a key element of national security and safety, and, on the other hand, an essential precondition for present and future use of atomic energy.

Implementation of provisions and requirements set forth in the Federal law № 190-FZ On Radioactive Waste Management … is a key element of State policy. The law sets forth requirement to RW disposal, requirements for the management of accumulated RW inventory and RW storage facilities; it also sets up administrative and financial fundamentals for all RW management activities.

The law provides for the establishment of the Unified State System for RW Management focused on arranging and ensuring safe and cost-effective management of waste, including its disposal. USS RW operation also provides for cooperation between the state management authority in the field of RW management, state management authorities in the field of atomic energy use, state safety regulatory authorities in the field of atomic energy use, National Operator for RW management, specialized RW management organizations, as well as RW generating organizations.

National Operator for RW Management is a legal body authorized to perform RW disposal operations, as well as other RW management activities (Government Resolution of the Russian Federation № 384-r On the National Operator for Radioactive Waste Management of March 20, 2012 provided for the establishment of the National Operator, namely FSUE National Operator for Radioactive Waste Management (hereinafter NO RAO)). Pursuant to the Order of the State Corporation Rosatom № 1/186-P of March 3, 2012, NO RAO was formally recognized as an operating organization. Corresponding investment and operational programs were adopted and are being implemented. Specialized RW management organizations are legal entities performing activities and providing their services on RW collection, segregation, processing, conditioning, transportation, storage, as well as operation, decommissioning or closure of RW storage (disposal) facilities, radiation control and monitoring, remediation of radioactively contaminated sites. FSUE Federal Environmental Operator (hereinafter FEO, previously RosRAO) and FSUE Radon are the largest specialized RW management organizations in the Russian Federation.

The process of USS RW establishment involves three stages (Government decree of the Russian Federation № 1185 of November 19, 2012, new edition of September 13, 2017 № 1099).

At the first stage, several key regulations specifying some legal and managerial fundamentals for USS RW establishment were adopted by late 2014 (see Section E.2.5).

Criteria for waste assignment to the category of RW and RW classification system based on RW disposal routes were set up (Government decree of the Russian Federation № 1069 of October 19, 2012 with amendments to criteria 2 and 3 introduced by Government decree № 95 of February 4, 2015 (see Section B.5)).

Primary registration of RW and RW sites was performed: based on it, Government Order of the Russian Federation № 238-r of February 17, 2016 On the Approved List of RW DFs, Long-Term SFs, Facilities Holding Non-Retrievable RW and Disposal Facilities for Non-Retrievable RW was developed.

Under the second USS RW development stage providing for the Establishment of a Disposal System for Low- and Intermediate-level Waste (2015 – 2018), the first section of a near-surface RW DF was commissioned at UECC site with the construction of the second section being currently underway.

Sites proposed for the construction of near-surface DFs for low- and intermediated SRW were selected:

- Urals Federal District – site located in the vicinity of PA Mayak site (Chelyabinsk Region);
- Siberian Federal District – site located in the vicinity of SCC site (Tomsk Region).

A combined license was issued by the regulator (Rostechnadzor) providing for siting and construction of a near-surface RW DF for low-level and intermediate-level SRW in the Siberian Federal District – site in the vicinity of SCC (Tomsk Region). Application was submitted to the regulator (Rostechnadzor) seeking for a combined siting and construction license for a RW DF in the Urals Federal District – site in the vicinity of PA Mayak (Chelyabinsk Region).

The third stage (2018 – 2025) is currently underway. It focuses on the establishment of a disposal system for high-level waste, upgrading the facilities holding non-retrievable RW to disposal facilities for non-retrievable RW, and the non-retrievable RW disposal facilities to RW disposal facilities. This stage also involves commissioning of an underground research laboratory where R&D will be performed to demonstrate the safety of the proposed deep HLW DF, as well as continued efforts on LLW and ILW DFs commissioning and LLW and ILW disposal.

B.4. Practices of Radioactive Waste Management

Presented below are the main changes reflecting the current RW management practices implemented in the Russian Federation.

RW management practice complies with the requirements of currently developed USS RW. USS RW establishment is viewed as a key focus area for the State Corporation Rosatom acting as a state RW management body. Separate elements of the system have already been established and are operated.

Prior to the enactment of the Federal Law № 190-FZ On Radioactive Waste Management ..., NPPs and large NFC organizations were responsible for collection, partial processing and temporary storage of RW generated at their sites.

Now, the organizations are responsible for RW conditioning (so that the resulting waste form would comply with waste acceptance criteria for disposal) and its further transfer to the National Operator for disposal. RW conditioning shall be performed prior to the expiration of the interim storage period established by the state management authority in the field of RW management. Based on a transitive regulation, interim storage time for unconditioned RW is limited to 10 years for organizations operating particularly hazardous nuclear and radiation facilities. In accordance with relevant provisions of the Federal law № 190 On Radioactive Waste Management …, for other organizations this period shall be limited to 5 years.

Specially designated funds are acquired and accumulated in Rosatom's special reserve fund № 5 pursuant to relevant provisions of Federal Law № 190-FZ On Radioactive Waste Management .... The fund is intended to cover RW disposal costs, as well as investment and industrial programs of the National Operator seeing as its major goal the establishment and operation of a RW DF system suitable for different RW categories.

Disposal of low-level and intermediate-level LRW generated at three Rosatom enterprises (MCC, SCC, RIAR) is performed via its injection into deep-seated reservoir beds (deep well injection facilities, DWIF). These facilities are currently operated by NO RAO.

Pursuant to provisions of Federal Law № 190-FZ On Radioactive Waste Management ..., all LRW deep well injection facilities, namely Experimental and Industrial Testing Site (Ulyanovsk Region, Dimitrovgrad), Testing sites 18 and 18a (Tomsk Region, Seversk) and testing site Severny (Krasnoyarsk Region, Zheleznogorsk) being under federal ownership (owned by the

State Corporation Rosatom) were transferred to NO RAO authorized to perform relevant economic activities.

Under the framework of USS RW establishment, NO RAO has obtained Rostechnadzor's operating license for the first section of a near-surface RW DF for low- and intermediate-level SRW located in the vicinity of UECC site and has started disposal operations. In 2016, over 47.45 m^3 of RW were disposed of at this facility, in 2017– 240.42 m^3; in 2018 – 3,727.83 m^3; in 2019 – 5,905.74 m^3 of RW. A total of 9,921.44 m^3 of RW was disposed of in the facility.

Currently, combined siting and construction license application for solid LLW and ILW disposal facility proposed for construction in the restricted-access territorial entity (RATE) Ozersk, Chelyabinsk region (in the vicinity PA Mayak site) was submitted to Rostechnadzor.

Siting and construction licenses were issued for a near-surface RW DF to be constructed in RATE Seversk, Tomsk region (SCC region).

By 2030, a total of around 480,000 m^3 of RW disposal capacity is planned to be commissioned.

Construction of a deep disposal facility designed for RW Class 1&2 and near-surface DFs for solid RW Class 3&4 is planned under FTP NRS (namely, under the activities providing for RW disposal infrastructure establishment) to address most urgent tasks facing the Russian Federation in the field of RW management, inter alia, to develop hands-on solutions addressing the accumulated problems in the field of RW management. RW DF establishment has been financed from two sources: the established special reserve fund and the federal budget. Table B 4.1 presents the corresponding milestones.

Table B 4.1. State of art in the development of RW disposal system under USS RW

RW DF type	Facilities	State	Commissioning
DDF RW for RW Class 1&2	Nizhnekansk rock mass	URL construction has been started	URL in 2026
Near-surface DF for RW Class 3&4	RW DF at UECC site, Novouralsk	Operation of the first section. Construction of the second section	2021
	RW DF in Ozersk, Chelyabinsk region	Application for a combined siting and construction license has been submitted	2023
	RW DF in Seversk, Tomsk region	Siting and construction license was issued	2023
	RW DF in Sergiev Posad, Moscow region	Design development stage	-
	Two RW DFs in the Northwestern Federal District and the Volga Federal District / Southern Federal District	Decision making on design development, siting and construction	-

B.5. Criteria Used for Definition and Classification of Radioactive Wastes

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

The criteria used to assign waste to the RW category are currently set forth by relevant provisions of Government decree of the Russian Federation № 1069 of October 19, 2012 (amended by decree № 95 of February 4, 2015). As provided by the decree, solid, liquid and gaseous waste containing radionuclides, except for waste resulted from non-atomic energy uses, namely, mining and reprocessing of mineral and organic raw materials with an increased content of naturally occurring radionuclides, is recognized as RW if the sum of ratios of specific (for solid and liquid waste) or volumetric (for gaseous waste) activities of radionuclides contained in the RW to relevant limits set in the supplement to the decree is greater than 1.

Specific assignment criteria are set for waste generated during operations that are not associated with atomic energy use, namely, mining and processing of mineral and organic raw materials with an increased concentrations of naturally occurring radionuclides. Such criteria account for an increased content of naturally occurring radionuclides in this waste, for instance, ^{232}Th, ^{40}K, uranium isotopes and their decay products.

Federal law № 190-FZ On Radioactive Waste Management … introduces RW classification system, according to which all RW can be divided into two groups for waste disposal purposes: non-retrievable and retrievable. The Government decree of the Russian Federation № 1069 specifies the criteria used to recognize waste as non-retrievable or retrievable.

According to these provisions, RW can be recognized as non-retrievable RW if it meets the following criteria:

- collective effective dose for the whole period during which RW remains potentially hazardous and the risks of potential exposure associated with RW retrieval operations are greater than those associated with in situ disposal of such waste;
- RW retrieval costs (including costs associated with RW retrieval operations, processing, conditioning, transportation to the disposal facility and disposal itself) are greater than the aggregate possible damage inflicted to the environment in case of its in situ disposal and the costs associated with RW in situ disposal (including costs associated with RW SF upgrading to a RW disposal facility, its operation and closure, as well as ensuring safety during the entire period while the waste remains hazardous);
- RW disposal facility and its sanitary-protection zone are located outside the borders of settlements, designated conservation areas, coastal buffer zones and water conservation zones, as well as other exclusive and protected areas established under Russian legislation.

Specific rules and guidelines have been developed to elaborate on the practical implementation of requirements discussed in Government decree of the Russian Federation № 1069 of October 19, 2012, in particular those associated with the evaluation and establishment of relevant values for criteria used to attribute particular RW to the category of non-retrievable RW.

Government decree of the Russian Federation № 1069 of October 19, 2012 specifies classification criteria for retrievable RW based on disposal routes. All radioactive waste recognized as retrievable RW are divided into 6 classes:

Retrievable RW of class 1 covers solid high-level RW that shall be disposed of in deep disposal facilities after being stored to reduce the decay heat.

Retrievable RW of class 2 covers solid high-level RW and intermediate-level long-lived RW containing radionuclides with half-lives greater than 31 years that shall be disposed of in deep disposal facilities without prior storage to reduce the decay heat.

Retrievable RW of class 3 covers solid intermediate-level RW and low-level long-lived RW containing radionuclides with half-lives greater than 31 years that shall be disposed of in near-surface disposal facilities at a depth of up to 100 m.

Retrievable RW of class 4 covers solid low-level RW and very low-level RW that shall be disposed of in near-surface disposal facilities located at the ground level.

Retrievable RW of class 5 covers liquid intermediate-level and low-level RW that shall be disposed of in deep well injection facilities constructed and operated at the time when the Federal law № 190 On Radioactive Waste Management …was enacted.

Retrievable RW of class 6 covers RW generated from mining and processing of uranium ores or during operations that are not associated with atomic energy use, namely, mining and processing of mineral and organic raw materials with an increased concentrations of naturally occurring radionuclides that shall be disposed of in near-surface disposal facilities.

Classification of solid and liquid RW and numerical values of relevant criteria were presented in the Fifth National Report of the Russian Federation.

Section C. Scope of Application (Article 3)

Article 3. Scope of Application

1. *This 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 Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.*
2. *This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this 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 Convention by the Contracting Party.*
3. *This 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 Convention by the Contracting Party. However, this 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 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 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.

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 (Article 32)

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 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 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 (i))

For the purposes of this Report, the following facilities are considered as SNF management facilities:

- storage facilities: at-reactor SNF pools, stand-alone SFs and centralized SFs;
- SNF reprocessing facilities;
- other infrastructure facilities.

SNF storage and reprocessing facilities are listed in Table B.1.1 of Annex B1.

Major SNF management facilities are discussed below.

D.1.1. SNF Storage Facilities

Each NPP/RR unit is fitted with at-reactor SNF storage pool. SNF is usually cooled in such storage facilities for no less than 3 years. In some cases, storage time can be increased to reduce its residual heat output and activity.

NPPs with RBMK-1000 type reactors, Novovoronezh NPP and research centers (IPPE, RIAR, Kurchatov Institute) are also fitted with stand-alone purpose-designed SFs. SNF is transferred to these facilities after cooling in at-reactor pools and is stored there until its further shipment to KhOT-2 SF at MCC site or to PA Mayak site. SNF is removed from such SFs (including RR storage pools) in accordance with an established procedure.

Centralized SNF storage is provided at MCC site.

“Wet” storage facility for WWER-1000 SNF, a “dry” storage facility for WWER-1000 SNF (after 10-15 years of cooling in the “wet” storage facility) and a “dry” RBMK-1000 SNF storage facility are operated at MCC site.

During 2018, 5,760 RBMK SFAs were accepted for “dry” storage, with 6,336 SFAs accepted in 2019 and 7,488 and 8,064 SFAs planned to be accepted for storage in 2020 and 2021 respectively.

Since 2016, WWER-1000 SFAs have been reloaded from the “wet” SF to the “dry” SF KhOT-2. By the end of 2019, a total of 740 SFAs was reloaded.

In the reporting period, SNF shipments from Russian NPPs for technological storage and reprocessing were continued. In 2018, 228 WWER-1000 SFAs were shipped to MCC site, in 2019 their number amounted to 344 SFAs. In 2018, 306 unconditioned RBMK-1000 SFAs, 432 WWER-440 SFAs, 257 BN-600 SFAs and 51 WWER-1000 SFA were shipped for reprocessing to PA Mayak site, with 432 WWER-440 SFAs, 175 BN-600 SFAs and 98 WWER-1000 SFAs shipped in 2019.

In 2018-2019, 124 bundles with SFAs removed from AMB reactor were shipped from Beloyarsk NPP to PA Mayak site allowing to empty one of two storage pools for AMB fuel and to ensure safety of the remaining AMB SFA inventory stored at Beloyarsk NPP until the SFA removal.

In the reporting period, efforts were performed at MCC's "wet" SF to enable the acceptance of WWER-1000 SFAs with high initial enrichment and burn-up (initial enrichment in ^{235}U up to 4.92 % and burn-up to 58 GW×day/tU).

"Wet" SNF storage facility at PA Mayak provides interim storage for SNF prior to its reprocessing.

SNF from civilian nuclear fleet vessels is stored at Atomflot site. For these purposes nuclear service ships (Lotta, Imandra) and onshore facilities (container-type SNF storage facility – SNF with uranium-zirconium fuel composition) are used. FMB Lepse was withdrawn from service (currently undergoing fuel unloading and disposition). SNF from the icebreaker fleet units is transported to PA Mayak for reprocessing using purpose-designed rail vehicles.

In 2019, SNF retrieval from the bow section of FTB Lepse unit package was started. The plans call for the retrieval of 620 SFAs held in tanks, as well as 19 damaged assemblies held in five caissons that will be further shipped for reprocessing by purpose designed vehicles to PA Mayak.

D.1.2. SNF Reprocessing Facilities

Industrial reprocessing plant for SNF from power, research, production and transport-ship units is currently operated in the Russian Federation, namely, PA Mayak radiochemical plant RT-1 with a design capacity of 400 tons of SNF per year. The facility was commissioned in 1977.

RT-1 operations are mainly focused on acceptance, temporary storage and reprocessing of different SNF types generated by power reactors with WWER-440, WWER-1000, BN-600, BN-800, AMB (storage, planned reprocessing) reactor units, damaged SFAs from RBMK-1000 reactor units, research and production reactors. To date, a total of 6,000 tons of SNF was reprocessed at RT-1.

RT-1 reprocessing flow chart is based on water-extraction technologies similar to a standard PUREX-process. HLW is vitrified using an aluminum-phosphate glass matrix, and packaged into purpose-designed canisters. SNF reprocessing results in vitrified HLW with a heat output of no more than 5 kW/m^3 with a specific generation volume of about 0.6-0.8 m^3 per SNF ton that is stored in a purpose-designed storage facility.

The current modernization and upgrading activities as RT-1 include construction of a cutting and packing unit to enable subsequent reprocessing of SNF from AMB-type reactors, revision of process flow chart to cease LRW discharges into industrial water reservoirs.

In 2017-2019, a total of 259.6 tons of SNF was reprocessed.

Second center for industrial SNF reprocessing is being established at MCC site under the initiative on the development of an integrated complex for SNF management. The first start-up complex of a pilot demonstration complex (PDC) for SNF reprocessing (license issued in 2016) was commissioned, R&D focused on development of advanced technologies and equipment for new SNF reprocessing technologies is underway. Construction of PDC's second start-up complex that will enable reprocessing of SNF from thermal reactors with a design capacity of up to 250 tons of SNF per year is almost completed. MCC PDC designs involve innovative SNF

reprocessing technologies providing minimal waste generation (specific generation of 0.1 m^3 HLW with about 4 m^3 of solidified ILW generated per SNF ton). All high-level LRW are sent to vitrification unit producing borosilicate glass and then to a temporary storage facility.

D.1.3. Other Infrastructure Facilities for SNF Management

In the reporting period, technical means designed for WWER-440 and WWER-1000/1200 SFA loading, unloading and transportation were manufactured to upgrade the fleet of transport and packaging kits used to ship NPP SFAs to centralized facilities.

TUK-141O designs were upgraded and certified to allow the removal of new SFA types. Railway transporters TK-U-141 were manufactured for TUK-141O transportation. WWER-1000 SNF was shipped for reprocessing to PA Mayak in TUK-141O casks purposely designed for SNF with increased initial enrichment (up to 4.98% U-235) and burnup (up to 68 GW x day/tU).

In 2018, a decision was made on the development of TUK-137 cask series and their further integration into designs of newly developed and constructed NPPs (WWER-1200). To enable transportation of TUK-137 in 2020-2021, MCC plans to upgrade the designs of TK-U unified railway SNF transporter to TUK-109T (RBMK-1000 SFA), TUK-137T.R and TUK-137T.A1 (SFA from WWER-1000/1200 reactor units).

In 2020-2021, process equipment required to handle TUK-109T casks designed for SNF with higher burn-ups will be manufactured and installed at Leningrad NPP with RBMK-1000 reactor units.

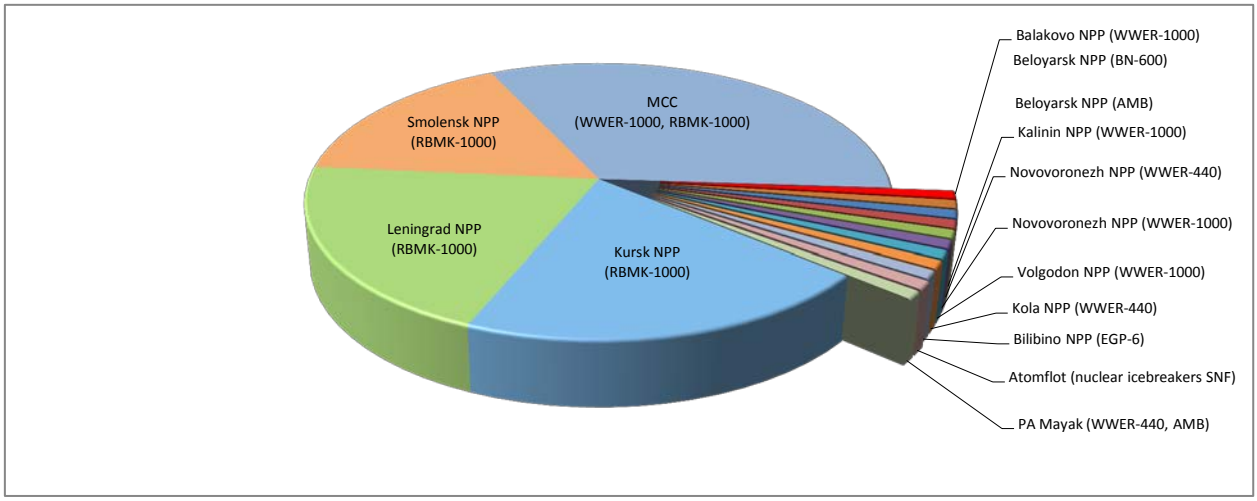
In the reporting period, a protective shelter structure was mounted to secure SNF unloading operations from FTP Lepse which is a complex purpose-designed structure developed based on advanced technologies providing compliance with all safety standards. The project was supported by EBRD (European Bank for Reconstruction and Development) with the structure itself being equipped with all the necessary engineering systems, process testing equipment and stands, equipment for remote SNF unloading.

In 2019, retrieval of SNF from the bow part of the Lepse's unit package was started. 620 SFAs held in tanks, as well as 19 damaged assemblies held in five caissons will be retrieved and further shipped to PA Mayak for reprocessing by purpose designed vehicles. SNF retrieval operations should be completed in 2021.

D.2. SNF Inventories (Article 32 (ii))

The implemented measures on RBMK-1000 SNF shipment provided a decrease in SNF inventories accumulated atNPP sites. Table B.1.2 of Annex B1 presents the corresponding SNF inventory lists, whereas the picture below shows the breakdown of SNF amounts distributed between different enterprises.

SNF inventory at Russian enterprises



D.3. RW Management Facilities (Article 32 (iii))

For the purposes of this Report, the following facilities are considered as RW management facilities:

- RW storage facilities, including RW disposal facilities;
- RW processing facilities (complexes);
- other infrastructure facilities associated with RW management systems.

RW storage facilities, including RW disposal facilities. All RW inventory is accumulated at 183 sites (including NPPs and RRs) located in 52 regions of the Russian Federation involving 968 RW SFs, including sites for RW collection and/or temporary storage. RW amounts of over 1,000 m^3 are found at 59 sites.

RW processing facilities. The types of RW processing units operated at enterprises depend on particular features of implemented activities, production and process flow charts resulting in RW generation, as well as on the regulatory requirements promoting the minimization of RW generation and production of RW packages complying to the acceptance criteria for safe RW disposal. Various processing technologies are applied depending on the aggregate state and morphological composition of the generated and accumulated RW, including: strong evaporation, ion-selective treatment (LRW LLW and ILW), segregation, pressing, re-melting, incineration (SRW LLW and ILW), cementation (LRW, SRW, LLW and ILW), vitrification (LRW HLW), decontamination (metal SRW), etc.

The following NPPs are fitted with most diverse systems for RW processing:

- Balakovo NPP – facilities for RW segregation, compaction, incineration, cementation of ash residues and SRW, strong evaporation of still residues with salt conversion into fusion cake;
- Rostov NPP – facilities for RW segregation, compaction, incineration, cementation of ash residues, cementation of still residues and ion exchange resins;
- Kola NPP – facilities for RW segregation, compaction, incineration, grinding, ion-selective treatment of still residues, cementation of sludge and ion exchange resins;
- Smolensk NPP – facilities for RW segregation, compaction, incineration, cementation of ash residues, ion-selective treatment, sludge, ion exchange resins and still residues cementation.

In 2016 – 2019, the following facilities were commissioned:

- AECC – RW compaction unit;

- UECC – waste shredding unit – two-roll shredder VIKMAKS-400, waste cementation unit;
- JSC PA ECP – incineration unit, decontamination and fragmentation unit, compaction unit for incombustible RW;
- FSUE EKhP Combine – cementation, incineration, fragmentation, demulsification and filtration units;
- FSUE Radon – supercompactor (after being upgraded);
- RIAR – incineration unit UST-50 (after being upgraded);
- Smolensk NPP – RW processing complex featuring a cementation unit, ion-selective treatment unit;
- Bilibino NPP – compaction unit;
- Novovoronezh NPP (ODIC) – plasma incineration unit;
- Novovoronezh NPP (unit 6) – compaction, incineration, cementation units;
- Novovoronezh NPP (unit 7) – IER drying, cementation units;
- Beloyarsk NPP (unit 4) – compaction and cementation units;
- Leningrad NPP (unit 5) – compaction, fragmentation, cementation units.

By 2025, the following facilities are planned to be commissioned:

- PDC UGR – cutting, mechanical treatment, chemical treatment and metal SRW melting units will be put into operation as part of LLW SRW processing complex.
- PA Mayak – LRW treatment facility; a facility for SRW processing featuring shredding and decontamination units, ILW electrochemical decontamination unit, a spent electrolyte conditioning unit, dry-jet abrasive decontamination unit, super-pressing and cementation unit.
- Kursk NPP – RW processing facility featuring a cementation unit, an ion-selective treatment unit, an electrochemical deactivation unit for LLW and ILW, a PVC deactivation unit, a compaction unit, an incineration unit, an ion-exchange resin pyrolysis unit
- Leningrad NPP – cementation unit for ion-exchange resins and bottoms, processing unit for homogeneous LRW.
- Beloyarsk NPP – LRW processing facility featuring: an ion-selective treatment unit, an IER drying unit, sludge cementation unit. SRW processing complex featuring a fragmentation unit and a compaction unit.
- FSUE FEO:
- Irkutsk branch – metal RW processing facility fitted with a shredding unit, a shot-blasting decontamination unit, a solution neutralization unit, LRW treatment unit involving cementation, an induction melting furnace;
- Leningrad branch – super-compaction and cementation units were put into operation as part of the RW processing complex.

D.4. RW Inventories (Article 32 (iv))

D.4.1. RW generation and processing

1. SRW generation. In 2019, a total of 0.73 million m^3 of SRW with a total activity of 7.79 10^{18} Bq was generated in Russia (an 1.2% increase in volume as compared to 2016).

By volume, most part of SRW generated in 2019 on the territory of the Russian Federation resulted from uranium ore mining activities (PIMCU). In 2019, SRW generation at PIMCU amounted to 0.7 million m^3 which presents over 96% of total SRW generation. At the same time, the activity of SRW generated at PJSC PIMCU accounted for 6.45 10^{13} Bq presenting less than 0.001% of the total activity of all generated SRW. Basically, compared to 2016, the volume of annual SRW generation at PIMCU has not changed.

Nuclear power (NPP). In 2019, the volume of SRW generation at NPPs amounted to 7.24 thousand m^3 with a total activity of 2.58 10^{15} Bq. Thus, compared to 2016, a 3% decrease in the generated SRW volume can be observed.

Enterprises related to the TVEL Fuel Company. In 2019, the volume of generated SRW amounted to 7.36 thousand m^3 with a total activity of $8.89 \cdot 10^{13}$ Bq (a 6% increase in volume as compared to 2016).

Enterprises belonging to the back-end division. In 2019, SRW generation amounted to about 1.9 thousand m^3. The total activity of the generated waste amounted to $1.72 \cdot 10^{16}$ Bq.

2. LRW generation. In 2019, a total of 0.79 million m^3 of LRW was generated with a total activity of 9.00 10^{18} Bq (1% decrease in volume as compared to 2016).

Production activities of four enterprises (MCC, SCC, RIAR and PA Mayak) are considered as key sources of LRW generation (more than 95% of LRW by volume and over 99 % by activity). In 2019, LRW inventory generated at these enterprises amounted to about 0.78 million m^3 (roughly a 1% change in the generation volume as compared to 2016).

Nuclear power (NPP). In 2019, the volume of LRW generated at NPPs amounted to 4.0 thousand m^3, its total activity accounted for 5.18 10^{13} Bq which is considered as a 22 % increase by LRW volume as compared to 2016.

3. RW processing.

In 2019:

A total of 28.9 thousand m^3 of SRW with a total activity of 7.42 10^{15} Bq and 0.12 million m^3 of LRW with a total activity of 1.01 10^{19} Bq has undergone processing;

A total of 2.36 thousand m^3 of RW (excluding pre-disposal LRW treatment prior to its deep-well injection) was conditioned to enable waste compliance with RW acceptance criteria for disposal;

2.87 thousand m^3 of SRW (not accounting for RW packaging), excluding LRW disposed of in deep-well injection facilities, was handed over to NO RAO for disposal.

Spent SRSs are considered as an additional source of RW generation.

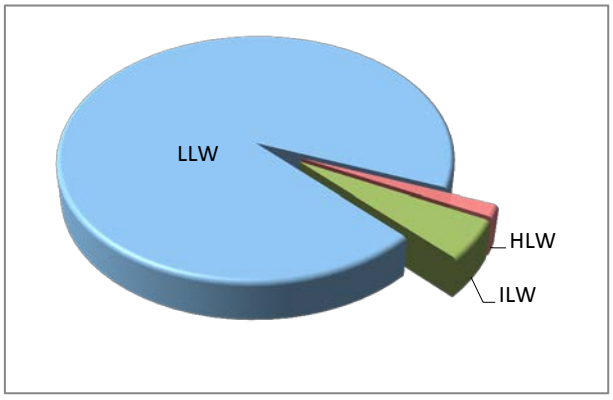
Section J of the Report provides some details on the management of spent SRSs.

D.4.2. RW emplacement and storage

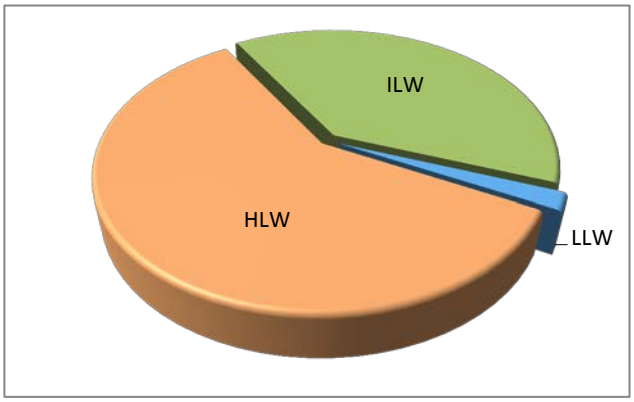
By the end of 2019, the total RW inventory accumulated at the enterprises of the Russian Federation amounted to 555.75 million m^3 with its total activity amounting to 1.86 10^{20} Bq.

The accumulated LRW inventory breakdown:

by volume

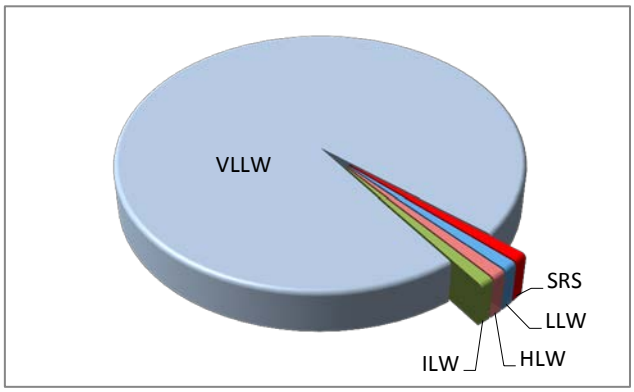


by activity

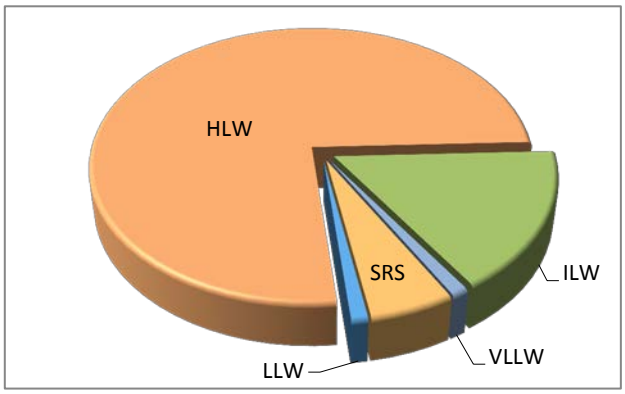


The accumulated SRW inventory breakdown:

by volume



by activity



Over 96% of all LRW inventory accounts for LLW with a total activity of 8.77 10^{15} Bq (less than 1% of the total LRW activity), 87% of this LRW inventory is accumulated in surface water reservoirs at PA Mayak site.

Most part of intermediate-level LRW is disposed of in DWIF.

High-level LRW makes up less than 0.01% of the total LRW volume with the activity corresponding to 40% of the total LRW activity. High-level LRW has been mostly accumulated due to SNF reprocessing at PA Mayak.

Very low-level SRW makes up some 98% of the total inventory with most part of the waste accumulated at PIMCU.

SRW activity (over 85%) is mainly concentrated in high-level SRW, including the products of high-level LRW processing at PA Mayak (2,779.08 m^3 of vitrified SRW with a total activity of 1.71 10^{19} Bq have been accumulated to date).

D.5. Decommissioning of Nuclear Facilities (Article 32 (v))

Pre-decommissioning efforts are ongoing at a number of NFs (in Russia, all nuclear installations, radiation sources and storage facilities are referred to as nuclear facilities), including research complexes and facilities, nuclear power plants, NFC facilities, storage facilities and nuclear icebreaker fleet facilities.

The following facilities were decommissioned in 2017 – 2019:

- Research NI EBR-L (FSUE NIITF), research NI AST-1 (SSC RIAR);
- building 804 at diffusion production site (AECC);
- building 73, complex of buildings (Makety), building 18 (NCCP), building 53 (VNIINM), building 220 (ChMP);
- highly enriched uranium processing facility located in building No. 1 (site No. 5 of SCC's Conversion plant);
- critical facility MATR-2 (IPPE);
- complex of accelerators EG-1 and EG-2.5 (IPPE), Sigma-Aralia (JSC IRM), radiation sources operated by JSC Centrotech-SPb;
- RW storage facility operated by the Murmansk branch of FEO's North-Western Territorial District.

Pre-decommissioning and decommissioning efforts are ongoing at a number of facilities, namely:

- PUGR I-1, ADE-3, 4, 5 (ODC UGR): decommissioning licenses were issued;
- PUGR AD and ADE-1 (MCC): decommissioning licenses were issued;
- PUGR A, AI, AV-1, 2, 3 (PA Mayak): decommissioning licenses were issued;
- Radiochemical Plant (SCC);
- Radiochemical Plant (MCC);

- diffusion production building 802 (AECC);
- buildings A, Zh, units U-5, areas of radioactive contamination No. 2.9 (VNIINM);
- building 242 (JSC MSZ);
- buildings 1,2,2a, 6 at site 1 and buildings A, B, C, D at site 2 (JSC RI);
- RR BR-10 (IPPE);
- buildings 60A, 116A (JSC NIIP);
- nuclear icebreakers Arktika and Sibir, floating maintenance base Lepse.

Pre-decommissioning (backfilling) efforts are ongoing at the site of a surface LRW storage facility № 365 at MCC site, while the backfilling of LRW storage reservoir B-1 is still underway at the SCC site.

Nuclear power (NPP).

In 2018 – 2019, the following NPP units were shut down for decommissioning:

- Unit № 1, Leningrad NPP – December 21, 2018;
- Unit № 1, Bilibino NPP – March 23, 2018.

In 2018, decisions of the State Atomic Energy Corporation Rosatom were drawn up on the final shutdown of Leningrad NPP Unit 2 in 2020 and Kursk NPP Unit 1 in 2021 providing for further decommissioning.

To implement the required pre-decommissioning procedures, the following activities were performed at shutdown NPP units:

- SNF was removed from Unit 3 of Novovoronezh NPP shut down in 2016, the unit was upgraded to ensure its nuclear safety. Radiation inspection of "slightly contaminated" equipment and systems fitted in the unit was performed as part of pre-dismantlement activities;
- SNF was shipped from shutdown units No. 1 and 2 of Beloyarsk NPP. Processed were 460 tons of metal RW resulted from the equipment dismantlement;
- SNF was unloaded from Unit 1 of Bilibino NPP, technical designs of transport and packaging kits were developed to provide SNF shipment from Bilibino NPP site and its storage;
- SNF is being shipped from the shutdown unit No. 1 of Leningrad NPP. Decommissioning design documentation for Units 1 and 2 of Leningrad NPP is currently being developed.

In accordance with the approved designs and the issued licenses, decommissioning of Novovoronezh NPP units No. 1 and No. 2 was completed as planned with some reference know-how gained regarding the dismantlement operations, fragmentation of steam generators and the use of robotic means during the fragmentation of transport and process equipment.

Remediation

Efforts on the remediation of contaminated sites were performed along with the decommissioning of nuclear facilities. In 2017 – 2019, the following milestones were reached in this area:

- Remediation of areas contaminated as the result of structure 4 decommissioning (building 804) at JSC Angarsk Electrolysis Chemical Combine (Angarsk, Irkutsk Region) was completed;
- Remediation of areas contaminated as the result of decommissioning efforts performed at the sites of building 73 and the complex of buildings "Models" (Makety) operated by the public joint-stock company Novosibirsk Plant of Chemical Concentrates (Novosibirsk) was completed;

- Remediation of areas contaminated as the result of decommissioning efforts performed at the sites of RW storage facilities operated by the Murmansk branch of the FEO's (FSUE Enterprise for Radioactive Waste Management) North-Western Territorial District (Murmansk) was completed;
- Remediation efforts are ongoing at PA Mayak site, namely, at the territory of plant 235 (Ozersk, Chelyabinsk region);
- Remediation of legacy RW storage facilities operated by JSC Chistopol Watch Factory Vostok and those located in the Kubass forest of the Chistopol region (Republic of Tatarstan) was completed.

A total of 130 thousand m^2 of contaminated areas was remediated as the result of these activities.

Section E. Legislative and Regulatory System

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 the Safety of Radioactive Waste Management provisions of the 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 Convention provides a background for further improvement of Russian regulatory and legal instruments governing the safe SNF and RW management in compliance with the obligations of the Russian Federation.

E.2. Legislative and Regulatory System (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 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 of the Russian Federation, normative legal acts approved by the President of the Russian Federation and the Government of the Russian Federation, federal rules and regulations 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-specific standards and technical regulations.

In keeping with provisions of the Federal law № 170-FZ On Atomic Energy Use, 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.

Article 15 of the 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. If provisions of an international agreement of the Russian Federation set forth the rules other than those provided by law, then the rules of the former one should be applied. At the same time, provisions of international agreements of the Russian Federation not complying with relevant provisions of the Constitution of the Russian Federation should not be enacted or enforced.

The following Federal laws form 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.

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 form of Presidential Decrees and Decrees and Orders of the Government of the Russian Federation.

According to the Federal law № 170-FZ On Atomic Energy Use, federal rules and regulations (FRRs) in the field of atomic energy use represent legal acts which specify the requirements for the safe use of atomic energy, including safety requirements for nuclear facilities and activities in the field of atomic energy use, involving safety objectives, principles and criteria that shall be observed when performing activities in the field of atomic energy use. FRRs in the field of atomic energy use are developed and approved according to the procedure established by the Government of the Russian Federation.

Pursuant to provisions of Article 8, Federal Law № 190-FZ On of Radioactive Waste …, federal rules and regulations governing RW management activities establish requirements concerning the safety of RW management.

Federal rules and regulations governing RW management are developed, approved and put into effect in accordance with the procedure set forth in the Federal Law of November 21, 1995 № 170-FZ On Atomic Energy Use and Federal Law № 190-FZ On Radioactive Waste Management.

Following enactment, FRRs shall be abided by all legal entities and private persons performing 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 Radiation Safety of Population, state legal regulation associated with the radiation safety of population is effectuated through the establishment of sanitary rules, standards, hygienic standards, radiation safety rules, codes of rules, occupational safety rules and other regulations governing radiation safety. Sanitary rules, norms and hygienic standards for radiation safety are approved in accordance with a procedure established by the Russian legislation.

To promote compliance with safety requirements set forth in the FRRs, safety regulatory authority approves safety guides for atomic energy uses (hereinafter, safety guides) providing recommendations on the compliance with FRR provisions, including those concerning 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 fifth National Report, some important amendments were introduced to legal and regulatory instruments, including FRR provisions, as well as technical regulatory documents in the field of atomic energy use. The most important of these 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 governing relations in the field of atomic energy use in Russia. It specifies the legal framework and legal principals regulating relations arising from the use of atomic energy. Its provisions are aimed at protecting the environment, human health, life and property when using atomic energy; promoting sustainable development of science and technology; contributing to international undertakings on assuring safe use of atomic energy.

Main provisions of federal laws On Atomic Energy Use, On Radiation Safety of Population, On Technical Regulation, On the Environmental Protection, On Radioactive Waste Management…, as well as some provisions of the Criminal Code of the Russian Federation and the Code of Administrative Violations governing relations in the field of atomic energy use were discussed in the fourth National Report of the Russian Federation.

Federal law of May 23, 2018 № 118-FZ On Amendments Introduced to Article 26 of the Federal law On Atomic Energy Use and the Recognition of Some Legal Provisions of the Russian Federation as Invalid introduced some amendments to the Federal law № 170-FZ On Atomic Energy Use that were presented in Section A 4.2 of the Report. According to Article 1, paragraph 2 of the Federal law № 246-FZ On Introducing Amendments to the Federal Law On Protection of Rights of Legal Entities and Self-Employed Individuals During the State Control (Supervision) and Municipal Control, a new article was introduced: Article 8.1 specifies the applicability and the use of a risk informed approach for arranging certain types of state control (supervision) specified by the Government of the Russian Federation. Section E 3.1 of this Report discusses relevant legislative amendments introduced to implement this approach under the state regulation of atomic energy uses.

Key legal acts on SNF and RW management including those adopted in the reporting period are listed in Annex E 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 certain provisions of the Federal law № 170-FZ On Atomic Energy Use and other federal laws associated with atomic energy use, the President of the Russian Federation and the Government of the Russian Federation adopts relevant normative legal acts (by-laws) in form of presidential decrees, as well as Government decrees and orders.

Since the presentation of the fifth National Report, a number of new by-laws concerning the atomic energy use was issued and a number of amendments was introduced to already existing presidential decrees and government decrees:

Decree of the President of the Russian Federation of October 13, 2018 № 585 On the Approval of the State Policy Fundamentals in the Field of Nuclear and Radiation Safety of the Russian Federation for the Period Until 2025 and Beyond.

In 2017-2020, decrees of the Government of the Russian Federation, namely, those of October 16, 2017 № 1255-50; of March 17, 2018 № 298-8; of November 3, 2018 № 1328-53; of February 5, 2019 № 82; of March 28, 2019 № 338-19; of November 27, 2019 №. 1519-61; of March 16, 2020 № 289-13 introduced some amendments to the State Program of the Russian Federation – Development of the Nuclear Power Industry Complex.

Government decree of the Russian Federation of May 27, 2017 № 643 On the Approved Rules for Granting Subsidies from the Federal Budget to Legal Entities to Reimburse the Costs of RW Management and Invalidating Certain Acts of the Government of the Russian Federation.

Government decree of the Russian Federation of June 26, 2018 № 731 On the Standards for Acceptable RM Releases and Discharges, as well as on the Issuance of Permits for RM Release and Discharges.

Government decree of the Russian Federation of July 13, 2019 № 892 On Amendments to the Rules for Granting Subsidies from the Federal Budget to Legal Entities Reimbursing the Costs of RW Management.

Government decree of the Russian Federation № 1475 of November 20, 2019 On Amendments to the Regulation Dealing with the Establishment of a State System for RM and RW Accounting and Control.

Order of the Government of the Russian Federation of May 4, 2017 № 862-r On the Approved List of Nuclear Facilities with a Restricted Access Zone Providing for a Special Legal Regulation Established to Increase the Anti-Terrorism Security Level.

Order of the Government of the Russian Federation of 3 March 2020 № 189-r On Amending Provisions of the Government Order № 610-r of April 23, 2012, revising the list of nuclear facilities that are to be subject to permanent state supervision.

Key by-laws effective in this field are listed in Annex E of the Report.

E.2.1.3. Federal Rules and Regulations in the Field Atomic Energy Use, Sanitary Rules and Radiation Safety Standards

Key federal rules and regulations, sanitary rules and radiation safety standards specifying safety requirements for SNF and RW management, and the amendments introduced to them in the reporting period are discussed below.

Key federal rules and regulations, sanitary rules and radiation safety standards effective in the considered area are listed in Annex E of the Report.

E.2.1.3.1 Federal Rules and Regulations in the Field Atomic Energy Use

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

In keeping with provisions of Article 8 of the Federal law № 190-FZ On Radioactive Waste Management…, FRRs regulating RW management aspects set forth requirements for the safe management of RW, including:

- RW acceptance criteria for disposal;
- Requirements for intermediate storage of RW;
- Safety requirements for siting, construction, operation, decommissioning or closure of RW storage facilities;
- Requirements to RW certificates (passports);
- Requirements for collection, transportation, storage and disposal of disused sealed sources of ionizing radiation;
- Categories of facilities holding non-retrievable RW and non-retrievable RW disposal facilities;
- Safety requirements for facilities holding non-retrievable RW and non-retrievable RW disposal facilities also accounting for some specific design features of particular SFs;
- RW disposal flow chart;
- Requirements to the methods used to protect the public and the environment against risks of radiation exposure associated with RW at all stages of its management;
- Requirements to the design of RW management facilities, in particular those associated with comprehensive assessment of their safety, and evaluation of as-designed facility;

- Requirements to the procedure followed by RW management organizations to notify about incidents associated with RW management;
- Requirements to the procedure for submitting the decommissioning plans for RW management facilities as well as to the content of these plans;
- Requirements to the procedure for submitting RW DF closure plans and their contents.

Regulation on FRR Development and Approval approved by Government decree of the Russian Federation № 1511 of December 1, 1997, stipulates that FRRs should be 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 Government decree of the Russian Federation of July 30, 2004 № 401 states that Rostechnadzor acting as a safety regulator in the field of atomic energy use shall adopt regulatory legal acts concerning the considered field of activity, including FRRs.

FRRs are developed on the basis of 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 in keeping with relevant recommendations of international agencies the Russian Federation being Party to which.

The established procedure provides for public release of the draft rules and regulations in official press (unless these rules and regulations in the field of atomic energy use constitute a state secret) and opportunities for the public discussions.

Upon being enacted, rules and regulations 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 Regulating the Safety and Standardization in the Field of Atomic Energy Use (hereinafter, the Concept). Activities implemented under the Concept are focused on increasing the efficiency of functions associated with the development and implementation of the state policy in the field of atomic energy use and ensuring the 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 are implemented 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 field, FRR system is updated with some new regulations being added and certain amendments and additions introduced to current regulations.

FRR updating is performed with an account of:

- provisions of international regulations ratified by the Russian Federation, documents issued by IAEA, OECD Nuclear Energy Agency and the Eurasian Economic Union;
- requirements specified in relevant regulations of the Russian Federation;
- reports on the law enforcement practice of Rostechnadzor's Interregional Territorial Departments concerning nuclear and radiation safety supervision;
- achieved scientific and engineering progress in the area regulated by relevant FRRs;
- investigations of accidents and incidents occurred at nuclear facilities in Russia and abroad that resulted from the violation of requirements set forth in relevant FRRs or similar international documents;

- experience gained from performed safety reviews.

To upgrade the FRR system, Rostechnadzor has approved and is implementing the Concept Implementation Plan stating that the legal framework should be revised by 2023.

In the reporting period, over 35 FRRs were updated and developed.

The current system of federal rules and regulations in the field of atomic energy use involves more than 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-033-011) set forth principles, criteria and general requirements for nuclear and radiation safety of nuclear facilities (NPPs, 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 and mitigation of their consequences, as well as SNF and RW management). Since the presentation of the fifth National Report, additional regulations have been approved, namely: General Safety Provisions for Ships and Other Floating Crafts Fitted with Nuclear Reactors (NP-022-17) and General Safety Provisions for Spacecrafts with Nuclear Reactors (NP-101-17).

Safety issues specific for SNF reprocessing facilities are regulated by FRR Spent nuclear fuel processing plants**. 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 being 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, construction, commissioning, operation and decommissioning of dry SNF storage facilities at NFC sites.

FRR **on Accounting External Natural and Human-Induced Impacts on Nuclear Facilities (NP-064-17)** includes requirements on accounting external natural and human-induced impacts during siting, design development, construction, operation and decommissioning of nuclear facilities. NP-064-17 includes a list of natural and human-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 which shall be accounted for to demonstrate its safety and stability.

Requirements to NF Quality Assurance Programs (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.

Provisions on the Procedures for Investigating and Accounting Operational Occurrences (NP-004-08, NP-027-10, NP-047-11, NP-014-16, NP-088-11 and etc.) specify the procedure followed to investigate and account for NF operational **occurrences**, categories of such **occurrences**, information content and the procedure for its communication, as well as the reporting requirements.

Requirements on the Contents of Action Plans for Personnel Protection in the Event of an Accident (NP-015-12, NP-075-19, NP-077-06 and etc.) specify general requirements to the development of action plans aimed at personnel protection in the event of accidents at different NF, 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 Demonstration of Safe NF Design Lifetime Extension (NP-024-2000, NP-017-18) set forth main criteria and safety requirements that shall be met to extend NF operating lifetime and to obtain relevant 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 designs, programs, comprehensive engineering and radiation surveys.

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

In 2017, a new edition of FNP **Safety Rules for the Decommissioning of Production Uranium-Graphite Reactors (NP-007-17)** was approved. The FRR establishes safety requirements to the decommissioning of production uranium-graphite reactors to be implemented during the operation and decommissioning of production uranium-graphite reactors, as well as to the safety analysis reports developed to support the decommissioning of such reactors.

In 2018, provisions of FNP **Safe Decommissioning of Nuclear Facilities. General Provisions (NP-091-14)** were amended, in particular:

- reduced maintenance and repair services provided for individual NF systems and elements at the pre-decommissioning stage;
- information required to be provided in the design documentation (designs) developed for NF decommissioning;
- establishment of criteria for NFs and their sites allowing to release them from control and supervision in the field of atomic energy use.

Safety Requirements for the Predisposal Management of RW (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 NPPs and other NFs.

RW Management Safety. General Provisions (NP-058-14) specify safety objectives, principles and general safety requirements for RW management, including those associated with retrievable and non-retrievable waste categories.

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 RW near-surface disposal facilities under development, construction, operation, closure or after closure.

In 2017 amendments to a number of FRRs in the field of atomic energy use, namely **RW Management Safety. General Provisions (NP-058-14**), **Radioactive Waste Disposal. Principles, Criteria and General Safety Requirements (NP-055-14), Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14)** were enacted, introducing specific safety requirements to the management of disused sealed sources of ionizing radiation, including their disposal.

RW Acceptance Criteria for Disposal (NP-093-14) set forth general RW acceptance criteria for disposal, requirements on clarification of RW acceptance criteria for specific disposal facilities, requirements on validation of RW conformity with the specified RW acceptance criteria, requirements to provisions of RW certificates (passports) issued for waste being transferred for disposal. Since the presentation of the fifth National Report of the Russian Federation, the FRR provisions were updated to specify the requirements to physical and chemical properties of disused sealed sources of ionizing radiation and packages containing such sources.

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 subject to accounting exclusively under the state system for NM accounting and control, and RW in organizations managing RM and RW.

Rules of reclassification of Nuclear Materials into Radioactive Material or Radioactive Waste (NP-072-13) specify the requirements that should be met to categorize nuclear material available in the form of elementary substances or compounds, alloys, items, accounting units containing nuclear materials registered under the State System for Accounting and Control of Nuclear Material, as RM or RW.

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

Requirements for the Safe Storage and Transportation of Nuclear Fuel on Nuclear Facilities (NP-061-05) specify main engineering and managerial requirements to the systems designed to store nuclear fuel and SNF, aiming to ensure safe storage at NFs.

Requirements to NF Safety Analysis Reports (NP-006-16, NP-018-05, NP-049-03, NP-051-04, NP-023-2000, NP-066-05) set forth the requirements to the development of safety analysis reports for different types of nuclear facilities, their layout, typical structure of system description, as well as the contents of individual sections.

In 2017, **Requirements on the Contents and Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities (NP-099-17), Requirements on the Contents and Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities (NP-100-17)** were adopted. These FRRs specify relevant requirements to the development of safety analysis reports for RW storage and disposal facilities, including facilities holding non-retrievable RW and disposal facilities for non-retrievable RW.

In 2017, enacted was **FNP Safety Requirements for Facilities Holding Non-retrievable RW and Disposal Facilities for Non-retrievable RW (NP-103-17)** establishing the categories of facilities holding non-retrievable RW and disposal facilities for non-retrievable RW, as well as requirements that should be followed to upgrade the former one into non-retrievable RW or RW disposal facilities. Furthermore, the FRR established safety requirements for various categories of facilities holding non-retrievable RW and non-retrievable RW disposal facilities (LRW storage reservoirs and tailings, SRW storage facilities, sites contaminated due to peaceful nuclear explosions, etc.).

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

E.2.1.3.1. State Sanitary Rules and Radiation Safety Standards

Article 9 of the Federal law № 3-FZ On Radiation Safety of Population 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 radiation safety.

Pursuant to the Federal law № 3-FZ On Radiation Safety of Population, Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing is authorized to develop and approve the sanitary rules.

Provisions of the Federal law № 52-FZ On the Sanitary and Epidemiological Wellbeing 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 authorities, state standards, building standards and rules, occupational safety and health rules, veterinary and phytosanitary rules shall not contravene relevant provisions of sanitary rules.

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

Basically, there are three fundamental sanitary regulations presenting general provisions on the radiation safety of population in Russia:

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

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

E.2.1.4. Directive 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 how to meet safety requirements in the field of atomic energy use.

Provisions of safety guides are developed based on the experience from FRR's past applications, as well as recommendations of international organizations in the field of atomic energy use the Russian Federation being Party to which.

Rostechnadzor is also charged to update and revise the current system of safety guides. In 2020, to upgrade 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.

In the reporting period, over 45 safety guides were updated and developed.

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

Regulatory legal acts of the regulatory body involve procedural standards establishing relevant rules and procedures for operations performed in different fields of activities supervised by Rostechnadzor.

Regulatory legal acts of the regulatory body and administrative regulations, in particular, specify the set of requirements to a document portfolio required to demonstrate the safety of SNF and RW storage facilities, NI, RS, 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 Government decree of the Russian Federation № 373 of May 16, 2011 On the Development and Approval of Administrative Regulations on the State Functions and Administrative Regulations for State Service Supply.

Rostechnadzor's legal acts are listed in Annex E of the Report.

E.2.2. Licensing Activities in the Field Spent Nuclear Fuel and Radioactive Waste Management (Article 19-2 (ii, iii))

Article 26 of the Federal law № 170-FZ On Atomic Energy Use specifies the types of activities in the field of atomic energy use being subject to licensing by the state safety regulatory authorities.

Article 14.1 of the Code of the Russian Federation on Administrative Violations declares that implementation of activities without an appropriate license, if such license is considered mandatory, shall result in a fine imposed under the administrative law.

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

Conditions and procedure followed to license activities 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 on March 29, 2013).

The following activities fall under the scope of the Convention:

- siting, construction, operation and decommissioning of NM, RM and RW storage facilities, NI, RS;
- 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;
- engineering and development of design for NM, RM and RW storage facilities, NI, RS;
- design engineering and manufacturing of equipment for NM, RM and RW storage facilities, NI, RS;
- expert review of design documentation, engineering and process flow documentation and documents demonstrating nuclear and radiation safety of NM, RM and RW storage facilities, NI, RS, as well as NM, RM and RW management activities.

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

Administrative Regulations Authorizing the Federal Environmental, Industrial and Nuclear Supervision Service to Implement its State Function on Licensing Activities in the Field of Atomic Energy Use, approved by Rostechnadzor's decree № 453 of October 8, 2014 (hereinafter Administrative Regulations) specify relevant procedures that Rostechnadzor should follow to provide the state services associated with licensing activities in the field of atomic energy use.

Administrative Regulations specify relevant timeframes, organizational and procedural matters (administrative procedures and operational sequences) that Rostechnadzor and its territorial departments shall comply with. These regulations also elaborate on the coordination mechanisms between Rostechnadzor's central office and territorial departments, their officials, as well as Rostechnadzor's interaction with applicants/licensees, other government authorities and organizations involved in the licensing process in the field of atomic energy use. The following matters are also discussed in these regulations: maximum duration of expert review of the license applications, requirements concerning the structure of submitted document portfolios demonstrating nuclear and radiation safety during siting, construction, operation and decommissioning (closure) of NIs, RSs and SFs.

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 verification of the credibility of data contained in these documents.

The following aspects shall be evaluated by Rostechnadzor during the review of a license application:

- compliance of design and engineering solutions with relevant legislative provisions of the Russian Federation in the field of atomic energy use and requirements specified in federal rules and regulations in the field of atomic energy use, as well as compliance with the requirements for the safe RW management during the implementation of the declared licensed activity;
- comprehensive technical and administrative arrangements provided to ensure nuclear and radiation safety when implementing the declared activity;
- 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 protection of personnel working at NFs and public in the event of an accident and preparedness to their implementation, as well as compliance of a quality assurance system and necessary technical and engineering support required for the declared activity;
- ability of the applicant to ensure adequate conditions for safe implementation of the declared activities, to ensure safety of the nuclear facility and implemented activities provided that the quality of performed activities and supplied services complies with relevant provisions of federal rules and regulations in the field of atomic energy use;
- availability of necessary resources and preparedness for the implementation of required efforts on the mitigation of emergencies associated with possible nuclear and radiation accidents at nuclear facility;
- ability of the applicant to ensure safe completion of the declared activity and safe NF decommissioning, as well as availability of appropriate design materials.

During the review of documents demonstrating the safety of a nuclear facility and (or) licensed activity, Rostechnodzor verifies the credibility of data presented in these documents that may be verified in two ways:

- nuclear facility and (or) licensed activity safety evaluation (safety case evaluation);
- evaluation of the applicant and inspection at the facility involved in the declared activity.

In keeping with the annex to the Administrative Regulations, licenses for siting, construction, operation and decommissioning of facilities having regional importance and designed for RW storage, RW management, shall be issued by Rostechnadzor interregional territorial departments. Operations associated with siting, construction, operation and decommissioning of SNF storage facilities, as well as facilities designed for RW storage of interregional importance, and RW disposal facilities (irrespective of RW DF status) shall be licensed by Rostechnadzor's central office.

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, some additional documents may be required from the applicant to demonstrate the adequate safety level of these activities and make a decision on amending the conditions of already issued licenses. Such an amendment to license conditions based on the above reasons may be introduced upon licensee's application.

E.2.3. System of Institutional and Regulating Controls, Documentation and Reporting (Article 19-2 (iv))

E.2.3.1. Institutional Control

Institutional control over SNF and RW management activities, documentation maintenance and relevant reporting is executed by the management body in the field of atomic energy use and the operating organization. Coordination between them is arranged based on relevant provisions of the Russian legal framework and federal rules and regulations in the field of atomic energy use.

Operating organization is an organization established under the legislation of the Russian Federation, recognized by relevant state management authorities 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 contracting other organizations, activities associated with siting, design development, construction, operation and decommissioning of NI, RS or SF, DF RW closure, as well as NM and RM management.

Pursuant to requirements set forth in Article 35 of the Federal Law № 170-FZ on Atomic Energy Use, the operating organization continuously monitors the safety of nuclear facilities. Performance of safety systems and other safety important systems is periodically checked.

Operating organizations conduct comprehensive and targeted inspections mainly focused on:

- assessing the compliance with the requirements of norms, rules, standards and safety guides;
- evaluating the effectiveness of measures implemented to ensure and improve NF safety, including those developed based on NF inspections carried out by state supervision and control bodies and investigations of events that occurred at nuclear facilities;
- evaluating the effectiveness of safety management systems operated at nuclear facilities, development of recommendations on improving their efficiency.

The procedures associated with safety evaluation and validation are implemented systematically throughout the entire life cycle of nuclear facilities.

Article 35 of the Federal law № 170-FZ On Atomic Energy Use stipulates that operating organization shall develop and implement activities contributing to NI, RS or SF safety. If necessary, it can establish special services providing safety control arrangements. The operating organization 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 suggest that the operating organization takes appropriate steps to ensure that control, inspections and testing of safety-important equipment and systems is carried out in accordance with the established procedures and schedules.

State management authorities in field of atomic energy use monitors the compliance of operating organizations with relevant safety requirements, conducts inspections to evaluate the safety of NF operated by subordinate operating organizations.

If operating organization fails to ensure safety, a competent state 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

Federal 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, 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 Regulations for the Federal Environmental, Industrial and Nuclear Supervision Service Regarding the Implementation 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's documents specifying inspection procedures and the issues subject to the reviews.

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

- the 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 occupational safety (at nuclear facilities);
- physical protection of NI, RS and SF, state systems for 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 relevant legislative provisions in the field of RW management specified under 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 SFAs 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 branches have been established within the structure of Rostechnadzor's interregional territorial departments implementing federal state supervision in the field of atomic energy use. These branches are staffed with inspectors qualified 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 territorial departments. Targeted inspections are performed by officials or commissions, including officials from Rostechnadzor's central office or territorial departments. These can be both field and documentary inspections that are performed in a planned or unscheduled manner.

Continuous federal state supervision is effectuated at the sites of nuclear facilities characterized with the highest potential level of hazard and included in the list of nuclear facilities approved by the Government of the Russian Federation and requiring permanent state supervision. Such supervision suggests that authorized Rostechnadzor officials should be on a regular basis present at high-risk facilities, the authorized officials should implement relevant measures to monitor the safety of high-risk facilities.

Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing implementing the functions of a federal state sanitary and epidemiologic supervision supervises the compliance of activities performed with the requirements set forth in sanitary and hygienic standards and rules, including those relevant to radiation safety. It issues statements on the compliance of SNF and RW management facilities or transport means with the requirements of sanitary standards and rules.

Article 3 of the Federal law № 170-FZ On Atomic Energy Use stipulates that items containing or applying NM and RM in quantities and with activity and/or emitting ionizing radiation with the intensity or energy less than the values established in the federal rules and regulations in the

field of atomic energy use are not covered by the law. Thus, they are exempted from the safety regulations being effective in the field of atomic energy use.

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

It should be noted that the requirements set forth in the Sanitary Rules do not apply to radiation sources (as well as the associated 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.

Also OSPORB-99/2010 specify criteria for the exemption of solid materials from regulatory control. Expected individual annual effective radiation dose is considered as a criterion for making decisions on the possible use of raw materials, materials and items containing radionuclides in economic activities: this dose should not exceed 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 of NF safety and submit them for the review to state safety regulatory authorities and state management authorities 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 concerning any operational occurrences shall involve an evaluation of why and how the safety requirements were breached, the efficiency of arrangements implemented by the operating organizations to avoid the reoccurrence of such occurrences in the future, causes and conditions of these occurrences.

Rostechnadzor establishes the procedure for communicating the information on operational occurrences and NF safety reports to Rostechnadzor and its territorial departments.

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

Categories of occurrences, the contents and the procedure for communicating relevant information, the procedure for investigating and accounting such occurrences, as well as relevant reporting requirements are established in relevant FRRs.

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 occurrences identified during NF operating lifetime.

If some amendments that can 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 whether the conditions of the license are to be altered or not.

E.2.4. Enforcement of Regulations and License Conditions (Article 19-2(v))

Pursuant to provision of the Federal law № 170-FZ On Atomic Energy Use, state safety regulatory authorities are entitled to apply administrative enforcement 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 departments to organizations (legal entities) for the declared types of activities in the field of atomic energy use, if they breach nuclear and radiation safety requirements or license conditions during the execution of relevant activities;
- to prohibit the use of equipment and technologies 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 are breached, and to disqualify personnel according to the Code of Administrative Violations;
- to send official warnings to organizations stating the inadmissibility of violating binding requirements;
- to communicate to law enforcement authorities the information revealing the violations of the Russian legislative provisions 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 had committed a gross violation of license conditions that was revealed during the inspection performed under federal state supervision in the field of atomic energy use;
- the license holder failed to present the findings of periodic safety assessment after the expiration of a 10-year period set for NI or SF operation or did not observe the timing;
- findings of a periodic safety assessment performed for a NI or SF revealed that the safety level of the licensed activity, NI, SF and (or) conducted operations and its demonstration cannot be considered adequate;
- the license holder failed to comply with the order issued to rectify the identified violations of the license conditions;
- the permit recognizing the organization as being able to operate a NI, RS or SF, to perform siting, design development, construction, operation and decommissioning of NI, RS or SF, RW DF closure, as well as to manage of 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 the 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 between Authorities Involved in Different Steps of Spent Nuclear Fuel and Radioactive Waste Management (Article 19-2 (vi))

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

According to provisions of the Federal law № 170-FZ On Atomic Energy Use, state management authorities in the field of atomic energy use are authorized:

- to implement state scientific, technical, investment and structural policy in the field of atomic energy use;
- to develop safety-relevant measures in the field of atomic energy use;
- to develop federal rules and regulations in the field of atomic energy use;
- to establish and implement SNF and RW management programs.

Pursuant to Government decree of the Russian Federation № 412 of July 3, 2006 On Federal Executive Authorities and Authorized Organizations Exercising State Management and State Safety Regulation in the Field of Atomic Energy Use, 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 … regulates the status and the powers of different parties engaged in RW management, specifies the ownership rights on RW and RW disposal facilities, as well as the procedure for 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 representing constituent territories 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.

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

According to the Federal law № 190-FZ On Radioactive Waste Management…, the National Operator for RW management is in charge of:

- safe management of RW that it accepts for disposal;
- operation and closure of RW disposal facilities;
- placement of orders for design development and construction of RW disposal facilities;

- making forecasts on RW inventory subject to disposal and necessary RW management infrastructure development, it also publishes relevant information at its web-site and the web-site of the state management authority in the field of RW management;
- providing technical and information support to the state service of RM and RW accounting and control;
- implementing other activities under relevant legislative provisions of the Russian Federation.

National Operator for RW management is responsible for:

- RW acceptance for disposal. The waste accepted for disposal has to comply with the established acceptance criteria, and relevant disposal costs should be covered. When the National Operator accepts waste for disposal, transfer and acceptance act is drawn;
- when RW is transferred to the National Operator by organizations not pertaining to those operating particularly hazardous nuclear and radiation productions and facilities, it should divert some funds coming from such organizations to a special reserve fund. Relevant procedure is established by the Government of the Russian Federation;
- nuclear, radiation, occupational and fire safety, environmental protection, compliance with legal provisions governing sanitary and epidemiologic welfare of public during operation, closure of RW disposal facilities, as well as at RW DF post-closure stage;
- radiation control at RW DF sites, including non-continuous (periodic) radiation monitoring at the post-closure stage;
- if requested by members of public, legal entities, including nonprofit organizations, state authorities, other state bodies and local authorities, shall provide information on its own activities unless the legislation of the Russian Federation recognizes it as a state secret;
- informing public, state authorities, other state bodies and local authorities on RW management safety and radiation environment at RW storage and disposal facility sites operated by NO RAO.

Pursuant to Article 20 of the Federal law № 190-FZ On Radioactive Waste Management …, NO RAO is responsible for RW receipt for disposal. Currently NO RAO's structure involves a central office and its branches:

- Zheleznogorsk (Zheleznogorsk, Krasnoyarsk Region);
- Seversk (Seversk, Tomsk region);
- Dimitrovgrad (Dimitrovgrad-10, Ulyanovsk Region);
- Ozersk (Ozersk, Chelyabinsk Region);
- Novouralsk division (Novouralsk, Sverdlovsk Region) pertaining to the Seversk branch.

Pursuant to Article 22 of the Federal law № 170-FZ On Atomic Energy Use, state system for RM and RW accounting and control has been established and is operating in the Russian Federation (SGUK RV and RAO).

The system is designed to identify the stocked RM and RW inventory 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 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 national RW inventory, RW storage and disposal facilities, radioactively contaminated territories located 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 enable the development of software and hardware required for the establishment, operation and upgrading of SGUK RV and RAO and communicating relevant findings to organizations performing RM and RW accounting and control at all levels;
- ensure the involvement of concerned federal executive authorities in the development of regulatory documents (reference forms for RM and RW accounting and control, methods used to specify the inventory and the radionuclide contents, etc.), provide unified information support and compatible software for relevant data basis;
- ensure coordination of efforts at the federal level;
- provide appropriate information to state authorities, state management authorities in the field of atomic energy use, and other executive authorities on RM and RW inventories, RW transport, export and import, so that these authorities were able to execute their powers;
- ensure operation of information and research organizations and the center for data collection and transfer (Central Analytical Center for State Accounting and Control of RM and RW) enabling the system operation 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 engaged in the development, approval and enforcement of federal rules and regulations in the field of atomic energy use concerned with the state accounting and control of items subject to state accounting and control, which is done in accordance with the procedure established by the Government of the Russian Federation.

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 during the development of RW DF designs. Relevant designs and RW acceptance criteria shall be submitted to Rostechnadzor as part of license application.

E.3. State Regulation of Safety in the Field of Atomic Energy Use (Article 20)

Article 20. Regulatory Authorities

20-1 Each Contracting Party shall establish or designate a regulatory authority 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 the responsibilities assigned to it.

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 in the cases when organizations are involved in both spent fuel or radioactive waste management and in

E.3.1. Regulatory Authorities (Article 20.1)

Federal law № 170-FZ On Atomic Energy Use stipulates that state regulation of safety in the field of atomic energy use provides for certain efforts 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 examination and inspection, oversight over development and implementation of measures aimed at protecting NF personnel, public and the environment in the event of accidents resulted from atomic energy uses.

Article 24 of the Federal law stipulates that state regulation of safety in the field of atomic energy use shall be carried out by federal executive authorities – state safety regulatory authorities.

In accordance with the Government decree № 412 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 Surveillance on Consumer Rights Protection and Human Wellbeing (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, according to which state regulation of safety in the field of atomic energy use shall also involve certain efforts of Rosatom on promoting the development of new rules and regulations in the field of atomic energy use, certification, standardization, compliance assessment, control over development and implementation of measures aimed at the protection of NF personnel, public and the environment in the event of accidents resulted from atomic energy uses.

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

Responsibilities of state safety regulatory authorities are set forth in relevant Government decrees of the Russian Federation.

Each year, the State Duma and the Federation Council of the Federal Assembly of the Russian Federation approves the amount of funds allocated to state safety regulatory authorities.

In 2011, a new amendment to the Federal law № 170-FZ On Atomic Energy Use introduced the following principles 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 decree № 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 are aimed at:

- Increasing the efficiency of measures addressing the radiation safety of personnel working at radiation hazardous facilities of the State Corporation Rosatom and public

residing in the areas supervised by the abovementioned organizations, and to protect the environment;
- to eliminate duplications of functions;
- to improve collaborative relationships 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; evaluations 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 Surveillance on Consumer Rights Protection and Human Wellbeing Associated with Federal State Sanitary and Epidemiological Supervision of Construction Activities was approved.

The document provides for cooperation on the following matters:
- provision of information on regulations and guideline documents establishing the arrangements for and implementation of federal state supervision activities;
- goals and scope of inspections and relevant timeframes;
- provision of information on the results of performed inspections, data demonstrating the compliance of the declared activities with legislative provisions of the Russian Federation and the overall effectiveness of federal state supervision activities;
- proposals on upgrading the national legal framework in respect to activities associated with federal state supervision and its arrangement.

Moreover, since the presentation of the forth National Report, Rostechnadzor signed the Agreement with EMERCOM of Russia on information exchange for prevention and mitigation of emergencies of August 30, 2017 No. 00-01-18/625/2-4-38-9, and the Agreement on cooperation between Rostechnadzor and the Federal Service for Hydrometeorology and Environmental Monitoring on the provision of data concerning the radiation situation in the territory of the Russian Federation of November 1, 2017 No. 00-01-18/776.

Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor) is the authority exercising functions of state safety regulatory authority in the field of atomic energy use (state federal supervision authority in the field of atomic energy use) and a regulatory authority pursuant to relevant provisions of the Convention on Nuclear Safety and the Joint Convention on the Safety of SNF and RW Management. Furthermore, according to an Amendment to the Convention on the Physical Protection of Nuclear Material, Rostechnadzor is also considered as a competent authority of the Russian Federation.

According to the Regulation on Federal Environmental, Industrial and Nuclear Supervision Service (hereinafter Regulation), Rostechnadzor is responsible for the following activities performed in the field of atomic energy use:
- it submits 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;
- on its own initiative approves the following by-laws within its scope of responsibility:
  - federal rules and regulations in the field of atomic energy use in accordance with legislative provisions of the Russian Federation;
  - safety guides in the field of atomic energy use (within its competence);
  - the procedure for issuing work permits to personnel engaged in activities associated with atomic energy use and working at NFs;
  - the requirements to the structure and the contents of documents demonstrating the safety of NIs, RSs, SFs and (or) performed activities in the field of atomic energy

use, required to license such activities; as well as to the expert review of the above documents;
    - the procedure for arranging and performing supervision over the state system for NM accounting and control;
    - the procedure for compiling and running files during the state supervision of construction activities, as well as the requirements regarding the documents that are included into such files;
    - codes of rules in accordance with the legislative provisions of the Russian Federation dealing with technical regulation;
    - methods applied to develop and introduce the regulatory standards specifying acceptable limits for RM releases and discharges into the atmosphere and water bodies;
    - the procedure for issuing permits on RM releases and discharges and their reference forms;
    - specific aspects of compliance assessments performed for products falling under the safety requirements being valid in the field of atomic energy use, as well as relevant design processes (including research activities), production, construction, installation, setup, operation, storage, transportation, sales, recycling and disposal;
    - the procedure followed by operating organizations during the submittal of documents containing the results of safety assessments performed for NI, NM and RM storage facilities, and demonstrating their operational safety, as well as the requirements to the contents and structure of such documents;
    - the procedure for expert reviews of safety (evaluation of safety cases) 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 NFs and (or) types of activities implemented in the field of atomic energy use[*];
- exercises control and supervision over:
    - the 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 occupational safety (at nuclear facilities);
    - physical protection of NI, RS, NM, RM and RW SF, as well as state NM, RM and RW accounting and control 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 Rostechnadzor's competence);
    - timely return of spent fuel assemblies removed from nuclear reactors and by-products resulting from their reprocessing to the State of origin having an international agreement with the Russian Federation providing for SFAs import to the Russian Federation for the purposes of their temporary storage and (or) reprocessing given that the by-products resulting from the reprocessing are returned back to the State of origin (within the scope of Rostechnadzor's competence).
- licenses activities in the field of atomic energy use in accordance with the legal framework of the Russian Federation;
- arranges for the review of document portfolios demonstrating the safety of nuclear facilities and (or) licensed activities; verifies the data presented in the submitted

[*] Introduced by the Government resolution of the Russian Federation of July 6, 2018 № 793 On Introducing Amendments to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service

documents via inspections and reviews of safety cases for nuclear facilities and (or) licensed activities;

- issues the following types of permits:
  - permits for individuals (personnel of a NF) allowing them to perform 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;
- performs reviews (inspections) of certain types of activities carried out by legal entities and individuals to check their compliance with relevant legal requirements of the Russian Federation, by-laws, rules and regulations;
- harmonizes:
  - provisions of qualification reference guides for managers, specialists and workforce containing job specifications for employees granted with permits 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 the system for control of NFs in the event of an accident;
- is involved in the certification of activities in the field of atomic energy use;
- establishes, develops and maintains the operation of an automated system for information and analytical support;
- issues statements on compliance of constructed, reconstructed or refurbished capital facilities with the requirements of technical regulations and design documentation.

Article 1, paragraph 2 of the Federal law № 246-FZ On Introducing Amendments to the Federal Law On the Protection of Rights of Legal Entities and Self-Employed Individuals During the State Control (Supervision) and Municipal Control**,** has introduced a new article, namely, Article 8.1 specifying the applicability and the use of a risk informed approach under certain types of state control (supervision) arrangements specified by the Government of the Russian Federation.

The above-mentioned provisions are effective since January 1, 2018.

Thus, according to Article 8.1, Part 2 of the Federal law № 294-FZ On the Protection of Rights of Legal Entities and Self-Employed Individuals During the State Control (Supervision) and Municipal Control, the risk informed approach suggests that state control (supervision) activities are arranged and performed in a way ensuring that relevant decisions on their intensity (form, duration and frequency) are made based on the category of the production facility or activities in question. Namely, the level of risk or hazard associated with the specific activity and (or) the facility involved in activities performed by legal entities or self-employed individuals.

Furthermore, Article 2, Part 2 of the Federal law № 294-FZ On the Protection of Rights of Legal Entities and Self-Employed Individuals During the State Control (Supervision) and Municipal Control stipulates that the Government of the Russian Federation defines specific types of state control (supervision) arrangements that could be applied until January 1, 2018 using the risk informed approach.

In this regard, to implement the above mentioned provisions of the Federal law № 294-FZ, as well as in support of other activities aimed at upgrading the state control and supervision system, namely, those listed in relevant Action Plan (road map), the following provisions were approved by the Government decree of the Russian Federation № 806 On the Use of Risk Informed Approach for Arranging Certain Types of State Control (Supervision) Activities and Introducing Certain Amendments to Legal Acts of the Government of the Russian Federation of August 17, 2016:

- rules for attributing certain types of activities performed by legal entities or self-employed individuals and (or) production facilities used by them to a specific category according to the associated risk or hazard level;
- list of state control (supervision) activities suggesting the use of risk informed approach.

Pursuant to Article 24 of the Federal Law № 170-FZ On Atomic Energy Use of November 21, 1995, measures implemented by state safety regulatory bodies on the fulfillment of their powers should be commensurate with the potential hazard level of nuclear facilities and activities implemented in the field of atomic energy use (hereinafter referred to as the differentiated approach).

Rostechnadzor consistently implements this provision while executing the functions assigned to it by applying a differentiated approach, in particular, during its activities associated with normative legal regulation of safety, licensing activities in the field of atomic energy use, and by applying risk informed approach while exercising its control and supervisory functions at NFs.

NFs are ranked according to the potential radiation hazard levels, i.e. potential radiation effects of a radiation accident at the NF on the population and personnel. If an accident at the facility may result in an exposure of not only the employees, but the population as well, the facility is considered potentially most hazardous. These facilities include nuclear power plants, research nuclear facilities, nuclear fuel cycle facilities, NM and RW storage facilities, ships and other floating crafts with nuclear reactors and radiation sources.

The licensing process (including the issuance (reissuance) of licenses, as well as revocation and renewal of licenses) involves a differentiated approach applied to delineate the powers between the Rostechnadzor's central office and its interregional territorial departments for nuclear and radiation safety supervision. Differentiated approach is also used in specifying the requirements for documents supporting the safety of facilities and (or) types of activities during the licensing process.

Federal state supervision in the field of atomic energy use is implemented in keeping with Article 24.1 of the Federal Law 1995 № 170-FZ On Atomic Energy Use of November 21 and relevant provisions of the Government Decree of the Russian Federation № 1044 of October 15, 2012.

Federal state supervision involves comprehensive and targeted inspections, planned and unscheduled (field surveys and document audits) inspections. Audit (inspection) program is developed with due account of the differentiated approach depending on the potential hazard level of the considered NF.

At most potentially hazardous NFs (nuclear hazardous facilities), federal state supervision is implemented continuously which is seen as an integral element of the differentiated (risk-oriented) approach with no restrictions imposed on the number of control and supervisory activities within its framework.

Rostechnadzor's quality assurance system is fully consistent with the requirements of the Regulation on the Quality Management System of the Federal Environmental, Industrial and Nuclear Supervision Service Covering State Regulation of Safety in the Field of Atomic Energy Use (approved by Rostechnadzor's order № 557 of December 11, 2014). This system provides qualitative and effective performance of Rostechnadzor's functions acting as a state safety regulatory authority in the field of atomic energy use. It should be noted that this quality assurance system was introduced in keeping with relevant provisions of international standards, namely: IAEA GSR Part 2 Leadership and Management for Safety, IAEA GS-G-3.1 Application of the Management System for Facilities and Activities, as well as GOST ISO 900-2011 (Quality management systems — Requirements) establishing current administrative structure and providing a clear description of processes associated with expert review of regulatory activities, inspections and evaluations of registered events.

Rostechnadzor has adopted a Statement on Safety Culture Policy in the Field of State Safety Regulation Associated with Atomic Energy Use, which provides for self-assessment of safety culture. In 2019, to elaborate the methods for the self-assessment of safety regulator, a pilot safety culture self-assessment was performed at the scientific and technical support organization of the regulator, SEC NRS, providing scientific and technical support to the regulator.

Rostechnadzor's central office and interregional territorial departments supervising nuclear and radiation safety execute the functions assigned to the Federal Environmental, Industrial and Nuclear Supervision Service.

Rostechnadzor's central office and interregional territorial departments supervising nuclear and radiation safety are staffed with personnel having the required qualifications. Relevant qualification requirements are set forth by the Federal law № 79-FZ of July 27, 2004 On State Civil Service and the Presidential decree of the Russian Federation № 16 of January 16, 2017 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 Vacancies in the State Civil Service and other regulations.

The existing system of advanced training provides for scheduled trainings allowing to maintain the competence of Rostechnadzor's public officers. The system involves:

- supplementary vocational training programs, advanced training;
- educational institutions responsible for providing required contents and quality of supplementary vocational training programs;
- Rostechnadzor's subdivisions managing the advanced training system.

Rostechnadzor's progress reports are published annually. These reports involve information on control, supervisory, licensing and permitting activities, safety evaluations and emergency vulnerability assessments of NFs and enterprises supervised by Rostechnadzor, including analysis of adverse human-induced impacts on the environment and findings of expert reviews and evaluations. These reports also contain information on operational occurrences at NFs supervised by Rostechnadzor including RW and SNF management facilities. These reports are available at Rostechnadzor's website and are published in 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 continuously cooperates 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 officials and its management team. Monitoring of publications is carried out 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 in the field of NRS regulation to Rostechnadzor, namely, the Federal budgetary enterprise 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.

SEC NRS is actively engaged in international cooperation with foreign organizations, including foreign technical support organization, incorporating international experience to the practice of scientific and technical support of the regulator. In 2012, SEC NRS became an associated member of the European Technical Safety Organizations Network (ETSON).

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

In accordance with Government decree of the Russian Federation № 322 of June 30, 2004, **Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor)** is the federal executive authority responsible for 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 rights 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 rights 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 covering radiation safety of the population and personnel being focused on activities involving all main types of radiation sources, as well as guidelines explaining how the requirements of the sanitary rules are to be met in practice;
- licenses activities associated with the management of sources generating ionizing radiation;
- performs compliance assessment of conditions, under which man-made sources of ionizing radiation are managed, 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 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 of October 11, 2004 On the Federal Medical and Biological Agency with the aim of developing a specialized sanitary and epidemiological supervision system and providing medical and sanitary service support to the employees working in certain industrial sectors with particularly hazardous working environment.

Responsibilities and powers of the Federal Medical and Biological Agency are set forth in the Government decree of the Russian Federation № 206 of April 11, 2005, according to which one of the FMBA's priority tasks involves 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.

State regulation of safety in the field of atomic energy use is considered as a fundamental NRS objective for FMBA of Russia. 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 are binding for all operating organizations.

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

FMBA of Russia performs its state sanitary and epidemiologic supervisory (control) functions directly or through its territorial authorities (interregional departments).

Radiation control over working environment at nuclear facilities, including RW and SNF management facilities, and over radiation safety of population residing in certain territories is performed by industrial sanitary laboratories (radiation hygienic laboratories) and internal dosimetry laboratories being part of FMBA's 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, Issues Addressed by 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 assigned to 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 of April 12, 2012 On the Federal State Fire Supervision;
- 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 of December 24, 2015 On the State Supervision over the Protection of Public and Territories Against Natural and Man-Induced Emergencies;
- state supervision of civil defense in accordance with a procedure established by the Government decree of the Russian Federation № 305 of May 21, 2007 On Approved Regulation on the State Supervision in Civil Defense.

Pursuant to the provisions of the Federal law №184-FZ of December 27, 2002 On Technical Regulation, technical regulation of fire safety at NPPs is considered as one of EMERCOM's focus areas. The Federal law № 117-FZ of July 10, 2012 On Amendments Introduced to the Federal Law On Technical Regulation of Fire Safety Requirements has extended provisions of the Federal law №123-FZ of July 22, 2008 (Technical Regulation on Fire Safety Requirements) to NPPs.

Code of rules titled Nuclear Power Plants. Fire Safety Requirements SP 13.13130.2009, developed by EMERCOM, provides a background for the implementation of relevant provisions of the Federal law №123-FZ of July 22, 2008 Technical Regulation on Fire Safety Requirements and specifies relevant requirements. This code presents fire protection rules for NPPs that should 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 developed based on the feedback from its application by EMERCOM.

In accordance with the Government decree of the Russian Federation № 1219 of November 11, 2015 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, **Ministry of Natural Resources and the Environment of the Russian Federation (Minprirodi of Russia)** is responsible for the development of state policy and legal regulation in the following areas: research, 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 relations associated with hunting; relations in the field of hydrometeorology and other relevant areas; state ecological monitoring (state environmental monitoring) involving state monitoring of radiation environment performed at 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 issues associated with the management of domestic waste, protection of the atmospheric air, state environmental supervision, specially protected nature conservation areas and state environmental impact assessments.

In accordance with the Government decree of the Russian Federation № 400 of July 30, 2004, **Federal Service for Supervision of 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 restricting man-induced impacts, waste management (excluding RW management) and state environmental expert examination.

E.3.2. Independence of Safety Regulatory Authorities (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, state safety regulatory authorities are independent from other state authorities, as well as organizations involved in atomic energy use.

In the Russian Federation, federal executive bodies responsible for the state safety regulation in the field of atomic energy use are indicated in the Government decree of the Russian Federation № 412 of July 3, 2006, and include: Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters, Ministry of Natural Resources and the Environment of the Russian Federation, Federal Environmental, Industrial and Nuclear Supervision Service, Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, Federal Medical and Biological Agency.

Responsibilities and powers of each of these bodies are limited to a certain area and are enshrined in relevant regulations concerning these bodies.

In accordance with the Federal law № 170-FZ On Atomic Energy Use, state safety regulatory authorities are funded through the federal budget.

In 2011, an amendment was introduced to the Federal law № 170-FZ On Atomic Energy Use according to which when making decisions and executing their powers, state safety regulatory authorities shall be independent 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.

Discussed 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 by 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;
- expenses of safety regulatory authorities are covered by the federal budget;
- open and transparent procedures are put in place for the development of regulations (requirements), licensing all types of activities in the field of atomic energy use, state supervision over the safety in the field of atomic energy use;
- enforcement system is applied to organizations involved 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

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 (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 substance.

The Russian Federation takes appropriate steps to ensure that operating organizations discharge all duties that they are responsible for.

Organization is recognized as an operating organization after relevant decision is made by the management authority in the field of atomic energy use, whereas licensing service is 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, operating organizations shall have adequate authority, financial and material resources to fulfill the responsibilities assigned to them.

According to Article 35 of the Federal law № 170-FZ On Atomic Energy Use, 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);
- measures aimed at preventing 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 are developed and implemented;
- enforcement of rights of NF employees on gaining social and economic benefits;
- registration of individual doses received by NF employees;
- development and implementation (within its competence) of measures aimed at protecting the employees and the public in the event of an accident at NI, RS and SF;
- NM, RM and RW accounting and control;
- physical protection of NI, RS, SF, NM, RM and RW;
- development and implementation of fire safety arrangements;
- radiation monitoring in the surveillance zones and sanitary-protection zones;
- recruitment, training and maintaining competences of NI, RS and SF employees, and establishment of good social environment and all proper conveniences at work places;
- communication of information concerning radiation environment in controlled areas and surveillance zones to the public;
- exercising other authorities in accordance with relevant regulations.

Operating organization bears full responsibility for:

- nuclear and radiation safety;
- development and implementation of measures on upgrading SNF and RW management safety;
- 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 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 a 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 during the review of 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 its 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 activity;
- proper conditions for storage and accounting and control of NM, RM, RW, physical protection of NI, RS, NM, RM, RW, SF, action plans for 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 the 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 (RW DF closure), as well as availability of appropriate design materials.

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 its transfer to another operating organization or acquisition of a new license (permit). If the operating organization is unable to ensure the safety of the abovementioned facilities, state management authority in the field of atomic energy use becomes responsible for safety assurance and all relevant management activities (Article 35 of the Federal law № 170-FZ On Atomic Energy Use).

Article 14 of the Federal law 190-FZ On Radioactive Waste Management… stipulates that RW management activities may be executed by organizations granted 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 for RW management.

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

Provisions of Basic Sanitary Rules OSPORB-99/2010 stipulate that any activity involving sources of ionizing radiation including radiation monitoring are allowed only if 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 the state sanitary and epidemiologic supervision authorities.

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, operating organization shall recruit, train and maintain competence 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 involved in SNF, RW or RM management shall provide:

- adequate staff number having the required competences and appropriate work permits prior to NI, RS or SF commissioning;
- recruitment, training and maintaining the required competence of NI, RS or SF employees;
- an adequate recruitment and training system to achieve, control 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 allowing them to perform the permitted activities;
- regular emergency drills aimed at working out employees' response in case of operational occurrences, 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 on safety culture development and maintenance was significantly extended, reflecting all the essential elements, including the establishment of the "safety first" principle as an internal necessity. The new definition of *safety culture* given in NP-001-15 more closely corresponds to those provided in international documents, for example, INSAG-15. Additional requirements on the safety culture development and maintenance were introduced by NP-038-16 also elaborating on the ways providing the safety culture development during activities involving the use of radiation sources.

State Corporation Rosatom is a federal 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 activities aimed at providing adequate support to the establishment of a multilevel system for safety training, advanced training and certification of personnel involved in the nuclear power and industry sectors are considered essential for its mission.

All specialized educational organizations training young specialists for the nuclear sector are integrated into a 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 (NRNU MEPhI), the main higher education facility of the State Corporation Rosatom, has an extensive network of branches located in regions with operating Rosatom organizations.

The university involves 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 of 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 being on demand in the nuclear sector. Extended target training is now considered as the most important trend providing staff supply to organizations of the sector. Thus, in 2019, the total number of students trained under such targeted programs at the request of atomic energy enterprises amounted to over 2,000 people. NRNU MEPhI educational programs involve multi-level trainings – 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 on the necessity of periodical enrolling on advanced training courses focused on safety aspects. The major goal of the professional training system is to achieve and maintain the appropriate personnel skill level ensuring 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 considered as the key educational institution of the corporate system for advanced training of personnel focused on the safety aspects. The Academy involves 4 branches operating in Moscow, St. Petersburg, Novovoronezh, Sosnovy Bor. Its headquarters is located in Obninsk, the first «science city» in Russia. The Academy provides courses in 19 focus areas, 7 of which are related to safety aspects (nuclear, radiation, industrial, energy, environmental safety, labor protection, physical protection) accounting for 97 educational programs.

A total of 18,671 managers and specialists employed in SC Rosatom organizations enrolled on the Academy's courses in 2019, with 8,909 people that graduated from safety-related courses, including 1,090 people trained in the field of nuclear and radiation safety.

54 people from the management staff of organizations operating nuclear and radiation hazardous facilities were awarded with certificates allowing them to perform relevant activities in the field of atomic energy use based on the successful training and final certification.

In general, the personnel development system meets the needs of industrial and scientific organizations engaged in the nuclear sector.

F.2.2. Financial Resources (Article 22 (ii))

In the Russian Federation, planning efforts, including financial support in SNF and RW management and nuclear decommissioning, are carried out at two levels:

- Federal target programs with predefined measures to be implemented in the medium and long term and relevant funding provisions. The Government of the Russian Federation has approved the following programs providing relevant financial support: FTP NRS-2 until 2030, a subprogram Industrial Disposition of Nuclear Submarines, Surface Ships with a Nuclear-Powered Units, Nuclear Service Ships and Remediation of Radiation Hazardous Facilities in 2011 – 2020;
- Three-year plans for measures implemented pursuant to the provisions of the Russian Federation approved by the President and the Government of the Russian Federation

and stipulated in the State Policy Fundamentals on NRS, plans for the deployment of the third USS RW development stage.

Activities proposed under relevant programs and plans of both levels are interrelated and mutually agreed upon.

The Russian Federation takes appropriate steps to ensure that adequate financial resources are available to ensure the safety of SNF and RW management facilities during their operation and decommissioning.

The following measures are put in place to ensure adequate financial resources to provide the safety of SNF and RW management facilities during 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);
- enterprises and organizations shall have available 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);
- operator bears civil liability for nuclear damage (not less than 5 million USD) (the Vienna Convention on Civil Liability for Nuclear Damage of May 21, 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 On the State Atomic Energy Corporation Rosatom) ensure accumulation of resources allocated for specific tasks (decommissioning, RW management, etc.);
- RW disposal costs are covered by RW generating organizations (Articles 10 and 21 of the Federal law № 190-FZ On Radioactive Waste Management …);
- evaluation of nuclear decommissioning and RW/SNF management costs is required during design development and operation;
- state programs for nuclear and radiation safety are being carried out.

Operating organizations are required to have adequate financial, material and other resources necessary to fulfill their functions.

Statement on compliance with these requirements 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).

Enterprises and organizations shall have available reserves to ensure safety of particularly hazardous nuclear and radiation productions and facilities.

The procedure for paying fees to the reserve funds is established according to Government decrees of the Russian Federation № 576 of September 21, 2005 and № 68 of January 30, 2002.

Fees into these reserves are associated with prime costs.

These reserves of enterprises and organizations are intended to cover:

- the costs associated with nuclear, radiation, occupational and fire safety;
- the costs associated with physical protection, NM, RM and RW accounting and control;
- the costs associated with decommissioning of NPPs and other nuclear installations, radiation sources, NM, RM and RW storage facilities, R&D required to demonstrate and improve the safety of the abovementioned facilities;
- the costs associated with newbuilding, increasing the capacity, 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.

Civil liability for nuclear damage beard by operators of nuclear facilities

Since July 13, 2005, provisions of the Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963 are effective on the territory of the Russian Federation, pursuant to which:

- liability of the operator for 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 a Rostechnadzor's license (parts 1 and 2, Article 56 of the Federal law № 170-FZ On Atomic Energy Use).

Special reserve funds of the State Corporation Rosatom

Federal law On the State Atomic Energy Corporation Rosatom specifies the procedure for the establishment of adequate financial resources for the safe RW and SNF management.

Special reserve funds are established within the State Corporation Rosatom to ensure the safety of RW and SNF management facilities during their operating lifetime and decommissioning:

- fund covering the costs associated with the steps taken to ensure nuclear, radiation, occupational and fire safety, maintenance and outfitting of emergency rescue teams, and relevant remunerations for activities (services) associated with emergency prevention and response;
- fund covering the costs associated with physical protection, NM, RM and RW accounting and control;
- fund covering the costs associated with NI, RS and SF decommissioning, SNF management, R&D required to demonstrate and improve NI, RS and SF safety;
- fund covering the costs associated with the initiatives on upgrading organizations being part of the Russian nuclear power generation complex, development of nuclear science and technologies, performance of design and survey activities and implementation of other investment projects;
- RW disposal fund.

Rosatom's special funds are established through contributions of enterprises and organizations operating particularly hazardous nuclear and radiation productions and facilities.

RW disposal costs covered by RW generators

This measure is based on the financial provision for RW management activities, including RW disposal, through the funds of organizations generating such RW (Article 10 of the Federal law № 190-FZ On Radioactive Waste Management …).

The funds intended to cover RW disposal costs are accumulated by the State Corporation Rosatom in a special reserve fund – RW Disposal Fund.

RW disposal costs are derived based on the RW inventory and relevant tariffs for disposal approved in accordance with the established procedure.

The tariffs are set by 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 container volume (gross volume). RW disposal tariffs are set in RUB/m^3.

Provisions of the International Financial Reporting Standards (IFRS) are applied to evaluate the funds required for SNF, RW management and nuclear decommissioning.

For these purposes, in keeping with the Order of the State Corporation Rosatom 1/1176-P of December 4, 2015 On the Approved Provision on the System of Regulating Documents of the State Corporation Rosatom, on December 16, 2015 the Director for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning enacted the guidelines on integrated evaluation of nuclear back end costs, including:

- Unified Industry-Specific Guidelines for an Integrated Assessment of Costs Associated with the Management of Irradiated and Spent Nuclear Fuel ...;
- Unified Industry-Specific Guidelines for an Integrated Assessment of Costs Associated with Radioactive Waste Management;
- Industry-Specific Guidelines on Integrated Assessment of Nuclear Decommissioning Costs;
- Industry-Specific Guidelines on Integrated Assessment of Costs for Remediation of Radioactively Contaminated Sites.

These guidelines specify the process for input data pre-processing and the cost evaluation procedure.

State programs for nuclear and radiation safety

Costs associated with activities providing nuclear and radiation safety in SNF and RW management are covered under the FTP NRS-2 program. Section B of this Report discusses some of the most important activities of this program.

F.2.3. Financial Resources (Article 22 (iii))

Nuclear and radiation control at the stages of RW DF operation, closure and post-closure is exercised by National Operator for RW Management (NO RAO). Relevant costs are covered using the RW disposal fund established via regular deductions made by nuclear operators according to the established RW disposal tariffs (Articles 18, 20 and 21 of the Federal law № 190-FZ On Radioactive Waste Management …).

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, 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 a 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 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 reviewed during Rostechnadzor's inspections of organizations engaged in the field of atomic energy use.

A number of FRRs and safety guides (NP-090-11, RB-086-13, RB-114-16) provide requirements and recommendations to the contents and structure of quality assurance programs. These requirements were developed based on the Federal law On Atomic Energy Use and with due regard to IAEA safety standards: 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, issues to be addressed in order to accomplish these objectives, appropriate ways of addressing these issues and relevant liabilities of the organization responsible for the development of such program(s).

Operating organization shall perform quality assurance activities, arrange for the development of a general quality assurance program(s), exercise control over quality assurance activities carried out by its subcontractors. All quality assurance programs shall be reviewed, at least once in 5 years, and amended if necessary.

Compliance with quality assurance program requirements is viewed as an essential element of activities performed under FTP NRS-2.

F.3.2. Standardization and Compliance Assessment

In addition to the development and implementation of quality assurance programs, the quality assurance initiatives involve standardization and compliance assessment of production goods (operations, services), as well as of processes associated with their development (including research), production, construction, installation, setup, operation, storage, transportation, sales, disposition and disposal (Federal law № 184-FZ On Technical Regulation, Federal law № 162-FZ On Standardization in the Russian Federation).

Rostechnadzor is authorized to establish rules for evaluating the compliance of products 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 regulation (approved by Government decree of the Russian Federation № 401 of July 30, 2004).

Specific aspects considered when assessing the compliance of production goods with relevant safety requirements, as well as the processes associated with the design development (including survey), production, construction, installation, adjustment, operation, storage, transportation, sales, disposition and disposal are set forth in the provisions of the Regulations on Specific Features of the Product Conformity Assessment Accounting for the Established Requirements Concerning the Safety of Atomic Energy Uses, as well as Processes Associated with its Design Development (Including Surveys), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal) (hereinafter - Regulation on the Specific Features of Product Conformity Assessment), approved by Government decree of the Russian Federation of June 15, 2016 № 544 (enacted on January 1, 2018).

Conformity assessments may be performed in the following ways:

- testing;
- control;
- acceptance;
- decision on the use of imported products at a nuclear facility;
- registration;

- expert review of technical documentation;
- obligatory product certification;
- federal state supervision in the field of atomic energy use;
- other forms established by technical regulations.

Regulation on the Specific Features of Product Conformity Assessment provides requirements for the procedure followed to assess the compliance of the product goods with each of the abovementioned forms of assessment.

Standardization procedure for production goods (implemented activities, services) involving some requirements dealing with safety of atomic energy uses, as well as design processes (including surveys), production, construction, installation, adjustment, operation, storage, transportation, sales, disposition and disposal and other standardization items related to such products is set forth in the Regulations on the Standardization of Products (Activities, Services), Involving Some Requirements Concerning the Safety of Atomic Energy Use, as well as Processes and Other Standardization Items Associated with such Products approved by Government decree of the Russian Federation № 669 of July 12, 2016.

In accordance with the Regulations on Standardization in the Russian Federation, the following documents establish standardization requirements for products, processes and other standardization items in the field of atomic energy use:

a) national standards of the Russian Federation;

b) codes of rules;

c) industry-specific standards and guidelines;

d) standards of organizations, including standards of State Corporation Rosatom;

e) international standards, regional standards, regional codes of practice, standards of other Countries and Codes of rules registered in the Federal Information Fund of Standards;

f) preliminary national standards of the Russian Federation;

g) engineering specifications;

h) information and technical reference books.

In keeping with the Regulations on Standardization, State Corporation Rosatom forms, maintains and updates a consolidated list of standardization documents. Provisions of these documents (parts of documents) setting forth standardization requirements concerning products, processes and other items subject to standardization in the field of atomic energy use included in the consolidated list of documents on standardization, are considered as binding from the date since relevant notification appears on the official website of the State Corporation Rosatom.

In accordance with the Regulations, a consolidated list of standardization documents shall be compiled by the State Corporation Rosatom based on decisions made on the inclusion of standardization documents (parts of documents) in the consolidated list of documents adopted, among other things, by Rostechnadzor in coordination with State Corporation Rosatom.

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 considered as 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;
- Federal law № 190-FZ On Radioactive Waste Management;
- Federal law № 68-FZ On the Protection of Population and Territories from Natural and Man-Induced Emergencies;
- Federal law № 7-FZ On the Environmental Protection;
- Federal law № 3-FZ On Radiation Safety of Population;
- Federal rules and regulations (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-058-14, NP-038-16 and etc.);
- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010).

These documents reflect internationally recognized principles of radiation safety consistent with the recommendations of the International Commission for Radiation Protection (ICRP) and ***the IAEA Safety Standards SF-1 Fundamental Safety Principles (2007) and other.***

The Federal Law № 170-FZ On Atomic Energy Use (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 (Article 35), operating organization shall develop and implement measures to maintain NI, RS and SF safety, establish specialized services (if necessary), exercise 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 should follow, as well as its coordination with different authorities when performing activities aimed at the protection of NF employees and the public in case of an accident shall be specified in relevant action plans.

Federal Law № 170-FZ On Atomic Energy Use also stipulates that if an accident results in RM release (discharge) into the environment exceeding the established limits, operating organization shall ensure prompt and timely exchange of information on the radiation conditions 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 are managed and stored safely and do not pose risk to NF employees and public;
- that individual doses received by NF personnel are registered;
- that radiation control is performed in surveillance and controlled areas established for the protection of public residing in the vicinity of NI, RS and SF sites;
- that the public is duly informed on radiation conditions in the surveillance zone and controlled areas.

Federal law № 3-FZ On Radiation Safety of Population, indicates the following principals as fundamental NRS principles and establishes relevant mechanism 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 radiation background) to which it gives rise shall be prohibited;
- optimization principle – individual doses and the number of exposed individuals due to the use of radiation sources shall be kept as low as reasonably achievable with economic and social factors being taken into account.

Federal law № 3-FZ On Radiation Safety of Population specifies the following fundamental hygienic standards (acceptable dose limits) for radiation exposure caused by the use of sources of ionizing radiation in the border of the Russian Federation (including those resulting from 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 dose values 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 dose value of 0.05 Sv is 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). Discussion on ESKID and EGASMRO, as well as their functions was presented in previous National Reports of the Russian Federation.

In 2019, annual effective dose of personnel exposure accounted for 1.59 mSv, thus, remaining similar to the levels recorded in the previous three years.

Provisions of basic sanitary rules OSPORB-99/2010 establish a classification system for nuclear facilities in accordance with relevant potential hazard (risk) levels. Such classification enables the differentiation of requirements set for siting, design development, operation, decommissioning (closure) of nuclear facilities, as well as the requirements to the measures aimed at the elimination of radiation accidents and mitigation of their consequences. Potential risk levels are derived based on potential radiation effects that are likely to be produced on

personnel and public in case of a radiation accident at the facility. Thus, facilities are categorized according to the consequences of potential accidents.

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 on-site 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.*

The following federal laws and regulations address personnel and public protection in the event of accidents at NI, RS and SF in Russia:

- Federal law № 170-FZ On Atomic Energy;
- Federal law № 68-FZ On the Protection of Population and Territories form Natural and Man-Induced Emergencies;
- Federal law № 3-FZ On Radiation Safety of Population;
- Regulation on the Unified State System for Prevention and Elimination of Emergencies (approved by 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 the protection of personnel and public in the event of an accident at NI, RS and SF (NP-005-16, NP-015-12, NP-075-19, NP-077-06, NP-078-06, NP-079-18, NP-106-19);
- 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 preparedness (NP-074-06);
- federal rules and regulations specifying the requirements for criteria used to define the boundaries of emergency planning zones (NP-032-19, NP-050-03, NP-075-19);
- sanitary norms and rules (OSPORB-99/2010, NRB-99/2009).

These documents have been drafted giving 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 said regulations are aimed at preventing the occurrence and development of emergencies resulting from atomic energy uses and reducing the damage associated with such emergencies and practices associated with peaceful uses of NF. 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, 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 stipulates that operating organization shall be liable for protection of NF employees, public and the environment in the event of an accident at NI, RS or SF.

Operating organization provides the development and implementation of measures aimed at preventing accidents at NI, RS and SF and mitigating their adverse effects, as well as the development of appropriate action plans to protect the personnel (employees) in the event of accidents at NI, RS and SF that should 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 account for the facility's category set according to the associated potential radiation hazard level. Procedures followed by employees in case of emergencies shall be developed for all facilities according to relevant levels of potential radiation hazard.

Federal rules and regulations stipulate that action plans for protection of employees (personnel) and public in the event of an accident at a NF and accounting for the radiation consequences of possible accidents shall be developed and ready for implementation before fissile nuclear materials are loaded into NF of categories I and II (according to the associated potential hazard level). Such plans are developed based on design features and parameters of a NF in question and specific criteria for making decisions on public protection arrangements in the event of an accident at NFs with due consideration of economic, natural and other characteristics and features of the site.

Operating organizations shall develop action plans to protect employees (personnel) in the event of accidents at NF. These plans shall provide for coordination of efforts performed by operating organization, NF administration, law enforcement agencies, state fire-fighting service, management authorities dealing with civil defense and emergencies, medical institutions, local authorities within the site boundaries, emergency response planning area and emergency response planning area for mandatory evacuation of residents. NF administration shall maintain instant readiness and implement these action plans.

Action plans for public protection in the event of accidents at NF shall provide for coordination of efforts of facility-level and territorial response forces being under the jurisdiction of management authorities dealing with civil defense and emergencies, constituent entities of the Russian Federation and local authorities, as well as ministries and institutions involved in public protection and emergency response activities.

Operating organizations shall ensure the development of guidelines and (or) programs for emergency response drills enabling to work out employee's response in case of accidents and arrange for such regular trainings.

During license review, the licensing authority 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 implementing all required response activities.

Such readiness inspections are performed under Rostechnadzor's inspection visits taking place throughout NI, RS and SF's lifetime, as well as under Rosatom's inspections (institutional control at Rosatom enterprises).

Unified State System for Prevention and Elimination of Emergencies (RSChS) covering the entire territory of the Russian Federation is operated by EMERCOM. RSChS involves an Industry-Specific System for Prevention and Elimination of Emergencies at Nuclear Sector

Facilities (OSChS) that was established to manage and perform activities aimed at protection of personnel and industrial sites against emergencies, to ensure preparedness to response in case of a potential nuclear or radiation emergency at an organization operating particularly hazardous radiation and nuclear productions and facilities.

OSChS of the State Corporation Rosatom unites management authorities, response forces and facilities of Rosatom's emergency rescue units and covers both federal and facility level. The first National Report discussed in detail relevant management system, units, equipment and OSChS preparedness to emergency response and emergency elimination. Regular program for arranging and implementing the emergency response drills is running under OSChS. It aims at working out the actions of management bodies, units and means of emergency rescue teams at an industry-specific level considering potential accidents both at the sites of SC Rosatom and beyond their boundaries.

According to the Regulation on 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 considered as an integral part of the Unified State System for Prevention and Elimination of Emergencies and integrates all resources and capabilities of Rostechnadzor aimed at addressing the following issues:

- control over NRHF's preparedness for actions enabling containment of nuclear and radiation accidents and elimination of their consequences;
- identification of violations potentially resulting in emergencies at NRHFs, relevant conditions and causes, as well as taking appropriate steps for their elimination;
- ensuring Rostechnadzor's preparedness for emergency response actions at NRHFs.

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 with their efforts being aimed at providing medical assistance and mitigating the consequences of radiation accidents.

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 regulations govern NF decommissioning process and procedures in the Russian Federation:

- Federal law № 170-FZ On Atomic Energy Use;
- federal rules and regulations setting up 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 (Article 33) stipulates that the procedure and measures providing safe NI, RS and SF decommissioning (closure) shall be provided for 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 implemented during design development, construction and operation of NI, RS and NF should be performed with due account of its forthcoming decommissioning (closure). In particular, during the entire period of NF operation, operating condition of structures, systems and equipment required for the safe NF decommissioning (closure) should be maintained.

At all stages of NF life cycle preceding its decommissioning (closure), including siting, design development, construction and operation, decommissioning (closure) planning efforts should be implemented via the development of a decommissioning (closure) concept and its further revision.

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 the need for obtaining RW DF closure licenses.

NI, RS and SF decommissioning (RW DF closure) shall be performed in accordance with the established decommissioning (RW DF closure) program and relevant decommissioning (RW DF closure) designs.

Comprehensive engineering and radiation survey of NI, RS and SF shall be performed prior to decommissioning to evaluate technical and radiation state of the engineering systems and equipment, building structures and the territories adjacent to NI, RS and SF sites. Based on the data collected, operating organizations develop relevant decommissioning (closure) designs and the safety analysis reports for decommissioning (closure).

Operating organization shall ensure safe decommissioning, including the development and implementation of administrative and technical measures aimed at prevention of accidents and mitigation of their consequences, safe NM, RM and RW management, its accounting and control, as well as physical protection of NI, RS and SF, environmental monitoring at the site, in surveillance zones and 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 the minimum practicable level with due regard of relevant social and economic aspects.

NI, RS and SF being under decommissioning (closure) shall be properly staffed; the employees (personnel) shall have appropriate qualifications and permits for self-guided work granted under the established procedure. Recruitment, training, authorization to self-guided work and maintenance of employees' (personnel) qualifications shall be provided by 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 (RW DF closure).

During NI, RW and SF operation, operating organization shall keep all relevant records and information being considered important for the safe NF decommissioning (RW DF closure), including design and operational documentation. These should be kept in appropriate decommissioning (RW DF closure) data bases.

According to FRR provisions, prevention of radiation accidents during NF decommissioning (RW DF closure) and mitigation of their consequences, in case if such accidents occur, are recognized as fundamental safety principles of NF decommissioning (RW DF closure).

During the review of applications for licenses authorizing activities in the field of atomic energy use, Rostechnadzor shall evaluate whether the operating organization is able to ensure safe completion of the declared activities and NF decommissioning (RW DF closure) and whether it has the required design documentation.

Rosatom has developed and approved the Concept for NF, RS and SF Decommissioning presenting basic provisions for the establishment of a unified decommissioning system covering all nuclear and radiation hazardous facilities supervised by the State Corporation.

This goal is 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, e.g. following NF final shutdown;
- development of economic and financial instruments providing effective NF decommissioning and RW management;
- adequate scientific, engineering and technical support of decommissioning and RW management activities.

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 measures to be taken at all stages of spent nuclear fuel management in order to ensure adequate protection of personnel, population and the environment against radiation impacts associated with its management.

The following federal laws and FNPs set forth general requirements for the safe SNF management and the safety of SNF management facilities:

- Federal law № 170-FZ On Atomic Energy Use;
- Federal law № 7-FZ On the Environmental Protection;
- Federal law № 3-FZ On Radiation Safety of Population;
- federal rules and regulations:
  - General safety provisions for NI, RS and SF (NP-001-15, NP-033-01, NP-022-17, NP-016-05);
  - Accounting of External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-17);
  - Facilities for Spent Nuclear Fuel Reprocessing. Safety Requirements. (NP-013-99);
  - Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements. (NP-035-02);
  - Requirements for the Safe Storage and Transportation of Nuclear Fuel on Nuclear Facilities (NP-061-05).
- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);

Complete list of regulatory documents is presented in Annex E 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, so that the issues associated with the criticality and removal of residual heat generated during the SNF management are adequately addressed at all management stages, including SNF on-site 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 and Requirements for the Safe Storage and Transportation of Nuclear Fuel on Nuclear Facilities (NP-061-05) establish nuclear safety requirements for SNF management covering NPPs, including independent storage facilities at NPP sites, research nuclear installations, coastal and floating SNF storage facilities at ships, and any other NF.

Distance between SFAs in shrouds, racks, packages and the mutual disposition of shrouds, racks, packages and containers shall be such that effective neutron multiplication factor during SF storage and transportation would not exceed 0.95 under 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 a self-sustained chain fission reaction (SCR) both under normal operation and any initiating events discussed in the safety case;
- prevention of any uncontrolled and unauthorized reprocessing, accumulation, relocation, transfer and transportation of nuclear fissile material (substances);
- adherence to the conditions and requirements of nuclear safety set forth in design, engineering and operational documentation, nuclear safety regulations specified both for normal operation and initiating events;
- preferential use of safe equipment, safe technical tools and automated equipment;
- monitoring of nuclear safety parameters;
- use of conservative approach in nuclear safety justification.

Design solutions shall provide for the preferential use of such equipment the design and the geometry features of which rule out the possibility of an SCR.

Nuclear safety of SNF storage is ensured through:

- imposing restrictions on the distribution of SNF in shrouds, racks, stacks and transportation casks (TUKs);
- imposing restrictions on the number of fuel rods and assemblies in shrouds, racks, canisters with SNF and TUKs;
- imposing restrictions on the number of packages, shrouds in a group and packages in a stack;
- imposing restrictions on the distribution of shroud groups, stacks, racks, SNF canisters, on-site TUKs;
- 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 compositions and concentrations;
- restrictions imposed on the concentration of nuclear hazardous fissile nuclides;
- use of neutron absorbers;
- restrictions imposed on the isotopic composition of nuclear hazardous fissile material;

- 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 operation limits so that passive systems are preferred over the active ones.

SNF storage and transportation system designs shall provide for certain measures or devices to maintain cladding temperature within the values 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 and ensuring nuclear safety.

Heat removal system design shall ensure that the temperature of the cooling media in 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 exceedance over 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))

The Russian Federation takes appropriate steps to ensure that generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of nuclear fuel cycle policy adopted.

Requirements concerning the minimization of RW generation also resulting from SNF reprocessing are set forth in the following regulations:

- Federal law № 190-FZ On Radioactive Waste Management …;
- SNF Management Concept of the State Corporation Rosatom (approved by Rosatom's decree № 721 of December 29, 2008, amended by Rosatom's decree of September 15, 2014 № 1/871-P);
- federal rules and regulations in the field of atomic energy use (NP-016-05, NP-058-14, NP-002-15, NP-019-15, NP-020-15 and etc.);
- sanitary rules (OSPORB-99/2010).

Federal rules and regulations and sanitary rules set forth the requirements according to which generation and accumulation of radioactive waste shall be kept to the minimum practicable (principle of RW generation and accumulation control).

Design development and operation of NFs, including SNF management facilities, and SNF management practice shall provide for certain conditions (engineering solutions and administrative arrangements) allowing to keep the RW generation as low as practicable. According to NP-016-05, NP-058-14, NP-002-15 and other federal rules and regulations, operating organization shall arrange for certain activities to minimize RW generation and prevent its further accumulation, in particular:

- to ensure timely RW processing and conditioning;
- to prevent unplanned RW accumulation;
- to limit RW generation to the minimum practicable;

- to establish standards concerning LRW and SRW generation that shall be revised regularly with due consideration of the best RW management practices;
- to avoid unconditioned RW storage if it's not discussed in design and operational documentation;
- to avoid radionuclide releases (discharges) into the environment in exceedance of the established limits.

Specific engineering solutions, means and administrative arrangements minimizing RW generation shall be provided for and implemented during the development of design and operational documentation.

Liabilities of RW generators (operating organizations) paying fees to cover future RW management costs, including RW disposal, foster them to optimize RW management practices, for example, by developing technologies aimed at minimizing RW generation, and, thus, stimulating practical implementation of the abovementioned requirement.

Accelerated technological development of advanced SNF management practices allowing to minimize RW generation during SNF management is stated among the expected future accomplishments of **the SNF Management Concept of the State Corporation Rosatom.**

Institutional Target Program for the Infrastructure Development and Spent Nuclear Fuel Management in 2011–2030 is aimed at delivering effective solutions addressing the issues accumulated to date in the field of SNF management, as well as ensuring at certain Rosatom enterprises safe and economically feasible management of SNF from NPPs, RRs and nuclear-powered transport installations owned by Russian as well as foreign entities.

Advanced SNF reprocessing technologies are currently being developed. These technologies will enable considerable reduction of RW generation. A pilot demonstration center (PDC) for advanced SNF reprocessing has been constructed at MCC site under the provisions of FTP NRS-2. PDC commissioning will enable a considerable reduction in RW inventory generated due to SNF reprocessing, elimination of LRW discharges and introduction of a closed water cycle.

FTP NRS-2 also provides for conditioning of the RW inventory generated in the past to ensure its safety and timely processing of the generated RW. This data was presented in Section B of this Report.

RW disposal tariffs set by the Federal Antimonopoly Service of the Russian Federation is another essential mechanism providing both for RW minimization and decrease in RW hazard level.

G.1.3. Interdependence among the Different Steps in Spent Fuel Management (Article 4 (iii))

Interdependence among the different steps in spent fuel management being a guideline SNF management principle for the State Corporation Rosatom has been implemented under the Institutional Target Program for the Infrastructure Development and Spent Nuclear Fuel Management in 2011 –2030 (ITP SNF).

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.

Federal law On the State Atomic Energy Corporation Rosatom, Federal Target Program Development of Nuclear Power Generation Complex, Spent Nuclear Fuel Management Concept of the State Corporation Rosatom, and ITP SNF declare the task of establishing an up-to-date system for safe SNF management as a top priority. Having in mind the realistic figures of projected future SNF generation, the Russian nuclear sector continued the implementation of a program for the establishment of centralized SNF storage and reprocessing facilities under FTP

NRS-2. These efforts will arrange for an SNF management system enabling safe and well-timed transition from one life-time stage to another.

Certain efforts enabling the construction of SNF management facilities were implemented under FTP NRS and part of them were continued under FTP NRS-2. Some issues associated with the management of specific SNF types have been also addressed under FTP NRS-2 (see Section B).

G.1.4. Protection of Individuals, Society and the Environment (Article 4 (iv))

Section F.4 (Article 24) 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 radiation monitoring of personnel exposure and contamination of the environment resulting from the releases and discharges associated with the SNF management, as well as state supervision over the radiation protection of personnel, public and the environment.

Operating organization shall submit a Safety Analysis Report (SAR) as part of a license application for siting, construction, operation and decommissioning of an SNF management facility, demonstrating the adequacy of technical and administrative arrangements put in place to provide radiation safety of personnel, public and the environment. The SAR shall also involve an evaluation of projected impacts on the population and the environment and the corresponding radioactive releases and discharges.

Regulatory authorities shall review the submitted SAR and decide whether they should grant a license or not.

Federal law № 7-FZ On the Environmental Protection establishes a legal framework for the environmental protection. 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 the 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.

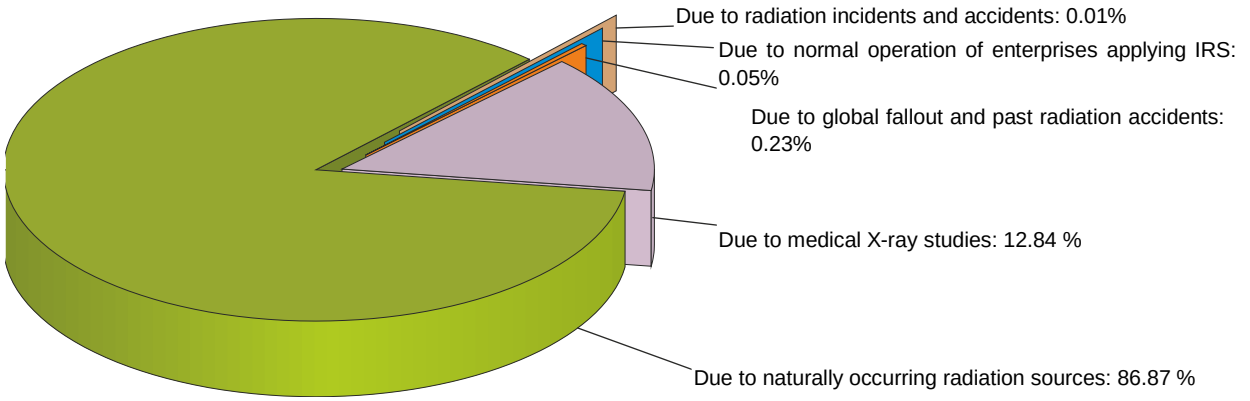
To ensure operational safety control over SNF management facilities, operating organizations shall perform radiation monitoring, including the monitoring of radioactive discharges and releases into the environment and their compliance with the established limits; whereas local and/or federal competent authorities shall implement their own independent monitoring programs.

Ongoing monitoring at enterprises indicates that radionuclide concentrations found in the air of industrial sites involved in SNF reprocessing, within their controlled areas and in near-by settlements are considerably lower than the acceptable limits specified in NRB-99/2009.

Real-time data on the radiation situation in the regions with Rosatom enterprises can be accessed via the automated radiation monitoring system from http://www.russianatom.ru

Results of annual radiation and hygienic certification indicate that public exposure in the Russian Federation is mostly due to naturally occurring radiation sources and X-ray studies, and, in general, is not related to the production induced effects. For instance, the latter account for less than 1 % of the annual effective dose (see diagram below).

Breakdown of annual effective doses of public exposure in the Russian Federation, %



In certain cases, special arrangements are put in place to mitigate the risk. A case in point, projects on SNF return to the Russian Federation for temporary storage and reprocessing purposes. A special procedure for the state environmental assessment of an integrated return-project was developed to demonstrate that such return would contribute to a general mitigation of radiation risks and environmental safety improvement. It should be noted, that such a project also includes the implementation of special environmental programs (SEPs) within the project funding.

Thus, for example, according to Government decree of the Russian Federation № 418 of July 11, 2003 On the Importation of Irradiated Fuel Assemblies of Nuclear Reactor to the Russian Federation, integrated return projects associated with SNF return from foreign customers should involve a SEP on remediation of radioactively contaminated sites in the Chelyabinsk region in 2010 – 2018. This SEP covers the area in the vicinity of plant RT-1 (PA Mayak) contaminated due to RW tank explosion in 1957. Thus, SNF reprocessing activities producing no negative impact on the environment and local residents prompt the financial support of post-accident clean-up. SEP involves a number of social and environmental efforts, including:

1. Remediation of radioactively contaminated sites at the floodplain of the Techa river within the limits of Muslumovo station (Kunashakovsk district) and settlements Brodokalmak, Russkaya Techa and Nizhnepetropavlovskoye (Krasnoarmeysk district, Chelyabinsk Region);
2. Activities to reduce radioactive exposure of the population residing in radioactively contaminated territories of the Chelyabinsk Region;
3. Remediation of areas in the village Muslumovo and partially at the Muslumovo station, the residents are to be relocated in accordance with the Agreement with the Federal Atomic Energy Agency and the Government of the Chelyabinsk region of November 14, 2006;
4. Remediation efforts in the area of the East-Uralsk radioactive plume to eliminate further spread of radioactive contamination from the territory of the East-Uralsk State Reserve;
5. Activities to reduce the risk of further migration of radioactive contaminants into the environment (within the boundaries of the considered region);
6. Evaluation of environmental, social and economic impacts associated with activities performed under SEP.

Environmental policy

Since 2008, the aim of the Environmental policy implemented by the State Corporation Rosatom is to ensure sustainable development of the atomic energy industry and safety of the environment. Environmental Policy Fundamentals of the State Corporation Rosatom and its Organizations is the key instrument governing relations in the field of environmental safety and environmental protection. Due to the newly adopted strategic documents on the environmental protection and environmental safety, as well as some amendments introduced to the environmental legislation, a new version of the environmental policy was approved in 2017.

Comprehensive Implementation Plan covering a three-year period is viewed as an important tool governing the implementation of the environmental policy. In 2018, implementation of the Comprehensive Plan for 2016–2018 was completed: it involved some administrative, production and technical measures performed by Rosatom and its organizations, including the environmentally significant ones. A new Comprehensive Plan for 2019–2021 has been developed and approved. To improve the environmental safety and efficiency of environmental protection activities, environmentally concerned organizations of the State Corporation Rosatom are operating and implementing systems for environmental management, quality management, health care, labor protection and energy management.

In 2018, 11 environmentally significant organizations were applying integrated management systems, including: environmental management systems ISO 14001; quality management systems ISO 9001; occupational health and safety management system OHSAS 18001; energy management ISO 50001.

In the course of 2018, 23 Rosatom organizations underwent recertification audits to check their compliance with the requirements of the environmental management system ISO 14001; 24 organizations – for the compliance with the requirements of the quality management system ISO 9001. Integration of the environmental management systems, quality management and health management systems was still ongoing at that time.

G.1.5. Taking into Account 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, 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 its physical, chemical, biological and other characteristics shall be addressed during the development of relevant SNF management plans and their execution.

Decisions on SNF management activities shall be made following an impact assessment allowing 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 to acquire 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 radiation impacts.

Risks associated with chemical, biological and other (non-radiation) impacts are regulated by relevant regulations.

G.1.6. Analysis of Actions that Impose 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 as established by the existing regulations (Annex E).

G.1.7. Minimization of Burdens Imposed on Future Generations (Article 4 (vii))

Provisions of the Federal law № 170-FZ On Atomic Energy Use 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 could be provided during NM and RM storage and reprocessing. The principle of avoiding undue burden associated with SNF management is implemented via SNF reprocessing and pre-disposal management of the resulting RW. Spent Nuclear Fuel 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 enabling the establishment of SNF management system aimed at avoiding the undue burden on future generations, negative environmental effects associated with accumulated SNF inventory, as well as timely and safe management of newly generated RW.

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 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 Convention entered into force for the Russian Federation.

The current management and regulatory system covering siting, design development, construction, operation, 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.

Operating licenses are issued following a safety assessment based on the review findings, evaluation of submitted documents demonstrating operational safety of the facility and operational safety inspections. Similar procedure is applied when the license conditions are amended.

The following papers shall be submitted by the operating organization as part of its operating license application:

- safety analysis report (SAR);
- report summarizing the commissioning results (for newly commissioned facilities);
- engineering designs of the facility (upon the request of Rostechnadzor);
- guidelines on elimination of accidents, safety guides summarizing beyond design basis accident management; action plans for the protection of personnel in the event of an accident;

- data on recruitment, training, maintenance of qualifications, permits to self-guided work and Rostechnadzor's permits 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 the construction), program of pre-commissioning testing activities (for facilities commissioned following the construction), trial operation program (for facilities commissioned following the construction);
- measures to make up for deviations from NRS provisions set forth in rules and regulations and a program for elimination of such deviations;
- documentary evidence of RM accounting and control assurance;
- documentary evidence on the assurance of NF physical protection;
- data on the availability of a sanitary and epidemiologic statement confirming that activities involving RM are performed in accordance with relevant sanitary rules;
- data on the availability of a paper establishing norms (limits) 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 licensee and data on such activities (or delivered services).

License application reviews performed by Rostechnadzor involve inspections aimed at proving compliance of the data presented by the licensee, the documents presented in the application and the actual state of the facility in question.

Thus, operation of all SNF management facilities is carried out in keeping with conditions specified in relevant licenses issued by Rostechnadzor to operating organizations and authorizing operation of relevant facilities, NM management and SNF transportation; compliance with these provisions is verified during the inspections.

According to Article 35 of the Federal law № 170-FZ On Atomic Energy Use, 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. In addition to that, operating organization shall collect, process, analyze, systematize and store information on failures of safety-important systems and their elements, 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 and submit them 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, the contents and structure of which are specified in Rostechnadzor's safety guides (for example, RB-043-13). These reports shall evaluate current safety levels at SNF management facilities in keeping with provisions of a safety guide Evaluation of the Current Safety Level at Nuclear Facilities (RB-091-13).

According to Article 26.1 of the Federal law № 170-FZ On Atomic Energy Use 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 its operational life and aging of its 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 in 10 years after facility's commissioning and further assessments are repeated every 10 years until the expiration of the facility's operating lifetime.

Upon the expiration of 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 for recognizing such sites as suitable for construction and safe operation. The key documents in this area are as follows:

- Federal law № 170-FZ On Atomic Energy Use;
- Federal law № 7-FZ On the Environmental Protection;
- 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 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, 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 the areas with restricted access shall be made by the Government of the Russian Federation in accordance with the procedure established by the Government of the Russian Federation.

Decisions on siting of the abovementioned facilities are made by the Government of the Russian Federation following their approval by the authorities of the regions of the Russian Federation where such facilities would be sited. The procedure and conditions for allocating land and subsoil for NF construction purposes are established by the legislation 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 to the findings of reviews performed by public organizations.

Decisions on NI, RS and SF siting and construction shall be made with account for 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, based on statements of state environmental assessment and the findings of reviews performed by public organizations.

According to the law, the following principles shall be met:

- integrity and comprehensiveness of the environmental impact assessment performed to evaluate economic and other activities and their effects;
- transparency, involvement 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 evaluating the radiation impacts produced on the environment supported by the required design documentation.

The following shall be taken into account when making a siting decision:

- if the facility addresses specific economic needs of the Russian Federation and its regions;
- if proper siting conditions that meet the requirements of federal rules and regulations in the field of atomic energy use are available;
- if no safety threats to NI, RS and SF are posed by nearby civil industrial facilities;
- if all potential social and economic effects from siting of the abovementioned nuclear facilities on industrial, agricultural, social and cultural development of the region are addressed.

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 Siting. Basic Criteria and Safety Requirements (NP-032-19);
- NPP Seismic Design Standards (NP-031-01);
- Siting of Nuclear Fuel Cycle Facilities. Basic Criteria and Safety Requirements (NP-050-03);
- Accounting of External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-17);
- Siting of Storage Facilities for Nuclear and Radioactive Materials. Basic Criteria and Safety Requirements (NP-060-05);
- 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 during 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, taking into consideration their adverse combinations, shall be limited;
- man-induced impacts on NI and SF exerted by nearby operating NF (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 contributions from operating NF located in the siting region, shall be limited;
- environmental characteristics facilitating RM migration or accumulation shall be taken into consideration;
- 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 eliminating potential consequences of design basis and beyond design basis accidents, as well as for taking prompt measures aimed at preventing unauthorized actions against NI and SF shall be demonstrated.

Adequacy of a site 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 FNPs governing NF siting and accounting of external effects, NI and SF shall not be sited or constructed at the sites which, according to provisions of the environmental legislation and particular requirements on radiation safety of population, civil defense and fire safety, are considered unsuitable for such NI and SNF SF construction.

Ministry of Regional Development of the Russian Federation in coordination with Rostechnadzor specifies on the kind of activities that should be performed during engineering surveys to investigate natural settings at the sites (Government decree of the Russian Federation № 20 of January 19, 2006 On Engineering Surveys Supporting Design Documentation Development, Construction and Refurbishment of Capital Structures).

Adequacy of the site and compliance of site conditions with the legal requirements and relevant provisions of federal rules and regulations shall be demonstrated by 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 Regulations Authorizing the Federal Environmental, Industrial and Nuclear Supervision Service to Implement 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 license or not.

G.3.2. Public Engagement on the Issues Associated with SNF Management

According to the Russian legislation, public discussions (consultations) are viewed as an essential condition for making siting decisions on SNF management facilities. Such discussions are arranged and held in accordance with the principles and provisions set forth in the Federal law № 7-FZ On the Environmental Protection (Articles 2 and 32) and, in accordance with the Provision On the Environmental Impact Assessment of Planned Economic and Other Activities in the Russian Federation (approved by the decree of Goskomekologiya of Russia № 372 of May 16, 2000), are considered as an integrated part of environment impact assessments (EIA). EIA Provision is approved by the federal executive authority providing state management in the field of environmental protection.

International law, agreements and treaties, the Russian Federation being party to which, establish the requirements to public discussions (consultations) of environmental aspects related to the proposed activities. If such activities may result in transboundary effects, provisions of the ECE UN Convention on the Environmental Impact Assessment in Transboundary Context shall be also accounted for.

In 2017, public hearings were held in Roslavl (Smolensk Region) to discuss the preliminary environmental impact assessment for the operation of SNF management facilities, namely: SNF storage facility's annex building (SNF SF annex) at Smolensk NPP and a cask-type storage

facility. SNF SF annex is designed to perform all required operations prior to SNF transfer to SNF “dry” storage facility developed as part of RT-2 plant in the Krasnoyarsk region (MCC site).
Public hearings are an essential element of the entire process on the development and approval of Consolidated Projects on the Importation of SFAs Removed from Foreign Russian-built (Soviet-built) RRs and their transportation to PA Mayak site. According to the established procedure, in 2017, public hearings were held in Ozersk on the importation of RR spent nuclear fuel from the Republic of Kazakhstan.
Rosatom’s Public Council is a permanent, expert collegial body that ensures Rosatom interaction with public associations, citizens of the Russian Federation, local authorities, professional associations providing recommendations on the decision-making in the field of atomic energy use and nuclear power development. The Public Council provides effective interaction between Rosatom and the public prompting the development of the above recommendations, facilitating the exchange of views on nuclear sector development, environmental protection, nuclear and radiation safety, socio-economic development of the territories hosting Rosatom facilities. The Public Council fosters public awareness concerning the key focus areas of Rosatom activities, in particular, through mass media and public discussions of issues related to Rosatom's activities in the field of atomic energy use. Moreover, the Public Council drafts its statements based on its reviews of draft laws and other draft regulations and papers, including program document developed by the State Corporation Rosatom that cannot be adopted without prior public discussions. This activity involves regular hearings and meetings, including annual meetings engaging representatives from Rosatom, public authorities and public representatives from international and Russian public organizations: International Public Forum-Dialogue Atomic Energy, Society, Safety; Regional Public Forum-Dialogue Nuclear Production, Society, Safety.
For example, on September 26-27, 2018, the XI Regional Public Forum-Dialogue was held in Murmansk engaging over 350 delegates-representatives of state authorities, business, and the public. Among other things, issues associated with SNF unloading from the storage facility of floating maintenance base Lepse were discussed with the representatives of the European Bank for Reconstruction and Development and the Nuclear Operational Committee of the Environmental Partnership Northern Dimension.

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 NFs, 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 up basic principles and general requirements that shall be met during NI and SF design development and construction:

- General safety provisions (NP-001-15, NP-033-01, NP-022-17, NP-016-05);
- NPP Seismic Design Standards (NP-031-01);

- Accounting for External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-17);
- SNF Dry Storage Facilities. Safety Requirements (NP-035-02);
- Facilities for Spent Nuclear Fuel Reprocessing. 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 FNP 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, would 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 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 provide for their further decommissioning.

Engineering solutions and administrative decisions ensuring safety of SNF management facility shall be evaluated based on past experience or justified by studies, investigations or operation of prototypes. This approach is applied during design development, development and testing of equipment, construction, reconstruction and upgrading of different systems (its 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.

In the reporting period, construction of “dry” storage facilities for RBMK-1000 and WWER-1000 SNF was completed at MCC site.

Another MCC accomplishment – completion of a start-up PDC unit for which an operating license was granted. Construction of the second start-up unit is underway at the site.

In 2019, on behalf of Rostechnadzor, as part of executing its state function on licensing activities in the field of atomic energy use, safety expert review for the construction of a Multifunctional Radiochemical Research Facility was completed.

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 legislation of the Russian Federation, NF safety assessment and assessment of NF radiation impact on the environment is viewed as an essential condition for decision-making on NF siting and construction, in particular, regarding SNF management facilities.

Positive statement of the state environmental assessment is an essential condition for acquiring a license for the declared activity. EIA materials shall be submitted as part of papers subject to the state environmental assessment.

If the license applicant is an operating organization, approved positive statement of the state environmental assessment shall be submitted to Rostechnadzor (submitted by license applicant on his own initiative).

Documents submitted to Rostechnadzor as part of 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 under consideration.

At the siting stage, a preliminary SAR for the SNF management facility covering all siting justifications required by 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.

Construction and operation of an SNF management facility requires submittal of a safety analysis report presenting a comprehensive safety evaluation.

SAR for an SNF management facility shall discuss a system of technical and administrative arrangements ensuring NF 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 of July 30, 2018 № 325).

Requirements to NF SARs, 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 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 provision of 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 accident;
  - evaluation of beyond design basis accidents;
- measures required 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 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 shall be addressed in the conditions of a sitting and operating license for an SNF management facility: requirements to the development and implementation of measures allowing elimination and (or) compensation for discrepancies from current/effective regulatory provisions, compliance with and (or) corrective actions taken in response to the findings of safety reviews. Corrective actions may involve a follow-up and more detailed safety assessment, a program of additional surveys and investigations, or introduction of amendments 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 time-frames for reporting documents submittal to Rostechnadzor shall be also indicated.

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 for acquiring operating licenses for 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 makes relevant decision on issuing an operating license for a SNF management facility based on expert review and inspection report with inspection findings.

The contents of the document portfolio demonstrating nuclear and radiation safety of NI/SNF SF commissioned following NI/SNF SF construction is specified in Administrative Regulations Authorizing the Federal Environmental, Industrial and Nuclear Supervision Service to Implement its State Function on Licensing Activities in the Field of Atomic Energy Use (Rostechnadzor's decree № 453 of October 8, 2014). The following main documents shall be submitted by an operating organization as part of an operating license application:

- safety analysis report;
- quality assurance program for NI/SF operation;
- data on personnel recruitment, training, maintenance of qualifications and issued work permits;
- guide on the elimination of accidents;
- guidelines on management of beyond design basis accidents;
- action plans for protection of personnel in the event of an accident at the facility;
- guides on providing safe storage, transportation and reloading of nuclear fuel;
- documentary evidence for accounting and control of NM and (or) RW;
- documentary evidence for physical protection;
- NI and SF commissioning program;
- operating regulations for NF operation;
- guides on 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 an appropriate Rostechnadzor license 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.

NF or an SNF SF operation can be started only following the completion of all pre-commissioning testing activities, comprehensive testing of its systems (components); the SAR should be completed and revised to account for the pre-commissioning testing findings and results of a comprehensive testing (systems and their elements).

G.6.2. Setting and Adjusting Safe Operational Limits and Conditions

According to FNP 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 design documentation for the equipment, operational processes and the entire facility before the comprehensive testing of systems (components) is launched.

Operational documentation shall include safe-operation guides and techniques, general procedures for executing safety-related operations, safe operational limits and conditions, specific instructions to employees (personnel) on the ways of executing certain operations under normal operation and in case of operational disorders, including near miss incidents, actions of employees (personnel) on providing safety in the event of design basis and beyond design basis accidents.

Operational documentation for SNF management facility shall be revised with due account of its commissioning results.

Procedures for keeping, storing and amending operational documentation are established by operating organizations in accordance with relevant regulatory requirements.

Frequency of safety assessments performed for SNF management facilities involving validation or revision of safe operational limits and conditions (taking into account past operational experience and available scientific and technical provisions) depends on specific aspects of facility's operation and its state. Such assessments shall be carried out each time the license renewal is required, if amendments to the license conditions are introduced following facility's overhaul or reconstruction or NI / SNF SF periodic safety assessment.

G.6.3. Regulatory System for Maintenance, Inspection and Testing of Nuclear Facilities

Maintenance, inspections and testing shall be performed for safety-important systems in accordance with FNP 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, NF and SNF SF supervisory personnel develops relevant 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 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, 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.

Safety-important systems (their components) are normally subject to direct and complete checks against relevant design characteristics during commissioning and following their maintenance and periodically throughout NI/SNF SF operating lifetime.

To identify whether unscheduled maintenance and repairs are needed, appropriate control arrangements are implemented to check the status of relevant equipment and systems.

During operation, 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 FNP 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 or a particular facility during NI or SNF SF siting, construction, commissioning and operation.

Article 37 of the Federal law № 170-FZ On Atomic Energy Use stipulates that organizations involved in scientific research and investigations, design development, construction and decommissioning of NI or SNF SF, design 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 provisions of 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 or SNF SF, or the service life of the manufactured equipment. Leading design development and engineering organizations are selected based on the decision of 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 having appropriate experience and licenses to provide their 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 for investigating and accounting 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 for accounting and investigating operational disorders at NIs and SNF SFs.

According to the requirements of the abovementioned 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 kept throughout the NI or SNF SF operating lifetime.

The system for accounting and investigating operational disorders put in place by operating organizations shall be aimed at 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 keeping of relevant data on NI or SNF SF 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 maintenance of safety-important systems (and their components) throughout the operating lifetime of SNF management facility, whereas certain documents shall be stored until the completion of NI/ SNF SF decommissioning.

G.6.7. Decommissioning Plans

According to relevant requirements of 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 during design development, construction and operation of SNF management facilities shall be implemented with account of their future decommissioning.

Federal law № 170-FZ On Atomic Energy Use, other relevant regulations, federal rules and regulations in the field of atomic energy use establish the requirements on decommissioning of SNF management facilities.

According to Article 20 of a Regulation on Licensing of Activities in the Field of Atomic Energy Use (approved by 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 licensee 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 should be planned via the development and upgrading of a decommissioning concept that should be submitted as part of NF (NI or SF) design documentation and SAR.

Pursuant to relevant provisions of NP-012-16, NP-057-17, etc., the concept should present the conditions under which NF decommissioning concept should be reviewed (clarified) so that the concept could be kept 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 date), the operating organization shall develop a decommissioning program.

NF decommissioning program is an administrative and technical document evaluating the main activities and operations, established procedures, conditions and relevant schedules for pre-decommissioning and decommissioning activities.

Decommissioning activities at SNF management facility (NI or SF) shall be preceded by a comprehensive engineering and radiation survey.

Based on the survey 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 overhauls, 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 design documentation (decommissioning 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 not subjected to disposal. No plans for SNF disposal exist at the moment.

Section H. Safety of Radioactive Waste 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 and the Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation being of a fundamental importance, as well as regulations and federal rules and regulations in the field of atomic energy use, sanitary rules and other regulatory documents.

The 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 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 top 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 USS RW (pp.1 and 3, part 3, Article 10 of the Federal law № 190-FZ On Radioactive Waste Management …).

Organizations generating RW shall ensure its safe management, including its safe storage during the time periods set for intermediate RW storage (pp.2, part 2, Article 21 of the Federal law № 190-FZ On Radioactive Waste Management …) by the state management authority in field of RW management (State Corporation Rosatom).

The following regulations establish basic requirements for the safe management of RW (Section E):

- Federal law № 3-FZ On Radiation Safety of Population;
- Federal law № 7-FZ On the Environmental Protection;

- federal rules and regulations in the field of atomic energy use:
  - General safety provisions for NI, RS and SF (NP-001-15, NP-033-11, NP-022-17, NP-016-05, NP-058-14, NP-038-16);
  - On Accounting for External Natural and Man-Induced Impacts at 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 Main 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 Disposal Facilities for Non-Retrievable RW (NP-103-17);
- Sanitary norms and rules:
  - 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 adequate protection of employees (personnel) and public from RW radiation impacts exceeding the limits established in radiation safety standards;
- to ensure adequate isolation of RW from the environment, protection of current and future generations, biological resources from radiation impacts exceeding the limits established in radiation safety standards;
- to prevent discharges (releases) of RM 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 should be provided in accordance with the principles of justification, regulation and optimization;
- adequate protection of the environment against adverse radiation impacts associated with RW should be provided;
- interdependencies between different steps of RW generation and management should be accounted for;
- 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 be not 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 nuclear safety 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 occurrence of SCR.

Premises housing equipment for collection, processing, storage and conditioning of RW containing hazardous fissile nuclear materials shall be fitted with an automated alarm system for SCR detection. Compaction shall be avoided for SRW containing such amounts of hazardous fissile nuclear materials that its compaction could result in SCR.

According to NP-058-14 and NP-055-14, special technical provisions and administrative arrangements shall be implemented during the disposal of RW containing hazardous fissile nuclear materials (substances) to avoid SCR. Features of engineered and natural safety barriers shall prevent SCR resulting from possible concentration of radionuclides due to their migration in the RW disposal system. NP-093-14 provisions set limitations on the contents of hazardous fissile nuclear materials in RW subject to disposal, thus, eliminating 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 decision-making on waste conditioning process. The volume of conditioned RW shall be reduced to minimum derived, in particular, on the basis of acceptable specific heat generation and heat dissipation.

During RW disposal, the host rock shall be resistant to thermal effects produced by heat generating RW, preserve their isolating properties and ensure that engineered and natural barriers do not lose their integrity due to thermal conditions in the DDF RW.

H.1.2. Minimization of Radioactive Waste Generation (Article 11 (ii))

RW minimization requirements are set forth in a number of regulations, in particular:

- Federal law № 190-FZ On Radioactive Waste Management …;
- federal rules and regulations in the field of atomic energy use (NP-016-05, NP-058-14, NP-002-15, NP-019-15, NP-020-15 and etc.);
- sanitary rules (OSPORB-99/2010).

Section G.1.2. discussed in detail RW minimization requirements specified in the regulations and their application during design development and operation of NFs.

H.1.3. Interdependence among Different Steps of RW Management (Article 11 (iii))

Interdependence among different steps of RW generation and management accounts for a fundamental principle of the Unified State System for RW Management (paragraph 5, part 3, Article 10 of the Federal law № 190-FZ On Radioactive Waste Management …).

Federal rules and regulations regulating predisposal management of RW, RW transportation and disposal (NP-058-14, NP-019-15, NP-020-15, NP-053-16, NP-055-14, NP-069-14) establish the requirements according to which interdependencies among different steps of RW generation and management shall be taken into account in RW management.

According to the provisions of the abovementioned federal rules and regulations, interdependence principle shall be ensured through the compliance with the following requirements:

- acquisition of reliable and complete information on the amount and qualitative composition of RW streams at the sites of waste generation, collection, processing, storage and conditioning;
- implementation of proper arrangements to exert control over the quality of engineering processes providing collection, processing, storage and conditioning of RW, RW quality control and testing of RW packages;

- establishment of a system involving quality criteria which RW shall comply with following waste collection, processing, storage and conditioning;
- establishment of RW acceptance criteria for disposal and control over RW compliance with these criteria;
- implementation of an effective system for record keeping and storage of documentation concerning RW collection, processing, storage, conditioning and disposal.

In order to implement the interdependence principle, Federal law № 190-FZ On Radioactive Waste Management … obligates RW generators to bring RW into compliance with relevant acceptance criteria within the timeframes specified for RW intermediate storage and to transfer the conditioned waste to the National Operator for disposal. Scheduled efforts were completed at a number of particularly hazardous legacy facilities to ensure their environmental safety, including completed backfilling at a number of LRW reservoir storage facilities, namely, B-2 at SCC, № 354 at MCC and V-9 at PA Mayak.

Under FTP NRS-2, pre-decommissioning efforts are ongoing at the surface LRW storage reservoir № 365 (MCC site), backfilling operations being underway at LRW storage reservoir B-1 (SCC site) and development of design documentation for V-17 closure at PA Mayak.

H.1.4. Protection of Individuals, Society and Environment (Article 11 (iv))

Section F.4 (Article 24) provides a detailed discussion of the following issues: regulating control over radiation safety and effective regulatory requirements for the protection of employees (personnel,) public and the environment; assessment of radiation impacts on employees (personnel), public and the environment, procedure for radiation control of personnel exposure and environmental contamination due to releases and discharges associated with RW management, as well as state supervision for the protection of employees (personnel), public and the environment during the predisposal management of RW.

Federal rules and regulations (NP-058-14) stipulate that the following principles shall be observed at all stages of RW management: adequate protection of employees (personnel) and public from radiation impacts associated with RW in accordance with justification, regulation and optimization principles and adequate protection of the environment from adverse radiation impacts associated with RW.

According to NP-058-14, reliable protection of employees (personnel), public and the environment from radiation impact associated with RW exceeding the established limits is viewed as the main safety objective in RW management.

Measures implemented to protect individuals; general public and the environment during the predisposal RW management are, in general, similar to those discussed in Section G.1.4.

Furthermore, Federal law On Special Environmental Programs on the Remediation of Radioactively Contaminated Sites provides for some specific measures addressing radiation safety of public, general reduction of risks associated with radiation impacts and improved radiation conditions at radioactively contaminated sites (see Section G).

Principles, criteria and general safety requirements for RW disposal, including those concerning long-term safety of RW DF, are set forth in relevant federal rules and regulations (NP-055-14, NP-069-14). According to NP-055-14 provisions, RW DF, including LRW DF, comply with the safety requirements at the post-closure stage, if:

- during normal evolution of natural processes at RW DF (LRW DWIF) site (most probable scenarios of disposal system evolution), its radiation impact on public does not lead to exposure exceeding the acceptable levels established by sanitary rules and radiation safety standards;
- external natural and man-induced impacts of low-probability (catastrophic events) at RW DF (LRW DWIF) site will not result in the exceedance of the overall risk limit established for the critical group of population by sanitary rules and radiation safety standards.

Adequacy of engineering safety solutions adopted in RW DF designs shall be demonstrated for the entire period of potential hazard of the disposed waste and with due consideration of possible external natural and man-induced impacts in the RW DF region, as well as of physical and chemical processes taking place in the RW DF.

RW DF long-term safety, safety of public and the environment shall be demonstrated for the entire period during which the disposed waste can potentially remain hazardous. Long-term safety shall be demonstrated based on relevant safety assessments, involving prediction calculations performed under the long-term post-closure safety assessment of a RW DF. Adequacy of the safety demonstration, including the long-term safety demonstration, is evaluated by Rostechnadzor under the licensing process.

H.1.5. On Taking into Account Biological, Chemical and Other Hazards that May Be Associated with Radioactive Waste Management (Article 11 (v))

Measures implemented by the Russian Federation to address 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, biological, chemical and other risks are addressed through the establishment of RW acceptance criteria for disposal. According to NP-093-14 provisions, the following RW properties make the waste unsuitable for disposal:

- explosive materials capable of detonating when heated, due to shock or friction;
- capable of spontaneous ignition;
- hazardous gases causing ignition and/or explosion (self-inflammable, inflammable or explosive) when interacted with water, air or other substances;
- relsulting in explosion, inflammation or high heat output when interacted with water, air or other substances;
- generating toxic gases or aerosols if interacted with water, air or other substances;
- containing infecting (pathogenic) materials (substances).

Effective federal rules and regulations establising RW disposal requirements (NP-055-14, NP-069-14) stipulate that RWDF design shall address RW acceptance criteria for disposal including those associated with the requirements to RW packages and RW physical and chemical properties.

Radioecological monitoring of environmental objects (water, air, soil, vegitation) covering not only the radiation factors, but also chemical contamination shall be performed at the sites of storage facilities holding large amounts of RW (water reservoirs – storage facilities for LRW, tailings, deep LRW storage facilities and SRW storage facilities), their sanitary protection zones and the environment.

H.1.6. Analysis of Actions that Impose Predictable Impacts on Future Generations (Article 11(vi))

Protection of future generations is provided by observing the requirements applied to the analysis of projected radiation impacts on future generations associated with RW management; these impacts shall not exceed the acceptable limits of public exposure established by existing regulations (Annex E).

Federal law № 190-FZ On Radioactive Waste Management … stipulates that protection of human health and life, present and future generations, and the environment from adverse impacts associated with RW management should be viewed as a priority and is stated as a USS RW operating principle.

According to the Federal law № 7-FZ On the Environmental Protection, 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 by radiation safety standards is considered as 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:

- the principle of protection of future generations is implemented in a way 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 need of providing safe RW management shall not be imposed on future generations.

Operating organization involved in RW management shall provide a demonstration of its compliance with the abovementioned principles under the SAR submitted to acquire a license authorizing relevant activities. Adequacy of the presented safety demonstration for an RW DF shall be evaluated by Rostechnadzor during the license review.

H.1.7. Minimization of Burdens Imposed on Future Generations (Article 11(vii))

Federal law № 190-FZ On Radioactive Waste Management … provides for a set of administrative and financial arrangements for the establishment of a RW disposal system preventing from imposing undue burden on future generations and adverse environmental effects associated with the accumulated RW inventory not being adequately isolated from the environment and allowing for timely and safe management of newly generated RW, including RW disposal. In particular, effective legislative provisions prohibit construction of industrial facilities and development of technologies resulting in a deliberate generation of special (non-retrievable) RW (part 2, Article 26 of the Federal law 190-FZ On Radioactive Waste Management…).

Provisions of certain regulations also elaborate on the requirement suggesting that no undue burdens associated with safe RW management should be imposed on future generations (Annex E).

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 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 the safety requirements for NF involving operating RW management facilities, including SF holding accumulated RW inventory, as well as facilities holding non-retrievable RW and disposal 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 safety of existing facilities for predisposal RW management, their expert evaluation and specification of license conditions is similar to the one discussed in Section G.2.

Operation of existing RW management facilities (including facilities operated at NI, RS and SF) can be carried out only based on a relevant license and shall comply with the established conditions of the licenses issued by Rostechnadzor to operating organizations and authorizing them to operate relevant facilities and manage RW. Inspections are conducted to check the observance of license conditions.

Requirements to the supervision over the safety of existing RW management facilities and relevant activities performed at the existing facilities, drafting 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 long-term safety assessment shall be performed for operated (mothballed) RW disposal facilities demonstrating the need for implementing relevant technical and administrative arrangements to ensure the safety of employees (personnel), public and the RW disposal system. All necessary reasonably practicable improvements identified based on the findings of the evaluation shall be implemented to meet the existing requirements set forth by provisions of federal rules and regulations. For RW DFs 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 decisions regarding the implementation of protective arrangements (intervention) to improve the safety of SFs holding accumulated RW:

- public benefits from the proposed intervention shall outweigh the associated damage, i.e. 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 (principle of justified intervention);
- form and scope of the intervention, as well as its duration shall be optimized so that ultimate benefits from the reduced dose, i.e. the benefit from the reduced radiation detriment after deducing the detriment resulting from the intervention, are maximal (principle of intervention optimization).

Federal law № 190-FZ On Radioactive Waste Management … provides for certain efforts aimed at bringing the accumulated “legacy” RW resulted from the past practices associated with the use of atomic energy either for peaceful or defense purposes to an environmentally sound state. The law stipulates that decisions on management plans regarding the accumulated RW inventory should be made based on a comparison between the risks associated with 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 is kept in situ.

FTP NRS allowed to address a large number of challenges associated with upgrading and reconstruction of RW management facilities implemented to enhance their safety and reduce the risks associated with the adverse effects. Federal law № 190-FZ On Radioactive Waste Management … 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).

In late 2012, State Corporation Rosatom and IAEA Secretariat approved the terms of reference for the International Peer Review on the Deep Well Injection Practice for Liquid Radioactive

Waste in the Russian Federation (IAEA Mission) held in 2013. To evaluate LRW injection practice compliance with IAEA safety requirements, a set of reports was drafted on LRW disposal background and operational history, safety analysis of LRW DWIF practice, general provisions of the proposed closure concept, as well as relevant provisions of the national legal framework. The IAEA Mission also involved a technical tour to LRW DWIF site in Dimitrovgrad during which IAEA experts got acquainted with LRW disposal practice (origin, key elements and disposal technology). Final Report on the Mission summarizing the Peer Review expert recommendations on the long-term safety enhancements in the post-closure period was drafted. In 2015, State Corporation Rosatom developed a Program for Modelling and Experimental Investigations on the Long-Term Safety Demonstration and Assessment of LRW Deep Well Injection Facilities Addressing IAEA Recommendations Concerning IAEA Peer Review on the Deep Well LRW Injection Practice in the Russian Federation. This program was approved by Rostechnadzor and provides for a large scope of experimental and modeling work aimed at evaluating borehole closure techniques and DWIF long-term safety assessment.

Predictive calculations of RW component migration were performed using purposely developed geofiltration and geomigration models accounting for the processes occurring in the reservoir beds during LRW DWIF operation and at the post-closure stage under a Program on the Long-term LRW DWIF Safety Demonstration.

For the first time ever in LRW DWIF operational history, lists of features, events and processes (hereinafter referred to as FEPs) were compiled and accounted for in the development of the disposal system evolution scenarios. Comprehensive evaluation of various combinations of individual FEPs and relationships between them, considered important for DWIF long-term safety demonstration, enabled the development of a normal evolution scenario and alternative scenarios describing disposal system evolution.

Under the R&D performed, for each of the above scenarios conceptual models have been developed taking into account the following aspects of the RW disposal system evolution:

- natural and man-induced processes and phenomena considered important for the migration of LRW components;
- climatic, geological, hydrogeological, hydrological aspects;
- heterogeneity of the structure and anisotropy of the filtration properties in the geological environment;
- dependence of LRW properties (viscosity, density) on the temperature and concentration of macrocomponents;
- boundary conditions identified for the developed models;
- various forms of LRW component migration;
- different pathways for radionuclide migration in the biosphere and exposure of a critical group of the population.

Based on the conceptual models, geofiltration and geomigration LRW DWIF models were developed and implemented using certified software tools developed in Russia (hereinafter - ST): ST GEOPOLIS (LRW DWIF in Zheleznogorsk), ST NIMFA 4.0 (LRW DWIF in Seversk) and ST GeRa (LRW DWIF in Dimitrovgrad). The long-term forecast period accounted for 1,000,000 years after LRW DWIF closure.

Based on the modeling results, estimated long-term impacts of the disposed radionuclides on humans were found to be within the acceptable threshold exposure for the critical group of population (10 μSv) for the entire long-term forecast period.

Closure Concept was developed under DWIF Closure Program to upgrade the LRW DWIF to its final state ensuring the safety of the population and the environment during the time period while the disposed RW remains hazardous. Upgrading to a final state suggests that the surface structures (buildings, structures, tanks, pipelines, equipment, etc.) are decommissioned and

most of the underground structures (wells) except for wells intended for the long-term monitoring purposes are to be closed.

Based on the performed forecast calculations and the developed LRW DWIF closure concept, recommendations on the long-term monitoring at the post-closure stage were developed. These are aimed at demonstrating safety of the RW disposal system, including the integrity of safety barriers, as well as the engineering solutions adopted in the designs and arrangements implemented to provide RW disposal system safety.

Based on the set of experiments and calculations implemented under the Program, proposals were developed to further develop the LRW DWIF safety case addressing the closure and post-closure stages. A range of issues deserving further investigation under the safety demonstration efforts and further consideration (research program upgrading, adjusting the design, etc.) was identified, namely, the list of studies, tests (experiments), including those involving computer modeling that should be performed to investigate these issues and obtain representative results enabling most adequate consideration of the processes both occurring in the RW disposal system and the predicted ones under the safety demonstration efforts.

The final report on the implementation of IAEA peer review recommendations is currently being developed.

In 2018, three expert evaluations of operational safety were conducted:

- deep well injection facility for LRW disposal Experimental and Industrial Testing Site (Ulyanovsk Region, Dimitrovgrad-10);
- deep well injection facility for LRW disposal Testing sites 18 and 18a (Tomsk Region, Sversk);
- deep well injection facility for LRW disposal Test Site Severny (Krasnoyarsk Region, Zheleznogorsk).

Licenses were issued by Rostechnadzor to FSUE NO RAO authorizing the operation of three LRW DWIFs for a 5-year period (until July 2023).

In 2019-2020, siting and safety expert reviews were performed for:

- a near-surface disposal facility for SRW Class 3 and 4, Chelyabinsk region, Ozersk urban district;
- a near-surface disposal facility for SRW Class 3 and 4, Tomsk region, urban district – restricted access territorial entity (RATE) Seversk.

Following the reviews, some remarks were expressed on the feasibility of siting decisions concerning the near-surface RWDFs, as well as the envisaged design and engineering solutions proposed for their construction. Siting and construction license was issued for the RW DF in Seversk, Tomsk Region (SCC region).

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, procedures for making decisions on siting and construction of RW management facilities, relevant EIA procedures, the contents and structure of documents evaluating 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 RWDFs are established by 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 RW DF 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 RW DF safety assessments. Safety of RW transportation shall be also considered and demonstrated in the decision-making process.

In general, procedures associated with licensing siting activities in case of RW management facilities, including RW DFs, and the requirements to the contents and structure of relevant materials demonstrating safety are similar to those discussed in Section G.3 of the Report.

During the license review of RW DF siting activities, the submitted demonstration of RW DF long-term safety covering the post-closure stage while the disposed RW potentially remains hazardous shall be evaluated. Recommendations on how the safety assessments are to be performed, as well as the contents and structure of SARs for near-surface RWDFs and deep RW DFs are established by Rostechnadzor in relevant provisions of federal rules and regulations and safety guides (NP-100-17, PNAE G-14-038-96, RB-117-16, RB-139-17 and etc.).

H.3.2. Public Engagement on the Issues Associated with RW Management

According to the Russian legal framework, public hearings are viewed as an essential part of the decision-making process on RW management facility siting. Public hearings are arranged and held in accordance with principles and provisions set forth in the Federal law № 7-FZ On the Environmental Protection.

Public hearings are held regularly in cities and other settlements located in the vicinity of sites proposed for RW management facilities construction.

In 2018, public hearings were held in Ozersk and Seversk to discuss the data presented in license applications for the construction and siting of final disposal facilities for RW Class 3 and 4. Furthermore, for the first time ever, public hearings were held in Zheleznogorsk, Seversk, Dimitrovgrad addressing the license applications for the operation of LRW DWIFs.

In 2020, public hearings are planned to be arranged to discuss the materials of license application for the operation of the second section of a near-surface disposal facility for RW Class 3 and 4 in the Novo-Uralsk urban district.

Rosatom's Public Council, acting as Rosatom's permanent advisory and consultative body for public awareness and oversight, is also engaged in the dissimilation of information on the safety of planned RW management facilities. The Public Council coordinates activities performed by Rosatom and nuclear enterprises with non-governmental organizations, citizens of the Russian Federation, regional and local authorities, and professional associations. This coordination results in recommendations supporting the decision-making process in the field of atomic energy use and nuclear power sector development.

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 federal rules and regulations in the field of atomic energy use and sanitary rules:

- General safety provisions for nuclear fuel cycle 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 management of RW considered as NFs shall be designed and constructed so that

the associated radiation impacts on personnel, public and the environment during normal operation, operational disorders, 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 RW DFs that shall be observed during design development. 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.

RW DF barrier system shall:

- ensure RW disposal safety during the entire time period while RW potentially remains hazardous with due account taken of all possible external natural and man-induced impacts in RW DF siting region and at RW DF site, as well as all relevant physical and chemical processes occurring in the disposal facility;
- prevent inadvertent human or animal intrusion into the disposal system;
- maintain its isolating functions under the impact of host rocks;
- maintain its isolating functions under thermal impacts produced by RW.

Loss of a safety barrier's integrity or likely external natural or man-induced impacts shall not result in the reduction of the long-term safety of the RW disposal facility (multi-barrier principle). Engineered barriers of an RW disposal facility shall continue implementing their functions without any maintenance or repairs after RW DF closure for the time specified and justified in the RW DF 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 future decommissioning (closure).

Engineering and administrative decisions made to ensure the safety of RW management facilities, including RW DFs, shall rely on the past experience or testing, investigations or operation of prototypes. This approach shall be applied to the development of facilities' designs, manufacturing and development of equipment, construction, reconstruction and upgrading of systems (their components).

Design and operational documentation shall provide for particular engineering solutions and administrative arrangements to ensure the safety for each RW category.

Design documentation is approved only if the state sanitary and epidemiologic supervision board issues an appropriate sanitary and epidemiologic statement.

When applying for construction or operating license for a RW management facility, the operating organization has to demonstrate and present relevant information in the safety analysis report stating that the applied design and engineering solutions and conditions of RW storage and management 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), feature findings of relevant safety assessments, including the list of initiating events for design basis accidents and a list of beyond design basis accidents, findings of deterministic and probabilistic safety evaluations, as well as methods and software used for NF safety demonstration. SAR for a RW disposal facility shall contain demonstration of its long-term safety, including the results of prediction calculations performed to assess the long-term safety of the RW disposal system at the post-closure stage 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 the established procedures.

Requirements to SARs developed for RW management facilities and RW DFs 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 operating licenses for RW management facilities and RWDFs may feature, if necessary, requirements to the development and implementation of activities on eliminating and (or) making up for discrepancies from current regulatory provisions, complying with and (or) introducing corrective measures to make up for the remarks expressed in the expert findings. Corrective actions may involve a follow-up and more detailed safety assessment, a program of additional surveys and investigations, or introduction of amendments to the SAR in accordance with the findings of reviews and inspections, as well as other identified safety-related factors. Relevant implementation and reporting schedules for document submittal to Rostechnadzor shall be also indicated.

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 implemented to acquire operating licenses for RW management facilities 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 adopts relevant decision on the issuance of an operating license for an RW management facility following a review resulting in an expert statement and completed inspection the findings of which are reflected in the inspection report.

Administrative Regulations Authorizing the Federal Environmental, Industrial and Nuclear Supervision Service to Implement 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) specify the list of documents that should be submitted to demonstrate the safety of RW management facilities commissioned following their construction.

The following documents are required to be submitted by the operating organization as a part of an operating license application:

- safety analysis report;
- quality assurance program for RW management facility operation;
- data on recruitment, training, maintenance of qualifications and issued permits to self-guided work;
- guide on elimination of accidents;
- guidelines on management of beyond design basis accidents;
- action plans for the protection of personnel in the event of an accident at the facility;
- documentary evidence for RW accounting and control;
- documentary evidence for physical protection;
- RW management facility commissioning program;

- technical regulation for RW management 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 operation of main process systems.

Federal law № 190-FZ On Radioactive Waste Management… provides for upgrading the facilities holding non-retrievable RW and disposal facilities for non-retrievable RW into RW disposal facilities given that the considered facility is fitted with appropriate safety barriers isolating RW from the environment during the entire period while the disposed waste potentially remains hazardous. Procedures for licensing activities associated with the operation of such facilities are similar to those established for RWDFs.

In 2020, safety guide «Recommendations for Assessing the Safety Level of Storage Facilities and Evaluating the Nonconformities with the Requirements of Current Federal Rules and Regulations in the Field of Atomic Energy Use» RB-164-20 (Order of the Federal Environmental, Industrial and Nuclear Supervision Service № 108 of March 12, 2020) were approved.

Basically, procedures for evaluating 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 materials provided by designers of equipment, operational processes and relevant designs before the comprehensive testing of systems (and their components) starts.

In general, the procedure put in place 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 of 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 tests are performed to maintain the performance of safety important systems and to avoid dangerous failures.

Forms and types of engineering and technical support may vary depending on specific tasks facing the operating organization or a particular facility during its construction, commissioning and operation.

Normally, according to the common best practices established in Russia that have demonstrated their feasibility and effectiveness, operating organizations, as well as

management teams of enterprises subcontract specialized scientific and research, design and engineering, repair, commissioning and other organizations and enterprises manufacturing equipment for RW management facilities that have appropriate experience and licenses to provide relevant services in the field of atomic energy use.

H.6.5. Accounting of Safety Significant Operational Incidents at RW Management Facilities

The procedure put in place 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 put in place 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 NFs, including RW management facilities, are established by the provisions of the Federal law № 170-FZ On Atomic Energy Use, 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).

Amended version of the federal rules and regulations, namely, Rules for the Safe Decommissioning of Production Uranium-Graphite Reactors (NP-007-17) was approved in 2017 elaborating on the requirements to the safe decommissioning of production uranium-graphite reactors that should be observed at the operational and decommissioning stages, as well as to SAR for the decommissioning of production uranium-graphite reactors.

In 2018, amendments were introduced to another FNP, namely Safe Decommissioning of Nuclear Facilities. General Provisions (NP-091-14), in particular:

- on reducing the operations associated with maintenance and repair of individual NF systems and elements at the pre-decommissioning stage;
- on data required to be provided in the NF decommissioning design documentation (designs);
- on the establishment of criteria for NF and nuclear site exemption from control and supervision in the field of atomic energy use. Two new RBs have been developed.

According to Article 20 of 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), 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 during design development, construction and operation of RW management facilities, including RW DFs, shall be put in place with account of their future decommissioning (RW DF closure).

As part of pre-decommissioning efforts implemented at the operational stage of a RW management facility (usually 5 years before the expiration of its service life), a decommissioning program shall be developed by the operating organization.

Decommissioning (closure) of 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 a 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 consequences of accidents that have previously occurred.

After the activities envisaged by 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 inspection of buildings, structures, premises, systems and components, as well as radiation survey of the NF site, including 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 the termination of licenses can be launched based on the completed review performed to check the reliability of the information contained in the documents supporting the safe termination of the licensee's activities. These also include a report on the findings of the final (radiation) survey. The decision to terminate the license is made by Rostechnadzor based on a review performed to check the reliability of the information contained in the documents supporting the safe termination of the licensee's activities attached to relevant application. The decision is made by Rostechnadzor following an audit (inspection).

In 2016, safety guide Recommendations on the Final Inspection of Decommissioned Nuclear Facilities (RB-124-16) were developed and enacted.

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 …:

- the RW DF designs shall provide for periodic post-closure radiation monitoring at the RW DF site;
- following the post-closure stage and the expiration of the period while the disposed 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 RW DF site and on the introduction of relevant amendments to the registry of RW SFs.

Federal rules and regulations regulating RW disposal safety (NP-055-14, NP-069-14) specify the requirements to the safe closure of RW DFs, relevant closure procedures and the procedures for post-closure controls.

Pursuant to the Federal law № 190 On Radioactive Waste Management…, National Operator provides radiation control at RW DF sites and recurrent control at RW DF post-closure stage.

NP-058-14, NP-055-14 and NP-069-14 establish the requirements to the post-closure institutional control over RW DFs. Post-closure institutional control of RW disposal system shall involve monitoring of engineered and natural safety barriers state, and environmental monitoring. Main objectives of such monitoring surveys are as follows: to identify the dynamic pattern for the spread of the RW plume, to monitor changes in geological medium providing early detection of incidents and their elimination. In the course of monitoring, the results obtained shall be recorded and stored in relevant data bases.

Duration of monitoring surveys and their frequency shall be specified during the development of 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 (passports) to the system of state RM and RW accounting and control;
- input of RW disposal data into the registry of RW DFs;
- permanent storage of data on RW inventory, registry of RW SFs and RW passports.

According to relevant requirements of federal rules and regulations, a RW DF (DWIF) monitoring system shall involve a computer model designed to forecast the migration of waste in the geological medium with account taken of processes that can potentially alter the geological medium due to RW disposal, as well as likely impacts on the population and the environmental medium.

As for DWIFs, modeling of migration processes occurring in the 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 in terms of radionuclide migration. The computer model shall be validated and certified by the regulatory authority in keeping with an established procedure.

The most important safety indicators that can be forecasted for LRW DWIFs are as follows:

- concentrations of radionuclides within the mining allotment and accessible biosphere;
- the plume formed due to the migration of radioactive components contained in 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;
- injection mode;
- sorption, chemical and biological processes;
- RW heat generation;
- filtration processes, including those occurring in low-permeability rocks.

It should be noted, that new items can be added to the list of important factors during the development of DWIF closure designs.

If RW disposal system monitoring reveals any non-conformities with the RW DF (DWIF) end state established in the RW DF (DWIF) closure designs that can undermine its safety, all practicable efforts shall be put in place to ensure the post-closure safety, including measures taken to reduce radionuclide migration, decontaminate the soil, treat the surface and ground water, dewater the disposal cells, as well as other essential measures. Detailed program of possible and required actions shall be developed along with RW DF (DWIF) closure design development.

RW DF (DWIF) post-closure monitoring shall be performed in accordance with a program developed and implemented by operating organization. The program shall indicate procedures, conditions and schedules for the following arrangements:

- post-closure monitoring of RW DF (DWIF) safety;
- monitoring of RW disposal system, including control over the state of engineered and natural safety barriers;
- environmental monitoring;
- protection of engineered barriers from degradation caused by animal intrusion or intrusion of roots;
- dismantlement of systems and equipment used to monitor the RW disposal system;
- prevention of inadvertent human intrusion;
- elimination/mitigation of consequences associated with advertent actions undermining RW DF safety.

The program shall specify:

- the procedure followed to keep the records on the closed RW DF (DWIF);
- the end state of RW DF (DWIF) after the monitoring activities in the RW disposal system are completed.

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 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 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:

- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;
- The Vienna Convention on Civil Liability for Nuclear Damage;
- Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management;
- Convention on Physical Protection of Nuclear Material;
- Federal law № 170-FZ On Atomic Energy Use;
- Federal law № 7-FZ On the Environmental Protection;
- Federal law № 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation;
- Federal law №3-FZ On Radiation Safety of Population;
- Federal law № 92-FZ On Special Environmental Programs for the Remediation of Radioactively Contaminated Territories;
- Federal law № 174-FZ On the Environmental Review;
- Government decree of the Russian Federation № 456 of July 19, 2007 Rules for Physical Protection of Nuclear Materials, Nuclear Installations and Storage Facilities for Nuclear Materials;

- Government decree of the Russian Federation № 421 of June 14, 2002 On the Approved Regulation Concerning the Development of Special Environmental Programs on the Remediation of Radioactively Contaminated Sites;
- Government decree of the Russian Federation № 418 of July 11, 2003 On the Importation of Irradiated Fuel Nuclear Reactor Assemblies to the Russian Federation;
- Government decree of the Russian Federation № 587 of September 22, 2003 On the Rules for Approving Costs Associated with the Management of Spent Fuel Assemblies Removed from Nuclear Reactors and their Reprocessing By-Products;
- Government decree of the Russian Federation № 588 of September 22, 2003 On the Approved Funding Provisions for Special Environmental Programs on the Remediation of Radioactively Contaminated Sites;
- Government decree of the Russian Federation № 204 of March 19, 2001, as amended on September 15, 2009 (№ 751) and on December 8, 2015 (№1341) On the State Competent Nuclear and Radiation Safety Authority for the Transportation of Nuclear Materials, Radioactive Materials and Relevant Products.

Article 63 of the Federal law № 170-FZ On Atomic Energy Use 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.

Procedure for the importation of nuclear reactors' SFAs to the Russian Federation, as well as for the return of SFAs 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 to the Russian Federation of July 11, 2003. According to its provisions, importation of SFAs to the territory of the Russian Federation, as well as export of earlier imported SFAs or SNF 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 specialized organizations authorized to perform relevant activities by the Government of the Russian Federation.

Import of SFAs to the territory of the Russian Federation is authorized only if the statement of the state environmental assessment on the unitary project issued by 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 relevant 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 from foreign reactors; subjected to state environmental expert assessment, developed and approved in accordance with the established requirements, including:

- draft of the foreign trade contract;
- SEP the costs of which are covered by funds raised from foreign trade operations involving the imported SNF;
- papers demonstrating the overall reduction of risks associated with radiation impacts and improvement of 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 by-products envisaged by the foreign trade contract.

Foreign trade contract on the importation of SNF (spent fuel assemblies) of Russian (Soviet) production may suggest that no further return of radioactive waste resulting from the SNF

reprocessing to the country of origin is expected except as otherwise provided in the intergovernmental agreements of the Russian Federation.

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 verifying if proper 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 casks 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 and shall be specifically stated in relevant intergovernmental agreements of the Russian Federation.

To specify the amount of RW and by-products intended for the return to the country of origin, special procedures approved by both Parties are used assuming that the activity of the irradiated assemblies previously imported for reprocessing is equivalent to the activity of the returned by-products resulting from SNF reprocessing with account of natural decay due to the temporary storage of the irradiated assemblies and the reprocessing by-products, as well as during SNF reprocessing.

SNF import to the Russian Federation is performed in compliance with intergovernmental agreements and provisions of the Russian legal framework being effective in this field.

Transportation of SNF (spent fuel assemblies) and its reprocessing by-products within the territory of the Russian Federation is carried out 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 the existing international standards on the safe transportation of radioactive material, including:

- Rules for the Safe Transport of Radioactive Material (NP-053-16);
- Basic Rules for Accounting and Control of Radioactive Material and Radioactive Waste in Organizations (NP-067-16);
- Basic Rules for Accounting and Control of Radioactive Material (NP-030-12);
- Rules for Physical Protection of Radioactive Material 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);
- Rules for the Physical Protection of Radioactive Material and Radiation Sources during their Transportation (NP-073-06);
- 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) and etc.;
- 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 relevant state safety regulatory authority and authorizing it to perform relevant activities in the field of atomic energy use.

The Government of the Russian Federation specifies annual amounts of SNF to be imported to the territory of the Russian Federation.

In accordance with effective contracts, spent nuclear fuel is imported from Ukrainian NPPs with operating WWER units.

On May 27, 2004, a bilateral agreement concerning the return of Russian-origin highly-enriched uranium (HEU) 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. The Agreement expires on May 27, 2024. According to the agreement, Russian-origin SNF (highly-enriched SNF), potentially suitable for the manufacturing of nuclear weapons, shall be returned back to Russia.

Scheduled RR SNF return from Uzbekistan (2005-2006, 2012, 2015), the Czech Republic (2007, 2013), Latvia (2008), Bulgaria (2008-2009), Hungary (2008, 2013), Kazakhstan (2008-2009, 2014, 2017), Romania (2009), Libya (2009), Poland (2009-2010, 2012, 2014, 2016), Belarus (2010), Ukraine (2010, 2012), Serbia (2010), and Vietnam (2013) to Russia was completed. In 2015, liquid irradiated nuclear fuel from Uzbekistan research reactor was shipped to the territory of the Russian Federation.

Under the above agreement, RR SNF from Ghana (2017) and Nigeria (2018) was transported across the territory of the Russian Federation to reach China.

SNF transport from abroad and within the territory of the Russian Federation is carried out by rail, by air and by road.

All shipments are performed in full compliance with international law, as well as legal and regulatory frameworks of 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 carried out if the carrier/ consignee has been awarded with a transportation license issued by Rostechnadzor.

TUK-13/1V, TUK-10V-1 and TUK-13V, TUK-141O casks are used for WWER-1000 SNF transportation to MCC and PA Mayak.

TUK-6 casks are used for WWER-440 SNF transportation from reactor sites to PA Mayak.

Based on the above Russia-USA agreement, transportation (shipment) of spent nuclear fuel from research reactors to Russia and through the territory of the Russian Federation is carried out 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 the Safety of Radioactive Waste Management ensures, in particular, the compliance with provisions of Article 27-2 of the 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…, 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 relevant international agreement of the Russian Federation;
- spent sealed ionizing radiation sources are allowed to be returned to the country of origin, if these were imported to the Russian Federation;
- spent sealed ionizing 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, to/from these states, 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 should be not less than the one specified in the Convention on the Physical Protection of Nuclear Material.

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.

Pursuant to an established procedure, SRSs, following their withdrawal from service, are handed over to specialized organizations authorized to provide their long-term storage or, after being conditioned to comply with waste acceptance criteria, are sent to disposal facilities.

By the end of 2019, over 3,080,000 of SRSs were stored by such organizations in Russia (including FSUE FEO – 2,268,000; Radon – 597,000, PA Mayak – 61,000, MCC – 46,000, RIAR – 30,000, SCC – 24,000).

Completing the dismantlement and disposal of radioisotope thermoelectric generators (RTGs) used as autonomous power sources is considered as a top priority task to be addressed to reduce potential radiation and environmental threats.

All initially manufactured RTGs (1,007 pcs.) were decommissioned.

The legal framework governing SRSs management, including disused and expired SRSs, involves legal provisions in the field of atomic energy use, RW management and environmental protection, including Government decree of the Russian Federation № 542 of June 15, 2016 On the Procedure for Arranging the System of State Accounting and Control of Radioactive Material and Radioactive Waste, federal rules and regulations in the field of atomic energy use setting up safety requirements for radiation sources containing radionuclides (NP-038-16), as well as requirements to RM and RW accounting and control in organizations (NP-067-16).

Federal rules and regulations in the field of atomic energy set forth the requirements for the safe management of disused SRSs, including their disposal, namely: RW management Safety. 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), Radioactive Waste Acceptance Criteria for Disposal (NP-093-14).

Pursuant to the Federal law № 190-FZ On Radioactive Waste Management …, SRSs produced in the Russian Federation are allowed to be imported to Russia, including for the purposes of their reprocessing and disposal.

According to relevant provisions of the Federal Law № 170-FZ On Atomic Energy Use, owners of RS and RM shall ensure control over their safety and proper use.

Operating organizations are responsible for RM and RW accounting and control.

Section K. Planned Activities to Improve Safety

K.1. Addressing the Challenges Pointed Out at the Sixth Review Meeting

Tasks highlighted at the Sixth Review Meeting as urgent	Current status
Shipment of accumulated SNF inventory for centralized storage followed by its reprocessing	In 2018 – 2019, KhOT-2 ("dry" SNF storage facility at MCC) accepted over 12,000 of RBMK-1000 SFAs from Leningrad and Kursk NPPs. In 2020 – 2021, plans call for the delivery of over 15,000 RBMK-1000 SFAs to the site. Since 2016, a total amount of 740 SFAs of WWER-1000 have been reloaded from the "wet" SF to the "dry" SF.. In 2018 – 2019, KhOT-1 ("wet" SNF storage facility at MCC) accepted a total of 572 WWER-1000 SFAs for storage from NPP`s sites . PA Mayak in 2018 received SFAs for reprocessing: 306 unconditioned RBMK-1000 SFAs, 432 WWER-440 SFAs, 257 BN-600 SFAs and 51 WWER-1000 SFAs. In 2019, relevant numbers accounted for: 432 WWER-440 SFAs, 175 BN-600 SFAs and 98 WWER-1000 SFAs. In 2017-2019 a total of 259.6 tons of SNF was reprocessed at PA Mayak plant . WWER-1000 SNF was shipped for reprocessing to PA Mayak in TUK-141O casks purposely designed for SNF with increased initial enrichment and higher burnup. Development of new TUK-137T cask designs for WWER-1200 SNF transportation was started.
Completion of PDC (pilot-demonstration center for SNF reprocessing) construction at MCC. Development of advanced reprocessing technologies for main SNF streams accumulated to date	Operating license was issued in 2016 for the first start-up PDC unit with a design capacity of 5 tons per year. Testing of the innovation SNF reprocessing technologies are started. Construction of the second PDC start-up complex of the PDC with a design capacity of 250 SNF t/year is ongoing.
Continued efforts on providing environmentally safe configuration of surface water reservoirs for LRW storage	Pre-decommissioning efforts are ongoing at the site of a surface LRW storage reservoir № 365 at MCC; backfilling operations at LRW storage reservoirs B-1 at SCC and V-17 at PA Mayak (design development) are underway.
Continued decommissioning of nuclear and radiation hazardous facilities (NRHF)	The largest and most complex projects involve: Building 804 that housed gas diffusion plant for uranium isotope separation (AECC) was decommissioned; Building 18 (NCCP site) previously operated as a

	plant producing fuel elements for production of uranium-graphite reactors was decommissioned; Highly enriched uranium processing unit fitted at building № 1 at site № 5 of SCC's Sublimate Plant was decommissioned; Pre-decommissioning operations are underway at the site of BR-10 reactor (IPPE site).
Continued efforts on the remediation of contaminated territories	In 2017-2019: rehabilitation was completed at the site of decommissioned structure 4 (building 804) at AECC site (Angarsk, Irkutsk Region); decommissioning of RW SF in the Murmansk division of the North-Western Territorial District branch of FSUE FEO (Murmansk) was completed; remediation of contaminated areas pertaining to non-design RW storage facilities at the site of Chistopol Watch Factory Vostok and in the Kubassk forest of the Chistopol region was completed (the Republic of Tatarstan); work is underway on the remediation of plant 235 territory (PA Mayak, Ozersk, Chelyabinsk region).
Implementation of IAEA Peer Review recommendations on LRW deep well injection practice	Special program approved by the State Corporation Rosatom and Rostechnadzor (regulatory authority) is being implemented.
Continued dismantlement of ships and floating maintenance bases of the Russian nuclear icebreaker fleet	In 2018 – 2020, operations on the dismantlement of FMB Lepse (scheduled for completion in 2023), nuclear icebreaker Siberia (scheduled completion in 2021) and nuclear icebreaker Arktika (scheduled for completion in 2020) were underway.
New RW processing and treatment capacities	In 2018, SRW pressing unit was put into operation at Bilibino NPP. In 2019, LRW cementing, pressing, fragmentation units were commissioned at Leningrad NPP (Unit 5); IER drying unit and LRW cementing unit were commissioned at Novovoronezh NPP (Unit 7).
Construction of an underground research laboratory under HLW disposal project	Siting and construction license for the URL was issued. URL construction was started.
Development of RW classification system based on waste disposal routes	RW classification system based on waste disposal routes and criteria for waste categorization was established (Government decree of the Russian Federation № 1069 of October 19, 2012 with amendments introduced by the Government decree of the Russian Federation № 95 of February 4, 2015).

K.2. Planned Efforts to Improve Safety

In Russia, a large-scope comprehensive program covering both engineering and administrative aspects has been developed to address short-term and long-term initiatives in the field of SNF management (centralized storage and reprocessing), RW management (RW processing and disposal, including the accumulated RW inventory) and nuclear decommissioning.

The following aspects associated with safety regulation are planned to be addressed:

- annual support of R&D in the URL, including systematic review and analysis of R&D findings to demonstrate the compliance with the requirements of federal rules and regulations in the field of atomic energy use, as well as recommendations of international organizations;
- development of permanent DDF RW geomigration and geofiltration models to perform an independent compliance assessment of DDF RW siting, construction, operation and closure activities with the requirements stipulated in Russian legislation and federal rules and regulations in the field of atomic energy use under Rostechnadzor's control and supervision;
- establishment of requirements to RW DF (LRW DWIF) closure concept, as well as requirements providing RW DF (LRW DWIF) safety at the closure and post-closure stages;
- further improvement of federal rules and regulations, also taking into consideration the best international practices.

K.3. Areas of Good Performance

Deployment of the Unified State System for RW Management.

1. Completed construction of the 2nd section of Novouralsk near-surface disposal facility at UECC site and commercial operation of its first section.

2. Strategy for DDF RW Establishment in the Nizhnekanskiy rock mass (Krasnoyarsk Territory) and Strategic Master Plan for the Development of DDF RW Long-term Safety Assessments and Justifications for RW Class 1 and 2 Disposal in the Nizhnekanskiy Rock Mass were developed and approved by the State Corporation Rosatom

3. Further deployment of efforts on the decommissioning of surface LRW storage reservoirs:

decommissioning of surface LRW storage reservoir № 365 at MCC stie, backfilling of LRW storage reservoirs B-1 at SCC site and design development stage for reservoir V-17 at PA Mayak site.

4. Completion of Structure 4 (building № 804) decommissioning at AECC site. The building was a part of a production facility for uranium isotope separation by gaseous diffusion method.

Establishment of SNF management system.

5. Operation of the first start-up unit of PDC for SNF reprocessing and construction of the second unit (with a capacity of 250 tons of SNF per year) at MCC site. The PDC is designed for SNF reprocessing based on advanced technologies providing no LRW discharges and minimizing the ultimate waste (solidified RW - HLW &ILW- intended for disposal.)
6. Complex for SNF cutting and container storage at Smolensk NPP has been put into pilot operation.
7. Over 12,000 SFAs of RBMK-1000 reactors were shipped from Leningrad and Kursk NPPs to dry storage facility at MCC site (2018-2019);
8. Continued reloading of WWER-1000 SFAs from the "wet" to the "dry" storage facility at MCC site.
9. Industrial-scale shipment and reprocessing of non-conditioned RBMK-1000 SFAs at PA Mayak.
10. Industrial-scale reprocessing of WWER-1000 SNF at PA Mayak.
11. Development and practical use of TUK-141O cask designs to enable shipment of WWER-1000 SNF with increased initial enrichment and burn-up for reprocessing to PA Mayak.
12. Completed shipment of AMB SNF from spent fuel pool № 2 of Beloyarsk NPP for its further storage and reprocessing at PA Mayak.

13. Commissioning of a protective shelter for SNF retrieval from FMB Lepse. In 2019, SNF retrieval from FMB's bow section was started using a purpose designed unit package enabling its further reprocessing at PA Mayak.
14. Novel methods were developed enabling reprocessing of SNF types that were previously considered as not suitable for reprocessing (uranium-zirconium, carbide, and others).
15. Full range of efforts on the removal of legacy RW and the decommissioning of legacy Radon-type storage facilities at the site of FEO's Murmansk branch was implemented.

Important know-how was gained during work execution with relevant practices developed to implement the following work stages:

- identification and accounting of legacy RW with different composition and stored in bulk, in process of waste retrieval and segregation for further processing;
- operations performed using automated equipment and radiation monitoring systems providing high level of personnel protection;
- development of decommissioning concepts and programs for storage facilities and their feasibility assessment, development of design documentation, selection of decommissioning options considering the opportunities for further unrestricted industrial use of the sites;
- decommissioning efforts performed with due account of the requirement on minimization of RW generation, and absence of radioactive discharges into the environment.

K.4. Good Practices

1. Components of the integrated centralized complex for SNF management at MCC site , Implementation, including "wet" and "dry" storage facilities, SNF reprocessing and uranium-plutonium fuel fabrication facilities. Centralized complex for SNF management will have benefits through minimal transport, optimization and alignment of processes, avoiding multiple handling of radioactive materials in different plants of the fuel cycle and comprehensive and integrated waste treatment and storage facilities and reach the strategic goals , recycling of nuclear materials in thermal and fast reactors to close the nuclear fuel cycle with enhanced environmental safety of reprocessing achieved via the application of a technology excluding LRW discharges, reducing the potential hazard of the RW generated due to partitioning and transmutation of long-lived radionuclides;.

K.5. Suggestions

No suggestions were provided.

K.6. Overview Matrix

Type of Liability	Long Term Management Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Fuel	Temporary storage; Reprocessing	State; Operating organization (operator)	Dry and wet storage (at-reactor storage and centralized storage at MCC and PA Mayak); Reprocessing (RT-1	Second start-up unit of Pilot Demonstration Center at MCC

			plant at PA Mayak, first start-up unit of Pilot Demonstration Center at MCC site)	
Nuclear Fuel Cycle Waste	Processing and transfer to the National Operator for disposal; Remediation of uranium mining and milling sites; Facilities holding special (non-retrievable) RW and disposal facilities for special RW are upgraded to RW disposal facilities	State; Operating organization (operator); Special Reserve Fund	Processing and storage at the sites of operating organizations (operators); Transfer for processing and storage to specialized organizations (FSUE FEO, FSUE Radon); SRW disposal (LLW and ILW) in the first section of NS DF at UECC site; Deep well injection of LRW	Near-surface disposal facility for solid LLW and ILW located in RATE Ozersk (Chelyabinsk Region, PA Mayak); Near-surface disposal facility for solid LLW and ILW located in RATE Seversk (Tomsk Region, SCC); Underground research laboratory developed to evaluate the feasibility of constructing the proposed ILW and HLW deep disposal facility; Second section of a near-surface disposal facility in Novouralsk, Sverdlovsk Region (UECC)
Non-fuel cycle Wastes	Processing and subsequent transfer to the National Operator for disposal	State; Operating organization (operator); Special Reserve Fund	Processing and storage at the sites of specialized organizations (FSUE FEO, FSUE Radon)	RW (LLW and ILW) disposal facilities

Decommissioning	Decommissioning Program	State; Operating organization (operator); Special Reserve Fund	Two pilot demonstration centers were established: – PDC for production uranium-graphite reactors decommissioning; – PDC for WWER-type reactor decommissioning. In 2017 – 2019, a total of 22 nuclear facilities was decommissioned, including: – VOU M-2079 facility (SCC), research reactor installation EBR-L (FSUE VNIITF); – critical test facility MATR-2 (IPPE); – radiation sources EG-1 and EG-2.5 (IPPE), Sigma-Aralia (IRM), radiation sources of JSC Tsentrotekh-SPb; – Building 804 (AECC); – SF RW of the Murmansk branch of FEO's North-Western	82 nuclear facilities are planned to be decommissioned by 2030.

			Territorial District.	
Disused Sealed Sources	Processing and subsequent transfer to the National Operator for disposal	State; Operating organization (operator); Special Reserve Fund	As of the end of 2019, 3,080,000 DSRSs were held in SFs (including 2,268,000 at FSUE FEO site, 597,000 at FSUE Radon site; 61,000 at PA Mayak site; 46,000 at MCC site; 30,000 at RIAR site; 24,000 at SCC site)	RW disposal facilities

Section L. Annexes

Annex B1. SNF Management

Table B1.1. Infrastructure Facilities for SNF Management

Location		Facility type
NPP		
Kola NPP	WWER-440	Storage facility
Novovoronezh NPP	WWER-440 WWER-1000 WWER-1200	
Balakovo NPP	WWER-1000	
Rostov NPP	WWER-1000	
Kalinin NPP	WWER-1000	
Kursk NPP	RBMK-1000	
Leningrad NPP	RBMK-1000 WWER-1200	
Smolensk NPP	RBMK-1000	
Beloyarsk NPP	BN-600 BN-800 AMB	
Bilibino NPP	EGP-6	
FNPP	KLT-40S	
NFC		
PA Mayak	WWER-440, AMB	Reprocessing facility Storage facility
MCC, PDC	WWER-1000 RBMK-100	Storage and reprocessing
RR		
NRC Kurchatov Institute	MR IR-8	Storage facility
IPPE	AM-1 BR-10	
IRM	IVV-2M	
RIAR	MIR.M1 SM-3 RBT-10/2 BOR-60 VK-50 KORO	
PNPI named after Konstantinov	VVR-m	Storage facility
Branch of Karpov IPC	VVR-ts	
MEPhI	IRT- MEPhI	
SSU TPU SRI NF	IRT-T	
Marine nuclear reactors		
“Atomflot”, FMB “Lotta”		Storage facility
Dry (Cask) storage for icebreakers’ SNF		

Table B1.2. SNF Inventory from Different Reactor Units, as of 01.01.20

Operating organization and its branches	Fuel type	SNF quantity, metric tons
Kola NPP	WWER-440	90.42
Novovoronezh NPP	WWER-440	27.39
	WWER-1000/1200	141.39
Balakovo NPP	WWER-1000	475.54
Rostov NPP	WWER-1000	342.57
Kalinin NPP	WWER-1000	456.65
Kursk NPP	RBMK-1000	3,585.93
Leningrad NPP	RBMK-1000	3,626.69
	WWER-1200	22.35
Smolensk NPP	RBMK-1000	3,577.22
Beloyarsk NPP	BN-600, BN-800	55.73
	AMB	73.2
Bilibino NPP	EGP-6	185.67
PA Mayak	WWER-440, AMB, BN-600, RR, SNF of nuclear icebreaker fleet	616.0
MCC	WWER-1000	7,896.92
	RBMK	3,437.24
IPPE	AM-1	5.084
RIAR	MIR, SM, VK-50, BOR-60, IVV-2M	40,926
		0.089
Atomflot		9.7

* in terms of uranium metal

Annex B2. RW Generation

Table B2.1. LRW Generation in 2019

Total LRW	Volume	Activity
	790,000 m^3 — 100%	$9.00 \cdot 10^{18}$ Bq — 100%
LLW	84.44%	<0.001%
ILW	12.57%	0.085%
HLW	2.99%	99.915%

Table B2.2. SRW Generation in 2019

Total SRW	Mass	Activity
	830,000 t (100%)	$7.79 \cdot 10^{18}$ Bq (100%)
VLLW	99.35%	0.001%
LLW	0.57%	0.001%
ILW	0.06%	0.221%
HLW	0.02%	96,777%

Annex E. Framework Normative and Legal Acts

Annex E provides the list of framework normative 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 the list of basic regulations.

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.	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

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 Radioactive Waste Management and the Safety of Spent Nuclear Fuel 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 Fire Safety	№ 69-FZ of December 21, 1994
7.	Water Code of the Russian Federation	№ 74-FZ of May 26, 2006
8.	On Environmental Assessment	№ 174-FZ of November 23, 1995
9.	On Radiation Safety of Population	№ 3-FZ of January 9, 1996
10.	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 Departmental Security Service	№77- FZ

№	Title of the document	Reference number, date of signature
		of April 14, 1999
16.	On Special Ecological Programs for the Remediation of Radioactively Contaminated 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
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 of Managing and Disposing Property and Stocks of Organizations Involved in Activities 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 Constructions	№ 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
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 Protection of Rights of Legal Entities and Self-Employed Individuals During the State Control (Supervision) and Municipal Control	№ 246-FZ of July 13, 2015

№	Title of the document	Reference number, date of signature
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
41.	On Amendments to the Federal Law On Atomic Energy Use	№ 40-FZ of March 18, 2019

3. Decrees and Orders of the President of the Russian Federation

№	Title of a decree or an order	Reference number and signature date
1.	On the Control Over Export of Nuclear Materials, 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
3.	On Complying with Obligations Arising from Intergovernmental Agreements on Cooperation in Overseas Construction of Nuclear Power Plants Assumed by the Russian Federation	№ 472, of April 21, 1993
4.	On the State Support of Structural Reorganization and Re-Engineering of the Nuclear Sector in Zheleznogorsk (the Krasnoyarsk region)	№ 72, of January 25, 1995
5.	On Follow-up Steps to Strengthen Control Over the Compliance with the Environmental Safety Requirements for SNF Reprocessing	№ 389, of April 20, 1995
6.	On Improved 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 the Field of 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 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 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

4. Decrees and Orders of the Government of the Russian Federation

№	Decree/Order title	Reference number and signature date
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 Sources of Ionizing Radiation in the Territory of the Russian Federation	№ 505, of July 22, 1992
2.	On Steps Taken for Comprehensive Solution of 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 Drafting Radiation and Hygienic Certificates ("Passports") for Organizations and their Sites	№ 93, of January 28, 1997
6.	On the Approved List of Employee Positions at Nuclear Power Facilities Requiring Permits from the Federal Service for Environmental, Technological and Nuclear Supervision to Exercise the Right of Performing Certain Activities in the Field of Atomic Energy Use	№ 240, of March 3, 1997
7.	On Rules for Making Decisions on Siting and Construction of Nuclear Installations, Radiation Sources and Storage Facilities	№ 306, of March 14, 1997
8.	On the Steps Taken Pursuant to the Decree of the President of the Russian Federation № 166 On the Improved Management of Nuclear Fuel Cycle Enterprises	No 677, of June11, 1996
9.	On the Approved Regulation on the Procedure for the Development and Approval of Federal Rules and Regulations in the Field of Atomic Energy Use	No 1511, of December 1, 1997
10.	On Export and Import of Nuclear Material, Equipment, Special Non-Nuclear Materials and Relevant Technologies	№ 973, of December 15, 2000
11.	On the Approved Regulation Concerning the State Sanitary and Epidemiologic Supervisory Service of the Russian Federation and of a Regulation on the State Sanitary and Epidemiologic Regulatory Standardization	№ 554, of July 24, 2000
12.	On the State Competent Authority for Nuclear and Radiation Safety During Transportation of Nuclear Material, Radioactive Material and Relevant Products	№ 204, of March 19, 2001
13.	On the Importation of Irradiated Nuclear Fuel Reactor Assemblies to the Territory of the Russian Federation	№ 418, of July 11, 2003
14.	On the Approved Regulation for Funding Special Environmental Programs on the Remediation of Radioactively Contaminated Territories	№ 588, of September 22, 2003
15.	On the Approved Regulation on the Development of Special Environmental Programs on the Remediation of Radioactively Contaminated Territories	№ 421, of June 14, 2002
16.	On the Federal Environmental, Industrial and Nuclear Supervision Service	№ 401, of July 30, 2004
17.	On the Federal Medical and Biological Agency	№ 206, of April 11, 2005
18.	On Federal Executive Authorities and Authorized Organizations Exercising State Management in the Field of Atomic Energy Use and	№ 412, of July3, 2006

№	Decree/Order title	Reference number and signature date
	State Regulation of Safety in the Field of Atomic Energy Use	
19.	On Engineering Investigations for the Development of Design Documentation, Construction and Reconstruction of Capital Facilities	№ 20, of January 19, 2006
20.	On the State Building Supervision in the Russian Federation	№ 54, of February 1, 2006
21.	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
22.	On the Federal Target Program Nuclear and Radiation Safety in 2008 – 2015	№ 444, of July 13, 2007
23.	On the Approved Rules for Physical Protection of Nuclear Material, Nuclear Installations and Storage Facilities for Nuclear Material	No 456, of July 19, 2007
24.	On the Structure of Particular Sections of Design Documentation and Requirements to their Contents	№ 87, of February 16, 2008
25.	On the Approved Regulation on the System for Nuclear Material Accounting and Control	№ 352 of May 6, 2008
26.	On the Approved Regulation on the State Atomic Energy Corporation Rosatom	№ 888, of November 26, 2008
27.	On the List of Organizations Operating Particularly Hazardous Nuclear and Radiation Productions and Facilities	№ 1311-r, of September 14, 2009
28.	On Amendments Introduced to Certain Government Decrees of the Russian Federation Concerning the Competences of the Ministry of Natural Resources and the Environment, the Federal Service for Supervision of Natural Resources, the Federal Environmental, Industrial and Nuclear Supervision Service	№ 717, of September 13, 2010
29.	On Amendments to Certain Government Regulations of the Russian Federation	№ 48, of February 4, 2011
30.	On the Approved Regulation on the Recognition of an Organization Able to Operate a Nuclear Installation, Radiation Source or Storage Facility and to Perform Siting, Design, Construction, Operation and Decommissioning of the 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
31.	On the List of Operating Organizations Subject to 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, on Amending and Invalidating Certain Acts of the Government of the Russian Federation	№ 597, of July 20, 2011
32.	On the National Operator for Radioactive Waste Management	№ 384-r, of March 20, 2012
33.	On the Approved Regulation on Continuous State Supervision of Nuclear Facilities	№ 373, of April 23, 2012
34.	On the Approved List of Nuclear Facilities Subjected to Continuous State Supervision	№ 610-r, of April 23, 2012
35.	On the Primary Registration of Radioactive Waste	№ 767, of July 25, 2012
36.	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	№ 899, of September 10, 2012

№	Decree/Order title	Reference number and signature date
	Nuclear Power Units	
37.	On the Federal State Supervision in the Field of Atomic Energy Use	№ 1044, of October 15, 2012
38.	On the Criteria Used to Categorize Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Categorize Radioactive Waste as Special (Non-Retrievable) Radioactive Waste and Retrievable Radioactive Waste, Criteria for the Classification of Retrievable Radioactive Waste	№ 1069, of October 19, 2012
39.	On the Registration of Organizations Operating Radiation Sources Exclusively Containing Radionuclide Sources of the Fourth and the Fifth Categories of Radiation Hazard	№ 1184, of November 19, 2012
40.	On the Procedure and Timeframes for the Establishment of a Unified State System for RW Management	№ 1185, of November 19, 2012
41.	On the Approved Regulation Concerning the Return of Spent Sealed Source of Ionizing Radiation of Russian Production to the Russian Federation, and the Return of Spent Sealed Sources of Ionizing Radiation to the Countries of Origin	№ 1186, of November 19, 2012
42.	On the Approved Rules Governing National Operator's Contributions, Being Part of Costs Paid by RW Generating Organizations that do not Operate Particularly Hazardous Nuclear and Radiation Facilities, to the RW Disposal Fund	№ 1187, of November 19, 2012
43.	On Amendments Introduced to Certain Government Decrees of the Russian Federation	№ 1189, of November 19, 2012
44.	On the Procedure for the State Regulation of Radioactive Waste Disposal Tariffs	№ 1249, of December 3, 2012
45.	On Federal Rules and Regulations in the Field of Atomic Energy Use	№ 1265, of December 6, 2012
46.	On the Approved Regulation on Assigning Nuclear Facilities to Specific Categories and Specifying the Composition and Boundaries of Such Facilities	№ 1494, of December 30, 2012
47.	On the Approved Regulation Concerning Particular Aspects of the Standardization Process for Products (Operations, Services) Subject to the 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
48.	On Licensing Activities in the Field of Atomic Energy Use	№ 280, of March 29, 2013
49.	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 Production Subject to the Safety Requirements Effective in the Field of Atomic Energy Use, as well as Design Processes (Including Research Efforts), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Sales, Disposition and Disposal of Above Mentioned Products	№ 362, of April 23, 2013
50.	On the Approved Regulation on Assigning a Legal Entity to 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
51.	On the Accreditation in the Field of Atomic Energy Use	№ 612,

№	Decree/Order title	Reference number and signature date
		of July 20, 2013
52.	On Fire Prevention Conditions	№ 390, of April 25, 2012
53.	On Federal State Metrological Supervision	№ 246, of April 6, 2011
54.	On the Management of the State System for Accounting and Control of Radioactive Material and Radioactive Waste	№ 542 of June 15, 2016
55.	On the Use of Risk Informed Approach in the Implementation of Certain Types of State Control (Supervision) and Introduction of Relevant Amendments to Certain Regulations of the Government of the Russian Federation	№ 806 of August 17, 2016
56.	On the Approved List of Nuclear Facilities Providing for the Establishment of Safety Zones with a Special Legal Regime Aimed at Attaining Increased Anti-Terrorist Security	№ 862-r of May 4, 2017
57.	On the Approved Rules for the Provision of Subsidies from the Federal Budget to Legal Entities to Reimburse the Costs of RW Management and Invalidating Some Acts of the Government of the Russian Federation	№ 643 of May 27, 2017
58.	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
59.	On Amendments to the Rules on Providing Subsidies from the Federal Budget to Legal Entities Reimbursing the Costs of RW Management	№ 892 of July 13, 2019
60.	On Amendments to the Regulation on Arranging a System of State Accounting and Control of Radioactive Material and Radioactive Waste	№ 1475 of November 20, 2019
61.	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

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

No	Title of the Document	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
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 Emergency Situation, Prompt Exchange of Information and Emergency Support in the Event of Radiation Hazardous Situations at Nuclear Power Plants	NP-005-16
5.	Requirements to the Contents of Safety Analysis Reports for NPPs with WWER 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 an Accident at an NPP	NP-015-12
11.	General Safety Provisions for Nuclear Fuel Cycle Facilities	NP-016-05
12.	General Requirements for NPP Unit Operating Lifetime Extension	NP-017-18

No	Title of the Document	Reference number
13.	Requirements to the Contents of Safety Analysis Reports for NPPs 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 on Marine Nuclear Propulsion Units	NP-022-17
18.	Requirements to Safety Analysis Reports Drafted for Marine Nuclear Propulsion Units	NP-023-2000
19.	Requirements on Evaluating the Possibility of Design Life Extension for Nuclear Facilities	NP-024-2000
20.	Regulation on the Procedure for Investigating Operational Disorders at Research Nuclear Facilities	NP-027-10
21.	Rules for the Safe Decommissioning of Research Nuclear Facilities	NP-028-16
22.	General Rules for Accounting and Control of Nuclear Materials	NP-030-19
23.	Design Development Standards for Seismic Resistant NPPs	NP-031-01
24.	NPP Site. Safety Requirements	NP-032-19
25.	General Safety Provisions for Research Nuclear Facilities	NP-033-11
26.	Rules for Physical Protection of Radioactive Materials, Radiation Sources and Storage Facilities	NP-034-15
27.	Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements	NP-035-02
28.	Rules for the Safe Decommissioning of Vessels and other Waterborne Vehicles with Nuclear Installations and Radiation Sources	NP-037-11
29.	General Safety Provisions for Radiation Sources	NP-038-16
30.	Regulation on the Procedures for Investigating and Accounting Operational Disorders at Nuclear Fuel Cycle Facilities	NP-047-11
31.	Requirements to the Contents of Safety Analysis Reports for Research Nuclear Facilities	NP-049-17
32.	Siting of Nuclear Fuel Cycle Facilities. Main Criteria and General Safety Requirements	NP-050-03
33.	Requirements to the Contents of Safety Analysis Reports for Nuclear Fuel Cycle Facilities	NP-051-04
34.	Requirements for the Safe Temporary Storage of Radioactive Waste Resulting from Mining, Processing and Use of Minerals	NP-052-04
35.	Rules for the Safe Transportation of Radioactive Material	NP-053-16
36.	Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements	NP-055-14
37.	Rules for the Safe Decommissioning of Nuclear Fuel Cycle Facilities	NP-057-17
38.	Safety in Radioactive Waste Management. General Provisions	NP-058-14
39.	Siting of Storage Facilities for Nuclear Materials and Radioactive Materials. Basic Criteria and Safety Requirements	NP-060-05
40.	Requirements for the Safe Storage and Transportation of Nuclear Fuel on Nuclear Facilities	NP-061-05
41.	Nuclear Safety Rules for Nuclear Fuel Cycle Facilities	NP-063-05
42.	On Accounting External Natural and Man-Induced Impacts on Nuclear Facilities	NP-064-17
43.	Requirements to the Contents of Safety Analysis Reports for R&Ds Involving the Use of Plutonium Containing Materials at Nuclear Fuel Cycle Facilities	NP-065-05
44.	Requirements to Safety Analysis Reports for Storage Facilities for Nuclear Materials	NP-066-05

No	Title of the Document	Reference number
45.	General Rules for Accounting and Control of Radioactive Material and Radioactive Waste in Organizations	NP-067-16
46.	Near-Surface Disposal of Radioactive Waste. Safety Requirements	NP-069-14
47.	Rules for the Safe Configuration and the Safe Operation of Equipment and Pipelines at Nuclear Fuel Cycle Facilities	NP-070-06
48.	Rules for Compliance Assessment of Equipment, Components, Materials and Semi-Finished Material Supplied to Nuclear Facilities	NP-071-06
49.	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, Setup, Adjustment, Operation, Storage, Transportation, Sales, Disposition and Disposal	NP-071-18
50.	Rules for Converting Nuclear Materials into Radioactive Materials or Radioactive Waste	NP-072-13
51.	Rules for the Physical Protection of Radioactive Materials and Radiation Sources during their Transportation	NP-073-11
52.	Requirements to Planning and Ensuring Preparedness to the Elimination of Consequences of Accidents Associated with the Transportation of Nuclear and Radioactive Materials	NP-074-06
53.	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
54.	Installations Providing Immobilization of Transuranic Radioactive Waste. Safety Requirements	NP-076-06
55.	Requirements to the Contents of Action Plans for Personnel Protection in the Event of an Accident at a Nuclear Fuel Cycle Enterprise	NP-077-06
56.	Regulation on the Procedure for the Declaration of Emergency Preparedness, Emergency Situation, and Prompt Exchange of Information in the Event of Radiation Hazardous Conditions at Nuclear Fuel Cycle Enterprises	NP-078-06
57.	Requirements for Planning Actions and Protection of Employees (Personnel) in the Event of Radiation Accidents at Nuclear-Powered Vessels and (or) Other Waterborne Vehicles	NP-079-18
58.	Requirements for Systems Providing Physical Protection of Nuclear Materials, Nuclear Installations and Storage Facilities for Nuclear Materials	NP-083-15
59.	Provision on the Procedure for Investigating and Accounting Operational Disorders at Conveyances Fitted with Nuclear Installations and Radiation Sources	NP-088-11
60.	Requirements on the Quality Assurance Programs for Nuclear Facilities	NP-090-11
61.	Safe Decommissioning of Nuclear Facilities. General Provisions	NP-091-14
62.	RW Acceptance Criteria for Disposal	NP-093-14
63.	Requirements for the Safe Decommissioning of Radioactive Waste Storage Facilities	NP-097-16
64.	Facilities for Plutonium Nuclear Fuel Fabrication. Safety Requirements	NP-098-17
65.	Requirements on the Contents and Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities	NP-099-17
66.	Requirements on the Contents and Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities	NP-100-17
67.	General Safety Provisions for Spacecrafts with Nuclear Reactors	NP-101-17
68.	Safety Requirements for Facilities Holding Non-Retrievable RW and Disposal Facilities for Non-Retrievable RW.	NP-103-17
69.	Regulation on the Procedure for Declaring a State of Emergency, Prompt Exchange of Information in Case of Radiation Hazardous Situations at Research Nuclear Facilities	NP-106-19
70.	Radiation Safety Standards	NRB-99/2009
71.	Basic Sanitary Rules of Radiation Safety	OSPORB-99/2010

No	Title of the Document	Reference number
72.	Hygienic Requirements to the Design Development of Enterprises and Facilities in the Nuclear Sector	SPP PUAP-03
73.	Sanitary Protection Zones and Surveillance Zones of Nuclear Facilities. Operational Conditions and Justification of their Boundaries	SP SZZ and ZN-07
74.	Fire Safety at Enterprises. General Requirements	NPB 201-96

6. Safety Guides of Rostechnadzor

№	Title of the document	Reference number
1.	Requirements to Safety Analysis Reports for Radioactive Waste Storage Facilities Concerning External Impact Accounting	PNAE G-14-038-96
2.	Identification of Initial Seismic Vibrations of Soil for Design Basis	RB-006-98
3.	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
4.	Requirements to the Contents of Unit Decommissioning Programs	RB-013-2000
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 during Engineering Surveys and Studies	RB-019-18
7.	Contents and Structure of Safety Analysis Reports for the Decommissioning of Nuclear Power Plant Units	RB-031-04
8.	Recommendations on Recruitment, Training, Maintaining and Enhancing the Competence of Operating Personnel at Nuclear Fuel Cycle Facilities	RB-034-05
9.	Monitoring of Engineering and Geological Conditions at the Sites of Nuclear Fuel Cycle Facilities	RB-036-06
10.	Contents and Structure of Annual Reports on Nuclear and Radiation Safety at Nuclear Fuel Cycle Facilities	RB-043-13
11.	Dynamic Monitoring of Structures at Nuclear Facilities	RB-045-08
12.	Monitoring of Meteorological and Aerological Conditions at the Sites of Nuclear Facilities	RB-046-08
13.	Methods Used to Evaluate the Safety Culture Level at Nuclear Fuel Cycle Facilities	RB-047-16
14.	Extending the Service Life of Transportation Casks Designed for SNF Transportation	RB-048-09
15.	Regulation Concerning the Re-Categorization of Nuclear Materials as Radioactive Waste	RB-052-15
16.	Regulation on the Contents and Structure of Radiation Safety Reports Drafted by Organizations Operating Radiation Sources	RB-054-09
17.	Regulation on Fire-Explosion Safety Assessment of Work Flows at Radiochemical Productions	RB-060-10
18.	Regulation on the Contents and Structure of Safety Analysis Reports for Radiation Sources	RB-064-11
19.	Regulation on the Procedure for Acquiring Data on the Amount of Nuclear Material Required for Accounting and Summarizing the Physical Inventory	RB-065-17
20.	Regulation on the Application of Mathematical Statistics in Accounting and Control of Nuclear Material	RB-066-11

21.	Regulation on Inventorying Radioactive Waste in Organizations	RB-071-11
22.	Regulation on Inventorying Radioactive Material in Organizations	RB-072-11
23.	Safe Decommissioning (Closure) of Tailings	RB-078-12
24.	Contents and Structure of Reports Summarizing the Findings of a Comprehensive Engineering and Radiation Survey Required for NPP Unit Decommissioning	RB-081-13
25.	Recommendations on the Contents of Document Portfolio Justifying the Limits Set for Radioactive Discharges into the Atmosphere and Water Bodies	RB-085-13
26.	Recommendations on the Development of Quality Assurance Programs for Radioactive Waste Management	RB-086-13
27.	Recommendations on the Procedures Applied to Ensure the Robustness of Equipment Used at Nuclear Facilities	RB-087-13
28.	Evaluation of the Current Safety Level at Nuclear Facilities	RB-091-13
29.	Recommendations on the Safe Return of the By-Products Resulting from SFAs Reprocessing to the State of Origin	RB-092-13
30.	Radiation, Thermal and Physical Characteristics of Spent Nuclear Fuel from WWER units	RB-093-20
31.	Recommendations on the Use of Sealing Equipment in the System of Accounting and Control of Radioactive Material and Radioactive Waste	RB-095-20
32.	Structure and Contents of Guidelines on Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations	RB-096-14
33.	Recommendations to the Contents and Structure of Safety Analysis Reports for the Decommissioning of Nuclear Fuel Cycle Facilities	RB-099-14
34.	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
35.	Recommendations to the Structure and the Contents of Decommissioning Programs for Ships and other Waterborne Vehicles Fitted with Nuclear Reactors and Nuclear Maintenance Service Ships	RB-105-15
36.	Recommendations on the Quantitative Evaluation of Parameters Required for the Development and Approval of Standards Setting Up Maximum Allowable Discharges of Radioactive Substances into the Atmosphere	RB-106-15
37.	Recommendations to the Contents and Structure of Safety Analysis Reports for Dual-Purpose Containers Used for Spent Nuclear Fuel Storage and Transportation	RB-107-15
38.	Recommendations Regarding the Form of Certificates and Relevant Data on Radiation Sources Required for the State Accounting and Control of Radioactive Material and Radioactive Waste	RB-109-15
39.	Recommendations on the Development of Quality Assurance Programs for the Transportation of Radioactive Material	RB-110-16
40.	Safe Closure of Near-Surface Disposal Facilities for Radioactive Waste	RB-111-16
41.	Safe Remediation of Sites Contaminated due to Mining and Milling of Uranium and Thorium Ores	RB-113-16
42.	Recommendations on the Development of Quality Assurance Programs for the Decommissioning of Nuclear Facilities	RB-114-16
43.	Recommendations on the Contents and Structure of Facility-Level Documents on the Physical Protection of Radioactive Materials, Radiation Sources and Storage Facilities	RB-115-16

44.	Recommendations on the Probabilistic Safety Assessment of Spent Nuclear Fuel Storage Facilities	RB-116-17
45.	Long-Term Safety Assessment of Near-Surface Disposal Facilities for Radioactive Waste	RB-117-16
46.	Recommendations on the Institutional Control Performed under the System for Accounting and Control of Radioactive Materials and Radioactive Waste in Organizations	RB-119-17
47.	Recommendations on the Vulnerability Evaluation of Nuclear Installations	RB-120-16
48.	Safety Assessment for the Pre-Disposal Management of Radioactive Waste	RB-122-16
49.	Recommendations on the Final Evaluation of a Nuclear Facility Subject to Decommissioning	RB-124-16
50.	Evaluation of Fire and Explosion Hazards Associated with Sorption Systems Used in Spent Nuclear Fuel Reprocessing	RB-125-17
51.	Recommendations on the Quantitative Evaluation of Parameters Required for the Development and Approval of Standards Setting Up Maximum Allowable Discharges of Radioactive Substances into Water Bodies	RB-126-17
52.	Contents and Structure of Radiation Safety Programs for the Transportation of Radioactive Materials	RB-127-17
53.	Recommended Methods for Assessing and Predicting the Radiation Consequences of Accidents at Nuclear Fuel Cycle Facilities	RB-134-17
54.	Recommendations on the Methods and Means Designed to Monitor Release of Radioactive Materials into the Atmospheric Air	RB-135-17
55.	Contents and Structure of Safety Analysis Reports for Deep Well Injection Facilities for Liquid Radioactive Waste	RB-139-17
56.	Recommendations on the Development of RW Acceptance Criteria for Disposal During the Development of Designs for Near-surface RW Disposal Facilities	RB-141-18
57.	Seismological Monitoring at the Sites of Nuclear and Radiation Hazardous Facilities	RB-142-18
58.	Recommendations on Accounting the Changes in the Operating Conditions of Systems and Elements Pertaining to Shutdown Nuclear Fuel Cycle Facilities when Identifying the Opportunities for Reduced Maintenance and Introducing Relevant Amendments to the Operational Documentation on Nuclear Fuel Cycle Facilities	RB-144-18
59.	Recommendations on Upgrading Facilities Holding Non-Retrievable RW into Non-Retrievable RW Disposal Facilities and RW Disposal Facilities	RB-146-18
60.	Recommendations on Demonstrating the Feasibility of NF Decommissioning Option	RB-153-18
61.	Recommendations on the Application of the Radionuclide Vector Method to Determine the Content of Difficult-to-Measure Radionuclides in Radioactive Waste from Nuclear Fuel Cycle Facilities	RB-154-19
62.	Recommendations on the Procedure, Scope, Methods and Means of Control over RW to Confirm its Compliance with Waste Acceptance Criteria for Disposal	RB-155-20

63.	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
64.	Recommendations for a Comprehensive Engineering and Radiation Survey of Nuclear Facility	RB-159-19
65.	Recommendations on the Development of a Program for a Comprehensive Engineering and Radiation Survey of Nuclear Facility	RB-160-19
66.	Recommendations on the Structure and Content of Safety Analysis Reports Focused on the Management of Nuclear Materials, Radioactive Materials and Radioactive Waste during their Transportation	RB-163-19
67.	Recommendations for Assessing the Safety Level of Storage Facilities and Identifying the Non-compliance with the Requirements of Current Federal Rules and Regulations in the Field of Atomic Energy Use	RB-164-20

7. Guideline Documents of Rostechnadzor

№	Title of the document	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 Regulations for the Federal Environmental, Industrial and Nuclear Supervision Service Regarding the Implementation of its State Function Associated with Federal State Supervision in the Field of Atomic Energy Use	№ 248, of June 7, 2013
3.	Administrative Regulations on the Federal Environmental, Industrial and Nuclear Supervision Service on Providing its State Service on 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	№ 224, of April 3, 2012
6.	Method for the Development and Establishment of Standards for Maximum Acceptable Discharges of Radioactive Materials into the Atmosphere	№ 639, of November 7, 2012
7.	Method for the Development and Establishment of Standards for Maximum Acceptable Discharges into Water Bodies	№ 551, of December 22, 2016