THE FIFTH 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 sixth Review Meeting in frames of the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management

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This fifth National Report of the Russian Federation has been drafted 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 has been 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 State-Funded Institution Scientific and Engineering Center for Nuclear and Radiation Safety (FSFI 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
FMB	—	floating maintenance base
FMBA of Russia	—	Federal Medical and Biological Agency
FNP	—	federal norms and rules
FR	—	fuel rod
FTP NRS	—	Federal Target Program Nuclear and Radiation Safety in 2008 and until 2015
FTP NRS-2	—	Federal Target Program Nuclear and Radiation Safety in 2016-2020 and until 2030
FZ	—	Federal law
GD	—	guideline 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
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 SRC 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 – 2020 and until 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 NIFKhl)
NITI	—	Federal State Unitary Enterprise Research and Technological Institute named after A.P. Aleksandrov (FSUE NITI)
NM	—	nuclear material
NP	—	norms and rules
NPF	—	nuclear power facility
NPGC	—	nuclear power generation complex
NPP	—	nuclear power plant
NRC KI	—	National Research Center Kurchatov Institute

NRHF	—	nuclear and radiation hazardous facility
NRS	—	nuclear and radiation safety
OSPORB 99/2010	—	Basic Sanitary Rules of Radiation Safety (OSPORB 99/2010). Basic Rules and Standards SP 2.6.1.2612-10
PA Mayak	—	Federal State Unitary Enterprise Production Association 'Mayak' (FSUE PA 'Mayak')
PA Start	—	Federal State Unitary Enterprise Federal Research and Production Center named after M.V. Procenko (Production Association 'Start')
PDC	—	pilot demonstration center
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
RFNC-VNIIEF	—	Russian Federal Nuclear Center All-Russian Research Institute of Experimental Physics
RIAR	—	Open-Type Joint Stock Company State Research Centre of the Russian Federation – 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
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
SPORO	—	Sanitary Rules for Radioactive Waste Management
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 fifth National Report of the Russian Federation on compliance with the obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter Convention) covers the period from November 2014 to April 2017.

The purpose of the National Report is to provide information on the compliance with the obligations for the safety of 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 fifth Review Meeting held in the IAEA Headquarters (Vienna, Austria) on May 11 – 22, 2015.

A.2. Structure of the Report

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

The Report demonstrates how the Russian Federation has been complying with every obligation arising from the provisions and requirements discussed in relevant Articles of the Convention.

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

The following key accomplishments of the Russian Federation aimed at ensuring the enhanced safety and regulation of SNF and RW management practice were pointed out during the final plenary session of the fifth Review Meeting:

- Construction of a “dry” storage facility for RBMK-1000 and WWER-1000 SNF was completed at MCC.
- Refurbishment of a “wet” storage facility for WWER-1000 SNF was completed at MCC.
- Efforts were underway on the establishment of a pilot-demonstration center for SNF reprocessing at MCC (construction license was granted).
- New RW treatment facilities were constructed.
- Efforts were performed at a number of surface water reservoirs for LRW storage under an action plan aimed at ensuring their environmentally safe configuration:
  - capping of surface water reservoirs at SCC: B-2 – completed, B-1 – ongoing;
  - surface water reservoir № 354 at MCC was capped, capping is ongoing at reservoirs № 354a, № 365, № 366;
  - capping efforts at PA Mayak reservoir V-9 (lake Karachay) were scheduled to be completed in 2015.
- Efforts were underway on the establishment of an underground research laboratory (deep geological RW disposal).
- Development and further improvement of federal norms and rules in the field of atomic energy use regulating the safety of SNF and RW management.
- Changes were introduced to Russian RW classification system based on waste disposal routes.
- Additional safety assessments were performed for SNF “wet” storage facility (in light of lessons learnt from the Fukushima accident), which served a basis for the development and implementation of additional technical and engineering solutions.
- Effective implementation of recommendations and suggestions of the IRRS post-mission by regulator.

As part of lessons learnt from the Fukushima accident, the following efforts were developed and performed at MCC to enhance the safety of “wet” SNF storage facility (KhOT-1) and “dry” SNF storage facility (KhOT-2), namely:

- extension of monitoring systems enabling to acquire data on geodynamic, seismic and geotechnical characteristics of the site, buildings and structures; construction of additional seismic and geodetic monitoring stations;
- implementing measures for beyond-design-basis accident management (“crash-tests”) at KhOT-1 and KhOT-2;
- setting up a system for SFA compartment emergency cooling and spraying at KhOT-1;
- commissioning of a new smoke exhaust system (as a fire protection measure at KhOT-1);
- enhancing the earthquake resistance of KhOT-2;
- inventorying potential external natural and man-made impacts.

It was emphasized that the Russian Federation should address a number of urgent tasks in SNF and RW management, namely:

- SNF management:
  - to complete the construction of a “dry” SNF storage facility at MCC (KhOT-2);
  - to ship the accumulated SNF inventory to a centralized storage facility and perform its reprocessing;

  - to complete construction of a pilot-demonstration center (PDC) for SNF reprocessing and provide further development of the advanced technology enabling to reprocess the main SNF streams accumulated to date.
- Addressing “nuclear legacy” challenges:
  - continued efforts on capping (placing into safe storage configuration) surface LRW storage reservoirs;
  - continued decommissioning of NRHFs;
  - continued remediation of contaminated sites;
  - implementation of IAEA peer-review recommendations on deep well injection of LRW;
  - continued dismantling of ships and floating maintenance bases of Russian nuclear icebreaker fleet;
  - commissioning of additional SNF reprocessing capacities;
  - creation of an underground research laboratory to study the proposed HLW deep geological disposal concept;
  - development of RW classification system based on RW disposal routs;
  - additional safety assessments for the “wet” SNF storage facilities located outside NPP sites.

Practical efforts enabling to address these tasks are implemented under FTP NRS-2 approved in 2015.

The following planned activities aimed at enhancing the safety of SNF and RW management in the Russian Federation were pointed out during the Review Meeting:

- activities scheduled under the second stage of USS RW establishment:
  - setting up the organizational framework for the system of LLW and ILW disposal;
  - construction of near-surface disposal facilities for LLW and ILW;
  - creation of an underground research laboratory to explore the concept of HLW deep geological disposal.
- upgrading and improvement of the state system for RM and RW accounting and control;
- further efforts to upgrade and improve the system of federal norms and rules in the field of atomic energy use and scientific and methodological support in SNF and RW management.

Following the Report presentation, some key milestones were highlighted by the Russian Federation:

- recommendations of the Fourth Review Meeting have been continuously and efficiently implemented by the Russian Federation;
- regulatory and legal framework for the safe management of SNF and RW consistent with relevant modern requirements and the latest best practices in this area has been established in the Russian Federation;
- a 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 recommendations, as well as planned and already implemented efforts aimed at improving SNF and RW management safety, the necessity of which was highlighted in the findings of the Review Meeting on the fourth 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

The State Program of the Russian Federation on the Development of Russian Nuclear Power Generation Complex (the latest version approved by the Government resolution of the Russian Federation № 344-11 of March 28, 2017), (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 has been set out by the Government Order of the Russian Federation № 1634-r of August 1, 2016. List of nuclear power plants scheduled for construction until 2030 includes 11 new power units.

Long-term goals and tasks, priorities and milestones set up for the long-term strategy ensuring the development of Russian power generation complex, as well as specific features of the state energy policy at particular stages of its implementation, enabling to achieve the identified goals and objectives are established by the provisions of the Energy Strategy of the Russian Federation Until 2030 approved by the Government resolution of the Russian Federation № 1715-r on November 13, 2009. The Energy Strategy provides for the following efforts scheduled in the field of Nuclear Fuel Cycle and Nuclear Power:

- upgrading NPP capacities with thermal-neutron reactors;
- construction of experimental and commercial power plants with fast breeder reactors;
- commissioning the new generation of supercritical water-cooled water-moderated power reactors with controlled neutron spectrum;
- elaborating the issues associated with operation of nuclear facilities and implementation of a closed nuclear fuel cycle involving new technologies and new enterprises enabling nuclear fuel supply to NPPs with due account of the overall and annual consumption of natural uranium, the required separation activities, nuclear fuel breeding factors, specific fuel tension rate in fast breeder reactors, as well as all relevant safety aspects;
- development of advanced RW treatment methods and technologies and ensuring closed nuclear fuel cycle when the rate of waste accumulation is equivalent to the rate of waste disposal according to the radiation factor.

State Policy Fundamentals of the Russian Federation in the Field of Nuclear and Radiation Safety up to 2025 approved by the Presidential decree № Pr-593 of March 1, 2012 (hereinafter State Policy Fundamentals) specifies the long-term aim, basic objectives, fundamental principles and crucial tasks of the state nuclear and radiation safety policy of the Russian Federation that were discussed in Section A.4.1 of the fourth National Report.

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

The Federal Target Program Nuclear and Radiation Safety in 2008 and until 2015 (hereinafter FTP NRS) approved by the Government resolution of the Russian Federation № 444 on 13 July, 2007 enabled to address the most urgent NRS issues facing the Russian Federation. FTP NRS enabled some fundamental changes in all areas relevant for NRS safety, including the elimination of some critical challenges associated with SNF storage at NPP sites. The amount of SNF shipped from NPP sites to the centralized storage facility exceeded the rate of its generation for all SNF streams; an enhanced safety level was achieved for the most part of the accumulated RW inventory held in storage facilities; capping efforts were completed at the most hazardous surface LRW storage reservoirs; 53 nuclear and radiation hazardous facilities were decommissioned and dismantled. Currently, a new Federal Target Program Nuclear and Radiation Safety in 2016 – 2020 and until 2030 (hereinafter FTP NRS-2) approved by the

Government resolution of the Russian Federation № 1248 of November 19, 2015 has been implemented in the Russian Federation. FTP NRS-2 is aimed at ensuring nuclear and radiation safety in the Russian Federation by addressing top priority challenges associated with “nuclear legacy” and setting up SNF and RW management infrastructure enabling to ensure the appropriate level of nuclear and radiation safety of nuclear legacy facilities followed by their elimination.

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 to improve legislative provisions aiming 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 the Use of Atomic Energy of November 21, 1995 to improve the legal framework for the state regulation of nuclear and radiation safety (Federal law № 74-FZ of March 30, 2016).

These amendments expanded the list of definitions adding some new items to the category of nuclear facilities: *nuclear fuel* (nuclear material used to generate heat energy and/or radiant fluxes in nuclear installations generated as a result of a controlled nuclear fission reaction), *spent nuclear fuel* (nuclear fuel that has been irradiated in the reactor core and ultimately removed from it).

The Federal law № 162-FZ On Standardization in the Russian Federation of June 29, 2015 sets up the legal framework for standardization in the Russian Federation, including those provisions that are relevant for the operation of a national standardization system, and is aimed at adopting a unified state policy in this area. This Federal law specifies the provisions regulating relations in the standardization area, including those arising from development, adoption, amendment (upgrading), repeal, and application of standards, as well as publication of relevant documents.

The Government resolution of the Russian Federation № 669 of July 12, 2016 On the Approval of a Standardization Provision Concerning the Products (Activities and Services) Subject to the Requirements Associated with Nuclear Safety in the Field of Atomic Energy Use, as well as Other Processes and Subjects Associated with these Products was adopted pursuant to part 2 Article 6 of the Federal law № 162-FZ On Standardization in the Russian Federation of June 29, 2015 and part 1 Article 8 of the Federal law On the State Atomic Energy Corporation Rosatom.

The Government of the Russian Federation made certain efforts to eliminate restrictions on the frequency and duration of regulatory inspections. In particular, the Federal law № 242-FZ On Amendments to Certain Legislative Acts of the Russian Federation Concerning State Control (Supervision) and Municipal Control of July 18, 2011 added Article 24.1 to the Federal law On the Use of Atomic Energy specifying particular aspects of federal state supervision in the field of atomic energy use, such as:

- the legal status “authorized authority of state regulation” was formalized;
- the term “federal state supervision in the field of atomic energy use” was defined;
- the procedure for scheduled and unscheduled inspections at nuclear facilities was set.

A specific Government order of the Russian Federation was adopted to ensure the implementation of Article 27 of the Federal law № 190-FZ On the Management of Radioactive Waste… of July 11, 2011, namely the Government order № 2499-r of December 7, 2015 *On the Approval of the List of Uranium Mining and Milling Organizations Generating RW, Operators of Particularly Hazardous Nuclear and Radiation Productions and Facilities, Organizations Involved in Operations Resulting in Very Low-Level Waste Generation that are Permitted to Dispose Such Waste in Disposal Facilities Located Within the Sites Used by these Organizations.*

On February 4, 2015, Government resolution of the Russian Federation № 95 On Introducing Amendments to the Government Resolution of the Russian Federation № 1069 of October 19, 2012 was adopted (see Section B.5 of this Report).

It is worth emphasizing that the key legal acts relevant for the implementation of the Federal law № 190 On the Management of Radioactive Waste… of July 11, 2011 were discussed in the fourth National Report (Section A.4.3).

The Government resolution of the Russian Federation № 297 of March 15, 2017 introduced some amendments to the Provision on State Regulation of RW Disposal Tariffs. Relevant figures are presented in section F.2.2 of this Report.

On June 15, 2016, Government resolution of the Russian Federation № 542 On the Management of the State System for Accounting and Control of Radioactive Material and Radioactive Waste regulating the procedure for state accounting and control of RW was adopted. The resolution also features a number of provisions discussing the procedures associated with:

- state accounting and control of RW;
- collection of data on RW inventory (RW amounts and its composition) and its transportation and relocation;
- RW registration;
- RW storage facility registration;
- RW inventory keeping;
- RW storage facility registry keeping;
- completing RW registration certificates.

The current system of federal norms and rules is an integrated part of the legal framework in the field of safe SNF and RW management. Its development and further improvement are primarily fostered by the need for FNPs upgrading in the light of legal changes and with due consideration to their past applications. Given below is a set of federal norms and rules regulating RW management activities that were adopted pursuant to the provisions of the Federal law № 190On the Management of Radioactive Waste…based on the analysis of its applications:

- Safety in RW Management. General Provisions (NP-058-14);
- Collection, Processing, Storage and Conditioning of LRW. Safety Requirements (NP-019-15);
- Collection, Processing, Storage and Conditioning of SRW. Safety Requirements (NP-020-15);
- Management of GRW. Safety Requirements (NP-021-15);
- Rules for the Safe Management of Radioactive Waste from Nuclear Power Plants (NP-002-15);
- Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14);
- Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14);
- RW Acceptance Criteria for Disposal (NP-093-14).

Relevant changes in the system of federal norms and rules are discussed in Section E.2.1.3.2 of this Report.

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

The core principle of the state policy of the Russian Federation in the field of SNF management involves SNF reprocessing to ensure ecologically sound management of fission products and to recycle the recoverable nuclear material into the nuclear fuel cycle.

The research and engineering policy, as well as the key provisions on the development and implementation of engineering and administrative arrangements at all SNF management stages are discussed in the Spent Nuclear Fuel Management Concept of the State Corporation Rosatom approved by the Order of the State Corporation Rosatom № 721 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 in provisions of the Institutional Target Program for Infrastructure Development and SNF Management in 2011 – 2020 and until 2030.

Priority tasks for managing the accumulated SNF inventory including construction of SNF management infrastructure facilities are discussed in the FTP NRS-2.

B.2. Practices of SNF Management

At present time, national practices of SNF management involve controlled storage and reprocessing of SNF and provide for addressing the priority tasks to ensure safe management of the accumulated SNF inventory under the FTP NRS-2.

B.2.1. Spent Nuclear Fuel from NPPs

As of January 1, 2017, a total of 35 nuclear power units was operated in Russia. Their overall installed capacity totaled 27.9 GW. Data on accumulation of SNF from different reactor types are summarized in Annex B1.

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

- SNF from WWER-440 and BN-600 reactor units: after interim storage in at-reactor pools (usually during 3 years for SNF BN-600 and from 3 to 5 years for SNF WWER-440), SNF is shipped to the reprocessing plant RT-1(PA Mayak) for its further reprocessing;
- SNF from WWER-1000: after interim storage in at-reactor or at-plant pools (usually for 3 or more years), SNF is shipped to the centralized storage facility at MCC (KhOT-1). In 2016, a pilot shipment and reprocessing of SNF from WWER-1000 was performed to test the transportation flow chart being part of SNF management system at RT-1 plant (PA Mayak);
- SNF from RMBK-1000: after interim storage in at-reactor pools, SNF is placed into “wet” storage facilities located in the vicinity of NPPs. Further on, SNF from these at-plant

storage facilities is transferred to at-plant cutting facilities, packed into TUK-109 casks and prepared for shipment to the centralized storage facility at MCC. Damaged RMBK-1000SNF not meeting MCC acceptance criteria for dry storage is shipped to the reprocessing plant RT-1 (PA Mayak);

- SNF from EPG-6: after storage in at-reactor pool, SNF is placed 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 storage facilities with its subsequent shipment to PA Mayak for reprocessing;
- SNF from AMB was removed from reactors, partially taken away from the site of Beloyarsk NPP, packaged into canisters and placed in the “wet” storage facility at PA Mayak, the rest of SNF is stored in at-reactor pools.

SNF management practice presented above is currently under revision, in particular:

- Preparations have been made to commence AMB SNF shipment from the Beloyarsk NPP to RT-1 (PA Mayak) for reprocessing in 2017;
- Construction of a modern AMB SNF management complex is ongoing at PA Mayak (completion of the first phase is scheduled for 2025);
- WWER-1000 SNF transfer from “wet” to “dry” storage facility at MCC has been started;
- A new type of TUKs (casks) designed for WWER-1000 and WWER-440 transportation is developed and put in place:
  - Shipment of WWER-1000 SNF to PA Mayak using the new TUK-141O cask designed for SFAs with enhanced initial enrichment and burnup was scheduled for 2017;
  - In-process testing of new certified TUK-140 cask designed for WWER-440 SNF is scheduled for 2017 – 2018 and a pilot shipment of WWER-440 SNF packed in TUK-140 to PA Mayak is scheduled for 2019.

B.2.2. SNF fromMarine Nuclear Propulsion Units

Currently Russia operates five nuclear-powered icebreakers — Taimyr (1988), Sovetskiy Soyuz (1989), Vaigach (1990), Yamal (1992), 50 Let Pobedy (2007) and a nuclear light container carrier Sevmorput (1988) (operated by FSUE Atomflot being part of the State Corporation Rosatom).

SNF from icebreakers is temporary stored at floating maintenance bases and in onshore facilities at FSUE Atomflot. Part of the icebreakers SNF has been discharged from nuclear icebreakers storage facilities, packaged into TUK-120 casks and transferred by FMB Lotta to accumulation storage site of FSUE Atomflot. Further on, using purpose-designed railway carriages icebreakers SNF is transported to PA Mayak for reprocessing.

B.2.3. SNF from Research Reactors (RR)

Currently, there are 20 operating RRs in Russia. Besides that, 2 RRs were mothballed, 9 RRs are undergoing decommissioning, and 2 RRs are under construction. RRs are operated by operating organizations pertaining to different institutions, including the State Corporation Rosatom – 10, NRC Kurchatov Institute – 7, 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 (PA Mayak). Efforts on SNF shipment to PA Mayak for reprocessing have been considerably intensified under state targeted funding provisions. In 2014 - 2016, a total of 3,754 RR SFAs were shipped for reprocessing to RT-1.

B.2.4. SNF from Foreign Reactors

A number of NPPs with WWER-1000 and WWER-440reactor units, as well as some research reactors using nuclear fuel of Russian production have been in operation outside the borders of the Russian Federation.

In the reporting period, the Russian Federation was engaged in international cooperation providing its SNF management services to the Ukrainian nuclear power reactors.

SNF from Ukrainian reactors of WWER-1000 type was taken to the MCC site for temporary storage and reprocessing, whereas SNF from WWER-440 reactors — 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 (RRRFR). In the reporting period, RR SNF shipments were performed from Kazakhstan (2014) and Poland (2016). In 2015, RR liquid SNF was shipped from Uzbekistan.

B.2.5. SNF Reprocessing and Storage at Specialized Enterprises (intended for these purposes)

Services on SNF centralized storage and reprocessing are provided by two enterprises of the State Corporation Rosatom, namely PA Mayak (“wet” storage and industrial reprocessing of all SNF streams) and MCC (centralized “wet” and “dry” storage and SNF reprocessing in the long run)(see Section D.1).

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

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

Adoption and implementation of the Federal law № 190-FZ On the Management of Radioactive Waste…became a key element of the State policy in this field. The law provides for RW disposal requirements, requirements on the management of the accumulated RW inventory and RW storage facilities; it also sets up administrative and financial fundamentals for all RW management activities. In addition, adoption of this law enabled to start the transition from RW storage practice to RW disposal practice.

The law provides for the establishment of a Unified State System for RW Management (USS RW) enabling to arrange for and ensure 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, the National Operator for RW management, specialized RW management organizations, as well as organizations generating RW.

The National Operator for RW Management (hereinafter National Operator) is a legal body authorized to perform RW disposal operations, as well as other RW management activities (the order of the Government 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 RW)). Pursuant to the Order of the State Corporation Rosatom № 1/186-P of March 3, 2012, NO RW was formally defined as an operating organization. The corresponding investment and operational programs were adopted and have been implemented

Specialized RW management organizations are legal entities performing activities and providing their services on collection, segregation, processing, conditioning, transportation, storage of RW, as well as operation, decommissioning or closure of RW storage (disposal) facilities.

Currently, the largest specialized RW management organization in the Russian Federation is FSUE Enterprise for Radioactive Waste Management RosRAO (hereinafter RosRAO).

The process of USS RW establishment involves three stages (Government resolution of the Russian Federation № 1185 of November 19, 2012).

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

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

The initial registration of RW and their storage sites was performed resulting in the Government Order of the Russian Federation № 238-r of February 17, 2016 On the Approval of the List of Radioactive Waste Disposal Facilities, Long-Term Storage Facilities, Facilities Holding Special (Non-Retrievable) Radioactive Waste and Disposal Facilities for Special Radioactive Waste.

Currently, activities scheduled under the second stage of USS RW establishment (2015 – 2017) are being implemented. The second stage covers the program on establishing the system of LLW and ILW disposal facilities. This stage involved construction of the first disposal facility unit at UECC, as well as efforts on the selection of sites potentially suitable for DF construction:

- Urals federal district – one site was identified in the vicinity of FSUE PA Mayak (Chelyabinsk Region);
- Siberian Federal District – one site was identified in the vicinity of SCC (Tomsk Region);
- Central, Volga, Southern, Northwestern Federal Districts –elaboration and safety assessment of potential site layouts.

The third stage (2018 – 2024) provides for the establishment of a disposal system for high-level waste, as well as alterations introduced to the status of certain facilities, namely, those holding special (non-retrievable) RW to disposal facilities for special RW and of certain special RW disposal facilities to RW disposal facilities. This stage also involves commissioning of an underground research laboratory where relevant investigations are to be performed to demonstrate the safety of the proposed deep HLW disposal concept, as well as commissioning of disposal facilities for low-level and intermediate-level RW and disposal of such waste.

B.4. Practices of Radioactive Waste Management

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

Generally, NPPs and large NFC enterprises performed collection, partial processing and further storage of RW at their sites.

This practice is currently under revision – organizations are now responsible for RW conditioning (resulting waste form shall meet relevant waste acceptance criteria for disposal) and its further transfer to the National Operator for disposal. RW conditioning shall be performed before the interim temporary storage period established by the state management authority in the field of RW management is expired. At present time, in accordance with the transitive regulation, interim storage life for unconditioned RW is limited to 10 years for organizations operating particularly hazardous nuclear and radiation facilities. In accordance with the provisions of the Federal law №190 On the Management of Radioactive Waste…, for other organizations this period shall be limited to 5 years.

Practices of RW management have been brought in line with relevant requirements of the Unified State System for RW Management (USS RW) which is currently being implemented. It

should be noted, that USS RW establishment is a priority task for the State Corporation Rosatom acting as the state management authority in the field of RW management. Certain elements of the system have already been established and were implemented in practice.

Pursuant to the provisions of the Federal law № 190-FZ On the Management of Radioactive Waste…, Rosatom's special reserve fund № 5 designed to cover RW disposal costs, as well as the National Operator's investment and industrial program, started accumulating its assets. Establishing a system of disposal facilities intended for different RW streams stands as the major goal for the National Operator (NO RW).

Disposal of low-level and intermediate-level LRW generated at three Rosatom enterprises (MCC, SCC, RIAR) have been carried out by injecting these waste into deep-seated reservoir beds (deep well injection facilities). These facilities are currently operated by NO RW.

Pursuant to provisions of the Federal № 190-FZ On the Management of Radioactive Waste…, 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) are under federal ownership (owned by the State Corporation Rosatom) and were transferred to NO RW with a right to conduct economic activities.

Under the framework of USS RW establishment, NO RW obtained Rostechnadzor's license to operate the first unit of a near-surface disposal facility for low- and intermediate-level SRW in the vicinity of UECC site and started the disposal operations. In 2016, over 47.45 m^3 of RW were disposed of in this facility.

In 2015, construction licenses were granted to NO RW for the second and the third unit of this near-surface facility.

In 2016, two other NO RW disposal facilities for low- and intermediate-level SRW were at the design stage of development. One of them is located in the restricted administrative and territorial entity Ozersk in the Chelyabinsk Region (the area of PA Mayak site) and the other – in the restricted administrative and territorial entity Seversk in the Tomsk Region (the area of SCC site).

RosRAO is dealing with management of sealed radiation sources, low- and intermediate-level waste, including their processing, conditioning and interim storage, remediation of radioactively contaminated sites, transportation of radioactive materials across the territory of the Russian Federation. RosRAO is also implementing programs on the dismantlement of nuclear submarines (NS) and nuclear maintenance ships, including the long-term storage of reactor compartments resulting from NS dismantlement. Some of these activities are performed under international agreements and contracts.

In 2013, FSUE Radon performing similar activities in the field of RW management entered the State Corporation Rosatom. Radon and RosRAO are both involved in activities associated with RW processing and its long-term storage, also receiving waste generated by some NFC enterprises and NPPs.

In 2015, processing and analysis of data from the initial registration of RW and RW sites performed in 2013 – 2014 were completed. As a result, the Government of the Russian Federation (RW Government order № 238-r of February 17, 2016) approved the registry containing a list of RW disposal facilities, long-term storage facilities, facilities holding special (non-retrievable) radioactive waste and disposal facilities for special radioactive waste. The data was filled into the State System for NM and RW Accounting and Control. The whole inventory of RW generated prior to the endorsement of the Federal law № 190-FZOn the Management of Radioactive Waste… was identified. According to this law, this waste got the status of a federal property.

Federal target programs (FTP) are also developed and implemented with the aim of addressing the priority tasks in RW management. For instance, FTP NRS and FTP NRS-2 were also aimed at providing some practical solutions to the backlog of challenges associated with RW management. In 2014 – 2017, the following milestones were achieved in this area:

- a new electric furnace EP-500/5 for HLW vitrification with an extended service life was commissioned at PA Mayak;
- temporary SRW storage facilities were constructed at RosRAO sites (Kazan, Blagoveshensk, Chelyabinsk);
- the second unit of a combined sewer system was commissioned at PA Mayak (upgrading the system for non-process RW management);
- near-surface storage facilities for low- and intermediate-level SRW were constructed at PA Mayak;
- the first unit of a long-term storage facility for SRW was constructed in the underground openings of MCC;
- start-up facilities of a SRW repository were constructed at MCC;
- RW management system was upgraded at four industrial enterprises (PA Sevmash, Ship Repair Center Zvezdochka, Ship Repair Plant Nerpa and Far Eastern Plant Zvezda). As a result, an improved level of safety was attained providing compliance with modern requirements and rules in the field of RW management;
- the first unit of a disposal facility designed for RW classes 3 and 4 with a design capacity of 10,000 m^3 RW was commissioned (operated by NO RW at the UECC site).

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

According to the provisions of the Federal law № 170-FZ On the Use of Atomic Energy, RW are defined as materials and substances for which no future use is foreseen, as well as equipment, goods (including spent ionizing radiation sources) containing radionuclides at concentrations greater than the limits derived from criteria set up by the Government of the Russian Federation.

The criteria used to define waste as radioactive waste are currently provided for by relevant provisions of the Government resolution of the Russian Federation № 1069 of October 19, 2012 (amended by resolution № 95 of February 4, 2015). As provided by the resolution, solid, liquid and gaseous waste containing radionuclides, except for waste generated during non-atomic energy use activities, namely, mining and reprocessing of mineral and organic raw materials with high concentrations of naturally occurring radionuclides, are defined 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 the relevant limits set in the supplement to the resolution is greater than 1.

Specific definition criteria are set for waste generated during operations that are not associated with atomic energy use, namely, mining and reprocessing of mineral and organic raw materials with high concentrations of naturally occurring radionuclides. Such criteria account for the high content of naturally occurring radionuclides in this waste, for instance, ^{226}Ra, ^{232}Th, ^{40}K, uranium and their fission products.

The Federal law № 190-FZ On the Management of Radioactive Waste… introduced an RW classification system, according to which all RW are divided into two groups: special (non-retrievable) and removable (retrievable). The Government resolution of the Russian Federation № 1069 specifies the criteria used to define waste as special or removable. According to the resolution, RW can be defined as special RW if it meets the following criteria:

- collective effective dose for the whole period during which RW keeps presenting potential hazard and the risk 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 site and disposal itself) are greater than the aggregate possible damage inflicted to the environment by in situ disposal and the costs associated with RW in situ disposal (including costs associated with RW storage facility upgrading to a RW disposal facility, its operation and closure, as well as ensuring safety during the whole period while RW 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 the Russian legislation.

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

The Government resolution of the Russian Federation №1069 of October 19, 2012 specifies classification criteria for retrievable RW based on appropriate disposal concepts. All radioactive waste defined 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 but not subject to 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 100m.

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 the Federal law №190On the Management of Radioactive Waste…came into force.

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

Thus, classes 1-5 are defined based on relevant specific activity limits set for radionuclides contained in RW and considering the time frames during which such waste keep presenting potential hazard.

RW specific activity limits used in this classification system are defined inOSPORB-99/2010 (with account of Amendment №1 to OSPROB-99/2010 introduced by the resolution of the Chief Public Health Official of the Russian Federation № 43 of September 16, 2013). Numerical values for these criteria are given in Table B1.

Based on specific activity levels, solid radioactive waste containing man-made radionuclides, except for spent sealed radionuclide sources are divided into 4 categories: very low-level, low-level, intermediate-level and high-level waste, whereas liquid waste are divided into 3 categories: low-level, intermediate-level and high-level waste. If, according to the radionuclide

characteristics, the category of waste is uncertain, it shall be attributed to the highest possible category.

Table B1. Classification of Solid and Liquid Radioactive Waste

Wastes category	Specific activity, kBq/kg			
	tritium	β-and γ-emitters (excluding tritium)	α-emitters (excluding TRU elements)	transuranic elements
Solid Waste				
Very low-level	less than 10^{7}	less than 10^{3}	less than 10^{2}	less than 10^{1}
Low-level	from 10^{7} to 10^{8}	from 10^{3} to 10^{4}	from 10^{2} to 10^{3}	from 10^{1} to 10^{2}
Intermediate-level	from 10^{8} to 10^{11}	from 10^{4} to 10^{7}	from 10^{3} to 10^{6}	from 10^{2} to 10^{5}
High-level	more than 10^{11}	more than 10^{7}	more than 10^{6}	more than 10^{5}
Liquid Waste				
Low-level	less than 10^{4}	less than 10^{3}	less than 10^{2}	less than 10^{1}
Intermediate-level	from 10^{4} to 10^{8}	from 10^{3} to 10^{7}	from 10^{2} to 10^{6}	from 10^{1} to 10^{5}
High-level	more than 10^{8}	more than 10^{7}	more than 10^{6}	more than 10^{5}

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-FZOn the Use of Atomic Energy.

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 to be SNF management facilities:

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

List of SNF storage and reprocessing facilities is given 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 a separate at-reactor SNF storage pool. SNF is usually held in such storage facilities for over 3 years. If necessary, storage time can be increased to reduce SNF heat generation.

NNPs with RBMK-1000 (SNF SF), Novovoronezh NPP and research centers (IPPE, RIAR) are also fitted with special independent storage facilities. SNF is transferred to these facilities after being held in at-reactor pools and is stored there until its further shipment to KhOT-1 storage facility at MCC. SNF is removed from such storage facilities (including RR storage pools) in accordance with an established schedule.

Centralized SNF storage is provided at two sites: MCC and PA Mayak.

MCC “wet” storage facility for WWER-1000 SNF has been operational since 1986. Its reconstruction was completed in 2011 providing an enhanced level of safety (a new system for emergency cooling and spraying, smoke exhaust system, efforts on managing beyond design basis accidents (“crash-tests”), enhanced seismic resistance).

The first section of a “dry” storage facility at MCC was commissioned in 2012 (“dry” storage facility forRBMK-1000 SNF). In 2014, this facility received a total of 3,442 SFAs from RBMK-1000 units, in 2015 the number of SFAs delivered for storage totaled 5,184 and in 2016 – 4,608. According to the schedule, over 6,000 SFAs are to be delivered to the facility in 2017.

In 2016, the second section of the “dry” storage facility designed for WWER-1000 and RBMK-1000 SNF was commissioned. A pilot transfer of 8 WWER-1000 SFAs previously held in a “wet” storage facility to the “dry” one was carried out.

In 2016, shipment of SNF generated by Russian power reactors of WWER-1000 type to MCC site for temporary storage and reprocessing was continued. In 2014, the number of delivered WWER-1000 SFAs totaled 598, in 2015 – 449, in 2016 – 312. In 2016, 12 WWER-1000 SFAs were shipped to PA Mayak and reprocessed (in 2017, a total of 20 tons of SNF was scheduled for reprocessing).

In the reporting period, efforts were performed to enable receiving 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) by the “wet” storage facility.

“Wet” SNF storage facility at PA Mayak provides:

- interim storage for spent fuel types awaiting reprocessing (WWER-440, BN, RR and etc.);
- storage of spent fuel types that are not reprocessed now but will be reprocessed after appropriate infrastructure are developed (AMB,EGP and others).

Three service ships (FMB Lepse (undergoing decommissioning, SNF hasn’t been removed yet), Lotta and Imandra) are used by FSUE Atomflot to provide storage of SNF generated by civilian nuclear-powered ships, whereas a costal container-type storage facility receives SNF from icebreakers fleet (uranium-zirconium SNF). Other Atomflot SNF streams are reprocessed according to the established schedule.

D.1.2. SNF Reprocessing Facilities

Industrial-scale SNF reprocessing is performed at RT-1 (PA Mayak) enabling acceptance, temporary storage and reprocessing of SNF generated by RRs, WWER-440 and BN-600 reactor units. RT-1 has a design capacity of 400 tons per year.

RT-1 reprocessing flow chart is based on water-extraction technologies similar to the PUREX-process. HLW are vitrified (aluminum-phosphate glass matrix packed into purpose-designed canisters).

Currently, several projects are being implemented at RT-1: construction of an AMB SNF cutting and packaging complex that will enable further reprocessing of such fuel, modernization of transportation and processing system and improvement of RW management systems to enable complete elimination of LRW discharges into industrial water reservoirs.

In 2016, license was granted to operate first start-up complex of SNF reprocessing pilot-demonstration center (PDC) at MCC site. R&D program aimed at elaborating innovative SNF reprocessing technologies has been launched.

Construction of the second PDC section with a design capacity of 250 tons of SNF per year is underway. It is scheduled to be completed in 2020.

In 2015 – 2017, a total of 555 tons of SNF was reprocessed in Russia.

D.1.3. Other Infrastructure Facilities for SNF Management

RBMK-1000 SFAs cutting complex at Leningrad NPP was commissioned in 2012, whereas in 2013 a similar facility became operational at Kursk NPP. Another RBMK SNF facility is expected to be commissioned in 2018 at Smolensk NPP.

Technical means and equipment required for WWER-440 and WWER-1000 SNF loading, unloading and transportation are being manufactured under the capital investment project “Renewal of Cask Fleet for NPP SFAs Transportation to Centralized SNF Management Facilities in 2011 – 2020 and until 2030”.

In 2016, a commercial prototype of a transportation cask (TUK-141O) was manufactured. This model is designed for transportation of WWER-1000 SFAs with enhanced initial enrichment (^{235}U up to 4.98 %) and burnup (up to 68 GW×day/tU). TUK-141O passed a series of qualification tests, “cold” in-process tests at Kalinin NPP and PA Mayak (in September 2017). TK-U-141 railway conveyors were manufactured to support TUK-141O shipments.

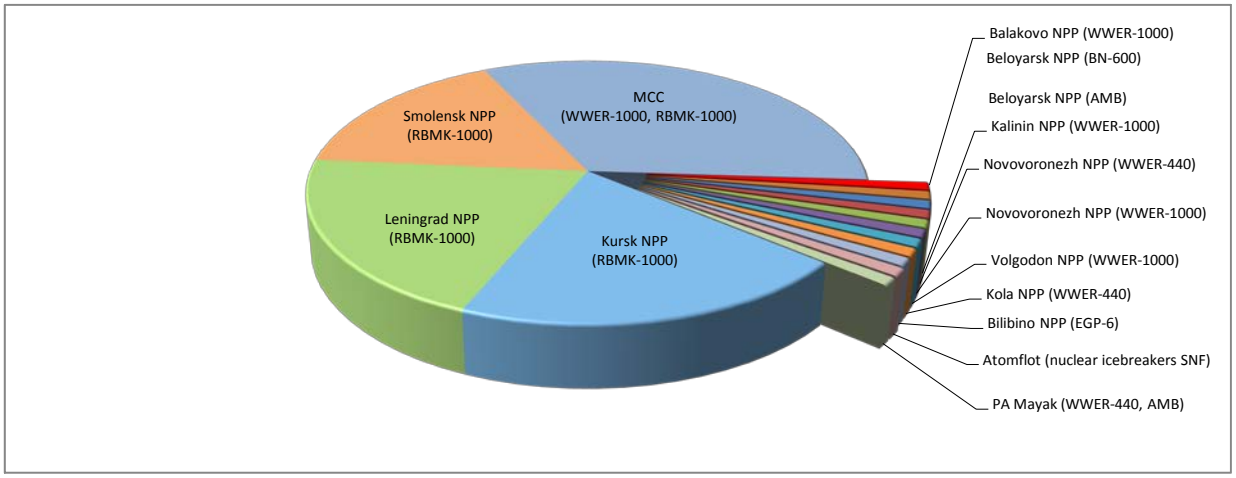
In 2016, program on the transportation of highly enriched PUGR SNF (DAV-90) from MCC site and its reprocessing at PA Mayak was launched. In 2017, this program was completed – all DAV-90 SNF inventory was shipped from MCC site.

In 2016, project on construction and commissioning of infrastructure necessary for Northern Fleet nuclear submarine SNF shipment was completed at the site of the North-Western center for RW management SevRAO (restricted administrative and territorial entity Zaozersk, Murmansk Region). In 2017, program on SNF shipment from NS storage facility was started (Andreev Bay).

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

The launched program for transportation of RBMK-1000 SNF slowed down SNF accumulation in at-reactor storage facilities. SNF inventories are presented in Table B.1.2 of Annex B1. The picture given below shows the breakdown of Russian SNF inventory by volume 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 to be RW management facilities:

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

This Section provides information on RW processing facilities (complexes).

RW processing facilities (complexes). Special nature of technological operations resulting in radioactive waste generation, as well as legislative provisions on waste minimization and manufacturing of RW packages complying with relevant acceptability criteria for safe long-term storage and disposal require appropriate types of RW processing facilities to be operated at Russian enterprises. Different treatment and pre-treatment techniques are used depending on physical state and morphological composition of generated and accumulated RW: strong

evaporation, ion-selective purification (low-level and intermediate-level LRW), compaction, melting, incineration (low-level and intermediate-level SRW), cementation (LRW, SRW, LLW, ILW), vitrification (high-level LRW).

The following NPPs have the most multifunctional complexes providing RW treatment and pre-treatment services:

- Balakovo NPP – facilities for RW segregation, compaction, incineration, cementation, strong evaporation of distillation residue providing salt conversion into fusion cake;
- Rostov NPP – facilities for RW segregation, compaction, incineration, cementation of ash residues, cementation of distillation residues and ion exchange resins;
- Kola NPP – facilities for RW segregation, compaction, incineration, ion-selective purification of distillation residues, cementation of sludge and ion exchange resins;
- Leningrad NPP – new facilities for RW segregation, compaction, incineration; a new ion-selective purification facility is currently on its final stage of construction.

In 2016, the following facilities were commissioned:

- Smolensk NPP – RW processing complex was commissioned involving facilities for RW compaction, incineration facility fitted with a unit for ash cementation, LRW cementation facility and a facility for ion exchange treatment of distillation residue;
- Kola NPP – an upgraded RW incineration facility;
- Novovoronezh NPP – plasma incineration facility and a storage facility for immobilized radioactive waste;
- Novovoronezh NPP (6^{th} unit) – RW compaction facility and drain water treatment facility fitted with a sludge cementation unit;
- Beloyarsk NPP (4^{th} unit) – RW compaction facility and LRW cementation facility.

Commissioning of a compaction unit at Bilibino NPP is scheduled to be completed in 2017.

Development of design documentation for a RW processing complex at Beloyarsk NPP was started in 2017.

The following goals are to be completed by 2020:

- RW processing complex and RW storage facility are to be commissioned at Kursk NPP;
- a storage facility is to be commissioned at Leningrad NPP.

Design documentation developed for all NPPs that are currently under construction provide for RW processing and storage facilities at their sites.

Under FTP NRS, a new electric furnace EP-500/5 for HLW vitrification with an extended service life was commissioned at PA Mayak. Capacity of an existing vitrified RW storage facility was increased.

RW storage facilities.

By January 1, 2017, there were a total of 897 RW storage facilities in the Russian Federation.

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

D.4.1. RW Generation and Processing

RW Generation.

SRW Generation. In 2016, the amount of generated SRW totaled some 720,000 m^3 with a total activity of $3.06 \cdot 10^{17}$Bq (40% reduction by volume and 13 times reduction in activity as compared to the 2013 inventory).

Uranium mining (PIMCU) was considered to be the principle source of low-level SRW generation in 2016. In 2016, PIMCU generated a total of 700,000 m^3 of RW accounting for over 96 % of the total waste generation by volume resulting in a total activity of about $5.98 \cdot 10^{13}$Bq which accounts for less than 0.02 % of the total activity of all waste generated during this

period. Compared to 2013 generation rate, the amount of waste generated by PIMCU dropped by 35 %, whereas the total activity decreased by 33 %.

Vitrification of HLW LRW resulting from SNF reprocessing at PA Mayak is considered to be the major source of high-level SRW generation. In 2016, the enterprise generated some 2,160$m^3$of SRW with a total activity of about $2.92 \cdot 10^{17}$Bq. Compared to 2013 figures, the amount of waste dropped by 11 %, whereas the total activity decreased by a factor of over 10.

In 2016, Russian NPPs generated over 7,500$m^3$of SRW with a total activity of $1.32 \cdot 10^{16}$ Bq. Compared to 2013 generation rate, the amount of SRW generated by NPPs dropped by 15 %, whereas the total activity increased by 40 %.

In 2016, nuclear fuel manufacturing enterprises (nuclear fuel company TVEL) generated over 6,900 m^3 of SRW with a total activity of $4.04 \cdot 10^{13}$ Bq (19%increase in activity as compared to 2013).

In 2016, nuclear back-end enterprises generated over 1,500m^3 of SRW with a total activity of $4.95 \cdot 10^{11}$Bq (activity decreased by a factor to 3 as compared to 2013).

The remaining SRW amounts with a total activity of about $9.57 \cdot 10^{14}$Bq resulted from other activities. Thus, as compared to 2013, the total activity of this waste decreased by a factor of over 500.

LRW generation. Some 800,000 m^3 of LRW with a total activity of $5.89 \cdot 10^{18}$ Bq were generated in 2016 (over 50 % decrease by volume as compared to 2013).

Four enterprises (MCC, SCC, RIAR and PA Mayak) constituted the main sources of LRW generation in this period. In 2016, the total amount of LRW generation accounting for these four enterprises equaled to 790,000 m^3 and their total activity amounted to $5.89 \cdot 10^{18}$Bq (2 fold reduction by volume as compared to 2013).

In 2016,Russian NPPs generated a total of 3,100 m^3 of LRW with a total activity of $5.48 \cdot 10^{13}$Bq (10 % reduction by volume and 27 % reduction in activity as compared to 2013).

RW processing.

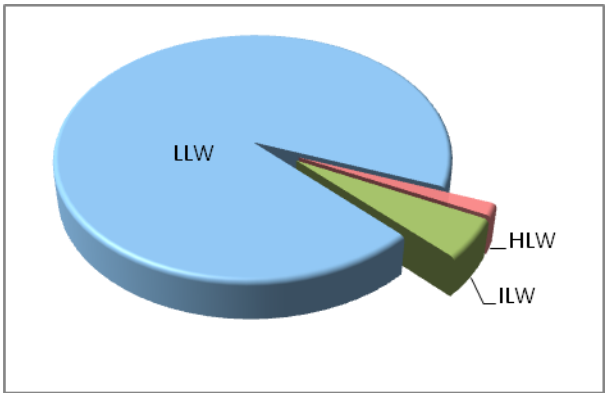
The total amount of LRW processed in 2016 equals to 270,000 m^3 with a total activity of 5.29 $\cdot 10^{18}$ Bq, whereas the amount of processed SRW totaled to 31,880m^3 having a total activity of $2.00 \cdot 10^{14}$ Bq. Some 6,670 m^3 of RW (not accounting packaging volume of 2,820 m^3 of RW) were conditioned in accordance with waste disposal criteria, 5,900m^3 of which (not accounting packaging volume of 2,220 m^3) were transferred to the National Operator.

D.4.2. RW Storage

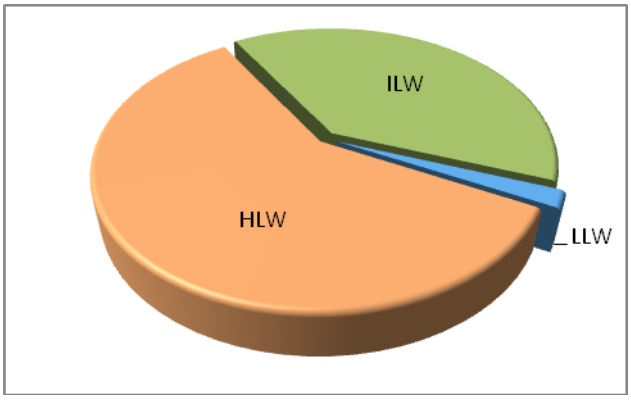
As of the end of 2016, sites of Russian nuclear enterprises were holding some 556,360,000 m^3 ($1.14 \cdot 10^{20}$ Bq) of RW.

The accumulated LRW inventory breakdown:

by volume

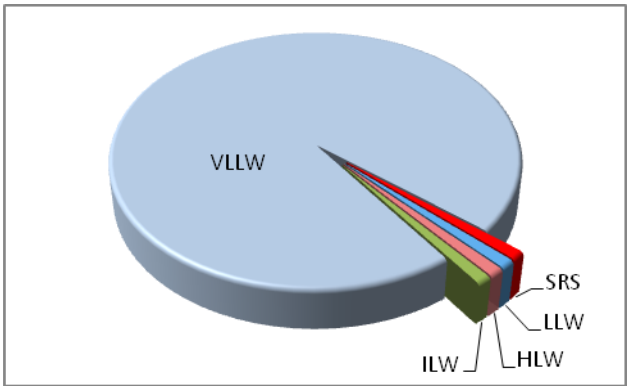


by activity

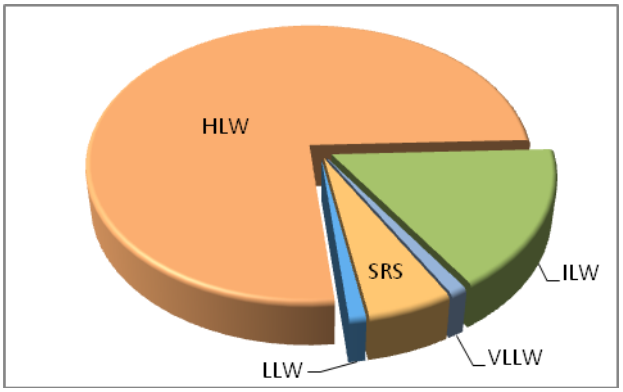


The accumulated SRW inventory breakdown:

by volume



by activity



High-level LRW processing at PA Mayak resulted in 2,481.6 m^3 of vitrified HLW with a total activity of $1.43 \cdot 10^{19}$ Bq.

In general, the total RW inventory is distributed among 174 enterprises located in 50 regions of the Russian Federation owning in total 897 RW storage facilities, including sites for collection and/or temporary storage. An RW inventory of over 1,000 m^3 is being distributed among 58 enterprises. Over 96 % of LRW are low-level waste with a total activity of $8.79 \cdot 10^{15}$ Bq (less than 1 % of LRW total activity), 88 % of LRW are held in surface water reservoirs at PA Mayak.

As for intermediate-level LRW, most of it is isolated from the environment in deep-well injection disposal facilities.

High-level LRW accounts for less than 0.01 % of the total LRW amount representing some 61% of the total LRW activity. High-level LRW inventory is being held in purpose-built structures and is isolated form the environment.

Very low-level SRW accounts for over 98% of the total SRW amount. Most part of this waste resulted from PIMCU uranium mining operations. It should be noted, that SRW activity is mostly concentrated in high-level SRW (over 80 %).

Disused SRSs constitute an additional source of RW generation.

Management of disused SRSs is discussed in Section J of this Report.

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

Preparation for decommissioning at a number of nuclear facilities (in Russia, the definition of a nuclear facilities covers all nuclear installations, radiation sources and storage facilities), including research complexes and facilities, nuclear power plants, NFC facilities, storage facilities and nuclear icebreaker fleet facilities are currently underway.

The following facilities were decommissioned in 2014 – 2017:

- critical test facility AMBF-2-1600 (IPPE);
- research reactor facility AST-1 (RIAR);
- nuclear power test facility KM-1 (NITI);
- test facilities enabling demonstration of a naval RW management technology (NITI);
- Gammatok-100 installation (NIFHI);
- PUGR EI-2 (PDC UGR);
- Gazgolder storage facility (PDC UGR);
- Building B (VNIINM);
- structure 7 (CMP);
- structures 22 and 65 (NCCP);
- building 17v (NCCP);
- ore stockpiles (NCCP);
- RW storage facility – building 227 (IPPE);
- RW storage facilities 235 and 560 (PA Start);
- landfills 2, 3, 7 and 19 (RFNC-VNIIEF);
- endurance test laboratory (OKB-Nizhniy Novgorod);
- RW storage facility (Vodniy, the Komi Republic).

Preparation for decommissioning are ongoing at a number of facilities, namely:

- LRW storage reservoirs B-1 and B-25, radiochemical plant, chemical and metallurgical plant, installation VOU M-2079 (SCC);
- facility for PUGR FAs fabrication, building 18, group of buildings Makety (NCCP);
- radiochemical plant (MCC);
- structures A and G, building 53, U-5 installation, radioactively contaminated sites 2 and 9 (VNIINM);
- RW storage facility of the Murmansk division of RosRAO's North-Western territorial district;
- RW storage facility of the Blagoveshensk division of RosRAO's Volga territorial district.

Work is underway at PA Mayak, SCC and MCC sites to ensure safe decommissioning of production uranium graphite reactors (PUGRs). In 2015, the first stage of PUGR AD decommissioning program was completed at MCC.

Until 2030, decommissioning projects are to be completed at a total of 82 facilities.

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 management of spent nuclear fuel and radioactive waste in compliance with the obligations the Russian Federation.

E.2. Legislative and Regulatory System (Article 19)

E.2.1. Legislative, Legal and Normative Regulation

The following instruments govern relations in the field of SNF and RW management: the 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, the Convention on Nuclear Safety, the Vienna Convention on Civil Liability for Nuclear Damage, the Convention on Early Notification of a Nuclear Accident, the 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 norms and rules in the field of atomic energy use, sanitary rules and radiation safety standards, regulatory provisions issued by state safety authorities and state management authorities in the field of atomic energy use, state and industry-wide standards, and technical regulations.

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

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 and shall have greater legal effect than the federal laws.

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 the Use of Atomic Energy of November 21, 1995;
- Federal law № 3-FZ On the Radiation Safety of Population of January 9, 1996;
- Federal law № 7-FZ On the Environmental Protection of January 10, 2002;
- Federal law № 190-FZ On the Management of Radioactive Waste 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: Presidential decrees and resolutions of the Government of the Russian Federation.

Normative regulation of safety in the field of atomic energy use is effectuated through federal norms and rules in the field of atomic energy use, in accordance with the Federal law № 170-FZ On the Use of Atomic Energy, and sanitary norms and rules, in accordance with the Federal law № 3-FZ On the Radiation Safety of Population. Provisions of these norms and rules have a binding nature.

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

Requirements specified in federal norms and rules 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.

According to the Federal law № 3-FZ On the Radiation Safety of Population, state regulation of radiation safety is effectuated through the establishment of sanitary rules, standards, hygienic standards, radiation safety rules, codes of rules, occupational safety rules and other regulations governing radiation safety. Sanitary rules, norms and hygienic standards for radiation safety are approved in accordance with the procedure established by the Russian legislation.

A number of documents regulate the safety of SNF and RW management in the Russian Federation, namely safety guides and guideline documents developed by state safety regulatory authorities, as well as instruments developed by state management authorities in the field of atomic energy use (institutional documents), state and industry-wide standards.

Since the presentation of the fourth National Report, some important amendments were introduced to legal and regulatory instruments, including federal norms and rules, as well as regulatory technical 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 the Use of Atomic Energy of November 21, 1995 is considered to be a fundamental provision 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 to protect the environment, human health, life and property when using atomic energy; to promote the sustainable development of science and technology; to contribute to international undertakings on the safe use of atomic energy.

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

Federal law № 74-FZ On Amending Certain Legislative Acts of the Russian Federation for the Purpose of Safety Regulation in the Field of Atomic Energy Use introduced some amendments to the Federal law № 170-FZ On the Use of Atomic Energy. According to these amendments, some new items were added to the list of nuclear facilities:

- nuclear fuel – nuclear material used to generate heat energy and/or radiant fluxes in nuclear installations as a result of a controlled nuclear fission reaction;
- spent nuclear fuel – nuclear fuel that has been irradiated in the reactor core and ultimately removed from it.

The Federal law № 162-FZ On Standardization in the Russian Federation of June 29, 2015 sets up the legal framework for standardization in the Russian Federation, including those provisions that are relevant for operation of a national standardization system, and is aimed at implementing a unified state policy in this area. This Federal law sets the provisions regulating relations in the standardization area, including those arising from development, adoption, amendment (upgrading), repeal, and application of standards, as well as publication of relevant documents.

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 certain types of state control (supervision) arrangements defined by the Government of the Russian Federation. Section E 3.1 of this Report discusses relevant legislative amendments introduced to implement this approach as part of state regulation in the field of atomic energy use.

List of main legal acts on SNF and RW management including those adopted in the reporting period is presented 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

To elaborate certain provisions of the Federal law № 170-FZ On the Use of Atomic Energy and other federal laws associated with atomic energy use, the President of the Russian Federation and the Government of the Russian Federation adopt relevant normative legal acts (by-laws) in form of presidential decrees and resolutions of the Government of the Russian Federation.

Since the presentation of the fourth National Report, a number of new by-laws governing atomic energy use was issued and a number of amendments was introduced to already existing presidential decrees and government resolutions.

In 2017, the Government resolution of the Russian Federation № 344-11 of March 28, 2017 introduced some amendments to the State Program of the Russian Federation Development of the Russian Nuclear Power Generation Complex.

In 2015, Resolution № 1248 of November 19, 2015 on the Approval of a Federal Target Program Nuclear and Radiation Safety in 2016 – 2020 and until 2030 was approved by the Government of the Russian Federation.

In 2015 – 2016 the following orders and resolutions were adopted by the Government of the Russian Federation:

- order of the Government of the Russian Federation № 2499-r of December 7, 2015 On the Approval of a List of Uranium Mining and Milling Organizations Generating RW, Operators of Particularly Hazardous Nuclear and Radiation Productions and Facilities, Organizations Involved in Operations Resulting in Very Low-Level Waste Generation that are Permitted to Dispose Such Waste in Disposal Facilities Located Within the Sites Used by these Organizations.
- Government resolution of the Russian Federation № 542 of June 15, 2016 On the Management of the State System for Accounting and Control of Radioactive Substances and Radioactive Waste.
- Government resolution of the Russian Federation № 669 of July 12, 2016 On the Approval of a Standardization Provision Concerning the Products (Activities and

Services) Subject to Requirements Associated with Nuclear Safety in the Field of Atomic Energy Use, as well as Other Processes and Standardization Subjects Associated with these Products.

- Government resolution of the Russian Federation № 806 of August 17, 2016 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.
- Government Order of the Russian Federation № 238-r of February 17, 2016 On the Approval of the List of Radioactive Waste Disposal Facilities, Long-Term Storage Facilities, Facilities Holding Special (Non-Retrievable) Radioactive Waste and Disposal Facilities for Special Radioactive Waste.

List of main by-laws effective in this field is presented in Annex E of the Report.

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

Main federal norms and rules, 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.

List of main federal norms and rules, sanitary rules and radiation safety standards effective in this field 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 the Radiation Safety of Population stipulates that state regulatory standardization in the field of radiation safety is provided by adoption of sanitary rules, standards, 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 the Radiation Safety of Population, Federal Supervision Agency for Customer Protection and Human Welfare is authorized to develop and approve sanitary rules. Sanitary rules are binding 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 discussing safety and (or) harmlessness of certain environmental factors for public and the mandatory requirements non-compliance with which is likely to endanger human life or health.

In general, in the Russian Federation, there are four fundamental sanitary regulations discussing radiation safety of the population:

- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);
- Sanitary Rules for Radioactive Waste Management (SPORO-2002);
- 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 detail in Section E.2.1.3.1 of the fourth National Report of the Russian Federation.

E.2.1.3.2. Federal Norms and Rules in the Field of Atomic Energy Use

Federal norms and rules in the field of atomic energy use are by-laws specifying the requirements for the safe use of atomic energy, involving the safety requirements for NF, as well as safety requirements covering activities in the field of atomic energy use, including safety objectives, principles and criteria that are binding for any entity implementing any activity in the field of atomic energy use.

Federal norms and rules in the field of atomic energy use shall be developed and approved according to the procedure established by the Government of the Russian Federation.

Federal norms and rules are developed on the basis of other by-laws of the Russian Federation, 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 the recommendations of international agencies in the field of atomic energy use the Russian Federation being Party to which.

In 2011, Article 6 of the Federal law № 170-FZOn the Use of Atomic Energy was amended and thereupon federal norms and rules shall account for the recommendations of international agencies in the field of atomic energy use the Russian Federation being Party to which.

Since 2010, Rostechnadzor has been authorized to approve on its own initiative by-laws covering the appropriate range of activities, including federal norms and rules, in keeping with the legislation of the Russian Federation.

According to the Government resolution of the Russian Federation № 1511 of December 1, 1997 On the Approval of a Provision Concerning the Procedure for the Development of Federal Norms and Rules in the Field of Atomic Energy Use, their development shall be carried out by state safety regulatory authorities and/or management authorities in the field of atomic energy use in accordance with their competences.

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

Norms and rules, upon their enactment, are binding for any entity performing activities in the field of atomic energy use and are effective throughout the territory of the Russian Federation.

According to the Rostechnadzor's decree № 267 of July 7, 2015 On the Approval of the Development Procedure for Federal Norms and Rules in the Field of Atomic Energy Use by the Federal Environmental, Industrial and Nuclear Supervision Service and the Requirements to their Layout and Representation, valid federal norms and rules in the field of atomic energy use shall be reviewed every 5 years.

Federal norms and rules specifying safety requirements applied to nuclear facilities and activities in the field of atomic energy use, also covering the safety of SNF and RW management, were developed and implemented for different types of NF (NPPs, NFC facilities, ship nuclear power units, research reactors, national economic enterprises, including scientific and medical institutions).

Federal norms and rules are developed in form of general provisions, standards and rules (requirements). General safety provisions specify principles, criteria and general requirements for the nuclear and radiation safety of NFs, whereas norms and rules (requirements) set forth appropriate requirements either concerning certain types of activities or certain NF components, systems and elements.

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 the nuclear and radiation safety of nuclear facilities (NPPs, NFC facilities, radiation sources, RM and RW storage facilities, research installations and etc.) at all stages of NF life cycle (siting, construction, commissioning,

operation, decommissioning, including accidents, elimination of their consequences, as well as SNF and RW management). Since the presentation of the fourth National Report, additional requirements on fire and explosion safety of operational processes at NFC facilities were introduced to NP-016-05.

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

Safety issues specific for dry SNF storage facilities are regulated by the FNR **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.

FNP **On Accounting External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-05)** involves the requirements for taking due account of external natural and man-induced impacts during siting, design, construction, operation and decommissioning of nuclear facilities.NP-064-05 involves a list of natural and man-induced features, events and processes that shall be identified at the investigation and research stage within the area and the site of a proposed nuclear facility and shall be accounted for to demonstrate its safety and stability.

Currently this FNP is being reviewed based on the findings from the Fukushima-1 accident evaluation. Approval of the reviewed document is expected in 2018.

Requirements for NF Quality Assurance Programs (NP-090-11) specify the requirements concerning the structure and the contents of quality assurance programs for nuclear installations, radiation sources, SNF and RW storage and processing facilities at all stages of NF life cycle.

Provisions on the Procedures for Investigating and Accounting Violations (NP-004-08, NP-047-11, NP-014-16 and etc.) specify the procedure for investigating and accounting NF operational disorders, categories of such violations, 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-077-06 and etc.) specify general requirements to the development of action plans aimed at personnel protection in the event of an accident, the procedure for their implementation, relevant arrangements for personnel protection in the event of an accident, human actions (personnel and administration) under abnormal operation and the response measures covering different nuclear installations, radiation sources and storage facilities.

Requirements to the Demonstration of Safe NF Design Lifetime Extension (NP-024-2000, NP-017-2000) 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 Nuclear Facilities Decommissioning (NP-057-17, NP-012-16, NP-028-16, NP-091-14, NP-097-16 and etc.) specify safety requirements for NF decommissioning (including RW storage facilities), relevant decommissioning programs, integrated engineering and radiation investigations and designs.

Safety in RW Management. 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. Since the presentation of the fourth National Report, these requirements were updated. Relevant requirements for the safe management of retrievable and non-retrievable waste were elaborated.

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. Since the presentation of the fourth National Report, these requirements were updated taking into account relevant provisions of the Federal law № 190-FZ On the Management of Radioactive Waste…

Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14) set forth objectives, principles, criteria and general safety requirements for radioactive disposal. The reviewed NP-055-14 takes into account relevant provisions of the Government Resolution № 1069 of October 19, 2012 On the Criteria Used to Define Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Define Radioactive Waste as Special Radioactive Waste or Retrievable Radioactive Waste, as well as Criteria Used to Categorize Retrievable Radioactive Waste, namely the classification of retrievable RW for disposal purposes. It also establishes relevant safety requirements for different classes of retrievable RW.

Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14) specify safety requirements for RW near-surface disposal facilities being developed, constructed, operated or closed.

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

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. Since the presentation of the fourth National Report, requirements on the contents of accounting documents and reports on RM and RW accounting and control were elaborated, as well as the requirements on the contents of guidelines and provisions concerning RM and RW accounting and control.

Rules Under Which Nuclear Material Can be Defined as Radioactive Material or Radioactive Waste (NP-072-13) specify the requirements that are required to be met to define nuclear material existing 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 radioactive material or RW.

Rules for the Safe Transport of Radioactive Material (NP-053-16) establish safety requirements to the transportation of radioactive materials (including radioactive waste and spent nuclear fuel), the requirements to operations and conditions that are associated with RW relocation and constitute to this process (design, 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). This FNP replaced the provisions of NP-053-04 and was developed in keeping with IAEA recommendations discussed in SSR-6 Regulations for the Safe Transport of Radioactive Material (2012).

Requirements for the Safe Storage of Radioactive Material (NP-061-05) specify main engineering and organizational requirements to the systems designed for storage of nuclear material, radioactive substances and radioactive waste, including SNF, that are aimed at ensuring the safe storage of nuclear material, RS and RW 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, its layout, typical structure of systems description, as well as the contents of the individual sections. In 2017, **Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities (NP-099-17), Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities (NP-100-17)** were adopted. These FNPs specify relevant requirements for the development of safety analysis reports for RW storage and disposal facilities.

A draft FNP in the field of atomic energy use titled Safety Requirements for Facilities Holding Non-Retrievable (Special) Radioactive Waste and Disposal Facilities for Special Radioactive Waste was developed based on provisions of Article 6 of Federal law № 170-FZ On the Use of Atomic Energy and Article 8 of the Federal law № 190-FZ On the Management of Radioactive Waste… This FNP specifying the requirements for the safe management of special RW is to be approved in 2017.

Draft provisions on introducing certain amendments to the following FNP in the field of atomic energy use are being proposed: Safety in RW Management. General Provisions (NP-058-14), Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14), Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14), RW Acceptance Criteria for Disposal (NP-093-14). These amendments are basically associated with requirements regarding the safe management of sealed spent radioactive sources of ionizing radiation, including their disposal. These FNPs are to be approved in 2017.

A number of federal norms and rules in the field of atomic energy use covering decommissioning of NFC facilities are planned to be approved in 2017, namely: Rules for the Safe Decommissioning of Production Uranium-Graphite Reactors (NP-007-17), Rules for the Safe Decommissioning of NFC facilities (NP-057-17).

Safe Decommissioning of Nuclear Facilities. General Provisions (NP-091-14) is another FNP that is planned to be amended to establish specific criteria for NF and site exemption from regulatory control and supervision in the field of atomic energy use.

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

The discussed amendments and proposals are mostly associated with the consideration of relevant provisions (RW classification for disposal purposes and RW acceptance criteria for disposal) of Federal law № 190-FZ On the Management of Radioactive Waste… and the Government resolution № 1069 of October 19, 2012 On Criteria Used to Define Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Define Radioactive Waste as Special Radioactive Waste or Retrievable Radioactive Waste, as well as Criteria Used to Categorize Retrievable Radioactive Waste.

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

E.2.1.4. Guideline Documents and Safety Guides in the Field of Atomic Energy Use

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

- methods used to perform certain activities;
- methodologies;
- performance of expert reviews and safety assessments;
- clarifications and other recommendations on how to meet safety requirements in the field of atomic energy use.

Safety guides shall take into account the experience from FNP's past applications, as well as the recommendations of international agencies involved in the field of atomic energy use the Russian Federation being Party to which.

List of safety guides involving recommendations on SNF and RW safe management is presented in Annex E.

Guideline documents involve procedural standards establishing relevant rules and procedures for operations performed in different fields of activities being under Rostechnadzor's jurisdiction.

Guideline documents and administrative regulations, in particular, specify a set of requirements to the set of documents required to demonstrate the safety of nuclear installations, radiation sources and SNF and RW storage facilities, requirements regarding their contents, the procedure for verification of data presented in license application, as well as the procedure for NRS expert review.

Rostechnadzor's administrative regulations are being developed and approved in accordance with the rules specified in the Government resolution of the Russian Federation № 373 of May 16, 2011 On the Development and Approval of Administrative Regulations on Carrying Out State Functions and Administrative Regulations on Supplying State Services.

List of Rostechnadzor guideline documents is presented 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 the Use of Atomic Energy stipulates that any activity in the field of atomic energy use subject to licensing by state safety regulatory authorities is prohibited if carried out without an appropriate license.

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 mandatory, shall result in a fine imposed under the administrative law.

Article 171 of the Criminal Code of the Russian Federation provides for criminal punishment for implementing activities without an appropriate license, if such license is mandatory.

The procedure and conditions for licensing 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 resolution of the Russian Federation on March 29, 2013).

The following activities fall under the scope of the Convention:

- siting, construction, operation and decommissioning of nuclear installations, radiation sources, NM, RM and RW storage facilities;
- management of nuclear materials and radioactive substances, including milling and mining of uranium ores, production, use, processing, transportation and storage of nuclear and radioactive material;
- management of radioactive waste during their storage, processing, transportation and disposal;
- the use of nuclear material and/or radioactive material in R&Ds;
- engineering and design of nuclear installations, radiation sources and NM, RM and RW storage facilities;
- design engineering and manufacturing of equipment for nuclear installations, radiation sources, NM, RM and RW storage facilities;
- expert examination of design documentation, engineering and process flow documentation and documents demonstrating nuclear and radiation safety of nuclear installations, radiation sources, NM, RM and RW storage facilities, as well as NM, RM and RW management activities.

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

Administrative Regulations for the Federal Environmental, Industrial and Nuclear Supervision Service on Rendering its State Services Associated with Licensing Activities in the Field of Atomic Energy Use, approved by Rostechnadzor decree № 453 on October 8, 2014 (hereinafter Administrative Regulations) specify relevant procedures that Rostechnadzor shall follow to provide the state service of 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 bodies shall comply with. These regulations also elaborate on coordination mechanisms between Rostechnadzor's central and territorial bodies, their officials, as well as Rostechnadzor 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 examination of license applications, requirements concerning the structure of submitted document sets (portfolios)demonstrating nuclear and radiation safety during siting, construction, operation and decommissioning (closure) of NIs, RSs and SFs.

License applications are reviewed by Rostechnadzor. It involves preliminary review of all required documents attached to the application, verification of compliance with the submission guidelines established under relevant legislative provisions of the Russian Federation. All the documents submitted with the license application are subject to a review under which the credibility of data contained in these documents shall be checked.

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 the requirements specified in federal norms and rules in the field of atomic energy use, as well as compliance with the requirements for the safe management of radioactive waste while performing the declared activity;
- provision of comprehensive technical and administrative arrangements to ensure nuclear and radiation safety when implementing the declared activity;
- compliance with the requirements for the safe storage and arrangements for proper accounting and control of nuclear material, radioactive substances 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 nuclear facilities and public in the event of an accident and preparedness to their implementation, as well as 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 the safe implementation of the declared activity, 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 norms and rules in the field of atomic energy use;
- availability of necessary resources and preparedness for the implementation of required efforts for the elimination of emergencies associated with the occurrence of possible nuclear and radiation accidents at a nuclear facility;
- ability of the applicant to ensure safe completion of the declared activity and the NF decommissioning, as well as availability of appropriate design materials.

The review of documents demonstrating the safety of a nuclear facility and (or) licensed activity performed by Rostechnodzor also involves checking the credibility of data contained in these documents that may be performed 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.

Pursuant to the supplement to the administrative regulations, licenses for siting, construction, operation and decommissioning of buildings/structures having regional importance and designed for RW storage, RW management, shall be issued by interregional territorial authorities of Rostechnadzor. Licensing of siting, construction, operation and decommissioning of SNF storage facilities, as well as structures designed for RW storage of interregional importance, and RW disposal facilities (irrespective of DF status) shall be carried out by Rostechnadzor's central authorities.

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

If previously unknown circumstances associated with the safety of already licensed activities are revealed or new federal norms and rules in the field of atomic energy use are adopted, 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. In these cases a licensee may on its own apply for amendments to be introduced to already issued licenses.

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

E.2.3.1. Institutional Control

Institutional control of activities associated with SNF and RW management, documentation maintenance and relevant reporting activities are performed in accordance with the established procedure specifying the distribution of responsibilities between state executive authorities and the operating organization.

Operating organization is an organization established under the legislation of the Russian Federation, acknowledged by relevant state management authority in the field of atomic energy use following a procedure and under the conditions specified by the Government of the Russian Federation to be able to operate a nuclear installation, radiation source or storage facility and to perform on its own or by contracting other organizations, activities associated with siting, development, construction, operation and decommissioning of NI, RS or SF, as well as with management of nuclear material and radioactive substances.

The following functions are shared both between state executive authorities and the operator:

- planning, arranging for and implementing inspections;
- development of industry-wide standards, rules and safety requirements;
- evaluation of plans, non-conformities and violations; development of recommendations;
- participation in the process of issuing permits and its administration;
- arranging for trainings and personnel certification;
- R&D and implementation of relevant finings.

Article 35 of the Federal law № 170-FZ On the Use of Atomic Energy stipulates that the operating organization shall develop and implement activities aimed at ensuring the safety of a nuclear facility, radiation source or storage facility. If necessary, it can establish special services providing for safety control arrangements. The operator shall also provide information on the safety of relevant nuclear facilities, radiation sources or storage facilities to state authorities regulating safety.

Conditions of licenses issued by the state safety regulatory authority require that the operating organization takes appropriate steps to ensure that control, inspections and testing of safety-

important equipment and systems are carried out in accordance with the established procedures and schedules.

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

E.2.3.2. Regulating Control

State safety supervision in the field of atomic energy use involves efforts of state safety regulatory authorities and their regional bodies aimed at acquisition and analysis of safety-important information, arranging for and performing inspections, decision-making, and imposing sanctions if non-compliances with safety requirements 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 that are to be reviewed.

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

- the compliance with norms and rules in the field of atomic energy use, as well as with conditions of permits (licenses) authorizing certain activities in the field of atomic energy use;
- nuclear, radiation, occupational and fire safety (at nuclear facilities);
- physical protection of nuclear installations, radiation sources, storage facilities for nuclear materials and radioactive substances, state systems for accounting and control of nuclear materials, radioactive substances and radioactive waste;
- the compliance with international obligations of the Russian Federation associated with the safe use of atomic energy;
- the compliance (within the scope of its competence) of relevant legislative provisions of the Russian Federation in the field of radioactive waste management;
- timely return of spent fuel assemblies removed from nuclear reactors and the by-products resulting from their reprocessing to the State of origin having an international agreement with the Russian Federation providing for SNAs import to the Russian Federation for the purposes of their temporary technological storage and (or) reprocessing given that by-products resulting from their reprocessing are returned back to the State of origin (within the scope of Rostechnadzor's competence).

Rostechnadzor's territorial authorities involve inspection divisions supervising organizations and nuclear enterprises performing activities in the field of atomic energy use. These departments are staffed with inspectors qualified in the appropriate areas of expertise and authorized by the state to supervise, on a regular basis, the safety of all nuclear installations, radiation sources and SNF and RW storage facilities.

Rostechnadzor draws up inspection plans on a yearly basis. This work is performed both by representatives of its territorial authorities (special-purpose short-time plans) and its central authorities (overall and special-purpose plans).

Federal Supervisory Service for Consumers Rights and Health Protection implementing the functions of a federal state sanitary and epidemiologic supervision board supervises the compliance of activities with the requirements set by sanitary and hygienic standards and rules, including those relevant to radiation safety. This authority issues statements on compliance of SNF and RW management facilities or conveyances with the requirements of sanitary standards and rules.

Article 3 of the Federal law № 170-FZ On the Use of Atomic Energy stipulates that items containing or applying nuclear materials and radioactive substances in quantities and with activity and /or emitting ionizing radiation with the intensity or energy less than the values established in the federal norms and rules effective in the field of atomic energy use are not covered by the law. Thus, they are exempted from the safety regulations 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 Basic Sanitary Rules do not cover radiation sources (as well as associated activities) that under any management conditions meet the following requirements:

- individual annual effective dose is less than 10 μSv;
- collective annual effective dose is either less than 1 man·Sv or greater than 1 man·Sv 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 in the lens of the eye is less than 15 mSv.

Basic Sanitary Rules OSPORB-99/2010 specify criteria for the exemption of solid materials from regulatory control. 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 the Federal law № 170-FZ On the Use of Atomic Energy and relevant provisions of federal norms and rules in the field of atomic energy use, the operating organization shall prepare periodic reports discussing 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; discharges and releases of radioactive substances, SNF and RW management;
- training and issued work permits;
- emergency preparedness;
- abnormal operation and its consequences.

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

Rostechnadzor is responsible for establishing the procedure for the submittal of information on operational disorders and NF safety reports to Rostechnadzor and its territorial authorities.

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

Categories of violations, the contents and the procedure for communicating relevant information, the procedure for investigating and accounting such violations, as well as relevant reporting requirements are established in federal norms and rules and the Rostechnadzor's safety guides.

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

If some amendments that are likely to have effect on nuclear and radiation safety are introduced to design, engineering, process flow and operational documents, relevant materials on introduced amendments that may require alteration of license conditions, together with the reviewed documents demonstrating safety (reports, supplements to reports and etc.) shall be submitted by the license holder (operating organization) to Rostechnadzor for further review; following the review Rostechnadzor will decide 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))

The Federal law № 170-FZ On the Use of Atomic Energy stipulates that 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 current legislation of the Russian Federation and the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service, its officials are authorized to implement the following measures of administrative enforcement (sanctions):

- to suspend or terminate licenses issued by Rostechnadzor and its territorial authorities to organizations (legal entities) for the declared types of activities in the field of atomic energy use, if 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 norms and rules are breached, and to disqualify personnel according to the Code of Administrative Violations;
- to impose administrative penalties in form of warnings and fines on organizations (legal entities) and NF officials for violating norms and rules in the field of atomic energy use;
- to submit to law enforcement authorities materials concerning violations of the Russian legislation in the field of atomic energy use, relevant provisions of federal norms and rules 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 or presented out-of-time the findings of periodic safety assessment after the expiration of a 10-year period set for NI or SF operation;
- findings of a periodic safety assessment performed for a NI or SF revealed that the safety of the licensed activity, NI, SF and (or) conducted operations are not adequately ensured and demonstrated in a written form;
- the license holder failed to comply with the order issued to rectify the identified violations of license conditions;
- the permit recognizing the organization able to operate a nuclear installation, radiation source or storage facility and to perform siting, design, construction, operation and decommissioning of NI, RS or SF, as well as management of NM and RS 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 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))

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

According to provisions of the Federal law № 170-FZ On the Use of Atomic Energy, 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 measures to ensure safety in the field of atomic energy use;
- to establish and implement RW management programs.

Pursuant to the Government resolution 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 Regional Development of the Russian Federation (Minregion of Russia) (deals exclusively with LLW and ILW and sources of ionizing radiation that do not pertain to nuclear, power and military complexes of the country);
- Ministry of Energy of the Russian Federation (Minenergo of Russia);
- Ministry of 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).

The Federal law № 190-FZ On the Management of Radioactive Waste… regulates the status and powers of different parties involved in RW management, specifies the ownership right on RW and RW storage 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;
- powers of state authorities representing constituent territories of the Russian Federation, powers of local authorities;
- powers and function of the state management authority in the field of RW management;
- powers and functions of state safety regulatory authorities in the field of atomic energy use;
- powers of the National Operator for RW Management;
- general requirements to organizations generating RW.

By the 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 RW became the national operator for RW management in Russia.

According to the Federal law, the National Operator:

- ensures safe management of radioactive waste that it receives for disposal;
- ensures operation and closure of radioactive waste disposal facilities;

- places orders for design development and construction of radioactive waste disposal facilities;
- makes forecasts on radioactive waste 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 radioactive waste management;
- provides technical and information support to the state service for accounting and control of radioactive material and radioactive waste;
- implements other activities under relevant legislative provisions of the Russian Federation.

National Operator for RW management:

- is responsible for acceptance of radioactive waste for disposal. Radioactive 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 radioactive waste are 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 specified by the Government of the Russian Federation;
- ensures nuclear, radiation, occupational and fire safety, environmental protection, compliance with legal provisions regarding sanitary and epidemiologic welfare of public during operation, closure of RW disposal facilities, as well as at the post-closure stage;
- ensures radiation control at RW disposal sites, including non-continuous 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, has to provide information on NO activities unless the legislation of the Russian Federation recognizes it as a state secret;
- informs public, state authorities, other state bodies and local authorities on RW management safety and radiation environment at RW storage and disposal sites operated by NO.

Article 20 of the Federal law № 190-FZ On the Management of Radioactive Waste… stipulates that FSUE NO RW is responsible for RW receipt for disposal. Currently FSUE NO RW consists of a central office and branches located in the regions with operating deep well injection facilities for LRW disposal:

- Zheleznogorsk (Zheleznogorsk, Krasnoyarsk Region);
- Seversk (Seversk, Tomsk region);
- Dimitrovgrad (Dimitrovgrad-10, Ulyanovsk Region).

and commissioned near-surface disposal facility for solid RW – Novouralsk (Novouralsk, Sverdlovsk Region) pertaining to the Seversk branch.

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

The system is designed to identify the stocked inventory of radioactive material and RW 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.

Within 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 for collection and evaluation of information concerning RM and RW accounting and control at regional and institutional levels;
- maintain data basis on state RW inventory, 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 necessary to establish, operate and upgrade the SGUK RV and RAO and to communicate 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 accounting and control of radioactive materials and RW, methods for identifying their inventory and radionuclide contents, etc.), provides unified information support and compatible software for relevant data basis;
- ensure coordination of efforts at the federal level;
- provide sufficient amount of information to state authorities, state management authorities in the field of atomic energy use, and other executive authorities on RM and RW inventory, their 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 collection and transfer of information (Central Analytical Center for State Accounting and Control of Radioactive Material and Radioactive Waste) enabling the system operation at the federal level;
- cooperation with other countries on the matters associated with RM and RW accounting and control under relevant international agreements and programs (projects).

Rostechnadzor supervises the system performance and issues relevant licenses, exercises control over the compliance with the established norms and rules in the field of RM and RW management.

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)

The Federal law № 170-FZ On the Use of Atomic Energy stipulates that state regulation of safety in the field of atomic energy provides for certain efforts implemented by federal executive authorities aimed at development, approval and implementation of norms and rules in the field of atomic energy use, issuance of permits (licenses) authorizing particular activities in the field of atomic energy use, accreditation, standardization, compliance assessment, safety supervision, expert examination and inspection, control over development and implementation

of measures required to protect NF personnel, public and the environment in the event of an accident resulted from the use of atomic energy.

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 resolution № 412 of July 3, 2006, the following authorities shall exercise state regulation of safety in the Russian Federation:

- 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 Supervisory Service for Consumers Rights and Health Protection (Rospotrebnadzor);
- Federal Medical and Biological Agency (FMBA of Russia).

In 2007, following the adoption of the Federal law On the State Atomic Energy Corporation Rosatom, certain amendments were introduced to Article 23 of the Federal law № 170-FZ On the Use of Atomic Energy, 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 norms and rules in the field of atomic energy use, accreditation, standardization, compliance assessment, control over development and implementation of measures to protect NF personnel, public and the environment in the event of an accident resulting from atomic energy uses.

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

Provisions regarding relevant competence, structure and human resources of state safety regulatory authorities are specified in a number of Government resolutions of the Russian Federation.

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

In 2011, a new amendment to the Federal law № 170-FZ On the Use of Atomic Energy 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, authorized management agency for 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.

In the reporting period, Rostechnadzor implemented certain efforts to enhance mutual cooperation between FMBA of Russia and Rospotrebnadzor involved in state regulation of safety 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 Approval of the 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:

- providing more effective efforts enabling to ensure 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 radioactive material and RW; evaluations and expert reviews in the field of radiation safety; establishing regulatory standards specifying acceptable limits for releases and discharges of radioactive substances to the atmosphere and water bodies.

Joint Decree of Rostechnadzor and Rospotrebnadzor № 315/588 of May 30, 2012 On the Approval of the Administrative Regulation on Cooperation between the Federal Environmental, Industrial and Nuclear Supervision Service and the Federal Supervisory Service for Consumers Rights and Health Protection Associated with Federal State Sanitary and Epidemiological Supervision of Construction Activities was approved.

The document provide for cooperation on the following matters:

- provision of information on regulations and guideline documents discussing the arrangements for and implementation of federal state supervision activities;
- identifying the goals and the scope of inspections and relevant timeframes;
- provision of information on the results of performed inspections, data on compliance of the declared activities with the legislative provisions of the Russian Federation and the overall effectiveness of federal state supervision activities;
- proposals aimed at improvement of national legal framework discussing the implementation of activities associated with federal state supervision and relevant management arrangements.

Rostechnadzor's cooperation with EMERCOM of Russia is regulated by the Agreement on Cooperation between the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters and the Federal Environmental, Industrial and Nuclear Supervision Service in the Field of State Regulation of NPP Safety № 2-4-38/KP-32/203 of February 28, 2008.Feedback from the implementation of similar agreements between Rostechnadzor and Rospotrebnadzor and FMBA of Russia has been evaluated and relevant findings are being considered in the development of the Administrative Regulation on Cooperation.

Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor) is a federal executive authority exercising functions of a state safety regulatory authority in the field of atomic energy use and a regulatory authority pursuant to provisions of the Convention on Nuclear Safety and the Joint Convention on the Safety of SNF and RW Management. Furthermore, according to the Amendment to the Convention on the Physical Protection of Nuclear Material, Rostechnadzor is also a competent authority of the Russian Federation. Relevant amendments have been introduced to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service № 401 of July 30, 2004 (hereinafter Regulation) following the adoption of two Government resolutions of the Russian Federation, namely, № 717 of September 13, 2010 and № 1037 of October 11, 2012.

According to the Regulation, Rostechnadzor is responsible for the following activities in the field of atomic energy use:

- submits drafts of federal laws, regulations approved by 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:
  - federal norms and rules in the field of atomic energy use in accordance with the legislation of the Russian Federation;
  - safety guides in the field of atomic energy use (within its competence)[*];
  - the procedure for issuing work permits to personnel involved in activities associated with atomic energy use and working at NFs;
  - the requirements to the structure and the contents of documents demonstrating safety of NIs, RSs, SFs and (or) activities in the field of atomic energy use, required for licensing relevant activities; as well as for the review of the above-mentioned documents;
  - the procedure for arranging for and performing supervision over the state system for accounting and control of nuclear material;
  - the procedure for compilation 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 discussing technical regulation;
  - methodologies for the development and introduction of regulatory standards specifying acceptable limits of releases and discharges of radioactive substances into the atmosphere and water bodies;
  - the procedure for issuing permits for releases and discharges of radioactive substances and their reference forms;
  - specific aspects of compliance assessments performed for products falling under the safety requirements 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; making decisions on inclusion of certain documents into the consolidated listing of standardization documents:
    - national standards;
    - industry-wide standards prior to their cancellation due to the adoption of relevant national standards (preliminary standards);
    - international and regional standards, regional codes of rules, foreign standards and codes of rules;
    - national standards for restricted use.
  - the procedure that operating organizations shall follow when submitting documents containing the results of safety assessments performed for nuclear installations and NM, RM and RW storage facilities, and demonstrating their operational safety to the authorized state safety authority in the field of atomic energy use, as well as the requirements to the contents and structure of such documents[**];
  - approves the procedure for expert reviews of safety (evaluation of safety cases) for nuclear facilities and (or) certain types of activities in the field of atomic energy use[***].
- exercises control and supervision over:

[*]Introduced by the, Government resolution of the Russian Federation № 1037 On Introducing Amendments to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service of October 11, 2012

[**]Introduced by the, Government resolution of the Russian Federation № 1037 On Introducing Amendments to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service of October 11, 2012

[***]Introduced by the, Government resolution of the Russian Federation № 1037 On Introducing Amendments to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service of October 11, 2012

    - the compliance with norms and rules in the field of atomic energy use, conditions of licenses (permits) authorizing certain activities in the field of atomic energy use;
    - nuclear, radiation, occupational and fire safety (at nuclear facilities);
    - physical protection of NI, RS, SF, NM and RM, as well as of the systems for integrated state accounting and control of nuclear and radioactive material and radioactive waste in organizations;
    - the compliance with international obligations of the Russian Federation discussing safety in the field of atomic energy use;
    - the 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 by-products resulting from their reprocessing are returned back to the State of origin (within the scope of Rostechnadzor's competence).
- in accordance with the legislation of the Russian Federation, licenses activities in the field of atomic energy use;
- arranges for the review of document sets demonstrating safety of nuclear facilities and (or) licensed activities; verifies the data presented in the submitted 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) enabling 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 allowable discharges and releases of radioactive substances to the atmosphere and water bodies;
- performs reviews (inspections) of certain types of activities carried out by legal entities and individuals on their compliance with relevant legal requirements of the Russian Federation, by-laws, norms and rules;
- Harmonizes:
    - provisions of managers, specialists and workforce qualification reference guides 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.
- ensures functioning of a control system over NFs in the event of an accident and provides all necessary administrative arrangements;
- is involved in certification of activities in the field of atomic energy use[*];
- establishes, develops and maintains the operation of an automated system of information and analytical support, inter alia the unified state automated system for radiation control in the territory of the Russian Federation;
- issues statements on compliance of constructed, reconstructed or refurbished capital facilities with the requirements of technical regulations and design documentation.

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, namely, Article 8.1 specifying the applicability and the use of a risk informed approach in certain types of state control (supervision) arrangements defined by the Government of the Russian Federation.

[*]Introduced by the, Government resolution of the Russian Federation № 1037 On Introducing Amendments to the Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service of October 11, 2012

The above mentioned provisions will enter into force on January 1, 2018.

Thus, according to the provisions of 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) in the cases specified by provisions of the Federal law 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. It should be noted, that this definition was altered on January 1, 2017 and a new line was added to it: “measure to prevent the breach of statutory requirements”.

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 shall define specific types of state control (supervision) activities that can 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 Resolution of the Government of the Russian Federation № 806 On the Use of Risk Informed Approach to Arrange Certain Types of State Control (Supervision) Activities and Introducing Certain Amendments to the 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.

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 decree № 557 of December 11, 2014). This system enables qualitative and effective performance of Rostechnadzor’s functions being 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 GS-R-3 The Management System for Facilities and Activities, IAEA GS-G-3.1Application of the Management System for Facilities and Activities, as well as GOST ISO 900-2011 (Quality management systems — Requirements) discussing current administrative structure and providing a clear description of processes associated with the expert review of regulatory activities, inspections and evaluations of registered events.

Rostechnadzor’s central office and its interregional territorial authorities supervising nuclear and radiation safety execute the functions entrusted to the Federal Environmental, Industrial and Nuclear Supervision Service.

Rostechnadzor’s central office and its interregional territorial authorities supervising nuclear and radiation 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, 2017On 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 to maintain the competence of Rostechnadzor's public officers. The system involves:

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

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

Rostechnadzor's public relations office is involved in cooperation with mass media promoting unbiased coverage of existing issues 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 the time 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.

In 2009, a full-scale IAEA mission on Integrated Review of Regulatory Authorities (IRRS) took place under the agreement between the IAEA and the Government of the Russian Federation. During this mission, IAEA experts evaluated the performance efficiency of state safety regulatory authorities, including Rostechnadzor, involved in the field of atomic energy use and compliance with the requirements of international conventions and obligations assumed by the Government of Russian Federation. Following the IRRS findings, Rostechnadzor developed and approved an Action Plan for the Implementation of Recommendations and Proposals of the IAEA Mission specifying particular steps to improve the state regulating system in the field of atomic energy use. According to the schedule, these arrangements were due to be completed in 2011-2013.

In 2013, a follow up IRRS mission was performed in Russia following another application of the Government of the Russian Federation. The goal of the follow-up review was to evaluate the national NRS regulatory system and the outcomes of measures taken in response to recommendations and proposals of the IRRS-2009 mission.

The follow-up mission for the evaluation of performance efficiency of Rostechnadzor being the authorized state safety regulatory authority took place in Moscow from November 11th to 19th, 2013. It involved the evaluation of accomplishments on carrying out IRRS-2009 recommendations, as well as an assessment of Rostechnadzor's activities in the following areas:

- emergency preparedness and response;
- lessons learned by regulators form the Fukushima-1 accident.

The follow-up IAEA mission enabled to develop a number of recommendations and proposals on further improvement of regulatory activities performed by Rostechnadzor and to identify the best Russian practices that may be recommended to safety regulatory authorities in other IAEA member countries involved in the field of atomic energy use.

During the review, the Russian legal framework regulating safety in the field of atomic energy use was compared against IAEA safety standards acting as the international safety standard.

The mission was also aimed at promoting an exchange of information and knowledge between the IAEA and Russian experts in the areas falling under the scope of the IRRS mission.

The IRRS peer review group came up with a conclusion that the IRRS-2009 recommendations and proposals had been incorporated throughout the integrated action plan. Significant advances were made in a number of areas, whereas the implementation of the action plan enabled much advancement.

IRRS experts noted a number of good practices and provided recommendations and proposals covering the areas where further advancements are necessary or desirable in order to increase the efficiency of regulatory functions and bring them into conformity with the IAEA safety standards.

The final report summarizing the findings of the IAEA follow-up mission was published in May 2014. The report sets forth the expert findings and is considered to be an official paper that IAEA submitted to the Government of the Russian Federation. The report was uploaded to Rostechnadzor's website.

Based on the findings presented in this report, another plan of actions was developed by Rostechnadzor enabling the implementation of proposals and recommendations of the follow-up mission aimed at further improvement of regulatory efforts in the field of peaceful uses of atomic energy.

There are two NRS technical support organizations being under Rostechnadzor's authority and providing their scientific and technical support in the field of NRS regulation, namely, the Federal State-Funded Institution Scientific and Engineering Center for Nuclear and Radiation Safety (FSFI SEC NRS) (www.secnrs.ru) and Federal State Unitary Enterprise VO Bezopasnost (www.vosafety.ru) (see Section E.3.1 of this Report).

Pursuant to Article 37.1 of the Federal law № 170-FZ On the Use of Atomic Energy, the Government resolution of the Russian Federation №387 of April 30, 2013 On the Approval of a 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 was enacted. According to it, a legal entity is considered to be a technical support organization if the following criteria are met:

- it has an appropriate license permitting it to carry out safety expert reviews (safety case reviews) for nuclear facilities and (or) certain types of activities in the field of atomic energy use;
- performs research and development to provide scientific and technical support in the field of state regulation of safety associated with atomic energy uses;
- performs research, testing, evaluations and (or) other safety assessments of nuclear facilities and (or) relevant types of activities.

Pursuant to the abovementioned regulation, Rostechnadzor adopted another decision of June 10, 2013, according to which FSFI SEC NRS became Rostechnadzor's technical support organization.

Technical support organization efforts are aimed at:

- providing scientific and technical support to the system of state regulation of safety in the field of atomic energy use, involving R&Ds and other relevant management activities, different types of expert reviews including safety evaluations;
- developing and upgrading the legal and regulatory framework in the field of atomic energy use and performing other activities to improve the system of state regulation of safety in the field of atomic energy use.

FSFI SEC NRS ensures effective advancements in scientific and technical NRS support practice and is actively engaged in international cooperation with foreign organizations,

including foreign technical support organizations. In 2012, FSFI SEC NRS became an allied member of the European Technical Safety Organizations Network (ETSON).

Development and improvement of the system enabling to inform the public through mass media and other information channels, authorized by federal executive bodies, on emergencies occurring at nuclear facilities, including those that have already happened and the projected ones, is considered to be a most important challenge for the state NRS policy.

In accordance with the Government resolution of the Russian Federation № 322 of June 30, 2004, **Federal Supervisory Service for Consumers Rights and Health Protection** (Rospotrebnadzor) is a federal executive authority responsible for state sanitary and epidemiological supervision over the compliance with the 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 consumers 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 consumers 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.

The following efforts of Rospotrebnadzor are aimed at ensuring radiation safety of the population of the Russian Federation:

- development and approval of sanitary rules covering radiation safety of the population and personnel and associated with activities involving all main types of radiation sources, as well as guidelines explaining how the requirements of sanitary rules are to be met in practice;
- licensing activities associated with management of sources generating ionizing radiation;
- compliance assessment of conditions, under which man-made sources of ionizing radiation are managed, with the provisions of sanitary rules the findings of which should be incorporated to relevant sanitary and epidemiologic statements that are required to obtain work permits;
- 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 resolution 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 to be a fundamental NRS objective of FMBA of Russia. FMBA of Russia executes its powers through the 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, providing medical and hygienic support and performing expert reviews of relevant design documentation.

FMBA of Russia performs its state sanitary and epidemiologic supervisory (control) functions on its own 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 the 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 resolution of the Russian Federation № 290 of April 12, 2004 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 resolution of the Russian Federation № 1418of 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 the procedure established by the Government resolution of the Russian Federation № 305 of May 21, 2007 On the Approval of a Regulation on the State Supervision in the Civil Defense.

Technical regulation of fire safety at NPPs is considered to be an important task for EMERCOM under the Federal law №184-FZof December 27, 2002 On Technical Regulation. The Federal law № 117-FZ of July 10, 2012 On Amendments Introduced to the Federal Law on the Technical Regulation of Fire Safety Requirements, introduced certain amendments extending the provisions of the Federal law №123-FZ of July 22, 2008 Technical Regulation on Fire Safety Requirements on nuclear power plants.

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 discusses rules for fire protection at nuclear power plants that are required to be met at different stages of nuclear reactor life cycle (excluding special purpose-built 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 resolution of the Russian Federation №1219 of November 11, 2015 On the Approval of a 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 a state policy and normative 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 resulting from 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 radiation monitoring 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 the issues associated with the management of domestic waste, protection of the atmospheric air, state environmental supervision, specially protected nature conservation areas and state environmental impact assessments.

In accordance with the Government resolution 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 radioactive waste 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 the Use of Atomic Energy, state safety regulatory authorities are independent from other state authorities, as well as organizations involved in atomic energy use.

Since 2010, all activities performed by the Federal Environmental, Industrial and Nuclear Supervision Service have been guided by the Government of the Russian Federation.

All activities performed by the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters are guided by the President of the Russian Federation.

All activities performed by the Federal Supervisory Service for Consumers Rights and Health Protection are guided by the Government of the Russian Federation.

All activities performed by the Federal Medical and Biological Agency are guided by the Ministry of Healthcare of the Russian Federation.

All activities performed by the Ministry of Natural Resources and the Environment of the Russian Federation are guided by the Government of the Russian Federation.

All activities performed by the Federal Service for Supervision of Natural Resources are guided by the Ministry of Natural Resources and the Environment of the Russian Federation.

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

In 2011, an amendment was introduced to the Federal law № 170-FZ On the Use of Atomic Energy according to which state safety regulatory authorities, when making decisions and executing their powers, 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 legislation;
- 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 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 applied to organizations involved in SNF and RW management and applicability of 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.*

The Federal law № 170-FZ On the Use of Atomic Energy (Article 34) stipulates that the operating organization, i.e. the license holder, is fully responsible for the safety of relevant nuclear facilities, as well as for the proper management of SNF, RW and other radioactive material.

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

An 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 activities are performed by state safety regulatory authorities in the field of atomic energy use.

According to Article 34 of the Federal law № 170-FZ On the Use of Atomic Energy, an operating organization shall have adequate authority, financial and material resources to fulfill the responsibilities assigned to it.

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

- that NI, RS and SF are used only for the intended purposes;
- 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, operation and decommissioning;
- development and implementation of measures aiming to prevent accidents at NI, RS and SF and, in case of their occurrence, to mitigate the adverse impacts produced on NI, RS and SF employees, public and the environment;
- 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 to protect the employees and the public in the event of an accident at NI, RS and SF;
- accounting and control of nuclear and radioactive material;
- physical protection of NI, RS, SF, NM and RM;
- development and implementation of fire safety measures;
- 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.

The license holder bears full responsibility for:

- nuclear and radiation safety;
- development and implementation of measures to improve the safety of SNF and RW management;
- radiological protection of personnel, public and the environment;

- financial coverage of civil liability for nuclear damage.

Article 26 of the Federal Law № 170-FZ On the Use of Atomic Energy stipulates that operating organization shall be licensed for each type of activity it performs. The license shall be issued by a state safety regulatory authority and formally specify the conditions that the operating organization has to follow when performing the declared activities in the field of atomic energy use.

The following institutions are responsible for licensing activities in the field of atomic energy use:

- Rostechnadzor (Government resolution of the Russian Federation № 280 On the Approval of a Regulation on Licensing Activities in the Field of Atomic Energy Use of June 29, 2013);
- Rospotrebnadzor (Government resolution of the Russian Federation № 278 On Licensing Activities Associated with the Use Ionizing Radiation Sources (Generating Sources) (Excluding Radiation Sources Used for Medical Purposes) of April 2, 2012).

According to the Government resolution of the Russian Federation № 280 of June 29, 2013 On the Approval of a Regulation on Licensing Activities in the Field of Atomic Energy Use, 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 norms and rules in the field of atomic energy use, compliance of staff qualification 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 nuclear and radioactive material, physical protection of nuclear installations, radiation sources, NM and RM storage facilities, action plans for the protection of NF employees and public in the event of an accident and preparedness to their implementation, availability of a quality assurance program and required engineering and technical support of the declared activity;
- ability of the applicant to ensure safety of the declared activity, nuclear facility and performed operations, as well as the adequate quality of performed operations and delivered services meeting the provisions of federal norms and rules 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, as well as to submit all relevant design materials.

Rostechnadzor and Rospotrebnadzor exercise state supervision over the compliance of license conditions by the license holder and if they are breached may impose sanctions in accordance with the legislation of the Russian Federation.

If the operating license (permit) is revoked, the operating organization remains responsible for NI, RS or SF safety prior to its transfer to another operating organization or acquisition of a new license (permit). If the operating organization is unable to ensure safety of the abovementioned facilities, 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 the Use of Atomic Energy).

Article 14 of the Federal law 190-FZ On the Management of Radioactive Waste… stipulates that RW management activities can 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 RW prior to its transfer to the National Operator.

The 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 operation, closure and post-closure of RW disposal facilities, and to perform radiation control at RW disposal sites, including periodic post-closure radiation monitoring.

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

F.2. Human and Financial Resources (Article 22)

Article 22. Human and Financial Resources

Each Contracting Party shall take the appropriate steps to ensure that:

i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;

ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;

iii) financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

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

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

According to relevant provisions of federal norms and rules in the field of atomic energy use (NP-001-15, NP-033-011, NP-022-2000, NP-016-05, NP-038-11), operating organizations involved in SNF, RW or RM management shall provide:

- adequate staff number having the required competences and appropriate permits for self-guided work 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 the safe NI, RS and SF operation;
- arrangement of a permit-to-work system enabling the employees, having the required competences, to perform the permitted activities;
- regular emergency drills enabling to work out employees response in case of operational disorders, including accidents, and 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 thus reflecting all the essential elements, including formation of an internal necessity of putting safety first. The new safety culture definition given in NP-001-15 more closely corresponds to the definitions provided in international papers, for example, INSAG-15. Additional requirements on safety culture development and maintenance were introduced by NP-038-16 also elaborating on the ways enabling the safety culture development when implementing activities associated with radiation sources.

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

Rosatom's activities aimed at providing adequate support for the establishment of a multilevel system for safety training, advanced training and certification of personnel involved in the atomic energy and nuclear industry sectors are considered to be an essential component of 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 15 specialized universities, covers 70-80% 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 is formed of 11 higher educational institutions and 7 institutions of secondary vocational education in 18 cities of 13 constituent territories of the Russian Federation.

MEPhI's higher and secondary vocational educational programs cover correspondingly 89 and 31 major disciplines and professions needed in the nuclear sector. Development of target admission to higher education institutions is now considered to be one of the most important ways of providing staff support to organizations of the sector. Thus, in 2016, the total number of students trained under such target 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 when and how often advanced training courses elaborating on safety aspects are to be held. 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 Russian nuclear sector.

Non-State Education Institution of Further Vocational Education and Training – Central Institute for Continuing Education and Training of the State Corporation Rosatom (CICE&T Rosatom) is considered to be a key educational institution of the corporate system providing personnel training in the area of nuclear and radiation safety.

In 2015, 96individuals from management teams of organizations operating nuclear and radiation hazardous facilities successfully completed NRS training and following the final examination received the certificates authorizing them to perform relevant activities in the field of atomic energy use.

In total, over 875 managers and specialists working at Rosatom enterprises completed NRS training courses.

Whereas 8,754 Rosatom employees have attended courses discussing nuclear and radiation safety matters.

On the whole, it can be stated that the industry-wide training system is capable of meeting the existing demands of enterprises and scientific institutions.

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

The Russian Federation takes the appropriate steps to ensure that adequate financial resources are available to ensure the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and decommissioning.

The following measures are to ensure adequate financial resources to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime 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 the Use of Atomic Energy);

- 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);
- RW disposal costs are covered by RW generating organizations (Articles 10 and 21 of the Federal law № 190-FZ On the Management of Radioactive Waste…);
- evaluation of decommissioning costs for nuclear facilities;
- state programs ensuring nuclear and radiation safety.

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

Statement on compliance with this requirement 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 (the Government resolutions 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 these deductions is established according to the Government resolutions of the Russian Federation № 576 of September 21, 2005 and № 68 of January 30, 2002.

Deductions 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, storage facilities for nuclear and radioactive material, RW storage facilities, R&D required to demonstrate and improve the safety of the abovementioned facilities;
- the costs associated with newbuilding, increased capacity, reconstruction and technical upgrading of operating production works, procurement of machines, equipment, tools, instruments, design and survey works and other capital expenditures;
- RW disposal costs.

Civil liability for nuclear damage beard by operators of nuclear facilities

From July 13, 2005, provisions of the Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963 expends to 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 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 to acquire a Rostechnadzor's license (parts 1 and 2, Article 56 of the Federal law № 170-FZ On the Use of Atomic Energy).

Special reserve funds of the State Corporation Rosatom.

The Federal law On the State Atomic Energy Corporation Rosatom specifies the procedure for the establishment of adequate financial resources to ensure the safety of RW and SNF management facilities.

Special reserve funds are established within the State Corporation Rosatom to ensure 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 decommissioning of NI, RS and SF, SNF management, R&Ds required to demonstrate and improve NI, RS and SF safety;
- fund covering the costs associated with the initiatives associated with the upgrading organizations being part of the Russian nuclear power generation complex, development of nuclear sciences and technologies, performance of design and survey activities and implementation of other investment projects;
- the 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 consists in ensuring 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 the Management of Radioactive Waste…).

The funds intended to cover RW disposal costs are accumulated by the State Corporation Rosatom in a special reserve fund – the 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 the federal executive authority 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 radioactive waste, including the package and container volume (gross volume). RW disposal tariffs are set in RUB/m^3.

In 2016, the Ministry of Natural Resources and the Environment of the Russian Federation specified the following RW disposal tariffs (order № 89 of March 13, 2013 and order № 557 of December 24, 2015): RW class 1 – 1,246,509.91RUB/m^3; RW class 2 – 566,954.39 RUB/m^3; RW class 3 – 132,681.13 RUB/m^3; RW class 4 – 37,520.42 RUB/m^3; RW class 6 – 175.21 RUB/m^3.

RW class 5 shall be disposed of in deep well injection facilities constructed and operated at the time when the Federal law № 190-FZ On the Management of Radioactive Waste…was enacted. Taking into account the special features of such waste, distinct waste disposal tariffs were set for relevant nuclear enterprises involved in its management (order № 559 of December

24, 2015): FSUE MCC – 6,674.67RUB/m^3; JSC SCC – 507.51 RUB/m^3; RIAR – 1,101.76 RUB/m^3.

According to provisions of the Government resolution of the Russian Federation № 920 of September 14, 2016 On Introducing Amendments to Certain Legislative Acts of the Government of the Russian Federation, on January 1, 2017 approval of RW disposal tariffs became a responsibility of the Federal Antimonopoly Service.

Evaluation of costs associated with RW and SNF management and decommissioning of nuclear facilities is performed in keeping with relevant provisions of International Financial Reporting Standards (IFRS).

For these purposes, in keeping with the Decree of the State Corporation Rosatom 1/1176-P of December 4, 2015 On the Approval of a 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:

- Industry-Wide Guidelines on Integrated Evaluation of Nuclear Decommissioning Costs;
- Industry-Wide Guidelines on Integrated Evaluation 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 ensuring nuclear and radiation safety

Major funding of efforts aimed at ensuring nuclear and radiation safety of RW and SNF management practices was carried out under the FTP NRS and subsequently under FTP NRS-2. Some of the most important activities carried out under this target program were discussed in Section B of the Report.

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

Nuclear and radiation control during operation, closure and post-closure of RW disposal facilities is performed by the National Operator for RW Management (NO RW). Funding of these activities is carried out from the RW disposal fund established via regular fees paid by nuclear operators according to fixed RW disposal tariffs (Articles 18, 20 and 21 of the Federal law № 190-FZ On the Management of Radioactive Waste…).

On the whole, the State Corporation Rosatom is ultimately responsible for the safety of nuclear facilities, including RW disposal facilities.

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 the Use of Atomic Energy, operating organization shall arrange for and coordinate activities associated with the development and implementation of quality assurance programs at all stages of development, operation and decommissioning of NI, RS and SF and exercise control over their implementation.

Availability of a quality assurance program and a plan for its implementation is essential to acquire a license for operations in the field of atomic energy use and to meet its conditions (Article 35 of the Federal law On the Use of Atomic Energy and the Regulation on Licensing Activities in the Field of Atomic Energy Use approved by the Government resolution of the Russian Federation № 280 of March 29, 2013). Safety related issues are reviewed during Rostechnadzor's inspections of organizations involved in the field of atomic energy use.

A number of federal norms and rules and Rostechnadzor's safety guides (NP-090-11 and RB-086-13) establish the requirements to the contents and structure of quality assurance programs. These requirements were developed on the basis of the Federal law On the Use of Atomic Energy and with due regard to the IAEA safety standards: 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 the provisions of international standards (ISO-9000).

Federal norms and rules specify 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 programs (program).

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

Ensuring compliance with quality assurance programs requirements is 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 (paragraphs 3 and 4, Article 5 of the Federal law On the Technical Regulation).

Rostechnadzor is authorized to establish rules for assessing the compliance of products in accordance with the special nature of relevant activities in the field of atomic energy use (p.5.2.2.16(3) of the Rostechnadzor regulation (approved by the Government decree of the Russian Federation № 401 of July 30, 2004).

In the Russian Federation, there is a particular consolidated list of standardization documents binding upon all nuclear facilities. The documents included in this list also establish relevant requirements to the abovementioned production goods (operations, services) and (or) processes. The consolidated list is drawn up by the State Corporation Rosatom and involves state standards, codes of rules, industry-wide standards, standards of organizations, international standards, regional standards, regional codes of rules, standards and codes of rules of foreign countries registered in the Federal Data Fund of Technical Regulations and Standards, as well as relevant engineering requirements.

The procedure according to which a particular standardization document can enter the consolidated list is established by the Government of the Russian Federation (Regulation Concerning Particular Aspects of the Standardization Process for Production Goods (Operations, Services) Subject to the Safety Requirements in the Field of Atomic Energy Use, as well as Design (Including R&Ds), Production, Construction, Installation, Setup, Operation, Storage, Transportation, Dismantlement and Disposal of Above Mentioned Products, approved by the Government resolution of the Russian Federation № 173 of March 1, 2013).

F.4. Operational Radiation Protection (Article 24)

Article 24. Operational Radiation Protection

24-1 Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:

i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;

ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and

iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.

24-2 Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:

i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and

ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

24-3 Uncontrolled and Unplanned Releases

Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

The following federal laws and regulations are the main instruments governing radiation protection of personnel, public and the environment during operation of NI, RS and SF in the Russian Federation:

- Federal law On the Use of Atomic Energy;
- Federal law On the Radiation Safety of Population;
- Federal law № 68-FZ On the Protection of Population and Territories from Natural and Man-Induced Emergencies;
- Federal law On the Management of Radioactive Waste…;
- Federal law On the Environmental Protection;
- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);
- Sanitary Rules for Radioactive Waste Management (SPORO-2002);
- Federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-058-14, NP-038-11 and etc.).

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 On the Use of Atomic Energy (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.

The Federal law (Article 35) stipulates that operating organization shall develop and implement measures to maintain NI, RS and SF safety, establish specialized services (if it's necessary), exercise control over NI, RS and SF safety, provide information on the safety status of NI, RS and SF 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 protection of NF employees and the public in case of an accident shall be specified in relevant action plans.

The Federal law also stipulates that if an accident results in a release of radioactive substances into the environment exceeding the established limits, the operating organization shall ensure prompt and timely exchange of information on 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 the Radiation Safety of Population, defines 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 the radiation 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, economic and social factors being taken into account.

The law specifies the following fundamental hygienic standards (acceptable dose limits) for radiation exposure caused by the use of IRSs in the territory of the Russian Federation (including those resulting from SNF and RW management):

- for the public – annual effective dose limit equals to 0.001Sv, whereas the lifetime effective dose limit (70 years) is equal to 0.07Sv; higher annual effective dose values are acceptable in certain years only if the average annual effective dose during five subsequent years does not exceed 0.001Sv;
- for the employees – annual effective dose limit equals to 0.02Sv, whereas the effective dose limit for the employment period (50 years) is equal to 1Sv; annual effective dose value of 0.05Sv is considered to be acceptable only if the average annual effective dose during five subsequent years does not exceed 0.02Sv.

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).

Unified State System for Accounting and Control of Public Exposure in the Russian Federation (ESKID) is an integral part of a subsystem operated by the Ministry of Healthcare of the Russian Federation. ESKID is an aggregate system formed of federal, regional and institutional subsystems for accounting and control of public exposure in Russia that are connected with the Russian State Medical and Dosimetry Registry via federal data pools. The federal level of ESKID involves:

- Ministry of Health of the Russian Federation and the Committee on Public Exposure supervised by it;
- federal data pools on individual public exposure doses.

Unified State Automated System for Radiation Monitoring on the Territory of the Russian Federation (EGASMRO) covers the whole territory of the Russian Federation and provides information support in the field of radiation safety to state governing and management authorities at all levels. Timely detection of changes in radiation environment, their evaluation, forecasting and prevention of potential negative impacts on population and the environment stand as the key purpose of the state radiation monitoring. Activities associated with EGASMRO and its functional subsystems are coordinated by Rosgidromet.

Radiation and Hygienic Certification of Facilities Applying Sources of Ionizing Radiation in the Constituent Entities of the Russian Federation is yet another instrument applied in this field in Russia.

A big number of technical and administrative arrangements aimed at achieving a higher level of radiation protection, safety culture development and better work management is implemented and support the efforts on reducing NI, RS and SF personnel exposure.

In 2016, annual effective dose of personnel exposure was equal to 1.7 mSv, thus, remaining unchanged as compared to the previous three years.

Provisions of basic sanitary rules OSPORB-99/2010establish a classification system for nuclear facilities in accordance with relevant potential hazard (risk) levels. Such classification enables to differentiate requirements to siting, design, 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 on personnel and public that are likely to be produced in case of a radiation accident at the facility. Thus, facilities are categorized according to the consequences of potential accidents. Classification system for nuclear facilities in accordance with relevant potential hazard (risk) levels is summarized in Annex F of this Report.

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 the Use of Atomic Energy;
- Federal law № 68-FZ On the Protection of Population and Territories form Natural and Man-Induced Emergencies;
- Federal law № 3-FZ On the Radiation Safety of Population;
- Regulation on the Unified State System for Prevention and Elimination of Emergencies (approved by the Government resolution of the Russian Federation № 794 of December 30, 2003), as amended;
- federal norms and rules specifying general safety requirements for NI, RS and SF (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-038-16, NP-058-14);
- federal norms and rules specifying the requirements to action plans for the protection of personnel and public in the event of an accident and emergency preparedness at NI, RS and SF (NP-075-06, NP-015-12, NP-077-06, NP-078-06);

- federal norms and rules specifying the procedure for declaration of emergency preparedness, emergency situation, prompt exchange of information in the event of radiation hazardous conditions at NI, RS and SF (NP-005-16, NP-078-06);
- federal norms and rules specifying the requirements to the planning and preparedness to response activities in the event of an accident during NM and RM transportation (NP-074-06);
- federal norms and rules specifying the requirements for criteria used to define the boundaries of fire-prevention planning zones (NP-050-03, NP-032-01);
- sanitary norms and rules (OSPORB-99/2010, NRB-99/2009, SP AS-03, MR 2.6.1.0055-11).

These documents have been drafted giving due consideration to Russian and international best practices and relevant requirements and recommendations provided in the 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-02 (2011);
- Arrangements for Preparedness for a Nuclear and Radiological Emergency. Safety Guide Series No. GS-G-2.1 (2007).

The said regulations are aimed at preventing the occurrence and development of emergencies resulting from atomic energy uses and reducing the associated damage. They provide a background for the establishment of standards for the protection of employees (personnel), public and the environment in the event of radiation emergencies, 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.

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

Appropriate action plans are drawn elaborating on the procedure that the operating organization shall follow to perform all relevant activities and interact with different authorities in order to protect NF employees and the public in the event of an accident.

Operating organization shall develop and implement measures to prevent radiation accidents at NI, RS and SF and to mitigate their adverse effects. It is also responsible for the development and implementation of action plans to protect its employees (personnel) in the event of an accident at NI, RS and SF that shall be drafted prior to the 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 of the facility's category set according to the associated potential radiation hazard level. Procedures that the employees are to follow in case of emergencies shall be developed for all facilities according to relevant levels of potential radiation hazard.

Federal norms and rules 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 the 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 an accident at NF. These plans shall provide for coordination of efforts of the 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. Administration of NF is responsible for maintenance of instant readiness and implementation of 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 employees response in case of accidents and arrange for such regular trainings.

During the license review, the licensing authority shall assess the feasibility and the adequacy of all technical and administrative arrangements put in place to ensure that the operating organization is ready to implement all the required response activities in the event of an accident.

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

Unified State System for Prevention and Elimination of Emergencies (RSChS) covering the whole territory of the Russian Federation is operated by EMERCOM.

RSChS also involves an Industry-Wide 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 response preparedness in case of potential nuclear and radiation emergencies in organizations operating particularly hazardous radiation and nuclear productions and facilities.

The OSChS of the State Corporation Rosatom unites management authorities, response forces and the facilities of Rosatom's emergency rescue units and covers both federal and facility levels. The first National Report discussed in detail relevant management system, forces, equipment and OSChS preparedness to emergency response and emergency elimination.

According to provisions of a 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 an integral part of the Unified State System for Prevention and Elimination of Emergencies and integrates all resources and capabilities of Rostechnadzor enabling to address the following issues:

- control over NRHF's preparedness for actions aimed at nuclear and radiation accident containment and elimination of their consequences;
- identification of violations that could potentially result 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 NRHFs.

Within the framework of the above mentioned functional sub-system, Rostechnadzor in coordination with FSFI SEC NRS experts takes part in emergency response drills at nuclear power plants evaluating the actions performed by operating organization thus drawing up recommendations on the enhancement of emergency response preparedness and providing them to the operating organization.

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 enabled to establish special emergency response units who's efforts are 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 federal laws and regulations govern NF decommissioning process and procedures in the Russian Federation:

- Federal law № 170-FZ On the Use of Atomic Energy;
- federal norms and rules setting up safety requirements to NI, RS and SF decommissioning (NP-057-17, NP-012-99, NP-028-01 and etc.).

Federal norms and rules in the field of atomic energy use (NP-057-17, NP-012-99, NP-028-01 and etc.) stipulate that institutional and technical measures during design development, construction and operation of NI, RS and SF shall be performed with due consideration of their future decommissioning (closure).

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

Comprehensive engineering and radiation investigation of NI, RS and SF shall be performed prior to their decommissioning to evaluate technical and radiation state of engineering systems and equipment, building structures and the territories adjacent to NI, RS and SF sites. Investigation findings shall provide a basis for the operating organization to develop relevant decommissioning (closure) projects and to prepare the safety analysis decommissioning (closure) report.

Operating organization shall ensure safe decommissioning, including the development and implementation of administrative and technical measures aimed at prevention of accidents and mitigation of relevant consequences, safe SNF and RW management, their accounting and control, as well as physical protection of NI, RS and SF, environmental monitoring performed at the site, in surveillance zones and sanitary-protection zones.

Administrative and technical measures being part of pre-decommissioning activities and decommissioning itself shall reduce radiation exposure of employees (personnel), public and the environment to the minimum practicable with due regard to relevant social and economic aspects.

NI, RS and SF being under decommissioning 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 ensured by the operating

organization. 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.

During NI and SF operation, operating organization shall keep all relevant records and information required for decommissioning, including design and operational documentation.

According to the provisions of federal norms and rules, prevention of accidents during NF decommissioning and mitigation of their consequences, in case if such accidents occur, are recognized as fundamental safety principles of NF decommissioning.

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

The current Rosatom's Concept for NF, RS and SF Decommissioning is aimed at development of basic provisions for the establishment of a unified decommissioning system covering all nuclear and radiation hazardous facilities being under the supervision of the State Corporation.

This goal is achieved through:

- development and improvement of the legal and regulatory framework governing the safety from the decommissioning stage and throughout NF exemption from regulatory control performed by state nuclear and radiation safety regulatory authorities;
- development of economic instruments to support decommissioning activities with due regard to social aspects and those associated with human resources (establishment of proper conditions);
- scientific, engineering and technical support of decommissioning activities (providing opportunities for it).

In 2014 – 2017, the following works of preparation for decommissioning were performed at NPP units:

- unit № 3 of Novovoronezh NPP was permanently shut down, final shut down operating license was acquired (LRW inventory accumulated during NPP operation and stored in LRW SF-3 was treated, maintenance facilities for reactor equipment and the raw water system were dismantled, all the equipment was removed from the central hall of unit 2 in order to provide the space required for an SRW segregation unit and a stationary cutting installation);
- integrated survey was performed at unit 1 of Leningrad NPP, systems that are required to operate following unit shut down were identified; technical specifications and a plan of pre-shut down actions were drawn;
- decommissioning programs for units 1 and 2 of Beloyarsk NPP were updated; in 2016, applications for operating licenses and relevant safety cases were submitted for review to Rostechnadzor due to expiration of existing operating licenses in 2017;
- dismantling works were performed at units 1 and 2 of Beloyarsk NPP, namely, equipment from the turbine hall of unit 1 was dismantled (240.2 tons), 58 tons of metal RW were transferred to a specialized RW management organization;
- under the pre-decommissioning program, a set of operations was completed at units 1 and 2 of Beloyarsk NPP enabling to prepare all transport and process systems, as well as necessary infrastructure for the shipment of AMB SNF stored in cooling ponds; a trial shipment of a SNF cask to FSUE PA Mayak was performed.

Nuclear decommissioning works are performed in parallel with remediation of contaminated territories. In 2015 – 2016, the following works were carried out in this field:

- remediation of "Globus-1" site in the Ivanovo Region, contaminated due to a peaceful nuclear explosion of 1971, was completed;
- remediation of refinery and ash disposal sites № 1 – 5 at JSC Podolsk Non-Ferrous Metal Plant was completed;

- safety was ensured at a number of facilities located at the industrial site of JSC Kirovo-Chepetsk Chemical Combine named after B.P. Konstantinov and contaminated due to past activities;
- after necessary R&Ds, remediation efforts were completed at tailings storage facilities, a number of facilities located at the site a hydrometallurgical plant and ore mines № 1 and 2 of a shut-down state-owned enterprise Almaz (Lermontov, Stavropol Territory);
- tailings facility and the site of an ore-processing plant of former Novotroitsk mining department were remediated (Novotroitsk, Zabaikalsk Territory);
- remediation completed at an abandoned test site of All-Russian Research Institute of Agricultural Radiology and Agroecology (RIARAE RAAS) located in the vicinity of settlement Volginski (the Vladimir Region);
- over 600 m^2 of radioactively contaminated lands were remediated in the Moscow Region including the territories in the vicinity of settlement Subbotino of the Pavlovo-Posadsk District;
- remediation works were completed at radioactively contaminated territories of JC Dalur site (the Kurgan region) involving decommissioning of over 70 boreholes.

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.*

The 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 federal norms and rules set forth general requirements for the safe SNF management and the safety of SNF management facilities:

- Federal law № 170-FZ On the Use of Atomic Energy;
- Federal law № 3-FZ On the Radiation Safety of Population;
- Federal law № 7-FZ On the Environmental Protection;
- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010) (as amended);
- federal norms and rules:
  - General safety provisions for NI, RS and SF (NP-001-15, NP-033-01, NP-022-2000, NP-016-05, NP-038-16, NP-058-14);
  - Accounting of External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-05);
  - Facilities for Spent Nuclear Fuel Reprocessing. Safety Requirements. (NP-013-99);
  - Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements. (NP-035-02);
  - Rules for the Safe Storage and Transportation of Nuclear Fuel at NF Sites (NP-061-05).

A 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 norms and rules of the Russian Federation in the field of atomic energy use provide for a comprehensive set of measures to ensure nuclear safety of SNF management, so that criticality and removal of residual heat generated during spent fuel management are adequately addressed at all management stages, including SNF on-site storage, transportation, storage and reprocessing at SNF reprocessing plants.

Federal norms and rules, namely, NP-063-05, NP-013-99, NP-035-02 and Rules for the Safe Storage and Transportation of Nuclear Fuel at Nuclear Facilities (NP-061-05) establish nuclear

safety requirements for SNF management covering a whole range of nuclear facilities: NPPs, including independent storage facilities at NPP sites, SNF storage facilities outside NF sites and SF, research nuclear installations, coastal and floating SNF storages at ships and other waterborne vehicles.

SFAs distribution in shrouds, racks, packages and the mutual disposition of shrouds, racks, packages and containers shall provide that effective neutron multiplication factor during SF storage and transportation does not exceed 0.95 under normal operation, operational disorders, including design basis accidents (under NP-061-05 provisions).

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, design of equipment, engineering, construction, operation and decommissioning of SNF management facilities shall ensure the following:

- that a self-sustained chain fission reaction (SCR) is avoided both under normal operation and any initiating events discussed in the safety case;
- that any uncontrolled and unauthorized reprocessing, accumulation, relocation, transfer and transportation of nuclear fissile material (substances) is avoided;
- that 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 are not breached;
- preferential use of safe equipment, safe technical tools and automated equipment;
- that nuclear safety parameters are monitored;
- that a conservative approach is applied in the safety case.

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 of an SNF reprocessing facility is achieved through:

- restrictions imposed on the geometry and the size of equipment;
- 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;
- the 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 involved at all stages of SNF management enabling to comply with normal operation limits provided that the passive systems are preferred over the active ones.

SNF storage and transportation system designs shall provide for certain measures or devices eliminating the possibility that the temperature of fuel cladding goes beyond 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.

The 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) eliminating the possibility that the fuel cladding temperature exceeds 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 drafted during design development, construction and operation of SNF management facilities and installations.

These lists shall include accidents associated with SCR and failure of heat removal.

G.1.2. Minimization of Radioactive Waste Generation (Article 4 (ii))

The Russian Federation takes the appropriate steps to ensure that the 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.

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

- Federal law № 190-FZ On the Management of Radioactive Waste…;
- The Concept for SNF Management 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 norms and rules 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, SPORO-2002).

Federal norms and rules 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 control over the generation and accumulation of RW).

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

- 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 enabling to minimize RW generation during SNF management is stated among the expected future accomplishments of **the Concept for SNF Management of the State Corporation Rosatom.**

Institutional Target Program for the Infrastructure Development and Spent Nuclear Fuel Management in 2011 – 2020 and until 2030 is aimed at delivering effective solution to address the issues accumulated to date in the field of SNF management, as well as ensuring safe and economically feasible management of SNF from NPPs, RRs and nuclear-powered transport installations owned by Russian and foreign entities and being part of Rosatom enterprises.

Financial provision of RW management activities, including RW disposal, by using RW generators funds is viewed as an economic incentive enabling to minimize RW generation during SNF management. RW management tariffs were discussed in Section F.2.2. of the Report.

Federal norms and rules (NP-058-14 and other) stipulate that the required conditions (engineering solutions and administrative arrangements) enabling to minimize RW generation to the minimum practicable shall be ensured during NI, RS and SF design development and operation.

According to general safety provisions (NP-016-05, NP-058-14 and other), operating organization shall limit RW generation to the minimum practicable that can be also achieved through compliance with the following RW management requirements established for operating organizations:

- to ensure timely RW processing and conditioning;
- to prevent unplanned RW accumulation;
- 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 operating documentation;
- to avoid radionuclide releases (discharges) into the environment exceeding the established limits.

The FTP NRS-2 provides for a set of arrangements that will enable to bring the accumulated RW inventory into safe condition and perform well-timed processing of the resulting RW. Relevant information was presented in Section B of this Report.

Development of technologies to minimize RW generation

Advanced SNF reprocessing technologies are currently under development. These technologies will enable considerable reduction of RW generation. A pilot demonstration center (PDC) for advanced SNF reprocessing has been constructed at FSUE MCC under 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 closed water cycle.

Currently, the required technologies and equipment for RW treatment, conditioning and pre-disposal management are operated at all large enterprises enabling RW repackaging, segregation, streaming, compaction, incineration and packaging of large-size RW items.

RW disposal tariffs set by the Ministry of Natural Resources of the Russian Federation is another essential mechanism providing both for RW minimization and decrease in RW hazard level. As for January 1, 2017, these tariffs varied from 347 RUB/m^3 for RW class 6 (RW generated from uranium ore, mineral and organic raw material mining and milling) to 1,300,000 RUB/m^3 for RW class 1 (HLW with high heat output).

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 – 2020 and until 2030 (ITP SNF).

The existing system regulating activities associated with design, 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.

The 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 the safe SNF management as a top priority. Having in mind the realistic figures of projected future SNF arising, the Russian nuclear sector continued the implementation of a program for the establishment of centralized SNF storage and reprocessing facilities carried out 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. For instance, FSUE MCC has started SNF reloading form its “wet” storage facility to the “dry” one.

Reprocessing of damaged RBMK-1000 SNF, WWER-1000 SNF, SNF discharged from different research reactor units has been started.

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 releases and discharges due to SNF management, as well as state supervision over the radiation protection of personnel, public and the environment.

The operating organization shall submit, as part of a license application for siting, construction, operation and decommissioning of an SNF management facility, a SAR 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 safety analysis and decide whether they should grant a license or not.

The Federal law № 7-FZ On the Environmental Protection establishes the legal framework for the environmental protection. Observance of the human right to 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 in Russia.

Questions concerning the tolerability of certain environmental impacts are addressed during state environmental assessments and the reviews of license (permit) applications.

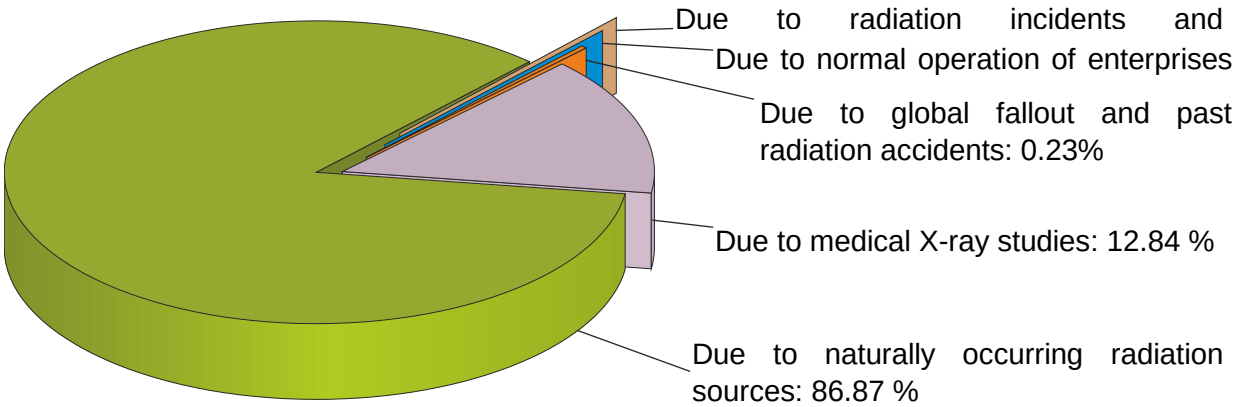
To ensure operational safety of SNF management facilities, operating organizations shall perform radiation monitoring, involving control of radioactive discharges and releases into the environment and monitor their compliance with the established limits; whereas local or federal competent authorities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

The ongoing monitoring at enterprises indicates that radionuclide concentrations found in the air of industrial sites where SNF reprocessing activities are taking place, within their controlled areas and in near-by settlements are considerably lower than the acceptable limits defined by provisions of NRB-99/2009.

Real-time data on the radiation environment in the regions, where Rosatom's enterprises are located, is available through the automated radiation monitoring system at the following URL: 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, production induced effects 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. A special procedure enabling to implement state environmental assessment of an integrated return-project was developed in order to demonstrate that such return would contribute to a general mitigation of radiation risks and environmental safety improvement. It should be noted, that this project also involved the implementation of special environmental programs (SEP) within the project funding.

Thus, for example, according to provisions of the Government resolution 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 provided for 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 prompt the financial support of post-accident clean-up producing no negative impact on the environment and local residents. 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 the 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 soils 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 contaminates from the territory of East-Uralsk State Reserve;
5. Activities to reduce the risk of further migration of radioactive contaminates into the environment (within the boundaries of the considered region);
6. Evaluation of environmental, social and economic impacts associated with activities performed under the 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 the 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.

2015 saw completion of activities scheduled under the Integrated Plan on Implementing the Environmental Policy in 2012 – 2015.New Integrated Plan for 2016 – 2018 was drafted and approved.

Efforts are underway on the implementation of environmental and quality management systems in atomic sector organizations enabling further transition to an integrated management system.

Since 2014, compliance audit of environmental management system was carried out in JC NIAEP by a certification agency. The audit confirmed the certificate on the compliance of NIAEP environmental management system (EMS) with the requirements of the international standard ISO 14001:2004. Similar EMS compliance audit against the requirements of DIN EN ISO 14001:2009 was successfully completed at JC Techsnabeksport.

In 2015, JC Rosenergoatom's environmental certificates ISO 14001:2004 were confirmed. JC TVEL also successfully completed a requalification test under intergraded management audit system for quality assurance, environmental protection, occupational health and safety, energy management confirming its consistency with the requirements of international standards ISO 9001, ISO 14001, OHSAS 18001 and ISO 50001. The audit was performed by German certification agency TŰV International Certification (TIC).

JC IRM has completed a certificate on compliance of its environmental management system with the requirements of ISO 14001:2004 system. JC Luch drafted all necessary documentation to perform similar audit of its environmental management system on compliance with GOST R ISO 14001:2007 standards.

G.1.5. Taking into Account Biological, Chemical and Other Hazards that May Be Associated with Spent Fuel Management (Article 4 (v))

According to the provisions of Federal law № 7-FZ On the Environmental Protection, observance of the human right to a healthy environment and mandatory consideration of environmental impact assessment findings when making decisions on economic and other activities are viewed as fundamental principles of the environmental protection.

According to the 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 when SNF management activities are planned and executed.

Decisions on SNF management activities shall be made following an impact assessment that will enable 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 negligible as compared to the radiation impact.

The State Corporation Rosatom ensured the implementation of all scheduled activities required to provide the environmental protection. As a result, in 2015 pollutant emissions decreased by 8.5 %, whereas RW class I and II generation decreased by a factor of 1.4. Branch-wise, the amount of fines associated with violations in the field of environmental protection totaled some 1,580,000 RUB. No environmental protection fines were imposed on NPPs. At the same time, Rosatom's investments associated with environmental protection incentives accounted for some 6.0 % of total funds invested into this field in Russia. Whereas, Rosatom enterprises accounted for only 0.3 % of discharges and 0.5 % of waste produced on the whole in Russia.

In 2015, pollutant atmospheric discharges totaled some 46,400 tons with a capture rate of about 84.43 %. According to 2015 breakdown of aggregate discharges in the Russian Federation, only some 0.15 % of them were generated by Rosatom enterprises.

The following federal laws and fire safety regulations govern fire and explosion risks in Russia: The Federal law №69-FZ On the Fire Safety of December 21, 1994 (as amended on March 12, 2014), Federal law №123-FZ Technical Regulation on Fire Safety Requirements of July 22, 2008, fire prevention regulations (approved by the Government resolution of the Russian Federation №390 of April 25, 2012); federal norms and rules and Rostechnadzor's decrees establishing fire and explosion safety requirements and provisions for nuclear facilities, including SNF management and SNF reprocessing.

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 projected radiation impacts produced on future generations and resulting from SNF management; these impacts shall not exceed the acceptable public exposure levels as established by the existing regulations (Annex E).

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

The requirements stipulating that undue burdens associated with the need to provide safe SNF management shall be not imposed on future generations are set forth by provisions of the Federal law№ 170-FZ On the Use of Atomic Energy and federal norms and rules according to which reliable protection of NF employees, public and the environment against unacceptable

radiation impacts (as defined in the relevant norms and rules in the field of atomic energy use) and radioactive contamination shall be provided during storage and reprocessing of nuclear and radioactive materials. The principle of avoiding undue burden associated with SNF management is implemented via the state policy of the Russian Federation involving SNF reprocessing and pre-disposal management of 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 – 2020 and until 2030 provide for administrative and financial arrangements enabling the establishment of SNF management system aimed at avoiding 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 attenuation of some deferred challenges associated with SNF management 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 the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention entered into force for the Russian Federation.

The current management and regulatory system covering siting, design, 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.

All operational NI and SF involved in SNF management activities are operated under Rostechnadzor licenses issued for operation and management of nuclear materials. Operating licenses are issued following a safety assessment based on the review findings, the 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;
- engineering design of the facility (approved by Rostechnadzor);
- guidelines on the 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 for 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 the NRS provisions set forth in norms and rules and a program for the 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 involve inspections that Rostechnadzor perform:

- to evaluate NF and SF safety;
- to verify the submitted information;
- to check if the applicant is able to perform the declared activities and if all relevant conditions can be provided.

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

According to Article 35 of the Federal law № 170-FZ On the Use of Atomic Energy, operating organizations exercise control over NI and SF safety and shall submit all relevant safety data to state safety regulatory authorities.

According to federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, 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 for their elimination in the future.

Furthermore, operating organizations shall prepare regular reports discussing NI and SF safety and submit them to state safety regulatory authority and state management authority in the field of atomic energy use. All enterprises operating SNF management facilities shall submit such annual reports the contents and the structure of which are specified in Rostechnadzor's guideline document RD-043-08. These reports shall discuss the current safety levels at SNF management facilities. Such information shall be presented in keeping with provisions of safety regulation Evaluation of the Current Safety Level at Nuclear Facilities (RB-091-13).

According to Article 26.1 of the Federal law № 170-FZ On the Use of Atomic Energy enacted in 2011, organization operating NI and SF under a permit (license) issued for more than 10 years shall perform periodic safety assessments. Such assessments are performed in order to evaluate NI and SF safety with regard to its operational life and aging of equipment. Relevant findings shall be applied to ensure 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 facility's operating lifetime.

Upon the expiration of the operating life (30 years), the operating organization shall evaluate if it can be extended on condition that all provisions of federal norms and rules 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 norms and rules (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 main documents in this area are as follows:

- Federal law № 170-FZ On the Use of Atomic Energy;
- Federal law № 7-FZ On the Environmental Protection;
- Government resolution 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 norms and rules specifying the NF siting requirements, as well as relevant basic criteria and safety requirements (NP-032-01, NP-050-03, NP-060-05), and requirements on accounting external natural and man-induced impacts on NF (NP-064-05);
- sanitary rules (OSPORB-99/2010, SP AS-03, SP PUAP-03).

According to the Federal law № 170-FZ On the Use of Atomic Energy, 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 constituent entities of the Russian Federation that are to host the proposed facilities. Decisions on the location of sites for nuclear facilities, including SNF management facilities, owned by constituent entities of the Russian Federation and on their construction shall be made by the authorities of relevant constituent entities of the Russian Federation. Decisions on the location of a site proposed for construction of municipally owned nuclear facilities and on their construction shall be made by relevant local authorities.

The procedure and conditions for providing land and subsoil to construct a nuclear facility 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 of relevant environmental impact assessments.

Decisions on NI, RS and SF siting and construction shall be made in keeping with provisions of the Federal law 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 the operating organization shall submit papers discussing radiation impacts on the environment that are likely to be produced by the evaluated nuclear facility supported by the required design documentation.

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

- if the facility enables to fill the economic needs of the Russian Federation and its particular regions;
- if proper siting conditions that meet the requirements of federal norms and rules 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 likely 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 norms and rules specify the way that relevant investigations and studies of natural and man-induced impacts in the NI, RS and SF siting regions are to be performed:

- NPP Siting. Basic Criteria and Safety Requirements (NP-032-01);
- 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-064-05);
- Siting of Storage Facilities for Nuclear and Radioactive Materials. Basic Criteria and Safety Requirements (NP-060-05);as well as Building Codes and Regulations (SNiP).

The abovementioned regulations are currently under revision following the lessons learned from the Fukushima-1 accident and with due consideration of IAEA safety standards:

- Site Evaluation for Nuclear Installations Safety Requirements, Series No. NS-R-3 (Rev. 1) (2016);
- Seismic Hazards in Site Evaluation for Nuclear Installations, Series No SSG-9 (2010).

Feasibility studies for NI and SF construction involve engineering surveys and investigations of safety-related features, events and processes.

Compliance 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 nuclear facilities (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 migration or accumulation of radioactive substances 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;
- adequate capabilities enabling to eliminate possible consequences of design basis and beyond design basis accidents, as well as to take 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 NI and SF safety given the identified natural and man-induced features, events and processes, as well as safety of the population and protection of the environment from radiation impacts resulting from normal operation and design basis accidents.

According to provisions of federal norms and rules governing NF siting and accounting of external effects, NI and SF shall not be sited and constructed at the sites which, according to provisions of the environmental legislation and particular requirements in the field of radiation safety of population, civil defense and fire-safety requirements, are not suitable for such NI and SNF SF.

Ministry of Regional Development of the Russian Federation in coordination with Rostechnadzor specifies what kind of activities shall be performed during engineering surveys to investigate natural settings at the sites (Government resolution 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 its settings with the legal requirements and the provisions of federal norms and rules shall be demonstrated by the licensee in the NI or SF safety analysis report submitted as part of a siting license application in accordance with relevant provisions of federal norms and rules and the 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 shall evaluate the compliance of NI or SF site settings, the adequacy of performed engineering surveys and investigations and relevant justifications and decide 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 of 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 to be an integrated part of the environment impact assessment (EIA) procedure. 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.

Article 28 of the Urban Development Code of the Russian Federation involves provisions on arranging and conducting public hearings. The procedure for relevant administrative

arrangements and their proceeding is established in the land use and urban development rules and shall comply with the charters of relevant municipalities and (or) regulations of the municipality's delegate body.

In the reporting period, a number of public hearings discussing the safety of SNF management was held:

- In 2015, public hearings were held to discuss environmental impact assessment (EIA) drafted for construction of TUK receiving and dispatching unit and a special facility for SNF handling at Leningrad NPP (at the site of SNF container storage complex).
- In 2015, public hearings were held in the restricted administrative and territorial entity (RATE) Aleksandrovsk (Murmansk Region). The key issue discussed there was the design project on SNF removal from floating maintenance base Lepse and its disposition, as well as environmental assessment of resulting chemical and radiation impacts. It was stated that occupational safety of ship repair facility workers and the safety of RATE Aleksandrovsk residents is considered to be a top priority for this project.
- In 2017, public hearings were held in Roslavl (Smolensk Region) to discuss the preliminary environmental impact assessment drafted for operation of spent nuclear fuel management facilities, namely: SNF storage facility's annex building (SNF SF annex) and a cask-type storage facility. SNF SF annex is designed to perform all the required operations to prepare SNF for its transfer to SNF "dry" storage facility in the Krasnoyarsk region (MCC).

Public hearings are an essential element of the whole process enabling to develop and approve Consolidated Projects on the Import of SFAs Removed from Foreign Russian-built (Soviet-built) RRs. According to the established procedure, a number of public hearings were held in Ozersk:

- In 2014, public hearings were held to discuss RR SFAs import from the Republican State Enterprise Nuclear Physics Institute (Atomic Energy Committee of the Ministry of Industry and New Technology of the Republic of Kazakhstan).
- In 2014, public hearings were held to discuss the import of liquid highly-enriched spent nuclear fuel produced in Russia and irradiated in pulsed solution reactor IIN-3M owned by JSC Foton (the Republic of Uzbekistan).
- In 2015, public hearings were held to discuss RR SNF import from Poland.
- In 2016, public hearings were held to discuss RR SNF import from the Republic of Kazakstan.

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 and construction of nuclear facilities, 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 norms and rules and sanitary rules set up basic principles and general requirements that shall be met during NI and SF design and construction:

- General safety provisions (NP-001-15, NP-033-01, NP-022-2000, NP-016-05);
- NPP Seismic Design Standards (NP-031-01);
- Accounting of External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-05);
- 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 for Enterprises and Facilities of Nuclear Sector (SPP PUAP-03);
- Sanitary Rules for Design and Operation of Nuclear Power Plants (SP AS-03).

In accordance with provisions of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, 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 for RN concentrations in the environment, and limit such effects in the event of beyond design basis accidents.

Provisions of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, 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, nuclear and radioactive materials 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 norms and rules (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-013-99, NP-035-02) stipulate that administrative and technical arrangements implemented during design and construction of an SNF management facility shall provide for its further decommissioning.

Technical and administrative decisions ensuring safety of an SNF management facility shall be evaluated based on the 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 storage and management of NM, RM and RW with federal norms and rules in the field of atomic energy use shall be demonstrated by the licensee in the NI /SF safety analysis report submitted as part of a construction and operating licenses applications in accordance with relevant provisions of federal norms and rules.

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

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 still ongoing at the site.

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 the assessment of NF radiation impacts produced on the environment is an essential condition for making decisions on siting and construction of nuclear facilities, including SNF management facilities. The scope of these assessments shall be appropriate to the hazard presented by the reviewed facility and cover the whole operating lifetime of a nuclear facility.

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

Statement of the state environmental assessment shall be submitted to Rostechnadzor as part of the license application for construction or operation of an SNF management facility.

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 safety analysis report for the SNF management facility covering all siting justifications required by effective 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 require the submittal of a safety analysis report presenting a comprehensive safety evaluation.

SAR for an SNF management facility shall provide for a system of technical and administrative arrangements ensuring NF safety. SAR shall present the findings of the 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 programs used to demonstrate NF safety. The programs used for NF safety demonstration shall be validated in accordance with the established procedure.

Requirements to NF safety analysis reports, including those drafted for SNF management facilities, and SNF storage facilities, in particular, are established in federal norms and rules (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 the NF;
- characteristics of the region and the site;
- safety demonstration for the design development stage (buildings, structures, systems and their components);
- system for management of nuclear material 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;
- accounting and control of NM, RM and RW;
- 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 the Use of Atomic Energy, organization operating NI and SF under a permit (license) issued for more than 10 years shall perform periodic safety assessments. Such assessments are performed in order 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 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 license for sitting and operation of an SNF management facility: requirements to the development and implementation of measures to eliminate and (or) to make up for discrepancies from relevant regulatory provisions, to comply with and (or) make up for the remarks expressed in the expert 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 safety case 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 the submittal of reporting documents on their implementation 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 SNF management facilities is set forth in the Regulation on Licensing Activities in the Field of Atomic Energy Use (Government resolution of the Russian Federation № 280 of March 29, 2013). Rostechnadzor adopts relevant decisions following the review of documents submitted by operating organization as part of a license application.

The scope of documents demonstrating nuclear and radiation safety of NI and SNF SF commissioned following their construction is specified in Administrative Regulations for the Federal Environmental, Industrial and Nuclear Supervision Service Concerning the Implementation of its State Function Associated with Licensing Activities in Field of Atomic Energy Use (decree of Minpriroda of Russia № 262 of October 16, 2008). The following main documents shall be submitted by operating organization as part of an operating license application:

- safety analysis report;
- quality assurance program for NI/ SF 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;
- guides on providing safe storage, transportation and reloading of nuclear fuel;
- documentary evidence for accounting and control of nuclear material and (or) radioactive waste;
- documentary evidence for physical protection;
- NI and SF commissioning program;
- guides on the operation of main engineering systems of a nuclear fuel storage facility;
- sanitary and epidemiologic statement confirming that the occupational conditions when performing operations with IRS meet relevant provisions of sanitary rules.

An expert review is performed to evaluate the adequacy of nuclear and radiation safety demonstration provided for a NF and (or) declared activity by the applicant. Expert reviews of

documents submitted as part of a license application are performed by organizations licensed by Rostechnadzor to perform reviews of design, engineering and process flow documentation and documents demonstrating nuclear and radiation safety of nuclear installations, radiation sources, NM, RM and RW storage facilities, NM, RM and RW management activities. Information on expert organizations having appropriate Rostechnadzor licenses is posted online on the web-site www.gosnadzor.ru by the coordinating division of the Rostechnadzor's central office.

Operation of a NF or an SNF storage facility shall be started only following the completion of all pre-commissioning testing activities, comprehensive testing of its systems (components). Furthermore, safety analysis report shall be revised taking into account these results.

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

According to requirements of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, 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 covering equipment, technological processes and the whole facility before the comprehensive testing of systems (components) starts.

Operational documentation shall involve safe-operation guides and techniques, the 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 operational disorders, including near miss incidents, actions of employees (personnel) to ensure safety in the event of design basis and beyond design basis accidents.

Operational documentation shall be revised following the commissioning results.

Procedures for keeping, storing and amending operational documentation are established by operating organization 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) shall depend on the specific aspects of facility's operation and its state and 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 /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 requirements of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, NP-016-05) to maintain their performance. These operations are carried out in keeping with relevant provisions of operational documentation, programs and schedules developed according to the procedure established by the operating organization based on design requirements.

Supervisory personnel of enterprises develops relevant maintenance programs based on effective regulatory and institutional standards. It shall be also responsible for the development and approval of relevant schedules for their implementation.

Operating organization shall arrange for planned and preventive maintenance and (or) overhaul of equipment at SNF management facilities in accordance with the approved schedules.

All operations are performed in conformity with instructions on maintenance of safety-important systems and in keeping with relevant schedules approved by management teams of enterprises.

During the operation of an SNF management facility, and, in particular, during its maintenance, operating organization shall ensure that all required operations are performed by personnel having appropriate qualifications and shall provide the involvement of properly licensed organizations to perform the required activities and to deliver their services.

After technical maintenance, systems and their components are checked against design characteristics, their performance is tested as well, 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 are carried out periodically throughout the operating lifetime of NI, SF or SNF management facility.

The need of unscheduled maintenance and repairs is identified following the results of control arrangements performed to identify the status of such systems and their components.

During operation, appropriate control and supervision is ensured by Rostechnadzor along with institutional controls and inspections.

G.6.4. Engineering, Technical and Scientific Support of Operation

According to the requirements of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, 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 facing the operating organization or a particular facility during NI or SF siting, construction, commissioning and operation.

Article 37 of the Federal law № 170-FZ On the Use of Atomic Energy stipulates that organizations involved in scientific research and investigations, design development, construction and decommissioning of NI or 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 norms and rules in the field of atomic energy use. These organizations shall bear the responsibility for the quality of performed work and delivered services throughout the operating lifetime of NI and SF, or the service life of the manufactured equipment. Management authority in the field of atomic energy use shall recommend the appointment of the organization responsible for the NI or SF design development.

Normally, operating organizations subcontract specialized scientific and research, design and engineering, repair, commissioning and other organizations and enterprises manufacturing equipment for NI and 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

According to provisions of the Federal law № 170-FZ On the Use of Atomic Energy, operating organization shall exert continuous control over the safety of NF operation at all stages of its lifetime.

Provisions of the following federal norms and rules regulate the procedure for accounting and control of operational disorders, including 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 (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 SFs.

According to the requirements of the abovementioned federal norms and rules, operational disorders at facilities, including accidents, shall be investigated in accordance with the established procedure. Operating organizations shall develop and arrange for measures to avoid the reoccurrence of operational disorders. In case of their occurrence, the operating organization shall submit information on such disorders to the state safety regulatory authority in the field of atomic energy use.

Investigation files shall be kept throughout NF operating lifetime.

The system for accounting and investigating operational disorders implemented by operating organizations shall be aimed at early detection and prevention of operational failures and their timely elimination.

G.6.6. Programs for Collection and Analysis of NI and SF Operational Experience

According to the provisions of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-013-99, NP-035-02), organization operating a NI/ SF shall ensure collection, processing, analysis, systematization and keeping of relevant data on NI or SF operational experience, including the information on investigations of 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 relevant information with organizations authorized to perform its analysis.

Operating organization shall store the NI/ SF design documentation, as-built documentation on NI and SF construction, test certificates and as-built documentation on maintenance of safety-important systems (and their components) throughout the operating lifetime of NI/ NS, whereas certain documents shall be stored until the completion of NI/ SF decommissioning.

G.6.7. Decommissioning Plans

According to the requirements of federal norms and rules (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 an SNF management facility (NI and SF) shall be implemented with account of its future decommissioning.

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

According to Article 18 of Regulation on Licensing of Activities in the Field of Atomic Energy Use, during the review of a license application for NI or SF siting, construction and operation and the set of documents demonstrating the safety of NI or SF and (or) relevant activities, Rostechnadzor shall analyze the ability of the licensee to ensure proper conditions for the safe completion of the declared activities and decommissioning of the nuclear facility, as well as the availability of appropriate design documentation.

Decommissioning of SNF management facility shall be performed in accordance with the decommissioning program and relevant decommissioning design. NF decommissioning program is an administrative and technical document discussing the main activities and operations, established procedures, conditions and relevant schedules for pre-decommissioning and decommissioning activities. The program shall be developed 5 years prior to NF operating lifetime expiration.

Decommissioning activities shall be preceded by a comprehensive engineering and radiation investigation of the facility.

Operating organization shall ensure the development of a decommissioning design for the SNF management facility and prepare a safety analysis report for decommissioning based on the investigation findings.

Decommissioning program and design shall be developed with due consideration of performed improvements and the consequences of occurred incidents.

An SNF management facility that is shut down for decommissioning is considered to be operating until the moment the nuclear materials contained in its systems (components) are ultimately removed from these systems. Prior to this moment, it shall be subjected to all requirements applied to operating facilities.

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

The legal framework of the Russian Federation stipulates that adequate protection of personnel, public and the environment from radiation impacts associated with RW management shall be ensured at all RW management stages (collection, segregation, conditioning, storage, transportation, disposal).

Article 48 of the Federal law 170-FZ On the Use of Atomic Energy 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 norms and rules in the field of atomic energy use shall be ensured during RW storage and disposal.

Priorities for the protection of human life and health, current and future generations, and the environment against RW adverse impacts and liability of organizations generating RW for the safe management of waste prior to its transfer to the National Operator are stated among the fundamental principles of the Unified State System for RW Management (pp.1 and 3, part 3, Article 10 of the Federal law № 190-FZ On the Management of Radioactive Waste …).

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 the Management of Radioactive Waste…) by the state management authority in field of RW management (the State Corporation Rosatom).

The following federal laws, federal norms and rules, sanitary rules and regulations establish the basic requirements for the safe management of radioactive waste (Section E):

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

- federal norms and rules:
  - General safety provisions for NI, RS and SF (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-058-14, NP-038-16);
  - On Accounting External Natural and Man-Induced Impacts on Nuclear Facilities (NP-064-05);
  - 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);
- Radiation Safety Standards (NRB-99/2009);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);
- Sanitary Rules for Radioactive Waste Management (SPORO-2002).

According to NP-058-14, safety objectives in RW management are as follows:

- to ensure adequate protection of 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 the acceptable discharge (release) limits.

According to NP-058-14, the following principles shall be met during RW management:

- to ensure adequate protection of employees (personnel) and public from radiation impacts associated with RW in accordance with the principles of justification, regulation and optimization;
- to ensure adequate protection of the environment against adverse radiation impacts associated with RW;
- to account for interdependencies among the different steps in radioactive waste generation and management;
- the projected exposure of future generations associated with RW disposal shall not exceed the acceptable levels of public exposure established by the current regulations;
- undue burden associated with the need of providing the safety of RW management shall be not imposed on future generations;
- generation and accumulation of RW shall be kept to the minimum practicable;
- accidents producing radiation effects shall be eliminated and, in case of their occurrence, their consequences shall be mitigated.

In the reporting period, new provisions of federal norms and rules regulating pre-disposal management of RW and its disposal were enacted. Basically these new provisions elaborate on the requirements set forth in the Federal law № 190-FZ On the Management of Radioactive Waste… and the Government resolution of the Russian Federation № 1069 of October 19, 2012 On Criteria Used to Define Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Define Radioactive Waste as Special Radioactive Waste or Retrievable Radioactive Waste, as well as Criteria Used to Categorize Retrievable Radioactive Waste, and discussing RW classification for disposal purposes and the ways of identifying RW acceptance criteria for disposal.

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 norms and rules 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, the design and the geometry of equipment for collection, processing, storage and conditioning of RW, the contents of hazardous fissile nuclear materials in conditioned RW, and the geometry of RW packages, as well as relevant handling procedures shall avoid the occurrence of SCR.

Premises with equipment for collection, processing, storage and conditioning of RW containing hazardous fissile nuclear materials shall be fitted with an automated alarm system the operating mode of which shall ensure instant readiness to 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 disposal of RW containing hazardous fissile nuclear materials (substances) to avoid SCR. Features of engineered and natural safety barriers shall avoid 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 norms and rules (NP-019-15, NP-020-15) and sanitary rules for RW management (SPORO-2002) stipulate that heat generation from RW shall be accounted for when selecting the appropriate 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 rocks shall be resistant to thermal effects produced by heat generating RW, preserve their isolating properties and ensure that engineered barriers won't lose their integrity due to the thermal conditions in the deep RW disposal facility.

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

RW minimization requirements are set forth in the following regulations:

- Federal law № 190-FZ On the Management of Radioactive Waste…;
- federal norms and rules 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, SPORO-2002).

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

The following activities aimed at development and establishment of RW management facilities designed for RW minimization, carried out under the FTP NRS were completed in the reporting period:

- construction of a combined sewer system at PA Mayak;
- commissioning of a new electric furnace for HLW vitrification EP-500/5 at PA Mayak. Capacity of an existing HLW storage facility was increased;
- refurbishment of SRW repository at MCC was completed, SRW processing facility was commissioned.

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 the Management of Radioactive Waste…).

Federal norms and rules 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 provisions of the abovementioned federal norms and rules, 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 sites of waste generation, collection, processing, storage and conditioning;
- implementation of proper arrangements to exert control over the quality of technological processes of 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 during 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 associated with RW collection, processing, storage, conditioning and disposal.

In order to implement the interdependence principle, the Federal law № 190-FZ On the Management of Radioactive Waste… enjoin on RW generators to ensure RW conditioning in order to comply with relevant acceptance criteria within the timeframes specified for RW intermediate storage and to transfer the conditioned waste to the National Operator for disposal.
FTP NRS enabled to address a large number of issues arisen in the past and associated with the failure to observe interdependencies between different steps of RW management.
Scheduled efforts were completed at a number of particularly hazardous facilities stablished in the past to ensure their environmental safety, including capping efforts at LRW reservoir storage facilities: B-2 at SCC, № 354 at MCC and V-9 at PA Mayak.

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

Section F.4 (Article 24) provided a detailed discussion of the following issues: regulating control over radiation safety and effective regulatory requirements for the protection of personnel, public and the environment; assessment of radiation impacts on 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 personnel, public and the environment during the predisposal management of RW.

Federal norms and rules (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 impacts associated with RW and 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 management of RW are, in general, similar to those discussed in Section G.1.4.

Furthermore, the Federal law On Special Environmental Programs for Remediation of Radioactively Contaminated Sites provides for special measures to ensure radiation safety of public, general reduction of risks associated with radiation impacts and to improve 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 disposal facilities, are set forth in relevant federal norms and rules (NP-055-14, NP-069-14) and sanitary rules SPORO-2002. According to NP-055-14 provisions, RW disposal facilities, including LRW disposal facilities, comply with the safety requirements at the post-closure stage, if:

- during normal evolution of natural processes at DF (LRW DWIF) site (most probable scenarios of disposal system evolution) its radiation impact on public and the environment won't result in the exceedance of the acceptable exposure level established by sanitary rules and radiation safety standards;
- external natural and man-induced impacts of low-probability (catastrophic) at DF (LRW DWIF) site will not result in the exceedance of the overall risk limits established for the critical group by sanitary rules and radiation safety standards.

Adequacy of engineering safety solutions adopted in the design of an RW disposal facility shall be demonstrated for the whole period of potential hazard of the disposed waste and with due consideration of possible external natural and man-induced impacts in the RWDF region, as well as of physical and chemical processes in the RW disposal facility.

Long-term safety of RW disposal facility, safety of public and the environment shall be demonstrated for the whole period during which the disposed waste could potentially remain hazardous. Long-term safety shall be demonstrated based on relevant safety assessments, involving prediction calculations performed for the long-term post-closure safety assessment of a RW disposal facility. Adequacy of the safety demonstration, including the long-term safety, is evaluated by Rostechnadzor during 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 hazards that may be associated withthe predisposal management of RW are, in general, similar to those discussed in Section G.1.5.

As for RW disposal, biological, chemical and other hazards are addressed through the establishment of RW acceptance criteria for disposal. According to NP-093-14 provisions, the following RW properties make them unsuitable for disposal:

- explosive materials that are able to detonate when heated, due to a shock or friction;
- liable to spontaneous ignition;
- hazardous gases generating fire and/or explosion (self-inflammable, inflammable or explosive) as a result of their interaction 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 due to their interaction with water, air or other substances;
- containing infecting (pathogenic) materials (substances).

Effective federal norm and rules discussing RW disposal requirements (NP-055-14, NP-069-14) stipulate that design of RW disposal facility 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 medium (water, air, soil, vegitation) covering not only 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))

The principle of protection of future generations is implemented through the compliance with 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 the existing regulations (Annex E).

The Federal law № 190-FZ On the Management of Radioactive Waste… stipulates that the priority of protection of human health and life, present and future generations, and the environment from adverse impacts associated with RW is considered to be one of the USS RW principles.

According to the Federal law № 7-FZ On the Environmental Protection, observance of the human right to a healthy environment and mandatory consideration of environmental impact assessment findings when making decisions on economic and other activities are viewed as fundamental principles of environmental protection.

Federal norms and rules (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 greater than the limits established by radiation safety standards is considered to be one of RW management safety objectives.

Provisions of NP-058-14 stipulate that the following principles established in respect to 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 to ensure RW management safety shall be not imposed on future generations.

Operating organization involved in RW management shall provide a demonstration of its compliance with the abovementioned principles and address them in the NF safety analysis report 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))

The Federal law№ 190-FZ On the Management of Radioactive Waste… provides for a set of administrative and financial arrangements to establish the RW disposal system enabling to avoid imposing undue burden on future generations and adverse environmental effects associated with the accumulated RW inventory not being adequately isolated from the environment and to ensure 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 deliberately resulting in the generation of special (non-retrievable) RW (part 2, Article 26 of the Federal law 190-FZ On the Management of Radioactive Waste…).

Provisions of certain regulations also elaborate the requirement on avoiding to impose undue burdens on future generations associated with the safe RW management (Annex E).

FTP NRS was implemented as a tool for addressing the accumulated backlog of challenges and reducing the burden imposed on future generations. Upon its completion, environmental safety

was ensured for a number of particularly hazardous facilities operated in the past. Capping efforts were completed at industrial water reservoir V-9 (lake Karachay) considered as a most contaminated LRW storage reservoir with a water surface area of 36 ha holding over $120 \cdot 10^6$ Ci (4.44×10^{18} Bq) of waste. Radiation and environmental monitoring system involving 450 monitoring wells was established. Extensive efforts have been carried out to address the Techa Cascade challenges. For instance, weir sills enabling to control water level and to eliminate contaminated water overflow were constructed. A total of 29.7 bln RUB were invested into the key projects associated with RW management facilities.

Current tasks are addressed under FTP NRS-2 involving ongoing efforts on decommissioning of LRW storage water reservoirs at MCC (№ 365 and 366), capping of LRW storage water reservoirs B-1, B-25, water reservoirs PKh-1 and PKh-2 at SCC and V-17 at PA Mayak (see Section B).

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 norms and rules 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 the existing facilities.

Federal norms and rules set forth the safety requirements for NF including operating RW management facilities and storage facilities holding accumulated RW inventory.

During the review of an operating license application for an existing RW management facility, Rostechnadzor evaluates if the operating facility complies with the established requirements. In general, the licensing procedure, as well the development and review of submitted materials demonstrating safety of existing facilities for predisposal RW management, their expert evaluation and definition of conditions for operating licenses is similar to those discussed in Section G.2.

Activities associated with operation of all existing RW management facilities (including those being part of NI, RS and SF) shall be licensed and 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 verify the observance of license conditions.

Requirements to the control 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-058-14 provisions, current safety level shall be evaluated and long-term safety assessment shall be performed for operated (mothballed) RW disposal facilities enabling to identify the need of implementing relevant technical and administrative arrangements to ensure

the safety of employees (personnel), public and the environment. 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 norms and rules. For RW disposal facilities 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 storage facilities 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 intervention, as well as its duration shall be optimized so that ultimate benefits from the reduction in dose, i.e. the benefit from the reduction in radiation detriment after deduction of the detriment due to the intervention, are maximal (principle of intervention optimization).

The Federal law № 190-FZ On the Management of Radioactive Waste… provides for certain efforts enabling to bring 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 are made on the basis of the comparison of risks associated with radiation impacts and other risks and costs due to the removal of the RW from the storage facility, its further management, including disposal, with risks and costs in case if the RW are kept in the storage facility.

FTP NRS enabled to address a large number of challenges associated with the improvement and reconstruction of RW management facilities, to upgrade the safety and reduce the risks associated with the adverse effects. The Federal law № 190-FZ On the Management of Radioactive Waste… 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, the State Corporation Rosatom and the IAEA Secretariat approved the terms of reference for an 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 discussing 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 Russian legal framework. The IAEA Mission also involved a technical tour to LRW DWIF site in Dimitrovgradduring which IAEA experts got acquainted with the LRW disposal practice (origin, key elements and the disposal technology). The Final Report on the Mission was drafted summarizing Peer Review expert recommendations on long-term safety enhancements in the post-closure period. In 2015, the State Corporation Rosatom drafted a Program for Modelling and Experimental Investigations on Long-Term Safety Demonstration and Assessment for LRW Deep Well Injection Facilities to Implement IAEA Recommendations Concerning IAEA Peer Review on the Deep Well Injection Practice for Liquid Radioactive Waste in the Russian Federation. This program was approved by Rostechnadzor and provides for a large scope of experimental and modeling efforts aimed at evaluating borehole closure techniques and long-term safety assessment of LRW DWIF.

In 2013, three expert evaluations of operational safety were performed under the FTP NRS:

- 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 Sever (Krasnoyarsk Region, Zheleznogorsk).

These expert evaluations were conducted under the instruction of Rostechnadzor in accordance with its function of a state authority licensing activities in the field of atomic energy use.

FSUE NO RAO acted as the applicant in line with relevant provisions of the Federal law № 190-FZ On the Management of Radioactive Waste… stipulating that ownership over all DWIFs mentioned above was transferred to the state management authority in the field of RW management – the State Corporation Rosatom and subsequently – to FSUE NO RAO with the right of economic management.

Provisions of federal norms and rules and other regulations in the field of atomic energy use were used as criteria for the feasibility evaluation. The evaluation accounted for advances in science and technology, as well as the feedback from the past operation of LRW deep well injection facilities.

In 2014 – 2015, at the instruction of Rostechnadzor in accordance with its function of a state authority licensing activities in the field of atomic energy use, expert evaluations were performed for the operation of the first unit of a near-surface disposal facility in Novouralsk (JC UECC site), as well as for siting and construction of its second and third units. All three licenses were granted and in 2016 the first unit of the disposal facility became operational.

In 2016, at the instruction of Rostechnadzor in accordance with its function of a state authority licensing activities in the field of atomic energy use, expert evaluation was performed for siting and construction of a site-specific underground research laboratory in the Nizhnekansk rock massif which will enable to gain information and experience directly applicable to the future deep geologic repository in Russia. Upon the completion of the review, relevant siting and construction license was granted.

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 facilities intended for predisposal management of RW, relevant procedures for environmental impact assessments,

as well as the contents and the structure of the documents discussing NI, RS and SF radiation impacts on the environment, as well as relevant submittal procedures are similar to those discussed in Section G.3 of the Report.

Specific siting requirements applied to RW disposal facilities are established by provisions of federal norms and rules, namely NP-055-14 and NP-069-14.

According to NP-055-14, a site is considered to be suitable for siting of a RW disposal facility (RW DF) if it can be demonstrated that RW can be disposed of safely taking into account all relevant natural events and processes, as well as natural and man-induced features. Siting decision for RW DF shall be justified in its designs on the basis of research and investigations carried out in the proposed siting region and relevant RW DF safety assessments. Safe RW transportation shall be also considered and demonstrated in the decision making process.

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

During the license review of activities associated with siting of RW disposal facilities, the submitted demonstration of the long-term safety of RW disposal facilities, also covering the post-closure stage and extending throughout the period of potential hazard of disposed waste shall be evaluated. In the siting application, the licensee shall demonstrate the long-term safety of RW DF based on relevant long-term safety assessment. Recommendations on performing safety assessments, as well as the content and the structure of safety analysis reports for near-surface RW disposal facilities are established by Rostechnadzor in relevant safety guides (PNAE G-14-038-96, RB-058-10, RB-011-2000 and etc.).

In the reporting period, provisions of federal norms and rules Requirements to the Contents and Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities were drafted. These provisions discuss relevant requirements to the structure and the contents of safety analysis reports drafted for siting, construction, operation and closure of radioactive waste disposal facilities.

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

According to the Russian legal framework, public hearings are an essential stage in the decision making process on siting RW management facilities. Public hearings are arranged and held in accordance with the 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 construction of RW management facilities.

In 2014 – 2017, public hearings on the construction of storage facilities for RW class 3 and 4 were held in Novouralsk and Chelyabinsk, in 2015 – 2016 public hearings on URL construction were held in Zhelezongorsk, in 2017 – public hearing on the construction of two units of a RW compaction and cementation facility were held in Sosnoviy Bor. In 2017, public hearings were held in the Primorsk Region (restricted administrative and territorial entity (RATE) Fokino) on the construction of a Regional Center for RW Conditioning and Long-Term Storage (RCKDKh).

Rosatom's Public Council, being Rosatom's permanent advisory and consultative body for public awareness and oversight, is also engaged in 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 and construction of RW management facilities are regulated by the following federal norms and rules 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-022-2000, NP-016-05, NP-038-16);
- Safety in RW Management. 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 and Operation of Nuclear Power Plants (SP AS-03);
- Sanitary Rules for Radioactive Waste Management (SPORO-2002).

According to the provisions of federal norms and rules (NP-001-15, NP-033-11, NP-022-2000, NP-016-05, NP-058-14), facility for predisposal management of RW being a nuclear facility 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 the concentrations of radioactive substances in the environment.

Federal norms and rules regulating RW disposal safety (NP-055-04, NP-069-14) and SPORO-2002 establish safety requirements for RW disposal facilities that shall be observed during design activities. According to the abovementioned documents, the long-term safety of a disposal facility at the post-closure stage shall be ensured by a system of barriers preventing the spread of ionizing radiation and radioactive substances into the environment.

RW DF barrier system shall:

- ensure RW disposal safety during the whole time period while RW potentially remains hazardous with due account of all possible external natural and man-induced impacts in RW DF siting region, as well as all relevant physical and chemical processes occurring in the disposal facility;
- prevent inadvertent or unauthorized human or animal intrusion into the disposal system;

- maintain their isolating functions under the impact of host rocks;
- maintain their isolating functions under the thermal impact produced by RW.

Loss of a 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 remain functional without any maintenance after DF closure for the time specified and justified in the DF designs.

Requirements of federal norms and rules (NP-058-14, NP-055-14, NP-069-14) stipulate that administrative arrangements and technical provisions during design development, construction and operation of an RW management facility and RW disposal facility 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 disposal facilities, 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 safety for each category of radioactive waste.

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

When applying for a license to construct or to operate an RW management facility, the licensee 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 handling comply with the requirements established by federal norms and rules 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 of assessing the safety of RW management facilities is, in general, similar to the one discussed in Section G.5 of the Report.

SAR for an RW management facility (NP-058-14) shall describe a system of technical provisions and administrative measures to ensure NF safety, feature findings of relevant safety assessments, including a 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 practices and programs used for NF safety demonstration. SAR for an RW disposal facility (NP-055-14, NP-069-14) shall provide the demonstration of the DF long-term safety, including the results of prediction calculations performed to assess the long-term safety of the RW disposal system in the post-closure stage while the disposed waste keeps presenting potential hazard.

Programs used to demonstrate NF safety shall be validated in accordance with the established procedures.

Requirements to the safety analysis reports for RW management facilities and RW disposal facilities are set forth by the provisions of relevant federal norms and rules in the field of atomic energy use(NP-006-16, NP-018-05, NP-051-04, NP-066-05 and etc.) and safety guides (PNAE G-14-038-96, RB-035-05, RB-050-09, RB-058-10 and etc.).

Under the second stage of USS RW establishment, two regulations falling into category of federal norms and rules in the field of atomic energy use were drafted, namely Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities and Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities.

Conditions of licenses authorizing construction or operation of RW management facilities and RW disposal facilities may feature, if necessary, requirements to the development and implementation of activities to eliminate and (or) to make up for discrepancies from relevant regulatory provisions, to comply with and (or) 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 safety case in accordance with the findings of reviews and inspections, as well as other identified safety-related factors. Relevant implementation schedules and terms for the submittal of reporting documents on their implementation 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 for acquiring licenses to operate RW management facilities is established in the Regulation on Licensing Activities in the Field of Atomic Energy Use (Government resolution of the Russian Federation № 280 of March 29, 2013). Decision on issuance of a license to operate RW management facilities is made by Rostechnadzor following a review of documents submitted by the operating organization as part of a license application.

Administrative Regulation for the Federal Environmental, Industrial and Nuclear Supervision Service Regarding the Implementation of its State Function Associated with Licensing Activities in the Field of Atomic Energy Use specify the set of documents required to be submitted in order to demonstrate the radiation safety of RW management facilities commissioned following their construction.

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

- safety analysis report;
- quality assurance program for the operation of RW management facilities;
- data on recruitment, training, maintenance of qualifications and issued permits to self-guided work;
- guide on the elimination of accidents;
- guidelines on the 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 accounting and control of radioactive waste;
- documentary evidence for physical protection;
- commissioning program for the RW management facility;
- guides on the operation of main process systems.

The Federal law № 190-FZ On the Management of Radioactive Waste… provides for upgrading special RW disposal facilities to RW disposal facilities given that the facility is fitted with appropriate safety barriers isolating RW from the environment during the whole 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 RW DFs.

Procedures for evaluating the safety of RW management activities followed by relevant commissioning efforts are, in general, 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, technological processes and relevant designs before the comprehensive testing of systems (and their components) starts.

In general, the procedure for setting and adjusting 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 describing regulation of 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 siting, construction, commissioning and operation.

Normally, according to the common best practices established in Russia that has 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 for accounting of 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 for collection and analysis of operational experiences 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 the safe decommissioning (closure) of NFs, including RW management facilities, are established by the provisions of the Federal law № 170-FZ On the Use of Atomic Energy, by-laws, federal norms and rules in the field of atomic energy use (NP-001-15, NP-033-11, NP-022-2000, 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 and SPORO-2002.

Current plans call for the approval of two new draft federal norms and rules in the field of atomic energy use, namely Rules for the Safe Decommissioning of Production Uranium-Graphite Reactors (NP-007-17) and Rules for the Safe Decommissioning of Nuclear Fuel Cycle Facilities (NP-057-17). These two regulations will set forth relevant requirements on the safe decommissioning of nuclear and radiation hazardous facilities being part of nuclear fuel cycle enterprises.

Another draft of federal norms and rules in the field of atomic energy use is going to be amended, namely Safe Decommissioning of Nuclear Facilities. General Provisions (NP-091-14). These amendments will enable to elaborate on the criteria for NF and NF site exemption from regulatory control in the field of atomic energy use.

According to Article 18 of the Regulation on Licensing Activities in the Field of Atomic Energy Use, during the review of a license application for NI or SF siting, construction and operation and the set of documents demonstrating safety of NI or SF and (or) relevant activities, Rostechnadzor shall analyze the ability of the licensee to ensure proper conditions for the safe

completion of declared activities and decommissioning of the nuclear facility, as well as the availability of appropriate plans, programs and design documentation.

Appropriate technical provisions and administrative arrangements during design, construction and operation of RW management facilities, including RW disposal facilities, shall be put in place with account of their future decommissioning (closure).

Decommissioning of RW management facilities (closure of RW disposal facilities) shall be performed in accordance with the decommissioning (closure) program and the decommissioning (closure) project design drafted and approved in accordance with the established procedure.

Decommissioning (closure) activities shall be preceded by a comprehensive engineering and radiation investigation of the RW management facility. The operating organization shall ensure the development of a decommissioning project for the RW management facility and prepare a safety analysis report for decommissioning (closure) based on the investigation findings.

Decommissioning (closure) program and project shall be developed with due consideration of performed improvements at the nuclear facility and the consequences of occurred incidents.

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 the Management of Radioactive Waste…:

- the RW DF designs shall provide for periodic post-closure radiation monitoring at the RW DF site;
- after RW DR closure and the expiration of the time period during which the waste keeps presenting potential, 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 introduction of relevant amendments to the registry of RW storage facilities.

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

NP-058-14, NP-055-14 and NP-069-14 establish the requirements to the post-closure institutional control over RW disposal facilities. Post-closure institutional control of RW disposal system shall involve monitoring of engineered and natural barriers state, and the environmental monitoring. Main objectives of such monitoring surveys are as follows: to identify the dynamic pattern of 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 documented and stored in relevant data basis.

Duration of monitoring surveys and their frequency shall be identified during the development of the closure project 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 accounting and control of RM and RW;
- input of RW disposal data into the registry of RW disposal facilities;
- permanent storage of data on RW inventory, registry of RW storage facilities and RW passports.

According to relevant requirements of federal norms and rules, an RW DF (DWIF) monitoring system shall involve a computer model designed to forecast the migration of waste in the geological medium with account of processes that are likely to result in changes of 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, interactions of radioactive waste with rocks and ground waters, temperature changes, gas generation, microbiological and other processes important in terms of radionuclide migration. The computer model shall be validated and certified by a regulatory authority in keeping with the established procedure.

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

- concentrations of radionuclides within the mining allotment and accessible biosphere;
- the plume formed due to 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 project.

If monitoring of RW disposal system identifies any non-conformities with the RW DF (DWIF) end state established in the RW DF (DFIF) closure project that can undermine its safety, all practicable efforts shall be put in place to ensure the post-closure safety, including measures to reduce radionuclide migration, soil decontamination, treatment of surface and ground waters, dewatering of disposal cells, as well as other necessary activities. Detailed program of possible and required actions shall be developed along with the closure project.

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

- post-closure monitoring of RW DF (DWIF) safety;
- monitoring of RW disposal system, including control of engineered and natural barriers state;
- 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:

- maintenance of records on the closed RW DF (DWIF);
- the end state of RW DF (DWIF) after the termination of monitoring activities in the RW disposal system.

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 transportation of nuclear and radioactive materials, 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;
- Federal law № 170-FZ On the Use of Atomic Energy;
- Federal law № 7-FZOn the Environmental Protection;
- Federal law № 190-FZ On the Management of Radioactive Waste and Amendments to Certain Legislative Acts of the Russian Federation;
- Federal law №3-FZ On the Radiation Safety of Population;
- Federal law № 92-FZ of July 10, 2001 On Special Environmental Programs for the Remediation of Radioactively Contaminated Territories;
- Federal law № 174-FZ On the Environmental Review;
- Government resolution of the Russian Federation № 421 of June 14, 2002 On the Approval of a Regulation Concerning the Development of Special Environmental Programs on Remediation of Radioactively Contaminated Sites;
- Government resolution of the Russian Federation № 418 of July 11, 2003 On the Importation of Irradiated Fuel Nuclear Reactor Assemblies to the Russian Federation;

- Government resolution of the Russian Federation № 587 of September 22, 2003 On the Rules for Evaluating Costs Associated with the Management of Spent Fuel Assemblies Discharged from Nuclear Reactors and their Reprocessing By-Products;
- Government resolution of the Russian Federation № 588 of September 22, 2003 On the Approval of a Funding Provision for Special Environmental Programs on Remediation of Radioactively Contaminated Sites;
- Government resolution 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 Authority Ensuring Nuclear and Radiation Safety for Transportation of Nuclear Materials, Radioactive Materials and the Relevant Products.

Article 63 of the Federal law № 170-FZ On the Use of Atomic Energy stipulates that export and import of nuclear materials, including nuclear fuel, radioactive materials and radiation sources shall be subjected 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.

Import of SNF from foreign countries to the territory of the Russian Federation for the purposes of its temporary technological storage and (or) reprocessing shall be performed in accordance with the procedures established by the Russian legislation and international agreements of the Russian Federation.

Procedure for the importation of nuclear reactors' spent fuel assemblies to the Russian Federation, as well as for the return of SFAs or by-products resulting from their reprocessing (including RW) to the country of origin is established by the Government resolution 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 approved to implement the abovementioned intergovernmental agreements by specialized organizations authorized to perform relevant activities by the Government of the Russian Federation.

According to the resolution, import of SFAs to the territory of the Russian Federation is authorized only if the statement of the state environmental assessment of the unitary project drafted by authorized organizations and approved by the Atomic Energy Ministry (currently, the State Corporation Rosatom) and the Federal Environmental, Industrial and Nuclear Supervision Service is positive, and if the authorized organizations have appropriate licenses issued by the Federal Environmental, Industrial and Nuclear Supervision Service.

Unitary project is a set of documents drafted for the proposed foreign trade contract on providing certain operations 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 spent fuel assemblies;
- materials 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 spent fuel assemblies and the by-products envisaged by the foreign trade contract.

Foreign trade contract on importation of SNF (spent fuel assemblies) of Russian (Soviet) production may provide that no further return of radioactive waste resulting from the SNF reprocessing to the country of origin is expected except as otherwise provided in intergovernmental agreements of the Russian Federation.

Return of radioactive waste and by-products resulting from SNF reprocessing to the state of origin is provided on the following terms:

- return of reprocessing by-products 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 on receipt of the by-products, as well as on providing opportunities to verify if adequate conditions for their receipt and safe management are available;
- foreign trade contract shall specify the following data: inventory, composition, physical form and amounts of by-products; types of casks intended for 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 determine the amount of radioactive waste and by-products intended for return to the country of origin, special procedures approved by both Parties are used assuming that the activity of irradiated assemblies previously imported for reprocessing is equivalent to the activity of returned radioactive waste and by-products resulting from SNF reprocessing with account of natural decay due to SFA reprocessing and temporary technological storage of the irradiated assemblies and the radioactive waste and by-products.

SNF import to the Russian Federation is performed in compliance with intergovernmental agreements and legal standards established in this field by Russian legal and regulatory framework. In 2014 – 2016, a new agreement was added to the list of effective intergovernmental agreements, namely the Agreement between the Government of the Russian Federation and the Government of the Republic of Uzbekistan on Cooperation on the Import of SNF from Research Reactor IIN-3M to the Russian Federation of April 9, 2014.

Transportation of SNF (spent fuel assemblies), radioactive waste and by-products after reprocessing within the territory of the Russian Federation is carried out in accordance with the provisions of federal norms and rules in the field of atomic energy use, special transport rules, transport regulations for 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);
- Sanitary Rules for the Radiation Safety of Personnel and the Public During Transportation of Radioactive Materials (Substances) (SanPiN 2.6.1.1281-03);
- Basic Rules for Accounting and Control of Radioactive Material and Radioactive Waste in Organizations (NP-067-16);
- Rules for Physical Protection of Radioactive Material and Radiation Sources During their Transportation (NP-073-06);
- Basic Sanitary Rules of Radiation Safety (OSPORB-99/2010);
- Radiation Safety Standards (NRB-99/2009) and 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 establishes the 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. In 2014, damaged SFAs were also imported from NPP Paks (Hungry).

On May 27, 2004, a bilateral agreement concerning the return of Russian-origin (soviet-origin) high-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 manufacturing nuclear weapons, shall be returned back to Russia.

Scheduled RR SNF return from Uzbekistan (2005-2006, 2012), the Czech Republic (2007, 2013), Latvia (2008), Bulgaria (2008-2009), Hungary (2008, 2013), Kazakhstan (2008-2009, 2014, 2017), Romania (2009), Libya (2010), 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.

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.

TUK-13/1V, TUK-10V-1 and TUK-13V casks are used for transportation of WWER-1000 SNF to MCC. Relevant transportation procedure is established by the Rostechnadzor's license № GN-05-401-3001On Handling Nuclear Material During its Transportation of March 19, 2015, based on the following valid certificates of approval:

- certificate for design and transportation permit for TUK-13/1V RU/052/B(U)F-96T (Rev.7);
- certificate for design and transportation permit for TUK-10V-1 RU/050/B(M)F-96T (Rev.6);
- certificate for design and transportation permit for TUK-13V RUS/046/B(U)F-96T (Rev.8).

TUK-6 cask is used for transportation of WWER-440 SNF from reactor sites to PA Mayak under the provisions of valid certificates of approval RU/042/B(M)F-96T (Rev.7) and RUS/3110/B(M)F-96T in accordance with the procedure established by Rostechnadzor's license № GN-05-401-2381 On Handling of Nuclear Material During its Transportation of June 1, 2010.

The Federal Law № 139-FZOn 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 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 their storage, processing and disposal are prohibited except for the cases referred to in the Article 31 of the Federal law № 190-FZ On the Management of Radioactive Waste…, namely:

- RW resulting from reprocessing of SNF imported to the Russian Federation is allowed to be returned to the country of origin if this is provided for in the relevant international agreement of the Russian Federation;
- spent sealed ionizing radiation sources are allowed to be returned to the country of origin, if the sealed sources 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.

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.

According to the data from the State System for RM and RW Accounting and Control, each year, an average of some 40,000 SRSs with expired service lives are withdrawn from service in the Russian Federation.

Following withdrawal, in accordance with established procedure, SRSs are handed over to specialized organizations authorized to provide their long-term storage and having appropriate permits or licenses allowing them to receive and store disused sealed sources.

By the end of 2016, over 2,900,000 of SRSs were stored in such organizations (including, FSUE RosRAO – 2,200,000; FSUE Radon – 488,000, FSUE PA Mayak – 52,800, MCC – 46,100, RIAR – 29,400, SCC – 21,300).

Dismantling and disposal of radioisotope thermoelectric generators (RTGs) used as autonomous power sources is considered to be a top priority activity to reduce potential radiation and environmental threats.

As of the end of 2016, only 12 RTGs out of 1,007 initially manufactured were operated by the Defense Ministry of the Russian Federation (Kamchatka).RTGs transportation from Antarctic was completed.

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

In the reporting period, amendments concerning the safe management of sealed radiation sources, including their disposal, were introduced to certain federal norms and rules, namely: Safety in RW management. General provisions (NP-058-14), Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements (NP-055-14), Near-Surface Disposal of Radioactive Waste. Safety Requirements (NP-069-14), Radioactive Waste Acceptance Criteria for Disposal (NP-093-14). The abovementioned by-laws are to be approved in 2017.

In accordance with provisions of the Federal law № 190-FZ On the Management of Radioactive Waste… sealed ionizing radiation sources produced in the Russian Federation are allowed to be imported to Russia, including for the purposes of their reprocessing and disposal.

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

Accounting and control of RM and RW shall be ensured by the operating organization.

Section K. Planned Activities to Improve Safety

K.1. Accomplishments of the Russian Federation Pointed Out at the Fifth Review Meeting

The following key accomplishments of the Russian Federation aimed at enhancing the safety of SNF and RW management practice and safety regulation were pointed out during the final plenary session of the fifth Review Meeting:

- the first unit of a “dry” storage facility for RBMK-1000 and WWER-1000 SNF was completed at MCC;
- refurbishment of a “wet” storage facility for WWER-1000 SNF was completed at MCC;
- construction license for a pilot-demonstration center for SNF reprocessing at MCC was granted;
- new RW treatment facilities were constructed;
- efforts were performed at a number of surface water reservoirs for LRW storage under an action plan aimed at ensuring their environmentally safe configuration:
  - capping of surface water reservoirs B-2 at SCC was completed;
  - surface water reservoir № 354 at MCC was eliminated;
  - capping efforts at PA Mayak reservoir V-9 (lake Karachay) were scheduled to be completed in 2015.
- an underground research laboratory (deep RW disposal) is being created;
- changes were introduced to the RW classification system based on waste disposal routes;
- additional safety assessments were performed for SNF “wet” and “dry” storage facilities (in light of lessons learnt from the Fukushima accident), which served a basis for development and implementation of additional technical and engineering solutions;
- recommendations and suggestions of the IRRS post-mission were effectively implemented by regulator.

Following the Reports presentation some key milestones have been highlighted by the Russian Federation:

- recommendations of the Fourth Review Meeting have been efficiently implemented by the Russian Federation;
- regulatory and legal framework for the safe management of SNF and RW consistent with relevant modern requirements and the latest best practices in this area have been set in the Russian Federation;
- a 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.

K.2. Addressing the Challenges Pointed Out at the Fifth Review Meeting

Challenges facing the Russian Federation that were pointed out at the Fifth Review Meeting	Current status
Construction of a “dry” SNF storage facility at FSUE MCC (KhOT-2)	Construction of a “dry” SNF storage facility was completed. The storage is under operation.
Shipment of the accumulated SNF inventory to a centralized storage facility followed by its reprocessing	In 2014 – 2016 the inventory of SNF shipped to MCC site (KhOT-2) accounted for over 13,000 RBMK-1000 SFAs from Leningrad and Kursk NPPs. 1,359 WWER-1000 SFAs were delivered to KhOT-

	1 storage facility (MCC). 3,754 RR SFAs and 2,221 Atomflot SFAs were shipped for reprocessing to PA Mayak. Transportation cask TUK-141O and railway conveyor TK-U-141 were manufactured and passed pre-commissioning testing. These models were designed for transportation of WWER-1000 SFAs with enhanced initial enrichment and burnup. Another prototype of TUK-140 and supporting railway conveyor TK-E-140 were designed for transportation of WWER-440 SFAs.
Construction of a pilot-demonstration center (PDC) for SNF reprocessing. Development of advanced reprocessing technologies for main SNF streams accumulated to date	PDC construction was completed. License was granted to operate the first start-up unit of SNF reprocessing PDC with a design capacity of 5 tons per year. Construction of the second PDC unit with a design capacity of 250 t/year is ongoing. R&D program was launched to elaborate the newly developed SNF reprocessing technologies.
Continued efforts on ensuring environmentally safe configuration of surface water reservoirs for LRW storage	Capping projects were completed at the following sites: surface water reservoirs B-2 at SCC; surface water reservoir № 354 at MCC; reservoir V-9 (lake Karachay) at PA Mayak. Under FTP NRS-2, capping activities are currently being scheduled or implemented at the following sites: B-1 and B-25 at SCC, V-17 at PA Mayak, №365 at MCC.
Continued decommissioning of nuclear and radiation hazardous facilities (NRHF)	In 2014 – 2016, a total of 35 NFs were decommissioned. 78 NRHFs are scheduled to be decommissioned in 2017 – 2030 under FTP NRS-2. The following NRHFs are considered to be the most challenging in terms of decommissioning: PUGR: In 2015, decommissioning of PUGR EI-2 was completed at SCC: SNF was removed from the reactor; a total of 2,800 tons of equipment were dismantled, cells with a total volume of 60,000 m^3 were backfilled with barrier material; continued monitoring has been ensured at the site. Building B at VNIINM site: building was dismantled, the site was remediated resulting in over 5,000 m^3 of RW with a total activity of over 3,000 Ci (1.11×10^{14} Bq). Buildings 65, 22, 73 and 17/5 at NCCP were dismantled, the sites were remediated. Building 7 involved in PUGR fuel manufacturing at CMP was decommissioned. In 2016, decommissioning of building 804 was started at the site of AECC.
Continued efforts on remediation of contaminated territories	In 2014 – 2016, a total of 2,000,000 m^2 of contaminated territories was remediated, including mining and milling productions sites (Stavropol

	Territory, Kurgan region, Zabaikalsk Territory), sites of production enterprises and R&D sites (Moscow region, Vladimir region, Chelyabinsk region), sites used for peaceful nuclear explosions (Ivanovo region, Tyumen region, Perm Territory).
Implementation of IAEA Peer Review recommendations on LRW deep well injection	Special program approved by the State Corporation Rosatom and Rostechnadzor (regulatory authority) is being implemented.
Continued dismantling of ships and floating maintenance bases of Russian nuclear icebreaker fleet	Dismantlement of nuclear service ship Volodarsky was completed. The following facilities are currently undergoing decommissioning: maintenance base Lepse (completion scheduled for 2019), icebreakers Sibir (completion scheduled for 2017) and Arctic (completion scheduled for 2019).
New RW processing and treatment capacities	In 2015 – 2016, RW treatment and processing units were commissioned at Leningrad, Smolensk, Novovoronezh and Kola NPPs. In 2016, a new electric furnace EP-500/5 for HLW vitrification was commissioned at PA Mayak. Capacity of an existing storage facility for vitrified RW was increased.
Construction of an underground research laboratory	In 2016, siting and construction license for URL was granted to FSUE NO RW.
Development of RW classification system based on waste disposal routes	RW classification system based on waste disposal routes and criteria for waste categorization were approved (Government resolution of the Russian Federation № 1069 of October 19, 2012 with amendments introduced by the Government resolution of the Russian Federation № 95 of February 4, 2015).
Additional safety assessments for “wet” SNF storage facilities located off NPP sites	In 2013, detailed probabilistic safety assessment was performed for “wet” SNF storage facility KhOT-1. In 2015, evaluation of thermal modes and NRS was performed for “wet” SF designed for SNF with 5 % enrichment and enhanced burnup. In 2015, a comprehensive examination of building structures, systems and their components was performed at KhOT-1. In 2016, seismic stability evaluations were performed for the complex of KhOT-1 buildings and structures.

K.3. Planned Efforts to Improve Safety (Suggestions)

A large scope comprehensive program involving short-term and long-term initiatives in SNF management(centralized storage and reprocessing), RW management (RW treatment and disposal, also addressing the challenges associated with the accumulated RW inventory) and nuclear decommissioning covering both engineering and administrative aspects is being scheduled for implementation in Russia.

In the Russian Federation, plans of actions and efforts associated with SNF and RW management, as well as nuclear decommissioning, including relevant financial support are dressed up at two levels:

- Federal Target Programs specifying particular activities and their funding for short- and long-term perspective. The following Federal Target Programs were approved and are funded by the Government of the Russian Federation: FTP NRS-2 until 2030, sub-program Industrial Disposition of Nuclear Submarines, Nuclear-Powered Surface Ships, Nuclear Service Ships and Remediation of Radioactively Contaminated Sites in 2011 – 2015 and until 2020;
- Triennial plans discussing the activities that are required to be performed to implement relevant provisions approved by the President and the Government of the Russian Federation (NRS State Policy Fundamentals, activities scheduled under the second stage of USS establishment).

K.4. Areas of Good Performance

Establishment and deployment of a Unified State System for RW Management.

- The Initial Registration of Radioactive Waste and RW Sites was an important large-scale initiative performed in 2013 – 2014 enabling to verify the data on the inventory of accumulated RW and RW sites covering all facilities located in the Russian Federation. Findings of the Initial Registration campaign provided a basis for decision making on how the long-term safety can be ensured.
- Key regulations and framework arrangements were developed and approved enabling to start the establishment of an RW DF system.
- Criteria used to define waste as radioactive waste and RW classification system based on waste disposal routes were established.
- The first unit of a near-surface disposal facility was commissioned at UECC (Novouralsk).

Efforts under an action plan aimed at ensuring environmentally safe configuration of surface water reservoirs for LRW storage.

- Capping efforts were completed at a number of surface water reservoirs for LRW storage: B-2 at SCC, № 354 at MCC, V-9 at PA Mayak.

Establishment of an SNF management system.

- Construction of a “dry” SNF storage facility (KhOT-2) was completed at MCC.
- KhOT-2 was commissioned enabling to arrange for safe long-term storage of over 20,000 tons of RBMK-1000 SNF and 10,000 tons of WWER-1000 SNF.

Construction of the first start-up unit of a Pilot Demonstration Center for advanced SNF reprocessing

The start-up unit will enable pilot-scale demonstration of proposed advanced SNF reprocessing technologies. The pilot stage of reprocessing will be followed by construction and operation of a new generation SNF reprocessing plant (second start-up unit of PDC) with a design capacity of 250 tons per year. Further on, the reprocessing technology is going to be scaled up stage by stage.

Shipment of accumulated SNF inventory for centralized storage and reprocessing.

Construction of NPPs with RBMK-1000 units fitted with SNF cutting complexes. A unified technology for RBMK-1000 SNF transfer to container storage and subsequent shipment to MCC for reprocessing was developed, thus, enabling to start practical efforts on addressing the RBMK-1000 SNF challenge.

In 2014 – 2016:

- the inventory of SNF shipped to MCC site (KhOT-2) accounted for over 13,000 RBMK-1000 SFAs from Leningrad and Kursk NPPs.
- 1,359 WWER-1000 SFAs were delivered to KhOT-1 storage facility (MCC), 3,754 RR SFAs and 2,221 Atomflot SFAs were shipped for reprocessing to PA Mayak.

- Transportation cask TUK-141O and a railway conveyor TK-U-141 were manufactured and passed pre-commissioning testing. These prototypes were designed for the transportation of WWER-1000 SFAs with enhanced initial enrichment and burnup. Another prototype of TUK-140 and supporting railway conveyor TK-E-140 were designed for the transportation of WWER-440 SFAs.

K.5. Good Practices

Creation of a consolidated centralized complex for SNF management at SCC site, involving a centralized storage facilities ("dry" and "wet" storage units), as well as SNF reprocessing and MOX fuel fabrication facilities.

Consolidated centralized complex for SNF management at SCC site will enable to address a number of strategic challenges, namely:

- safe long-term SNF storage (for no less than 50 years);
- enhanced environmental safety due to the introduction of advanced reprocessing technologies avoiding LRW generation and resulting in RW form suitable for long-term storage and followed by its final disposal;
- closing the nuclear fuel cycle.

Prioritization of decommissioning projects based on the evaluation of NF state and the NF site (location). Thus, most hazardous facilities located in cities are to be decommissioned first. According to this prioritization principle, building B located at JC VNIINM site in Moscow was decommissioned. From mid-1940's, its premises were used for R&Ds, and radiochemical research in particular. Radiation safety was ensured at each stage of its decommissioning, so that no exceedance of personnel exposure limits was revealed and no changes in radiation environment inside the site boundaries occurred. As a result, this nuclear facility was completely dismantled and the site was remediated.

Standard work flow set up. Reactor EI-2 located at SCC site was chosen out of 12 shutdown production uranium graphite reactors. The whole decommissioning work package was implemented at EI-2 site. EI-2 was designed for plutonium production and operated in 1958 - 1990. Basically, EI-2 design features a structure of 150,000 m^3 by volume consisting of a surface and an underground part. The latter one containing the reactor shaft had a depth of 40 – 50 m.

"Dry" backfilling method was chosen for EI-2 mothballing. PUGR decommissioning program provided for experiments enabling to evaluate the changes in sorption properties of shredded clay rocks when certain inorganic cementitious additives are introduced. Optimal composition of barrier material for reactor shaft and at-reactor premises backfilling was identified, as well as the backfilling method.

As the result of performed decommissioning efforts, reactor (4,500 m^3) and at-reactor (36,664 m^3) premises were backfilled with barrier materials also providing for a system enabling to monitor the actual state of the safety barriers, surface structures were dismantled resulting in 22,915 tons of waste, protective slabs fitted with a monitoring system enabling to control the actual state of safety barriers were installed (85,820 m^3).

Lessons learned from practical efforts on PUGR EI-2 decommissioning performed at PCD UGR being the only operated center for PUGR decommissioning in the Russian Federation will be applied during the implementation of a series of projects on PUGR decommissioning.

K.6. Suggestions

Suggestions: suggestions were presented in Section K.3 of this Report.

K.7. 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 (MCC, PA Mayak and at-reactor storage) Reprocessing (RT-1 plant at PA Mayak, the first start-up unit of a Pilot Demonstration Center at MCC site)	The second start-up unit of a Pilot Demonstration Center at MCC
Nuclear Fuel Cycle Waste	Treatment 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 being upgraded to RW disposal facilities	State Operating organization (operator) Special Reserve Fund	Processing and storage at the sites of operating organizations (operators) Transfer for storage and reprocessing to specialized organizations (FSUE RosRAO, FSUE Radon) RW (LLW and ILW) are disposed of in the first unit of a near-surface disposal facility located at the UECC site Deep well injection of LRW Processing and analysis of the data from the Initial Registration of RW and RW sites, development and approval by the Government of the Russian Federation of lists covering RW disposal facilities, RW long-term storage facilities, facilities	Near-surface disposal facility for LLW and ILW located in the restricted administrative and territorial entity Ozersk (Chelyabinsk Region) in the vicinity of PA Mayak Near-surface disposal facility for LLW and ILW located in the restricted administrative and territorial entity Seversk (Tomsk Region) in the vicinity of SCC Underground research laboratory required to investigate the proposed ILW and HLW deep disposal concept

			holding non-retrievable RW and disposal facilities for non-retrievable RW. Relevant information was filled into the SGUK RV and RAO data base.	
Application Wastes	Treatment and subsequent transfer to the National Operator for disposal	State Operating organization (operator) Special Reserve Fund	Treatment and storage at the sites of specialized organizations (FSUE RosRAO, 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 NPP unit decommissioning. In 2014 – 2017, a total of 22 NRHFs were decommissioned, including: – PURG EI-2 at SCC; – Building B at VNIINM site (located within Moscow city boundaries).	82 NRHFs are scheduled to be decommissioned by 2025.

Disused Sealed Sources	Treatment and subsequent transfer to the National Operator for disposal	State Operating organization (operator) Special Reserve Fund	Storage at the sites of specialized organizations (FSUE RosRAO – 2,200,000, FSUE Radon – 488,000, PA Mayak – 52,800, MCC – 46,100, RIAR – 29,400, SCC – 21,300)	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	
Balakovo NPP	WWER-1000	
Rostov NPP	WWER-1000	
Kalinin NPP	WWER-1000	
Kursk NPP	RBMK-1000	
Leningrad NPP	RBMK-1000	
Smolensk NPP	RBMK-1000	
Beloyarsk NPP	BN-600 AMB	
Bilibino NPP	EGP-6	
NFC		
PA Mayak	WWER-440, AMB	Reprocessing facility Storage facility
MCC, PDC	WWER-1000 RBMK-100	Storage facility
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	
NPF		
“Atomflot”, FMB “Lotta”		Storage facility
Container storage for icebreakers’ SNF		

Table B1.2. SNF Inventory from Different Reactor Units, as of 01.01.17

Operating organization and its branches	Fuel type	SNF quantity, metric tons
Kola NPP	WWER-440	97.461
Novovoronezh NPP	WWER-440	40.107
	WWER-1000	101.899
Balakovo NPP	WWER-1000	358.34
Rostov NPP	WWER-1000	211.12
Kalinin NPP	WWER-1000	368.727
Kursk NPP	RBMK-1000	4,387.834
Leningrad NPP	RBMK-1000	4,332.007
Smolensk NPP	RBMK-1000	3,288.358
Beloyarsk NPP	BN-600, BN-800	26.792
	AMB	190.15
Bilibino NPP	EGP-6	168.91
PA Mayak	WWER-440, AMB	325.44
MCC	WWER-1000	6,670.66
	RBMK	1,820.42
IPPE	AM-1	8.601
RIAR	MIR, SM, VK-50, BOR-60	41.279
Atomflot		11.273

Annex B2. RW Generation

Table B2.1. LRW Generation in 2016

Total LRW	Volume	Activity
	800,000 m^3 — 100%	$5.89 \cdot 10^{18}$ Bq — 100%
LLW	85.82 %	0.002 %
ILW	11.85 %	0.084 %
HLW	2.33 %	99.914 %

Table B2.2. SRW Generation in 2016

Total SRW	Mass	Activity
	1,200,000 t (100%)	$4.0 \cdot 10^{18}$ Bq (100%)
VLLW	99.25%	0.056 %
LLW	0.57 %	0.035 %
ILW	0.14 %	3.266%
HLW	0.04 %	96.643 %

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 resolutions 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	1965
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	1996
8.	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	1998

2. Federal Laws

№	Title of the document	Reference number, date of signature
1.	On the Use of Atomic Energy	№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	№ 4871-1p of April 27, 1993
5.	On the Protection of Population and Territories Against Natural and Man-Induced Emergencies	№68-FZ of December 21, 1994
6.	On the Fire Safety	№69-FZ of December 21, 1994
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 the Radiation Safety of Population	№3-FZ of January 9, 1996
10.	On Financing Particularly Hazardous Nuclear and Radiation Productions and Facilities	№29-FZ of April 3, 1996
11.	On the 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 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

№	Title of the document	Reference number, date of signature
		of January 10, 2002
19.	On Technical Regulation	№ 184-FZ of December27, 2002
20.	On Licensing Certain Types of Activities	№ 128-FZ of August8, 2001
21.	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
22.	Urban Development Code of the Russian Federation	№ 190-FZ of December 29, 2004
23.	On the State Atomic Energy Corporation “Rosatom”	№ 317-FZ of December 1, 2007
24.	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
25.	Technical Regulation on Fire Safety Requirements	№ 123-FZ of July 22, 2008
26.	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
27.	On the Procedure for Foreign Investments into Economic Entities of Strategic Importance for National Defense and Security	№ 57-FZ of April 29, 2008
28.	Technical Regulation on the Safety of Buildings and Constructions	№ 384-FZ of December 30, 2009
29.	On Amendment to the Convention on the Physical Protection of Nuclear Material	№ 130-FZ of July 22, 2008
30.	Discipline Regulations for Employees Involved in Organizations Operating Particularly Hazardous Radiation and Nuclear Productions and Facilities in the Field of Atomic Energy Use	№ 35-FZ of March 8, 2011
31.	On the Management of Radioactive Waste and Amendments to Certain Legislative Acts of the Russian Federation	№ 190-FZ of July 11, 2011
32.	On Amendments to Certain Legislative Acts of the Russian Federation Concerning State Control (Supervision) and Municipal Control	№ 242-FZ of July 18, 2011
33.	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
34.	On Amendments to Articles 25 and 26 of the Federal Law On the Use of Atomic Energy	№ 159-FZ of July 2, 2013
35.	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
36.	On Standardization in the Russian Federation	№ 162-FZ of June 29, 2015
37.	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
38.	The Criminal Code of the Russian Federation	№ 63-FZ of June 13, 1996
39.	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

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 territory)	№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 Approval of a 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 Import of Foreign-Made Spent Fuel Assemblies to the Territory of the Russian Federation	№ 705, of June 18, 2005
11.	On the Approval of a Statute on the Ad-Hoc Commission for the Import 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

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

№	Title of an ordinance	Reference number and signature date
1.	On the Approval of a Procedure Applied to Inventory the Sites and Facilities Involved in Mining, Transportation, Processing, Use, Collection, Storage and Disposal of Radioactive Substances and Sources of Ionizing Radiation in the Territory of the Russian Federation	№ 505, of July 22, 1992
2.	On Steps Taken for the Integrated 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 Approval of a Regulation on the State Environmental Assessment	№ 942, of September 22, 1993
4.	On the Approval of a 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 Rules for Making Decisions on Siting and Construction of Nuclear Installations, Radiation Sources and Storage Facilities	№ 306, of March 14, 1997
7.	On the Steps Taken Pursuant to the Decree of the President of the Russian Federation № 166 On the Improved Management of Nuclear Fuel Cycle Enterprises of February 8, 1996	No 677, of June11, 1996
8.	On the Approval of a Regulation on the Procedure for the Development and Approval of Federal Norms and Rules in the Field of Atomic Energy Use	No 1511, of December 1, 1997
9.	On Export and Import of Nuclear Material, Equipment, Special Non-Nuclear Materials and Relevant Technologies	№ 973, of December 15, 2000
10.	On the Approval of a 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
11.	On the State Competent Authority Ensuring Nuclear and Radiation Safety During Transportation of Nuclear Material, Radioactive Material and Relevant Products	№ 204, of March 19, 2001
12.	On the Importation of Irradiated Nuclear Fuel Reactor Assemblies to the Territory of the Russian Federation	№ 418, of July 11, 2003
13.	On the Approval of a Regulation on Financing Special Environmental Programs for the Remediation of Radioactively Contaminated Territories	№ 588, of September 22, 2003
14.	On the Approval of a Regulation on the Development of Special Environmental Programs for the Remediation of Radioactively Contaminated Territories	№ 421, of June 14, 2002
15.	On the Federal Environmental, Industrial and Nuclear Supervision Service	№ 401, of July 30, 2004
16.	On the Federal Medical and Biological Agency	№ 206, of April 11, 2005
17.	On Federal Executive Authorities Exercising State Management in the Field of Atomic Energy Use and State Regulation of Safety in the Field of Atomic Energy Use	№ 412, of July03, 2006
18.	On Engineering Investigations for the Development of Design	№ 20,

№	Title of an ordinance	Reference number and signature date
	Documentation, Construction and Reconstruction of Capital Facilities	of January 19, 2006
19.	On the State Building Supervision in the Russian Federation	№ 54, of February 1, 2006
20.	On the Procedure and Conditions for the Transfer of Ownership Rights for Nuclear material to a Foreign State or a Foreign Legal Entity	№ 724, of October 31, 2007
21.	On the Federal Target Program Nuclear and Radiation Safety in 2008 and until 2015	№ 444, of July 13, 2007
22.	On the Approval of Rules for Physical Protection of Nuclear Material, Nuclear Installations and Storage Facilities for Nuclear Material	No 456, of July 19, 2007
23.	On the Structure of Particular Sections of Design Documentation and Requirements to their Contents	№ 87, of February 16, 2008
24.	On the Approval of a Regulation on the System for Accounting and Control of Nuclear Material	№ 352 of May 6, 2008
25.	On the Approval of a Regulation on the State Atomic Energy Corporation Rosatom	№ 888, of November 26, 2008
26.	On the List of Organizations Operating Particularly Hazardous Nuclear and Radiation Productions and Facilities	№ 1311-r, of September 14, 2009
27.	On Amendments Introduced to Certain Government Resolutions 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
28.	On Amendments to Certain Government Regulations of the Russian Federation	№ 48, of February 4, 2011
29.	On the Approval of a 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
30.	On the National Operator for Radioactive Waste Management	№ 384-r, of March 20, 2012
31.	On the Approval of a Regulation on Continuous State Supervision of Nuclear Facilities	№ 373, of April 23, 2012
32.	On the Approval of a List of Nuclear Facilities Subjected to Continuous State Control	№ 610-r, of April 23, 2012
33.	On the Initial Registration of Radioactive Waste	№ 767, of July 25, 2012
34.	On the Approval of a Regulation on the Transfer of Radioactive Waste for Disposal, Including Waste Resulting from Development, Manufacturing, Testing, Operation and Disposition of Nuclear Weapons and Military Nuclear Power Units	№ 899, of September 10, 2012
35.	On the Federal State Supervision in the Field of Atomic Energy Use	№ 1044, of October 15, 2012
36.	On the Criteria Used to Define Solid, Liquid and Gaseous Waste as Radioactive Waste, Criteria Used to Define Radioactive Waste as Special Radioactive Waste and Retrievable Radioactive Waste, Criteria for the Classification of Retrievable Radioactive Waste	№ 1069, of October 19, 2012

№	Title of an ordinance	Reference number and signature date
37.	On the Registration of Organizations Operating Radiation Sources Containing Exclusively Radionuclide Sources of the Fourth and the Fifth Categories of Radiation Hazard	№ 1184, of November 19, 2012
38.	On the Procedure and Timeframes for the Establishment of a Unified State System for RW Management	№ 1185, of November 19, 2012
39.	On the Approval of a 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
40.	On the Approval of 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
41.	On Amendments Introduced to Certain Government Resolutions of the Russian Federation	№ 1189, of November 19, 2012
42.	On the Procedure for the State Regulation of Radioactive Waste Disposal Tariffs	№ 1249, of December 3, 2012
43.	On Federal Norms and Rules in the Field of Atomic Energy Use	№ 1265, of December 6, 2012
44.	On the Approval of a Regulation Concerning Particular Aspects of the Standardization Process for Products (Operations, Services) Subjected 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 June 12, 2013\6
45.	On Licensing Activities in the Field of Atomic Energy Use	№ 280, of March 29, 2013
46.	On Special Aspects of Technical Regulation Concerning the Development and Adoption of Mandatory Requirements by State Customers, Federal Executive Authorities Authorized in the Field of State Management of Atomic Energy Use and State Regulation of Safety in the Field of Atomic Energy Use, and the State Atomic Energy Corporation Rosatom Applied to 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, Sale, Dismantlement and Disposal of Above Mentioned Products	№ 362, of April 23, 2013
47.	On the Approval of a 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
48.	On Accreditation in the Field of Atomic Energy Use	№ 612, of July 20, 2013
49.	On Fire Prevention Conditions	№ 390, of April 25, 2012
50.	On Federal State Metrological Supervision	№ 246, of April 6, 2011 (as amended on June 5, 2013)
51.	On the Management of the State System for Accounting and Control of Radioactive Material and Radioactive Waste	№ 542 of June 15, 2016
52.	On the Use of Risk Informed Approach in the Implementation of Certain	№ 806 of August 17,

№	Title of an ordinance	Reference number and signature date
	Types of State Control (Supervision) and Introduction of Relevant Amendments to Certain Regulations of the Government of the Russian Federation	2016

5. Federal Norms and Rules in the Field of Atomic Energy Use

No	Title of the Document	Reference number
1.	Radiation Safety Standards	NRB-99/2009
2.	Basic Sanitary Rules of Radiation Safety	OSPORB-99/2010
3.	Sanitary Rules for Radioactive Waste Management	SPORO-2002
4.	Sanitary Rules for Design and Operation of Nuclear Power Plants	SP AS-03
5.	Hygienic Requirements to the Design of Enterprises and Facilities in the Nuclear Sector	SPP PUAP-03
6.	Sanitary Protection Zones and Surveillance Zones of Nuclear Facilities. Operational Conditions and Justification of their Boundaries	SP SZZ and ZN-07
7.	Fire Safety at Enterprises. General Requirements	NPB 201-96
8.	General Safety Provisions for Nuclear Power Plants	NP-001-15
9.	Rules for the Safe Management of Radioactive Waste from Nuclear Power Plants	NP-002-15
10.	Regulation on the Procedure for Investigating and Accounting Operational Disorders at Nuclear Power Plants	NP-004-08
11.	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
12.	Requirements to the Contents of Safety Analysis Reports for NPPs with WWER Units	NP-006-16
13.	Rules for the Safe Decommissioning of NPP Units	NP-012-16
14.	Spent Nuclear Fuel Reprocessing Facilities. Safety Requirements	NP-013-99
15.	Rules for Investigating and Accounting Violations Associated with Management of Radiation Sources and Radioactive Materials Applied in National Economy	NP-014-16
16.	Standard Contents of Action Plans for Personnel Protection in the Event of an Accident at an NPP	NP-015-12
17.	General Safety Provisions for Nuclear Fuel Cycle Facilities	NP-016-05
18.	General Requirements for NPP Unit Operating Lifetime Extension	NP-017-2000
19.	Requirements to the Contents of Safety Analysis Reports for NPPs with BN Units	NP-018-05
20.	Collection, Processing, Storage and Conditioning of Liquid Radioactive Waste. Safety requirements	NP-019-15
21.	Collection, Processing, Storage and Conditioning of Solid Radioactive Waste. Safety Requirements	NP-020-15
22.	Management of Gaseous Radioactive Waste. Safety Requirements	NP-021-15
23.	General Safety Provisions on Marine Nuclear Propulsion Units	NP-022-2000
24.	Requirements to Safety Analysis Reports Drafted for Marine Nuclear Propulsion Units	NP-023-2000
25.	Requirements to the Evaluation of the Possibility of Design Life Extension for Nuclear Facilities	NP-024-2000
26.	Regulation on the Procedure of Investigating Operational Disorders at Research Nuclear Facilities	NP-027-10
27.	Rules for the Safe Decommissioning of Research Nuclear Facilities	NP-028-16
28.	Siting of Nuclear Power Plants. General Criteria and Requirements	NP-032-01
29.	General Safety Provisions for Research Nuclear Facilities	NP-033-11

No	Title of the Document	Reference number
30.	Dry Storage Facilities for Spent Nuclear Fuel. Safety Requirements	NP-035-02
31.	Rules for the Safe Decommissioning of Vessels and other Waterborne Vehicles with Nuclear Installations and Radiation Sources	NP-037-11
32.	General Safety Provisions for Radiation Sources	NP-038-16
33.	Regulation on the Procedure for Investigating and Accounting Operational Disorders at Nuclear Fuel Cycle Facilities	NP-047-11
34.	Requirements to the Contents of Safety Analysis Reports for Research Nuclear Facilities	NP-049-03
35.	Siting of Nuclear Fuel Cycle Facilities. Main Criteria and General Safety Requirements	NP-050-03
36.	Requirements to the Contents of Safety Analysis Reports for Nuclear Fuel Cycle Facilities	NP-051-04
37.	Requirements for the Safe Temporary Storage of Radioactive Waste Resulting from Mining, Processing and Use of Minerals	NP-052-04
38.	Rules for the Safe Transportation of Radioactive Material	NP-053-16
39.	Disposal of Radioactive Waste. Principles, Criteria and General Safety Requirements	NP-055-14
40.	Rules for the Safe Decommissioning of Nuclear Fuel Cycle Facilities	NP-057-17
41.	Safety in Radioactive Waste Management. General Provisions	NP-058-14
42.	Siting of Storage Facilities for Nuclear Materials and Radioactive Substances. Main Criteria and Safety Requirements	NP-060-05
43.	Rules for the Safe Storage and Transportation of Nuclear Fuel at Nuclear Facilities	NP-061-05
44.	Nuclear Safety Rules for Nuclear Fuel Cycle Facilities	NP-063-05
45.	On Accounting External Natural and Man-Induced Impacts on Nuclear Facilities	NP-064-05
46.	Requirements to the Contents of Safety Analysis Reports for R&Ds Involving the Use of Materials Containing Plutonium at Nuclear Fuel Cycle Facilities	NP-065-05
47.	Requirements to Safety Analysis Reports for Storage Facilities Holding Nuclear Material	NP-066-05
48.	General Rules for Accounting and Control of Radioactive Material and Radioactive Waste in Organizations	NP-067-16
49.	Near-Surface Disposal of Radioactive Waste. Safety Requirements	NP-069-14
50.	Rules for the Safe Configuration and the Safe Operation of Equipment and Pipelines at Nuclear Fuel Cycle Facilities	NP-070-06
51.	Rules for Compliance Assessment of Equipment, Components, Materials and Semi-Finished Material Supplied to Nuclear Facilities	NP-071-06
52.	Requirements to Planning and Ensuring Preparedness to the Elimination of Consequences of Accidents Associated with Transportation of Nuclear Material and Radioactive Substances	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-075-06
54.	Installations for 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 a Nuclear-Powered Vessels and (or) Other Waterborne Vehicles	NP-079-06
58.	Provision on the Procedure for Investigating and Accounting Operational Disorders at Conveyances Fitted with Nuclear Installations and Radiation	NP-088-11

No	Title of the Document	Reference number
	Sources	
59.	Requirements to the Quality Assurance Program for Nuclear Facilities	NP-090-11
60.	Safe Decommissioning of Nuclear Facilities. General Provisions	NP-091-14
61.	RW Acceptance Criteria for Disposal	NP-093-14
62.	Requirements for the Safe Decommissioning of Radioactive Waste Storage Facilities	NP-097-16
63.	Facilities for Plutonium Nuclear Fuel Fabrication. Safety Requirements	NP-098-17
64.	Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Storage Facilities	NP-099-17
65.	Requirements on the Contents and the Structure of Safety Analysis Reports for Radioactive Waste Disposal Facilities	NP-100-17

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.	Safe Management of Radioactive Waste from Research Nuclear Facilities	RB-08-99
4.	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
5.	Safety Assessment of Near-Surface Storage Facilities for Radioactive Waste	RB-011-2000
6.	Requirements to the Contents of the Program on the Decommissioning NPP Units	RB-013-2000
7.	Safe Management of Radioactive Waste Resulting from Mining, Milling and Use of Minerals	RB-014-2000
8.	Assessment of Seismic Hazards at Sites Considered for Construction of Nuclear and Radiation Hazardous Facilities on the Basis of Geodynamic Data	RB-019-01
9.	Recommendations on the Establishment of Acceptance Criteria for Storage and Disposal of Conditioned Radioactive Waste	RB-023-02
10.	Contents and Structure of Safety Analysis Reports for the Decommissioning of Nuclear Power Plant Units	RB-031-04
11.	Recommendations on Recruitment, Training, Maintaining and Enhancement of Competence of Operating Personnel at Nuclear Fuel Cycle Facilities	RB-034-05
12.	Contents and Structure of Safety Analysis Reports for Temporary Storage Facilities for Radioactive Waste Resulting from Mining, Milling and Use of Minerals	RB-035-05
13.	Monitoring of Engineering and Geological Conditions at the Sites of Nuclear Fuel Cycle Facilities	RB-036-06
14.	Contents and Structure of Annual Reports on Nuclear and Radiation Safety of Nuclear Fuel Cycle Facilities	RB-043-13
15.	Dynamic Monitoring of Structures at Nuclear Facilities	RB-045-08
16.	Monitoring of Meteorological and Aerological Conditions at the Sites of Nuclear Facilities	RB-046-08
17.	Methods Used to Evaluate the Safety Culture Level at Nuclear Fuel Cycle Facilities	RB-047-16
18.	Life Extension for Transportation Casks Designed for Transportation of Spent	RB-048-09

	Nuclear Fuel	
19.	Safety Assessment of Radioactive Waste Management at the Techa Cascade of Reservoirs in Terms of RW Reprocessing and Storage	RB-049-09
20.	Contents and Structure of Safety Analysis Reports for Solid Radioactive Waste Storage Facilities	RB-050-09
21.	Regulation Concerning the Re-Categorization of Nuclear Material as Radioactive Waste	RB-052-15
22.	Regulation on the Improved Accuracy of Prognostic Assessments Enabling to Evaluate the Radiation Characteristics of Radioactive Contamination of the Environment and Personnel and Public Exposure	RB-053-10
23.	Provision on the Contents and Structure of Radiation Safety Reports Drafted by Organizations Operating Radiation Sources	RB-054-09
24.	Regulation on the Structure and Contents of Safety Analysis Reports for Near-Surface Storage Facilities for Radioactive Waste	RB-058-10
25.	Regulation on Fire-Explosion Safety Assessment of Work Flows at Radiochemical Productions	RB-060-10
26.	Regulation on the Contents and Structure of Safety Analysis Reports for Research Reactor Decommissioning	RB-062-11
27.	Regulation on the Contents and Structure of a Principle Program for Research Reactor Decommissioning	RB-063-11
28.	Regulation on the Structure and Contents of Safety Analysis Reports for Radiation Sources	RB-064-11
29.	Regulation on the Procedure for Acquiring Data on the Amount of Nuclear Material Required for Accounting and Summarizing the Physical Inventory	RB-065-11
30.	Regulation on the Application of Mathematical Statistics in Accounting and Control of Nuclear Material	RB-066-11
31.	Regulation on Inventorying Radioactive Waste in Organizations	RB-071-11
32.	Regulation on Inventorying Radioactive Material in Organizations	RB-072-11
33.	Safe Decommissioning (Closure) of Tailings	RB-078-12
34.	Contents and Structure of Reports Summarizing the Findings of Integrated Engineering and Radiation Survey Required for NPP Unit Decommissioning	RB-081-13
35.	Recommendations on the Contents of Documents Justifying the Limits Set for Radioactive Discharges into the Atmosphere and Water Bodies	RB-085-13
36.	Recommendations on the Development of Quality Assurance Programs for Radioactive Waste Management	RB-086-13
37.	Recommendations on the Procedures Applied to Ensure the Robustness of Equipment Used at Nuclear Facilities	RB-087-13
38.	Evaluation of the Current Safety Level at Nuclear Facilities	RB-091-13
39.	Recommendations on the Safe Return of the By-Products Resulting from SFAs Reprocessing the State of Origin	RB-092-13
40.	Radiation, Thermal and Physical Characteristics of Spent Nuclear Fuel from WWER units	RB-093-14
41.	Recommendations on the Use of Sealing Equipment in the System of Accounting and Control of Radioactive Material and Radioactive Waste	RB-095-14
42.	Structure and Contents of Guidelines on the Accounting and Control of Radioactive Material and Radioactive Waste in Organizations	RB-096-14
43.	Recommendations on the Structure and the Contents of Safety Analysis	RB-099-14

	Reports for the Decommissioning of Nuclear Fuel Cycle Facilities	
44.	Recommendations on the Structure and the Contents 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
45.	Recommendations on 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
46.	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
47.	Recommendations on the Structure and the Contents of Safety Analysis Reports Dual-Purpose Containers Used for Storage and Transportation of Spent Nuclear Fuel	RB-107-15
48.	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
49.	Recommendations on the Development of Quality Assurance Programs for the Transportation of Radioactive Material	RB-110-16
50.	Safe Closure of Near-Surface Disposal Facilities for Radioactive Waste	RB-111-16
51.	Safe Remediation of the Sites Contaminated due to Mining and Milling of Uranium and Thorium Ores	RB-113-16
52.	Recommendations on the Development of Quality Assurance Programs for Decommissioning of Nuclear Facilities	RB-114-16
53.	Recommendations on the Contents and the Structure of Facility-Level Documents Discussing the Physical Protection of Radioactive Materials, Radiation Sources and Storage Facilities	RB-115-16
54.	Recommendations on the Probabilistic Safety Evaluation of Spent Nuclear Fuel Storage Facilities	RB-116-17
55.	Evaluation of the Long-Term Safety of Near-Surface Disposal Facilities for Radioactive Waste	RB-117-16
56.	Recommendations on the Institutional Control Performed under the System for Accounting and Control of Radioactive Material and Radioactive Waste in Organizations	RB-119-17
57.	Recommendations on the Vulnerability Evaluation of Nuclear Installations	RB-120-16
58.	Safety Assessment for the Pre-Disposal Management of Radioactive Waste	RB-122-16
59.	Recommendations on the Final Evaluation of a Nuclear Facility Subject to Decommissioning	RB-124-16
60.	Evaluation of Fire and Explosion Hazards Associated with Sorption Systems Used in the Reprocessing of Spent Nuclear Fuel	RB-125-17
61.	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
62.	Contents and Structure of Programs Aimed at Ensuring the Radiation Safety During the Transportation of Radioactive Material	RB-127-17

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	№721, of December 21, 2011
2.	Administrative Regulation on the Federal Environmental, Industrial and Nuclear Supervision Service on the Implementation of its State Function Associated with Federal State Supervision in the Field of Atomic Energy Use	№ 248, of June 7, 2013
3.	Guideline on the Evaluation of Software Tools Applied for Demonstration and (or) Assurance of Safety at Nuclear Facilities	RD-03-33-2008
4.	Guideline on the Information Support of Activities Performed by the Federal Environmental, Industrial and Nuclear Supervision Service	RD-22-06-2007
5.	Regulation on Compilation and Uploading Data Discussing the Activities Performed by the Federal Environmental, Industrial and Nuclear Supervision Service to its Official Website www.gosnadzor.ru	№800, of October 14, 2008
6.	Method for the Development and Establishment of Standards for Maximum Allowable Discharges into the Atmosphere	№639, of November 7, 2012
7.	Method for the Development and Establishment of Standards for Maximum Allowable Discharges into Water Bodies	№ 551, of December 22, 2016