

**THE SECOND NATIONAL REPORT  
OF THE REPUBLIC OF UZBEKISTAN**

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

Tashkent 2020

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## LIST OF ABBREVIATIONS

ASEW	The Agency for Sanitary and Epidemiological Wellbeing under the Ministry of Health of the Republic of Uzbekistan
BSRRS	Basic sanitary rules for radiation safety
CERS	Comprehensive engineering and radiation survey
CRS	Control reference samples
CMD	Control and measuring devices
CIS	Commonwealth of Independent States
FA	Fuel assemblies
IDC	Individual dosimetric control
INP AS RUz	The Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan
IPGEB	Institute of Plant Genetics and Experimental Biology
IPFCU	Individual photographic film cassette universal
IRT-4M	Research reactor fuel modernized
JSC	Joint-stock company
LMCC	Leninabad mining and chemical combine
LRW	Liquid radioactive waste
LRU	Law of the Republic of Uzbekistan
MSA	Minimum significant specific activity
NPP	Nuclear power plant
NRNU - MEPHI	National Research Nuclear University - Moscow Engineering Physics Institute
PR	President's Resolution
PD	President's Decree
RSD	Radiation safety division
RSS	Radiation safety standards
RTC	Radiation technology complex
SCIS	The State Committee on Industrial Safety of the Republic of Uzbekistan
SSGRS	Sample spectrometric gamma-ray sources
SE "NMMC"	State enterprise "Navoi Mining and Metallurgical Combine"
SUE "RBSRW"	State Unitary Enterprise "Republican Burial Site for Radioactive Waste" under the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan
SRW	Solid radioactive waste
SCR	Self-sustaining chain reaction
SNRHS	Sanitary norms, rules and hygienic standards
SFA	Spent fuel assemblies
TLD/ TLM	Thermoluminescent dosimeter (method)
TIPME	Tashkent Institute of Postgraduate Medical Education
TUK	Transport packaging container
WWR-SM	Water-water reactor - serial modernized

## Section A. Introduction

This National Report describes the implementation status of the Republic of Uzbekistan as a contracting party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, in accordance with the Law of the Republic of Uzbekistan “On the accession of the Republic of Uzbekistan to the "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” No. LRU-186 of December 11, 2008, and Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On Measures to Implement the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” No. 379 of December 31, 2015, and prepared in accordance with the “Guidelines Regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3)” under the Joint Convention and described the implementation status by reflecting the observations given in the Summary Report of the 6<sup>th</sup> Review Meeting.

### A.1. Purpose of the Report

The Second National Report of the Republic of Uzbekistan on the Implementation of Obligations under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter referred to as the “Joint Convention”) covers the period from 2017 to 2020.

The purpose of this National Report is to inform, in accordance with the Joint Convention, about the implementation of the obligations assumed by the Republic of Uzbekistan in the field of safety of spent nuclear fuel and radioactive waste management.

### A.2. Structure of the Report

Section	Title of Section	Article of the Convention
A	Introduction	
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### A.3. Conclusions from the Discussion of the First National Report at the Previous Review Meeting

During the discussion of the First National Report of the Republic of Uzbekistan on the implementation of the Joint Convention, the following directions and tasks that the Republic of Uzbekistan is designed to solve in order to achieve increased safety and regulate the practice of spent nuclear fuel and radioactive waste management were noted:

the issue of providing information on the activities and volume of stored solid radioactive

waste at the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan in accordance with section B “Policy and practice”;

make a list of available storage facilities for radioactive waste at the State Unitary Enterprise “Republican Burial Site for Radioactive Waste” under the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan in accordance with Section D “Inventory lists”;

main aspects and terms of implementation of the National Strategy for the safe management of spent nuclear fuel and radioactive waste management;

creating a Central registry/database for closed sources and unused closed sources;

the issue of removing or cleaning up radioactive materials in practice under Section H where it is stated that the IAEA Safety Guide GSG-1 applies to the classification of radioactive waste.

Following the submission of the First National Report of the Republic of Uzbekistan, measures were taken to implement the recommendations, as well as planned and ongoing efforts aimed at improving the safety of spent nuclear fuel and radioactive waste management, the need for which was emphasized in the conclusions of the meeting on the First National Report of the Republic of Uzbekistan, are presented in the relevant sections of this report.

#### **A.4. Main Guidance Documents on the Safe Management of Spent Nuclear Fuel and Radioactive Waste Management and their Amendments**

The Republic of Uzbekistan acceded to the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management by Law of the Republic of Uzbekistan “On the accession of the Republic of Uzbekistan to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” No. LRU-186 of December 11, 2008.

By the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On Measures to Implement the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management” No. 379 of December 31, 2015, the State Committee on Industrial Safety of the Republic of Uzbekistan (hereinafter referred to as the “SCIS”) defined by the authorized body to ensure the fulfillment of obligations of the Republic of Uzbekistan on the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management, as well as preparing and submitting national reports on the implementation of obligations under the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management.

### **Section B. Policies and Practice**

#### *Article 32. Reporting*

*1. In accordance with the provisions of Article 30 each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:*

- i) spent fuel management policy;*
- ii) spent fuel management practice;*
- iii) radioactive waste management policy;*
- iv) radioactive waste management practices;*
- v) criteria used to define and categorize radioactive waste.*

#### **B.1. Spent Fuel Management Policy**

##### ***The Agency for the Development of Nuclear Energy – “Uzatom” Agency***

In 2018, a decision was made to build a nuclear power plant. On September 7, 2018, in

Moscow, the governments of the Republic of Uzbekistan and the Russian Federation signed an agreement on cooperation in the construction of a “3+” Generation nuclear power plant on the territory of the Republic of Uzbekistan consisting of two power units with an installed capacity of 2400 MW (WWER-1200), which compliant all the safety requirements of the IAEA. Along with that, there was adopted the Decree of the President of the Republic of Uzbekistan “On Measures for the Development of Nuclear Energy in the Republic of Uzbekistan” No. PD-5484 of July 19, 2018, as well as to establish a long-term sustainable system for the development of nuclear energy in the Republic as a new high-tech energy industry by the Resolution of President of the Republic of Uzbekistan No. PR-4165 of February 7, 2019, approved the Concept of Development of Nuclear Energy in the Republic of Uzbekistan for the period 2019-2029 years. The Concept provides for the implementation of the following main priority areas:

- development of the national nuclear infrastructure, including the formation of a regulatory framework, participation of the Republic of Uzbekistan in the global nuclear safety regime, ensuring the activities of the NPP operating organization, creating a regulatory framework for nuclear energy, ensuring transparency and openness to the public of the nuclear energy program, providing qualified personnel;

- construction of the first NPP, including site selection and licensing of placement, design, construction and commissioning of the NPP;

- ensuring environmental protection and radiation protection of people when using nuclear energy;

- organization of a safe and cost-effective nuclear fuel cycle, including the long-term provision of nuclear power with nuclear fuel, creation of conditions for the safe management of spent fuel, organization of its processing and waste disposal;

- ensuring the long-term development of nuclear energy, including the development of nuclear science and technology, the acquisition by domestic organizations of design, engineering, environmental and other knowledge and experience to support the construction and operation of NPPs, the study of nuclear technology trends to select the reference technology for future NPPs.

On September 9, 2019, the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” was adopted. The Law stipulates the basic concepts, defines the principles of nuclear energy, such as legal, security, priority of protecting the life and health of citizens, environment, independence of activities of bodies of state regulation of safe use of nuclear energy, openness, good faith fulfillment of international obligations, provides for the objects of its use, nuclear installations, storage facilities, nuclear materials, nuclear fuel, fuel assemblies of nuclear reactors, spent nuclear fuel, radioactive waste.

The main directions of state policy in the field of nuclear energy use are defined, such as the development of national nuclear infrastructure, construction of nuclear installations and storage facilities, ensuring environmental protection and protection of the population when using nuclear energy, organization of a safe nuclear fuel cycle, ensuring the long-term development of nuclear energy, and development of international cooperation.

The main principles of the use of nuclear energy are the protection of life and health of citizens, a property of individuals and legal entities, as well as the priority of environmental protection, security, the openness of information, and the prohibition of the production of nuclear weapons and other nuclear explosive devices.

The document is highly significant because it regulates the placement and construction of nuclear facilities, their acceptance, commissioning and decommissioning, the management of radioactive substances, nuclear materials, fuel, including spent fuel, and radioactive waste, as well as regulate international cooperation in this area. The following aspects of state regulation and security are applied in the sphere:



*firstly*, licensing is mandatory for operating organizations and other legal entities operating in the field of nuclear energy use. A license can also be issued to a foreign company, but not to an operating organization, for the duration of a similar license issued in the country of their registration;

*secondly*, a work permit is issued to employees of operating and other organizations to perform certain works. Lists of such employees and types of work are approved by the Cabinet of Ministers;

*thirdly*, certification of products, equipment and technical devices used at nuclear power facilities. For this, it is necessary to apply to an accredited certification body. However, in accordance with international agreements, certificates of the supplier's country can be applied;

*fourthly*, state supervision and control – verify (inspections), measures to prevent detected violations, systematic monitoring of compliance with mandatory requirements, analysis and forecasting of their implementation.

Based on the recommendations of the IAEA, a strategy for the nuclear fuel cycle and radioactive waste management is being developed for the start of implementation of the contract for the construction of NPPs, which will be used to develop a state policy for managing spent nuclear fuel and radioactive waste management.

The safety of spent fuel management and on the safety of radioactive waste management is an important part of the state security of the republic.

An important factor for ensuring nuclear and radiation safety is the improvement of the regulatory framework for the management of spent fuel management and on the safety of radioactive waste, nuclear and radiation safety, and decommissioning of nuclear installations.

The policy is based on the legislation of the Republic of Uzbekistan, international obligations and modern technological approaches to the management of spent nuclear fuel and radioactive waste in relation to the conditions of the Republic of Uzbekistan.

In the Republic of Uzbekistan legislation in the field of nuclear and radiation safety and use of nuclear energy for peaceful purposes, compliant with IAEA recommendations, as in the country more than 60 years, operated a research nuclear reactor of Institute of Nuclear Physics, Academy of Sciences of the Republic of Uzbekistan.

Financing of the NPP construction, including the spent fuel management and on the safety of radioactive waste management infrastructure, is planned at the expense of the Republic of Uzbekistan's funds and credit funds.

The strategy for implementing the state policy in the field of spent fuel management and on the safety of radioactive waste management is defined as a priority task in the Decree of the President of the Republic of Uzbekistan no. “On Approval of the Concept of Nuclear Energy Development in the Republic of Uzbekistan for the period 2019-2029” No. PD-4165 of February 7, 2019, which will ensure the priority of safety at all stages of the life cycle of nuclear energy facilities.

In connection with the decision taken by the Republic of Uzbekistan in 2018 to build the first nuclear power plant on its territory, the country is implementing significant measures to develop the national nuclear infrastructure. The basis on the comparative analysis and discussions with State Atomic Energy Corporation “Rosatom” and Scientific, Technical and Expert Council of the Agency for the Development of Nuclear Energy under the Ministry of Energy of the Republic of Uzbekistan (Agency “Uzatom”) decided on adoption of the draft “Novovoronezh NPP-2” as a reference project for the Republic of Uzbekistan. Commissioning of the first unit of the nuclear power plant in the Republic of Uzbekistan is planned for 2028, and the second unit for 2030.

It should be noted that in the Republic of Uzbekistan since 1959, there is a Research Nuclear Reactor WWR-SM, the operating organization which is the Institute of Nuclear Physics, Academy of Sciences of the Republic of Uzbekistan. The country has a certain

nuclear infrastructure, which is developing with the implementation of the project for the construction of nuclear power plants.

Taking into account the IAEA recommendations on the necessity of adoption by the beginning of the implementation of the contract for construction of NPP strategy of the nuclear fuel cycle and radioactive waste management, it is advisable to develop and enact public policy management the management of spent nuclear fuel and radioactive waste, the nuclear installations out of operation, and a strategy to implement this state policy.

At present, the legal basis for the implementation of issues related to spent fuel management and on the safety of radioactive waste management is international agreements of the Republic of Uzbekistan and other international legal acts containing obligations of the Republic of Uzbekistan, Laws and Regulations of the Republic of Uzbekistan in the field of nuclear energy use.

In Addition, the “Uzatom” Agency developed a draft resolution of the President of the Republic of Uzbekistan “On Approval of the Strategy for the Management of Spent Nuclear Fuel, Radioactive Waste and Decommissioning of Nuclear Installations”, which, after approval by all interested ministries and departments, was submitted to the Cabinet of Ministers of the Republic of Uzbekistan in November 2019. Currently, the draft document is already being considered by the Administration of the President of the Republic of Uzbekistan.

The purpose of the Strategy is to protect the life and health of citizens, property of individuals and legal entities, as well as to protect the environment from the harmful effects of radiation substances and ionizing radiation while management spent nuclear fuel and radioactive waste.

The main tasks of the Strategy are to:

- improve the national regulatory and regulatory framework in the field of spent fuel management and on the safety of radioactive waste management and decommissioning of nuclear installations;

- delineating the powers and responsibilities of all participants in the management of spent nuclear fuel, radioactive waste, and decommissioning of nuclear installations;

- providing spent nuclear fuel management, radioactive waste management and decommissioning of nuclear installations with the necessary resources to avoid security threats and inappropriate technical solutions due to their shortage;

- development of financing mechanisms for the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations;

- provision of training of competent personnel;

- use of advanced, cost-effective technologies that ensure high levels of nuclear, radiation and environmental safety in the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations;

- organization of inspection and control all activities related to the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations;

- the development of state systems of accounting for and control spent nuclear fuel and radioactive waste at all stages of treatment;

- organization of physical protection of spent nuclear fuel and radioactive waste at all stages of treatment and ensuring the non-proliferation regime;

- development of the state system of emergency preparedness and response for the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations;

- development of national infrastructure and scientific support for activities in the field of spent nuclear fuel and radioactive waste management;

- organization of public awareness on the management of spent nuclear fuel and



radioactive waste, international cooperation in the field of improving safety in the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations.

## **B.2. Spent Fuel Management Practices**

### ***The Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan – INP AS RUz***

National practice in the field of spent nuclear fuel management includes controlled storage (ensuring nuclear safety and physical protection) for at least 3 years and sending spent fuel for reprocessing to the country of the nuclear fuel producer. During 2006-2012, 362 SFA WWR-SM were sent for processing to FSUE Production Association “Mayak” (Russian).

Access to SFA storage facilities is restricted and monitored by the physical security system.

Fuel is stored under a layer of water, which eliminates the release of radiation to the environment.

Storage facilities are equipped with appropriate sensors that monitor such parameters as water level; water temperature; storage flow; air pressure in storage facilities and SCR sensors.

Upon results of water analysis in SFA storages, they are cleaned with ion-exchange filters at regular intervals once every three months.

The formation of a critical mass in the storage is excluded by the storage design, where the cells in which the SFAs are stored are built with a certain step.

Transportation of SFA for processing is carried out in special containers of TUK (Russia), which are certified according to international standards, have the highest degree of protection and exclude the release of radiation into the environment during transportation.

### ***“Uzatom” Agency***

Possible options for management of spent nuclear fuel at nuclear installations in the Republic of Uzbekistan

As mentioned above, the Republic of Uzbekistan has a 10 MW WWR-SM research nuclear reactor operated by the INP AS RUz. The Republic of Uzbekistan has decided to build a nuclear power plant consisting of two power units with WWER-1200 reactors, with a total capacity of 2400 MW.

The nuclear power plant project provides for a four-year fuel cycle with one overload in 12 months (with a possible transition to an 18-month cycle). The number of fuel assemblies unloaded from two nuclear installations during the 60 years of operation of the nuclear power plant will be approximately 5,300 units with a total weight of approximately 2,500 tons of heavy metal.

At the same time, the mandatory technological stage of spent nuclear fuel management after unloading from the holding pools in accordance with the reference solutions of Novovoronezh NPP-2 is medium-term (up to 10 years) intermediate storage, which requires the installation of a storage site with a capacity of up to 16 dual-purpose (storage and transportation) containers for spent nuclear fuel, technologically compatible with the spent nuclear fuel management system provided for by the NPP project, with the possibility of expansion (if there is a reasonable need).

Optimization of transport and technical operations related to the preparation and subsequent shipment of spent nuclear fuel for reprocessing requires a storage area with a capacity of 8-16 dual-purpose (transportation and storage) containers that are technologically compatible with the spent nuclear fuel management system.

Draft Strategy for the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations.

*option No. 1* — disposal of spent nuclear fuel in deep geological formations after ageing and medium-term (up to 10 years) intermediate storage;

*option No. 2* — directing spent nuclear fuel to a country that previously supplied nuclear fuel to a NPP for reprocessing to return spent nuclear materials to the nuclear fuel cycle;

*option No. 3* — directing spent fuel for reprocessing to a country that previously supplied nuclear fuel to a NPP, with the return of radiation-equivalent radioactive waste for environmentally acceptable disposal;

*option No. 4* — construction of an intermediate (up to 100 years of storage) dry container storage of spent nuclear fuel for making a decision on options 2 or 3, depending on future market conditions for natural uranium and nuclear materials as part of spent nuclear fuel (deferred decision).

The final choice of the option acceptable to the Republic of Uzbekistan for managing spent nuclear fuel will be made after the commissioning of the first unit of the nuclear power plant of the Republic of Uzbekistan, taking into account the feasibility study of the selected option, as well as the future market conditions for natural uranium and nuclear materials in the composition of spent nuclear fuel.

### **B.3. Radioactive Waste Management Policy**

As noted above, the “Uzatom” Agency has prepared a draft Resolution of the President of the Republic of Uzbekistan “On Approval of the Strategy for the Management of Spent Nuclear Fuel, Radioactive Waste and Decommissioning of Nuclear Installations”.

The task of ensuring the safe management of radioactive waste is considered, on the one hand, as a key element of national security and safety, and on the other, as an essential prerequisite for the present and future use of nuclear energy. In accordance with the legislation of the Republic of Uzbekistan, the main principles for ensuring radiation safety in the management of radioactive waste are:

ensuring an acceptable level of protection of employees (personnel) and the public from the radiation effects of radioactive waste in accordance with the principles of justification, rationing and optimization;

ensuring an acceptable level of environmental protection from the harmful radiation effects of radioactive waste;

projected levels of exposure to future generations caused by the disposal of radioactive waste should not exceed the permissible levels of exposure to the population established by regulatory legal acts, including technical regulatory legal acts;

taking into account the relationship between the stages of radioactive waste generation and management;

not placing an unreasonable burden on future generations related to the need to ensure safety in the management of radioactive waste;

the generation and accumulation of radioactive waste should be limited to the minimum practicable level;

prevention of accidents with radiation consequences and mitigation of possible consequences if they occur.

According to these principles, the main areas of activity are defined:

development of new and improvement of existing technologies for radioactive waste management;

the functioning of the state system of accounting and control of radioactive waste;

scientific, technical and informational support for activities in the field of radioactive

waste management;

development of documents on the regulation of radioactive waste management;

expanding international cooperation in the field of radioactive waste management;

achieving and maintaining a high level of safety in the management of spent fuel and radioactive waste on the national scale with the solution of cross-border safety problems;

provide effective protection against potential hazards at all stages of spent fuel and radioactive waste management, in order to protect individuals, society as a whole and the environment from the harmful effects of ionizing radiation now and in the future;

prevention of accidents with radiological consequences and mitigation of their consequences if they occur at any stage of spent fuel or radioactive waste management.

#### **B.4. Radioactive Waste Management Practices**

The WWR-SM research reactor of the INP AS RUz is one of the sources of radioactive waste generation in the Republic of Uzbekistan, which is formed during its operation. The main product of the reactor is the production of radioisotopes used in medical diagnostics and treatment, in industry or agriculture, as well as in scientific research. In this case, the Joint Convention makes a significant contribution to ensuring the safety of spent nuclear fuel and radioactive waste management.

The main amount of radioactive waste is accumulated in the process of uranium mining. Separate elements of the nuclear fuel cycle were created on the basis of the facilities, and as a result, Uzbekistan is one of the few countries in the world that has separate elements of the nuclear fuel cycle, including the extraction and use of nuclear fuel, the production of isotope products and the management of radioactive waste.

With the development of public production, the existing uranium heritage in the Republic, the expansion of the number of industries and the use of radioactive substances and sources of ionizing radiation, the probability of risk is constantly expanding, and the size of possible negative consequences is increasing.

With the development of public production, the existing uranium heritage in the Republic of Uzbekistan, the expansion of the number of industries and the use of radioactive substances and sources of ionizing radiation, the probability of risk is constantly expanding, and the size of possible negative consequences is increasing.

##### ***The Ministry of Health of the Republic of Uzbekistan***

One of the priority areas for ensuring radiation safety is the safe management of radioactive waste. This issue requires special attention. Today, there is a huge amount of radioactive waste of various activities and composition on the territory of the Republic of Uzbekistan. There is still no legalized assessment of the content of radioactive elements in them. Performing works on remediation of territories require not small expenses.

##### ***The geography of the contaminated areas***

Abandoned contaminated sites of the uranium industry in Navoi, Samarkand, Namangan, Tashkent, and Andijan regions. The total amount, composition, aggregate state, and activity of radioactive waste varies.

When solving the existing problems related to radioactive waste, a differentiated approach will be achieved to the safety of facility personnel, the public and the environment. It is worth taking into account the interaction factors of radioactive waste, while optimizing waste management programs, taking into account various treatment and disposal options, as well as potential regimes for exemption from control and recycling.

Radioecological hazardous objects of the uranium mining industry on the territory of the Republic of Uzbekistan are located in two regions – in Central-Kyzylkum and Chatkalo-

Kurama. In the first, Central-Kyzylkum Region, State enterprise “Navoi Mining and Metallurgical Combine” (SE “NMMC”) is engaged in uranium mining. In the second – Chatkalo-Kurama Region, there are a number of stopped uranium mines with insufficient reclamation of radioactive waste. Waste from mining uranium ores (dumps of ore-bearing rocks and off-balance ores, as well as industrial equipment and buildings) are located in mountainous areas. In total, 24 uranium deposits were found and explored on the territory of the Republic. The main deposits are located near the localities of Uchkuduk, Zaravshan, Zafarabad, Nurabad, Angren, Charkesar and Krasnogorsky. Two plants operated on the basis of these deposits: the Leninabad mining and chemical combine (LMCC) and SE NMMC.

*At the first stage* of development of the uranium industry, uranium ore deposits were discovered in the East of Uzbekistan, in the Chatkalo-Kurama region. They were worked by the underground method. A significant part of the waste was stored at the sites of operation of the Chauili, Mailikatan, Rezak, Charkesar-1 and Charkesar-2 uranium ore deposits, as well as the fields of the Yangiabad group.

*At the second stage*, numerous uranium deposits were identified in the Central Kyzylkum region. At the initial stage of development of these deposits, ores were extracted by mine and open-pit methods, and their processing was carried out at the hydrometallurgical plant in Navoi. Thus, in the Central-Kyzylkum Region, radioactive waste from the extraction and processing of uranium ores with different contents of uranium, thorium and their decay products, formed in the course of past activities, was concentrated in two places - at the city of Navoi and Uchkuduk.

The most significant objects of regulatory control and integrated environmental monitoring, as well as reasonable rehabilitation activities are: the tailings dump in the vicinity of Navoi, mines and dumps of off-balance ore near Uchkuduk, Charkesar village, as well as waste in Angren and Yangiabad.

The Charkesar uranium Deposit is located in the foothills of the Kurama range, in the Pap district of the Namangan region of Uzbekistan, in the North-West of the densely populated Ferghana valley. The field was developed by the Charkesar-1 and Charkesar-2 mines. The industrial site of the Charkesar-2 mine is located on the outskirts of the village of Charkesar, where about 3.5 thousand people live, and the Charkesar-1 mine is located 5 km to the West. The total volume of dumps, which are located on an area of 206 thousand m<sup>2</sup>, is about 482 thousand m<sup>3</sup>. at the industrial site of the Charkesar-2 mine, dumps of rocks and off-balance ores are stored. The volume of rock in the dumps is estimated at about 330 thousand m<sup>3</sup>. another problem is related to the outflow of mine water with a high content of dissolved uranium and heavy metals. Since 2000, water has been diverted to the drainage system, and evaporation ponds have been organized. Currently, the drainage system is silted up, water from it is poured to the surface, partially filtered and drained into the river.

*The Charkesar-1* mine is located in a desolate, waterless mountain valley. The industrial site stretches along the valley for 1.5 km. Rock dumps are located in randomly selected terrain depressions on the bottom and sides of the valley and are covered with sparse vegetation, composed of crushed granite of various sizes. In the fall of 2019, reclamation of the Charkesar 1 mine site began. the site Was laid out with further the coverage of the mine site with neutral soil. The drainage stream from mine No. 1 is channeled into an underground well. It is planned to build a fence around the reclaimed site.

In the area of the former uranium production in the area of *Angren* and *Yangiabad*, there are more than 20 sites of contamination of territories that were formed as a result of accumulated rock dumps and waste from former uranium production. The main problem of this area is the high degree of contamination of the territories of former mines, waste storage sites, sorting and storage sites, as well as ensuring safe water use in case of severe waterlogging of the area. The former mines are located in the upper part of Yangiabad and



the mountain valleys above the village. The area around the mines is significantly polluted. A number of mine workings are filled with underground water with a high content of dissolved uranium (up to 30 Bq/l) and heavy metals. Many drainage water streams are formed around the mine, which drains into streams available for water use. Water flows down the valley to the town of Angren, where there are also areas that are significantly polluted as a result of past activities related to the processing of uranium ores. Basically, these are places where uranium ores are stored and sorted, from where they were sent for processing to the LMCC.

***Joint-stock company “Uranredmetgeologiya” of the State Committee of the Republic of Uzbekistan on Geology and Mineral Resources***

Performs radiation and environmental monitoring of former uranium mines in the Tashkent region – the Chauli mine, Alatanga, Jekindek, Kattasay, Razveduchastok (Yangiabad group) and in the Namangan region – the Charkesar-1 and Charkesar-2 mines.

In the present presents information on the waste dumps and tailing ponds of former uranium mines have Chatkal-Kuramin region.

Chauli mine, Tashkent region;

Central dump of off-balance ores of the Chauli mine, Tashkent region;

Alatanga mine, Tashkent region;

mine Razvedochno, Tashkent region;

Kattasay mine, Tashkent region;

mine Cekirdek, Tashkent region;

Central dump of off-balance ores of Yangiabad mines, Tashkent region;

Central overburden dump of Yangiabad mines, Tashkent region;

the mine Cutter, Tashkent region;

Charkesar 1 mine, Namangan region;

Charkesar 2 mine, Namangan region.

***INP AS RUz***

The INP AS RUz is licensed AH No. 0036, August 26, 2019, which includes research and development work in the field of management of ionizing radiation sources, use, storage, maintenance, transportation, neutralization, utilization and disposal.

The national operator for disposal of waste State Unitary Enterprise “Republican Burial Site for Radioactive Waste” under the INP AS RUz, which adopts and carries out the disposal of radioactive waste.

*Management of gaseous radioactive waste.* Air containing radioactive gases and aerosols is decontaminated with special filters and then removed through the pipe of the ventilation centers at the reactor and in the State unitary enterprise “Radiopreparat”. Emission control is carried out at the reactor by the Pelikan automatic system, and at the Radiopreparat enterprise by the SRK-AT2337 automatic radiation control system.

*Liquid radioactive waste management.* Liquid radioactive waste (LRW) formed in the INP AS RUz with the activities of the Institute and enterprises located in its territory is treated at the station space modulated on installing Aqua-Express method of sorption to an acceptable sanitary norms and rules values. Reception and storage of LRW in the storage facility are carried out via special channel lines in 6 containers with a volume of 300 m<sup>3</sup> each. The ingress of LRW into underground water from the LRW storage facility is controlled by analyzing the underground water taken from the well located between the LRW storage facility and the solid radioactive waste storage facility. Sorbents saturated with radionuclides during the treatment of LRW are handed over to the state unitary enterprise "RBSRW" of the Russian Academy of Sciences for disposal in the form of solid radioactive waste (SRW).

*Solid radioactive waste management.* The disposal of a SRW shall be made to the SUE “RBSRW” INP AS RUz on the approved schedule. Special rooms are equipped for the temporary storage of SRW. Prior to the disposal of SRW, at the site of the WWR-SM reactor, concreting is performed in metal barrels of SRW with high and medium activity (ion exchange resins, sorbents after cleaning of LRW, contaminated equipment), and low-level SRW (rags, clothing, gloves, etc.) are packed in Kraft bags.

*Storage of high-level solid waste.* The storage area of 252 m<sup>2</sup> includes 12 wells with a diameter of 0.8 m and 6 wells with a diameter of 0.35 m and a depth of 4.8 m. the Storage is a concrete building with a wall thickness of 0.4 m. the Storage was designed for the disposal of high-level waste and was built before the creation of SUE “RBSRW” INP AS RUz. In 50-70 years, high-level solid waste was stored in the wells of this storage, and low-level waste (rags, paper, glass, etc.) was stored in the storage of low-level waste. From the mid-70s, all radioactive waste began to be disposed of at SUE “RBSRW” INP AS RUz. It is not possible to extract disposed of high-level waste from wells, so it will remain in storage for at least another 50 years with mandatory radiation monitoring. High-level waste is not stored in wells. The high-level solid waste storage facility is currently being used as a temporary storage facility to reduce SRW activity to an acceptable level for delivery to SUE "RBSRW" INP AS RUz. There is a well between the solid waste storage and liquid waste storage buildings. The underground water level is measured and the water from this well is analyzed on a monthly basis. Long-term results show that the specific activity of water from the well does not exceed 0.4 Bq/l with an acceptable value for drinking water of 2.0 Bq/l.

*State Enterprise “Navoi Mining and Metallurgical Combine”.*

Due to their unprofitability during the years of conversion of the uranium industry in the city of Uchkuduk, SE “NMMC” was completely closed (1990-1994). Uranium extraction from the Uchkuduk deposit was carried out in various ways: underground mining (mines), open mining (quarries) and underground leaching at the site of ore deposits through a system of technological wells.

In the process of uranium mining, 23 off-balance-sheet ore dumps with a total volume of 1,400 thousand m<sup>3</sup> or 2.25 million tons were formed at the Uchkuduk industrial site.

The area of contamination of the territory due to dust emissions from the surface of dumps is observed at a distance of 20-30 m.

In some areas of the former uranium mines located in the Central Kyzylkum region (Uchkuduk, Zarafshan, Zafarabad), phased reclamation is being carried out at the expense of the SE “NMMC”.

### **“Uzatom” Agency**

*Possible options for the management of radioactive waste that occurs during the operation of nuclear power plants.*

The expected volume of solid radioactive waste generation, taking into account their processing, is determined based on data from the reference Novovoronezh NPP-2 and is per year per nuclear plant of the NPP:

very low-level radioactive waste (with the maximum activity determined by the rules and regulations in the field of nuclear energy use) - 8 m<sup>3</sup> (about 18%); low - level radioactive waste - 32 m<sup>3</sup> (about 70%); medium-level radioactive waste-5 m<sup>3</sup> (about 11%); high – level radioactive waste-0.5 m<sup>3</sup> (about 1 %).

During the design life of one nuclear installation of the reference Novovoronezh NPP-2 (60 years), the generation of about 9400 m<sup>3</sup> of radioactive waste of various categories (very low-level, low-level and medium-level) and about 60 m<sup>3</sup> of high-level radioactive waste is predicted.

During the decommissioning of one nuclear installation of the reference Novovoronezh



NPP-2, it is predicted that about 2,100 m<sup>3</sup> of radioactive waste of various categories (very low-level, low-level and medium-level) and about 85 m<sup>3</sup> of high-level radioactive waste will be generated.

Considering the expected volumes of radioactive waste generation among the objects of state infrastructure for radioactive waste management, it is necessary to provide for the creation of a radioactive waste disposal point using a disposed of near-surface localization method with the possibility of expansion to ensure the disposal of radioactive waste that is generated during the decommissioning of NPPs.

At the design stage of the NPP, the operating organization will organize engineering surveys and studies to select the site for the storage and disposal of radioactive waste.

The first stage of the radioactive waste disposal facility (besides high-level waste) will be put into operation not later than 10 years after the commissioning of the first NPP in the Republic of Uzbekistan, terms of the construction of the next phases will be determined by the results of NPP operation.

The question of the expediency of constructing a high-level radioactive waste disposal facility should be justified from the point of view of radiation safety for current and future generations and resolved in conjunction with the issue of disposal of vitrified radioactive waste from spent nuclear fuel reprocessing.

### **B.5. Criteria Used for Definition and Categorization of Radioactive Wastes**

On the state of aggregation of radioactive waste is divided into liquid, solid and gaseous.

Liquid radioactive waste includes any radioactive liquids, solutions of organic and inorganic substances, pulps, etc. that are not subject to further use. Liquid waste is considered radioactive if the specific activity of radionuclides in it is more than 10 times higher than the values of intervention levels (ILs), according to the minimum significant levels of the specific activity of radionuclides in radioactive waste (Bq/kg), given in Sanitary norms, rules and hygienic standards (SNRHS) of the Republic of Uzbekistan “Radiation safety standards (RSS-2006) and Basic sanitary rules for ensuring radiation safety (BSRERS-2006)”, No. 0193-06.

Solid radioactive waste includes spent radionuclide sources that are not intended for further use materials, products, equipment, biological objects, contaminated objects of the external environment, solidified liquid waste in which the specific activity of radionuclides exceeds the values of the minimum significant specific activity given in SNRHS No. 0193-06 (RSS-2006/ BSRERS-2006).

With a known radionuclide composition in waste, they are considered radioactive if the sum of the ratio of the specific activity of radionuclides to their minimum significant activity exceeds 1.

With an unknown radionuclide composition, solid waste is considered radioactive if its specific activity is greater than:

- 100 kBq/kg - for beta-emitting radionuclides;
- 10 kBq/kg - for sources of alpha-emitting radionuclides;
- 1 kBq/kg - for transuranic radionuclides.

Gamma-emitting wastes of unknown composition are considered radioactive if the absorbed dose rate at their surface (0.1 m) exceeds 0.001 mGy/h above the background if the measurement conditions are met in accordance with approved methods.

Liquid and solid radioactive waste are divided by specific activity into three categorizations (Table B. 1.).

Table B. 1.

**Categorization of liquid and solid radioactive waste by specific radioactivity**

Category of radioactive waste	Specific activity, Bq/g		
	beta-emitting radionuclides (excluding tritium)	alpha-emitting radionuclides (excluding transuranic)	transuranic radionuclides
Low-level	up to $10^3$	up to $10^2$	up to $10^1$
Intermediate-level	from $10^3$ to $10^7$	from $10^2$ to $10^6$	from $10^1$ to $10^2$
High-level	over $10^7$	over $10^6$	over $10^5$

For pre-sorting of solid waste, it is recommended to use criteria for the level of radioactive contamination (Table B. 2.) and the dose rate of gamma radiation at a distance of 0.1 m from the surface, if the measurement conditions are met in accordance with approved methods:

- low - level-from 0.001 mGy/h to 0.3 mGy/h;
- medium - active-from 0.3 mGy/h to 10 mGy/h;
- highly active - more than 10 mGy/h.

Table B. 2.

**Categorization of solid radioactive waste by the level of radioactive contamination**

Category of radioactive waste	Level of radioactive contamination, part/( $\text{cm}^2 \times \text{min}$ )		
	beta-emitting radionuclides (excluding tritium)	alpha-emitting radionuclides (excluding transuranic)	transuranic radionuclides
Low-level	from $5 \cdot 10^2$ to $10^4$	from $5 \cdot 10^1$ to $10^3$	from 5 to $10^2$
Intermediate-level	from $10^4$ to $10^7$	from $10^3$ to $10^6$	from $10^2$ to $10^5$
High-level	over $10^7$	over $10^6$	over $10^5$

System for management liquid and solid radioactive waste includes:

collection and sorting of radioactive waste is performed in places of their formation and/or processing taking into account radiation, physical and chemical characteristics in accordance with the system of waste classification and accounting methods, the subsequent treatment of them;

primary sorting of waste involves their separation for radioactive and non-radioactive components of;

sorting of primary liquid and solid radioactive waste is aimed at separating the waste into different categories and groups for processing according to accepted technologies and for preparation for subsequent storage and disposal;

conditioning of radioactive waste is carried out to improve the safety of management them by reducing their volume and converting them into a form that is convenient for transportation, storage and disposal;

storage of radioactive waste is carried out separately for a waste of different categories and groups in a facility that provides safe isolation of waste during the entire storage period and the possibility of their subsequent recovery;

transportation of radioactive waste involves their safe movement between the places of their formation, processing, storage and disposal using special lifting and transport vehicles;

disposal of radioactive waste is aimed at their safe isolation from humans and their

environment.

## Section C. Scope of Application

### *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, except for spent fuel held at reprocessing facilities as 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 materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or 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 or radioactive waste within 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 to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26..*

The Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management in the Republic of Uzbekistan apply to the following:

safe management of spent fuel, as a result of the operation of the research reactor WWR-SM INP AS RUz;

safety in the management of radioactive waste and spent nuclear fuel at the first nuclear power plant planned for construction;

the safe management of waste resulting from the use of radioactive materials in the industry, medicine, research, education and other sectors of the economy in the territory of the Republic of Uzbekistan, if the level of contamination of these materials is higher than defined in the SNRHS No. 0193-06 (RSS-2006/ BSRERS-2006);

safe management of disused sealed radioactive sources;

safety of radioactive waste storage facilities located on the territory of the Republic of Uzbekistan;

safe management of radioactive waste generated at former uranium mining facilities.

## Section D. Lists and Inventories

### *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 general level of 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 is being held in storage at radioactive waste management and nuclear fuel cycle facilities and waste that has been disposed of as well as waste that 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 at those facilities.*

## D.1. List of Spent Fuel Management Facilities

### *INP AS RUz*

In the reactor hall of building 1 of the WWR-SM facility, there are 3 pool-type storage facilities for the long-term storage of spent fuel of the WWR-SM research reactor. The shelf life of SFA in these storage facilities to reduce residual heat generation and activity is at least 3 years.

## D.2. List of Spent Fuel Management Facilities

### *INP AS RUz*

An inventory list of SFAS that are stored in these storage facilities, a description of the material, and information about their mass and isotopic composition of uranium is given in *Annex L.1*.

There are only 94 SFA units with LEU in the storage facilities.

## D.3. Radioactive Waste Management Facilities

### *SUE "REBRW" INP AS RUz*

SUE "REBRW" INP AS RUz has storage for radioactive waste. The object is located 60 km North-East of Tashkent (in the foothills at an altitude of 800 m). above sea level) and 10 km in Southeast from the city of Chirchik. It is 5 km away from the nearest locality (Aidarali village). The nearest canal is the Parkent main canal, which flows at a distance of 3 km from the object at an altitude of 670 meters above sea level. In sue "CSRO" INP of Uzbekistan Academy of Sciences in available in *Annex L.2.*, storage of radioactive waste.

## D.4. List of Radioactive Waste Management Facilities

A list containing radioactive waste in storage SUE "REBRW" INP AS RUz disposed from 1 January 1971 to 31 December 2019 in accordance with *Annex L.3*.

### *JSC "Uranredmetgeologiya"*

Inventory of the extent and level of pollution and the size of the affected areas or area:

#### *Chauli Mine:*

The region, district, locality: Tashkent region, Parkentsky district, Krasnogorsky urban-type settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1952-1980's.

Total volume of dumps (visual assessment): 39700 m<sup>3</sup>.

Total mass of the dump material: approximately 87340 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 7.9 Ci (Curie).

#### *Central dump of off-balance-sheet ores of the Chauli mine:*

The region, district, locality: Tashkent region, Parkentsky district, Krasnogorsky urban-type settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1952-1980's.

Total volume of dumps (visual assessment): 328554 m<sup>3</sup>.

Total mass of the dump material: approximately 459647 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 48.16 Ci (Curie).

***Alatanga Mine:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1949 – 1983's.

Total volume of dumps (visual assessment): 84,100 m<sup>3</sup>.

Total mass of the dump material: approximately 633900 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 59.2 Ci (Curie).

***Razveduchastok Mine:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1949 – 1983's.

Total amount of dumps (visual assessment): approximately 20150 m<sup>3</sup>.

Total mass of the dump material: approximately 44330 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 3.3 Ci (Curie).

***Kattasai Mine:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1949 – 1983's.

Total volume of dumps (visual assessment): 366900 m<sup>3</sup>.

Total mass of the dump material: approximately 767400 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 67.0 Ci (Curie).

***Jackindeck Mine:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1975-1983's.

Total volume of dumps (visual assessment): 73800 m<sup>3</sup>.

Total mass of the dump material: approximately 98900 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 34.2 Ci (Curie).

***Central dump of off-balance sheet ores of Yangiabad mines:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1949 – 1983's.



Total volume of dumps: approximately: 1290564 m<sup>3</sup>.

Total mass of dump material, including radioactive soil and material of buildings and structures: approximately 2839240 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 328.4 Ci (Curie).

***Central overburden dump of Yangiabad mines:***

The region, district, locality: Tashkent region, Akhangaran district, Angren city, Yangiabad settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Period of operation: 1951 – 1983's.

Total volume of dumps: 62900 m<sup>3</sup>.

Total mass of the dump material: approximately 176,000 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 14.0 Ci (Curie).

***Rezak Mine:***

The region, district, location: Namangan region, Pap district, village of the Rezak.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Operational period: 1953-1972's.

Total volume of dumps: about 162800 m<sup>3</sup>.

Total mass of the dump material: approximately 358140 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 7.7 Ci (Curie).

***Charkesar 1:***

The region, district, locality: Namangan region, Pap district, Charkesar settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Operational period: 1953-1988's.

Total volume of dumps: about 142780 m<sup>3</sup>.

Total mass of the dump material: approximately 323775 tons.

The material of dumps is different-sized rock fragments (solid waste).

The total activity of the entire mass of the material is 20.0 Ci (Curie).

***Charkesar 2:***

The region, district, locality: Namangan region, Pap district, Charkesar settlement.

Operating company: LMCC (now the state enterprise "Vostokredmet"), Khujand, Sughd region, Tajikistan.

Operational period: 1953-1988's.

Total volume of dumps: about 339230 m<sup>3</sup>.

Total mass of the dump material: approximately 746306 tons.

The material of dumps is different-sized rock fragments (solid waste).

Total activity of the material, Ci (Curie): information was not found, the material of the dumps is covered with a layer of neutral soil, which is not advisable to violate. No analysis of the dump material was performed.

Uranium production waste of 1.96 million cubic meters was preserved in Mayлуу-Suu on an area of 44 hectares in 1967. The problem of transboundary of radionuclides is most clearly seen in the North Ferghana region. Here on the territory of 1300 sq. km is home to a population of 1.1 million people, who are threatened by the destruction of dumps and tailings of radioactive waste accumulated in the areas of uranium deposits and ore occurrences of Kyzyl-jar, Mayлуу-Suu, Shakoptar, etc., located on the territory of Kyrgyzstan.



## **D.5. Decommissioning of Nuclear Facilities**

### ***INP AS RUz***

Decommissioning of the radiation technology complex of JSC "Photon". In Uzbekistan, work was carried out to decommission the radiation technology complex (RTC) of JSC "Photon", which included two gamma installations—"RHM – 20" and "Researcher", as well as the pulsed liquid-fuel research reactor IIN-3M. Decommissioning works were carried out in 2015-2019 by a consortium consisting of the INP AS RUz – Sosny R&D Company (Russia). As a result of the work carried out, the RTC site was turned into a "Green lawn" state.

All work on decommissioning of the RTC of JSC "Photon" was carried out in strict accordance with the requirements of sanitary rules and norms of SNRHS No. 0193-06 (RSS-2006/BSRERS-2006) and other regulations, as well as in compliance with General technical, electrical and fire safety standards. Personnel who performed radiation-hazardous work passed examinations on radiation protection, as well as daily pre-training before starting work and performed work with the use of personal protective equipment.

In 2016, a group of specialists from the Institute of nuclear physics and international experts, with the technical assistance and Advisory support of the IAEA, developed a plan for decommissioning the WWR-SM reactor of the INP AS RUz. The General content of The plan mainly corresponds to the IAEA report No. 45 (2005) "Standard format and content of safety documentation for decommissioning of nuclear facilities". The prepared "Decommissioning plan for the WWR-SM research reactor" is periodically reviewed to account for updates and installations of additional systems and upgrades at the WWR-SM reactor.

### ***Decommissioning of the WWR-SM research reactor of the INP AS RUz***

When designing the reactor, the need for its final decommissioning was not taken into account. However, all operational activities at the reactor, including inspections, periodic testing and maintenance, upgrades, and experiments, are performed in a way that facilitates the decommissioning of the reactor. The reactor documentation is updated in a timely manner, and information on experience with contaminated or irradiated reference standards during maintenance or modernization of the reactor is recorded to facilitate planning for decommissioning. In 2016, a "Plan for decommissioning the WWR-SM research reactor" was developed jointly with the IAEA. Before the reactor is decommissioned, the Commission, with the participation of representatives of the SCIS, will conduct a comprehensive inspection of the reactor and, based On the results of this survey, make a decision on decommissioning the reactor in accordance with the established procedure. Procedures for handling, dismantling and disposal applied to experimental installations and other irradiated equipment that require storage and final disposal are established in advance or as early as possible. The responsibility of the Institute of nuclear physics is removed only with the approval of the regulatory body – SCIS.

## Section E. Legislative and Regulatory Framework

### E.1. Implementing Measures

*Article 18. Implementing measures*

*Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other measures necessary for implementing its obligations under this Convention.*

Uzbekistan joined the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management by the Law of the Republic of Uzbekistan № LRU -186 of December 11, 2008. The adopted law confirms Uzbekistan's commitment to regulating international relations in the field of spent nuclear fuel and radioactive waste management.

The legislation of the Republic of Uzbekistan in the field of spent nuclear fuel and radioactive waste management ensures compliance with the obligations arising from the Joint Convention.

Additionally, the Joint Convention creates preconditions for further improvement of regulatory and legal acts in the field of safe management of spent nuclear fuel and radioactive waste in accordance with the obligations of the Republic of Uzbekistan.

### E.2. Legislative and Regulatory Framework

*Article 19. Legislative and regulatory framework*

*1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.*

*2. This legislative and regulatory framework shall provide for:*

- i) the establishment of applicable national safety requirements and regulations for radiation safety;*
- ii) a system of licensing of spent fuel and radioactive waste management activities;*
- iii) a system of prohibition of the operation of a spent fuel and radioactive waste management facility without a license;*
- iv) a system of appropriate institutional control, regulatory inspection and documentation and reporting;*
- v) the enforcement of applicable regulations and of the terms of a license;*
- vi) a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and radioactive waste management.*

*3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.*

Relations in the area of spent nuclear fuel and radioactive waste regulated by the Constitution of the Republic of Uzbekistan, international treaties and Conventions, laws of the Republic of Uzbekistan of normative-legal acts approved by the President of the Republic of Uzbekistan and the Cabinet of Ministers of the Republic of Uzbekistan, norms and rules in the field of atomic energy use, sanitary rules and norms of radiation safety, regulatory acts of bodies of state security and state administration bodies in the field of use of atomic energy, state and industry standards, technical regulations.

As part of the implementation of the Decree of the President of the Republic of Uzbekistan “On Measures for the Development of Atomic Energy in the Republic of Uzbekistan”, No. PD-5484 of July 19, 2018, the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” was adopted on September 9, 2019. The purpose of the law is to create a legal framework for establishing the activities of institutions and systems that ensure the use of nuclear energy for peaceful purposes, as well as to unify

the relevant rules and regulations, and to create an effective mechanism for ensuring the safety of citizens and legal entities when using nuclear energy for peaceful purposes.

The document defines the powers of the Cabinet of Ministers, the Ministry of Energy, state authorities and management in the field of atomic energy. The law also establishes the procedure for the placement and construction of a nuclear installation and storage point, operation of the objects of atomic energy use, transportation (carriage) of nuclear materials and radioactive substances, import and export of nuclear facilities, nuclear materials, radioactive substances and waste, their storage, processing and disposal.

Thus to date the following laws form the legislative framework for regulating safety in the field of radiation safety and the use of atomic energy in the Republic of Uzbekistan:

Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes”, No. LRU-565 of September 9, 2019;

Law of the Republic of Uzbekistan “On Radiation Safety” (amended in 2011) No. 120-II of August 31, 2000;

Law of the Republic of Uzbekistan “On the Sanitary and Epidemiological Wellbeing of the Population”, LRU-393 of August 26, 2015;

Law of the Republic of Uzbekistan “On Waste”, No. 362-II of April 5, 2002;

Law of the Republic of Uzbekistan “On Environmental Control”, No. LRU -363 of December 27, 2013;

Law of the Republic of Uzbekistan “On Nature Protection”, No. 754-XII of December 9, 1992.

Normative regulation of safety in the field of atomic energy use is carried out through the norms and rules in the field of atomic energy use in accordance with the laws “On the Use of Atomic Energy for Peaceful Purposes”, “On Radiation Safety” and sanitary rules and norms, where the provisions of these norms and rules are the binding character.

The Law of the Republic of Uzbekistan “On the Sanitary and Epidemiological Wellbeing of the Population” establishes the legal and organizational basis for preventing the adverse effects of environmental factors on the human body in order to ensure the sanitary and epidemiological well-being of the population. *Article 22* of this Law prescribes the obligations of organizations working with sources of ionizing radiation, including radioactive waste.

In accordance with the Law of the Republic of Uzbekistan “On Radiation Safety”, the state regulation of radiation safety is carried out by establishing sanitary rules, norms, hygiene standards, radiation safety rules, labor protection rules and other regulatory legal acts regulating radiation safety. Sanitary rules, norms and hygienic standards for radiation safety are approved in the manner prescribed by the legislation of the Republic of Uzbekistan.

*Article 9.* State expertise of facilities for using sources of ionizing radiation are subject to state environmental, radiation-hygienic and technical expertise in the manner prescribed by law.

*Article 10.* Licensing of activities in the field of circulation of sources of ionizing radiation is carried out on the basis of a license issued in accordance with the established procedure and includes:

Scientific-research and development work in the field of handling sources of ionizing radiation, design, construction of sources of ionizing radiation, design and manufacture of technological equipment for them, radiation protection;

extraction, production, output, processing, use, storage, maintenance, transportation, neutralization, utilization and disposal of sources of ionizing radiation.

*Article 11.* Regulation in the field of radiation safety is carried out by establishing sanitary standards, rules and hygienic standards for radiation safety, state standards, building codes and rules, labor protection rules, instructions, methodological and other documents on

radiation safety, approved and registered in accordance with the procedure established by law.

*Article 21.* Storage or disposal of radioactive waste should be ensured their isolation from the environment.

The procedure for organizing the collection and disposal of radioactive waste is established by law.

*Article 22.* Ensuring the safety of radioactive and nuclear materials in all types of handling is mandatory.

The safety of radioactive and nuclear materials is ensured by the users of sources of ionizing radiation.

Ensuring the safety of radioactive and nuclear materials provides for a unified system for planning and implementing a set of technical and organizational measures aimed at:

prevention of unauthorized entry into the territory of placement of radioactive and nuclear materials, as well as their theft or damage;

identification and return of lost or stolen radioactive and nuclear materials.

Supervision over ensuring the safety of radioactive and nuclear materials is carried out by the State Committee on Industrial Safety of the Republic of Uzbekistan.

*Article 23.* Protection of citizens and the environment from radiation accidents.

Organizations in which the occurrence of radiation accidents is possible must have:

a list of potential radiation emergencies with a forecast of their consequences and a forecast of the radiation situation;

decision criteria in the event of a radiation accident;

an action plan for the protection of citizens and the environment from a radiation accident and its consequences, agreed upon with local government authorities, government bodies that regulate radiation safety;

means for warning and ensuring the elimination of the consequences of a radiation accident;

medical devices for the prevention of radiation injuries and means of providing medical assistance to victims of a radiation accident;

emergency rescue teams created from the number of employees (personnel).

*Article 24.* Obligations of the user of sources of ionizing radiation in a radiation accident.

In the event of a radiation accident, the user of ionizing radiation sources must:

to ensure the implementation of measures to protect employees (personnel) and the population from a radiation accident and its consequences;

inform state bodies that regulate radiation safety, as well as local government bodies and citizens' self-government bodies;

take measures to provide medical assistance to victims;

localize the source of radioactive contamination and prevent the spread of radioactive substances in the environment;

analyze and prepare a forecast for the development of a radiation accident and changes in the radiation situation during a radiation accident;

take measures to normalize the radiation situation after the elimination of a radiation accident.

The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 98 of April 3, 2009, approved the rules for organizing the system of state accounting and control over the circulation of sources of ionizing radiation. The rules established the procedure, as well as the frequency of providing information for state registration in a unified system of accounting and control over the turnover of sources of ionizing radiation - nuclear materials, radioactive substances, containing their radioactive sources and radioactive waste.

The regulation on the procedure for state accounting and control over the turnover of radioactive substances and radioactive waste, as well as nuclear materials of the Republic of

Uzbekistan was approved by the Cabinet of Ministers of the Republic of Uzbekistan No. 231 of August 13, 2009. The system of accounting and control over the turnover of radioactive substances and radioactive waste, as well as nuclear materials of the Republic of Uzbekistan applies to radioactive substances and radioactive waste produced, used and stored on the territory of the Republic of Uzbekistan.

The Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” establishes that the state regulation of safety in the field of atomic energy provides for the implementation by state authorities in the field of atomic energy use and state regulation of the safety of atomic energy use in certain measures aimed at the development, approval and implementation of norms and rules in the field of atomic energy use, issuance of licenses (permits) for the implementation of certain types of activities in the field of atomic energy use, accreditation, standardization, conformity assessment, safety supervision, expertise and inspection, control over the development and implementation of measures necessary for the protection of personnel, the population and the environment in the event of an accident resulting from the use of atomic energy.

Also, the issues of safe handling of spent nuclear fuel and radioactive waste in the Republic of Uzbekistan are regulated by a number of documents, namely, safety guides and guidance documents developed by state safety regulatory bodies, as well as instruments developed by state authorities in the field of atomic energy use (institutional documents), state and industry standards.

A list of the main legal acts on the management of spent nuclear fuel and radioactive waste, including those adopted in the reporting period, is provided in *Annex L.4*.

According to *Article 20* of the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes”, licensing of activities in the field of atomic energy use is carried out by a specially authorized body to operating organizations, as well as other legal entities operating in the field of atomic energy use, subject to ensuring the safety of nuclear facilities. energy and work performed.

The following activities of operating organizations are subject to licensing of activities in the field of atomic energy use:

- construction and operation of nuclear installations and (or) storage facilities;
- handling of radioactive substances, nuclear materials and radioactive waste.

The main conditions for obtaining a license by the operating organization are:

- availability of a positive expert opinion on the safety justification of the object atomic energy uses and (or) activities in the field of atomic energy use;

- whether the operating organization has financial support for compensation for damage caused by radiation exposure;

- justification of the financial stability of the operating organization in order to ensure safety at all stages of the full “life” cycle of the nuclear power facility.

The following activities of other legal entities are subject to licensing of activities in the field of nuclear energy use:

- design and construction of nuclear installations and (or) storage facilities, operation of radiation sources;

- design and manufacture of equipment for nuclear installations and (or) storage facilities, radiation sources;

- conducting an expert assessment of the safety justification of nuclear energy use facilities and (or) activities in the field of nuclear energy use;

- handling of radioactive substances and nuclear materials, including their use, transportation and storage;

- radioactive waste management, including its processing, transportation, storage and disposal;



conducting scientific research at nuclear power facilities;  
 import and export of nuclear materials, equipment and technologies for nuclear installations and (or) storage facilities;  
 provision of services in the field of nuclear energy use;  
 training, retraining and advanced training of personnel required for the operation of nuclear power facilities.

The adoption of new legal acts and regulatory documents in the field of technical regulation, as well as amendments and additions to them, do not directly entail the termination or change of the license validity period.

In the course of licensing, organizations of scientific and technical support of a specially authorized body conduct safety expertise of licensed activities in the field of nuclear energy use and related facilities for the use of nuclear energy.

By a decision of a specially authorized body, a license may be issued to legal entities of a foreign state engaged in activities in the field of nuclear energy use (other than operating organizations) for the duration of a similar license issued to these legal entities by the competent authority in the country of their registration.

*Article 21.* Permit for the right to conduct work in the field of nuclear energy use.

Employees of operating organizations and employees of other legal entities engaged in activities in the field of nuclear energy use may perform certain work in the field of nuclear energy use only if they have permits for the right to conduct work in the field of nuclear energy use.

The list of positions of employees who, depending on what activities need permits to conduct work in the field of nuclear energy, as well as a list of activities, the implementation of which requires obtaining permission for the right of conducting works in the field of atomic energy use, approved by the Cabinet of Ministers of the Republic of Uzbekistan.

*Article 22.* Certification of products, equipment and technical devices used at nuclear power facilities

Products, equipment and technical devices that are subject to certification for their use in nuclear power facilities are certified by accredited certification bodies.

Certificates issued in the supplier's country may be applied to products, equipment and technical devices supplied for nuclear installations and (or) storage facilities in accordance with international agreements of the Republic of Uzbekistan.

Licensing relations in the field of the use of atomic energy and sources of ionizing radiation, including the management of spent nuclear fuel and radioactive waste, are regulated by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan “On Measures to Further Improve Licensing of Certain Types of Activities and Licensing Procedures in the Field of Industrial and Radiation Safety”, No. 782 of October 2, 2018

In order to develop individual provisions based on the fundamental laws “On the Use of Atomic Energy for Peaceful Purposes”, “On Radiation Safety” and other laws related to the use of atomic energy, the President of the Republic of Uzbekistan and the Cabinet of Ministers of the Republic of Uzbekistan adopt the relevant regulatory legal acts (subordinate legislation) in the form of a decree, resolutions and orders of the President of the Republic of Uzbekistan and decisions, orders of the Cabinet of Ministers of the Republic of Uzbekistan.

State sanitary and epidemiological rules, norms and hygienic standards, approved by the chief state sanitary doctor of the Republic of Uzbekistan, determine the criteria for the safety and (or) harmlessness of certain environmental factors for the population and mandatory requirements, failure to comply with which may pose a danger to human life or health.

In general, in the Republic of Uzbekistan there are the following fundamental sanitary rules and regulations concerning the management of spent nuclear fuel and radioactive waste:  
 Sanitary norms, rules and hygienic standards of the Republic of Uzbekistan “Radiation



safety standards (RSS-2006) and Basic sanitary rules for ensuring radiation safety (BSRERS-2006)”, No. 0193-06;

Sanitary rules and norms of the Republic of Uzbekistan “Sanitary rules for radioactive waste management”, No. 0251-08;

Sanitary rules and norms of the Republic of Uzbekistan “Radioecological monitoring of the environment at the facilities for the disposal of radioactive waste of uranium production”, No. 0361-18.

### **E.3. State Administration and Regulation of Nuclear and Radioactive Safety**

*Article 20. Regulatory body*

*1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.*

*2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate measures to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.*

In accordance with *Article 7* of the Law of the Republic of Uzbekistan “On Radiation Safety”, state regulation in the field of radiation safety is carried out by the Cabinet of Ministers of the Republic of Uzbekistan and its authorized state bodies.

According to *Article 8*, state control in the field of radiation safety ensure is carried out by the State Committee on Industrial Safety of the Republic of Uzbekistan, the Ministry of Health of the Republic of Uzbekistan, the State Committee on the Republic of Uzbekistan on Ecology and Environmental Protection and the State Customs Committee of the Republic of Uzbekistan.

The State Committee on Industrial Safety of the Republic of Uzbekistan coordinates the activities of state control bodies in the field of ensuring radiation safety, with the exception of coordinating the activities of specially authorized state bodies in the field of waste management.

*Article 12.* Radiation safety is ensured by:

- development and implementation of programs to ensure radiation safety;
- functioning of a unified state system for monitoring and recording individual radiation doses received by citizens when using sources of ionizing radiation;
- establishing the types and amounts of compensation for the increased risk of harm to the health of citizens caused by radiation exposure;
- compensation for damage to the health of citizens and losses to their property as a result of a radiation accident;
- definitions of activities related to the use of ionizing radiation sources;
- state regulation of export and import of ionizing radiation sources;
- conducting medical and preventive measures;
- informing citizens about the radiation situation and measures to ensure radiation safety;
- training citizens in radiation safety measures;
- providing assistance to citizens exposed to radiation as a result of radiation accidents;
- introduction of special living conditions for citizens in areas of radioactive contamination;
- elimination of consequences of radiation accidents in the relevant territory;
- organization and implementation of operational measures in the event of a threat of a radiation accident.

Radiation safety can also be ensured by other measures in accordance with the legislation.

*Article 13.* assessment of the state of radiation safety is carried out when planning and implementing measures to ensure radiation safety, analyzing the effectiveness of these measures by local government authorities, state bodies that regulate radiation safety, as well as users of ionizing radiation sources.

The assessment of the state of radiation safety includes the following main indicators:  
 characteristics of radioactive contamination of the environment;  
 analysis of ensuring radiation safety measures and compliance with radiation safety norms, rules and hygiene standards;  
 probability of radiation accidents and their scale;  
 degree of preparedness to eliminate radiation accidents and their consequences;  
 analysis of radiation doses received, received and expected to be received by employees (personnel) and the public from all sources of ionizing radiation;  
 the number of people exposed to radiation above the established basic dose limits.

*Article 17.* Obligations of the user of ionizing radiation sources to ensure radiation safety:

comply with the requirements of the legislation on radiation safety;  
 develop and implement measures to ensure radiation safety;  
 conduct work on justification and assessment of radiation safety of products, materials and substances, technological processes that are sources of ionizing radiation;  
 to carry out production control over the radiation situation at workplaces, in premises, in production areas, in sanitary protection zones and observation zones, as well as over the release, discharge and disposal sites of sources of ionizing radiation;  
 to monitor and record individual radiation doses of workers (personnel);  
 to conduct training, retraining and certification of production managers, workers (personnel), specialists of production control services;  
 regularly inform workers (personnel) about the levels of ionizing radiation at their workplaces and the amount of individual radiation doses received by them;  
 organize medical examinations of employees (personnel);  
 to ensure the disposal of sources of ionizing radiation that are not used;  
 comply with the requirements of state bodies that regulate radiation safety.

According to article 10 of the Law of the Republic of Uzbekistan “On Use of Atomic Energy for Peaceful Purposes”, State regulation in the field of nuclear energy is carried out by bodies of state administration in the field of use of atomic energy and state regulatory bodies safe use of nuclear energy.

State administration in the field of atomic energy use is carried out by the Cabinet of Ministers of the Republic of Uzbekistan, the authorized state administration body in the field of atomic energy, state bodies, institutions and organizations that have separate powers for state administration in the field of atomic energy use, as well as local state authorities.

State regulation of the safe use of nuclear energy is carried out by a specially authorized body of state safety regulation of nuclear energy use and state bodies with separate powers for state regulation of the safe use of nuclear energy.

*Article 12.* The authorized state management body in the field of nuclear energy is the Ministry of the energy of the Republic of Uzbekistan.

Authorized state administration body:  
 implements unified state policy in the field of nuclear energy development;  
 coordinates the activities of state and economic management bodies and local public authorities in the field of nuclear energy development;  
 develops and implements state and other programs for the development of nuclear energy;  
 develops safety measures in the nuclear power industry;

participates in the development of normative legal acts in the field of nuclear energy use, as well as develops and approves norms and rules in this field within the limits of its powers;

organizes the development and implementation of fire safety measures at subordinate facilities for the use of nuclear energy;

takes measures to ensure the physical protection of subordinate facilities for the use of nuclear energy;

organizes research, placement, design, construction and operation of subordinate nuclear installations and (or) storage facilities;

assists in the preparation and implementation of projects of fundamental research, scientific research, experimental design and innovative work, the introduction of advanced technologies;

creates and improves systems of radiation and nuclear safety at subordinate facilities for the use of atomic energy;

takes measures for the non-proliferation of nuclear materials and technologies, radioactive materials, as well as the implementation of measures to ensure radiation and nuclear safety at the subordinate facilities for the use of atomic energy;

organizes a system of training, retraining and advanced training of personnel required for the operation of nuclear facilities, including abroad;

participates in the development and implementation of external and internal emergency plans;

participates in the creation and functioning of the Unified State Automated System for Monitoring the Radiation Situation on the Territory of the Republic of Uzbekistan;

carries out departmental control over ensuring the formation and implementation of programs for the management of nuclear materials, spent nuclear fuel and radioactive waste;

determines the leading organizations (scientific, design and design) of nuclear installations and (or) storage points, approves regulations on them;

carries out international cooperation in the field of nuclear energy.

An authorized government body may exercise other powers in accordance with the legislation.

*Article 16.* The State Committee on industrial safety of the Republic of Uzbekistan is a Specially authorized body for state regulation of the safety of the use of atomic energy.

The specially authorized body within its powers:

forms and implements the main directions of the state policy in the field of ensuring the safety of nuclear power facilities;

coordinates the activities of state bodies that have separate powers for state regulation of the safety of nuclear energy use;

performs state control over compliance with the requirements of the legislation on the use of atomic energy at nuclear power facilities;

performs state supervision and control over ensuring the safety of nuclear energy facilities;

develops, approves, puts into effect and ensures the implementation of rules and regulations in the field of nuclear energy use;

performs state supervision over the physical protection of nuclear power facilities;

participates in the acceptance of work performed by contractors at nuclear installations and (or) storage facilities;

provides state control over compliance with the accounting of radioactive substances, nuclear materials and radioactive waste at nuclear installations and (or) storage points;

organizes an expert review of the safety justification of nuclear energy use facilities and

(or) activities in the field of nuclear energy use;

performs licensing of activities in the field of nuclear energy use;

issues permit for the right to conduct work in the field of nuclear energy use to employees of operating organizations and other legal entities engaged in activities in the field of nuclear energy use, in accordance with the list of positions of employees, as well as the list of types of work;

develops and implements preventive measures to ensure radiation and nuclear safety of nuclear power facilities;

participates in the development of an external emergency plan and provides state supervision over the emergency preparedness of state administration bodies and other legal entities engaged in activities in the field of nuclear energy use;

carries out international cooperation in the field of the use of atomic energy.

*Article 17.* State bodies with separate powers on state regulation of safe use of nuclear energy, are the State Committee of Uzbekistan on Ecology and Environmental Protection, Ministry of Emergency Situations of the Republic of Uzbekistan, the Ministry of Health of the Republic of Uzbekistan, the Ministry of Construction of the Republic of Uzbekistan, State Committee of the Republic of Uzbekistan on Geology and Mineral Resources, the State Customs Committee of the Republic of Uzbekistan, The Center of Hydro-Meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan, Ministry of Internal Affairs, State Security Service of the Republic of Uzbekistan, the Ministry of Defense of the Republic of Uzbekistan, the National Guard of the Republic of Uzbekistan.

The state bodies specified in the first part of this article, within the limits of their powers:

develop norms and rules in the field of atomic energy use and approve them in agreement with a specially authorized body;

participate in making a decision on the selection of a site for the placement of nuclear installations and (or) storage facilities;

participate in the organization of the examination of the safety substantiation of nuclear facilities and (or) activities in the field of atomic energy use;

carry out state supervision and control over compliance with the requirements of nuclear, radiation, industrial, fire, sanitary-epidemiological and environmental safety;

exercise state control over the physical protection of nuclear facilities, as well as over the emergency preparedness of government bodies and other legal entities.

## **Section F. Other General Safety Provisions**

### **F.1. Responsibility of the License Holder**

*Article 21. Responsibility of the license holder*

*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 license and shall take the appropriate measures to ensure that each such license holder meets its responsibility.*

*2. If there is no such license holder or other responsibility party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel and over the radioactive waste.*

In accordance with article 17 of the Law of the Republic of Uzbekistan “On Radiation Safety”, the user of sources of ionizing radiation is obliged to:

comply with the requirements of the legislation on radiation safety;

develop and implement measures to ensure radiation safety;

carry out work on the justification and assessment of the radiation safety of products, materials and substances, technological processes that are sources of ionizing radiation;

to carry out production control over the radiation situation at workplaces, in premises,

in production areas, in sanitary protection zones and observation zones, as well as over the release, discharge and disposal sites of sources of ionizing radiation;

- to monitor and record individual radiation doses of workers (personnel);

- to conduct training, retraining and certification of production managers, workers (personnel), specialists of production control services;

- regularly inform workers (personnel) about the levels of ionizing radiation at their workplaces and the amount of individual radiation doses received by them;

- organize medical examinations of employees (personnel);

- to ensure the disposal of sources of ionizing radiation that are not used;

- comply with the requirements of state bodies regulating radiation safety.

*Article 31* of the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” defines the rights and obligations of the operating organization to ensure the safety of nuclear facilities.

The operating organization develops and implements measures to maintain and improve the safety of nuclear facilities, creates, if necessary, appropriate services that monitor safety, submits information on the safety status of these facilities to the state authorities for safety regulation in the use of atomic energy within the time frame established by them.

The operating organization has the right to:

- participate in the development and implementation of state and other programs in the field of atomic energy use;

- to carry out placement, construction, operation and decommissioning of a nuclear installation and (or) storage point, handling of nuclear materials, radioactive substances and radioactive waste;

- perform the functions of a single customer under contracts for the construction and decommissioning of a nuclear installation and (or) storage point, supply of nuclear fuel for nuclear installations, service support for maintenance, management of spent nuclear fuel, radioactive substances and radioactive waste;

- conclude contracts for design support for the operation of a nuclear installation and (or) storage facility for the full “life” cycle of an atomic energy facility;

- to employ, including for the management of the objects of atomic energy uses foreign specialists whose qualifications have been confirmed by the competent authorities of foreign States and who have been granted a permit by a specially authorized body to conduct work in the field of nuclear energy use.

The operating organization is obliged to:

- organize engineering surveys and studies to justify safety in order to obtain permission from a specially authorized body to use the site for the placement of a nuclear installation and (or) storage point;

- develop and implement measures to ensure safety at all stages of the full “life” cycle of an atomic energy facility;

- create services at a nuclear installation and (or) at a storage facility that monitor the radiation situation and perform industrial control over the safety of nuclear energy use;

- provide information on the state of safety of a nuclear installation and (or) storage point to the state safety regulatory authorities;

- comply with the instructions of officials of state safety regulation bodies;

- to ensure physical protection of the relevant nuclear facilities;

- develop and implement quality assurance programs at all stages of construction, operation and decommissioning of a nuclear installation and (or) storage facility;

- ensure information security of nuclear installations and (or) storage points;

- keep records of radioactive substances, nuclear materials and radioactive waste at nuclear installations and (or) storage facilities;



develop and implement measures to prevent accidents at a nuclear installation and (or) storage point and to reduce their negative consequences for their own and involved workers, the population of the adjacent territories and the environment;

conduct a technical investigation of the causes of incidents and accidents that occurred during the operation of a nuclear installation and (or) storage point;

develop and approve an internal emergency plan for a nuclear installation and (or) storage point and ensure the readiness of its own and involved workers and the necessary material and technical means for its implementation;

ensure the implementation of the rights of their employees to social guarantees;

carry out dosimetric accounting of individual radiation doses of its own and hired workers;

to provide their own and attracted employees with appropriate personal protective equipment;

organize a medical examination of their employees;

develop, approve and implement programs of measures for fire protection and environmental protection at a nuclear installation and (or) storage point;

carry out the selection, training, retraining and advanced training of workers and create the necessary social and living conditions for them in production;

inform the population about the radiation situation in the sanitary protection zone and the observation zone.

*Article 56* of the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” defines liability for violation of legislation in the field of the use of atomic energy.

## **F.2. Human and Financial Resources**

### *Article 22. Human and financial resources*

*Each Contracting Party shall take the appropriate measures 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 agreements to be continued for the period deemed necessary following the closure of a*

The operating organization is obliged to provide facilities for radioactive waste management with qualified personnel in the field of nuclear and radiation safety.

The availability of qualified personnel in the field of nuclear and radiation safety is a general requirement for obtaining a special license for the right to carry out activities in the field of the use of atomic energy and sources of ionizing radiation.

### ***Ministry of Health of the Republic of Uzbekistan***

***Personnel training*** - since April 2004, in order to support ministries and departments in carrying out comprehensive, consistent and optimized training of personnel, a Training Center for radiation safety specialists was created at the TIPME of the Ministry of Health of the Republic of Uzbekistan and a working group for the coordination of education and training in the field of radiation and nuclear safety.

The training center, with the support of the Government of the Republic of Uzbekistan and the IAEA, organized (at the regional and national levels) 25 international training courses on various problem areas of emergency preparedness and response. More than 850 domestic



and 70 foreign specialists have studied at these courses. The training reached a wide audience, ranging from emergency managers and emergency responders to regulators and civilian protection personnel.

The training center recognizes and emphasizes the importance of education and training, and has developed a strategic plan for education and training in the field of radiation protection and waste safety, which was approved in Russia in 2004. The plan is updated annually based on the analysis of national experience, based on world achievements in the education system and is focused on the formation of a new generation of personnel with high professional culture, able to set and solve problems for the future.

### ***“Uzatom” Agency***

In order to develop human resources for the purposes of the nuclear energy program of the Republic of Uzbekistan, interested ministries and departments organize various seminars, advanced training courses and internships for personnel. In addition, in accordance with the agreements, the Russian side annually allocates quotas for admission of Uzbek students to higher educational institutions in Russia, primarily to the national research nuclear University “Moscow Institute of engineering and physics” in the areas of nuclear energy, nuclear physics, heat engineering and electrical engineering. Currently, 130 students from Uzbekistan study at NRNU-MEPHI. Also, since the 2019/2020 academic year, a branch of NRNU-MEPHI has been operating in Tashkent, where 200 students study.

Training of personnel for nuclear power engineering includes:

- internships for teachers and researchers of higher educational institutions abroad, industrial practice of students in countries with developed nuclear power;

- provision of advanced training, internships and training seminars for specialists of the regulatory body in the field of nuclear and radiation safety;

- state bodies exercising control (supervisory) activities over the conduct of work at all stages of the life cycle of the Uzbek NPP, as well as subordinate organizations, territorial bodies.

Based on the paramount importance of training personnel for a nuclear power program, the Republic of Uzbekistan, in addition to the listed activities, intensively uses IAEA technical assistance (technical cooperation programs) to train specialists for a nuclear power program. These programs provide for the provision of expert and consulting assistance on the creation of a training system for nuclear power, taking into account international experience and IAEA recommendations, and include holding seminars and training sessions, visits of Belarusian scientists and university professors to NPP training centers and research institutes for abroad, visits by Uzbek specialists to operating and under construction NPPs, as well as the development and delivery of a computer training system for organizations involved in the implementation of the construction project of the Uzbek NPP.

### ***Financial resources***

All installations for the management of radioactive waste are managed by state organizations, so financial resources for maintaining their safety during their operational life and for decommissioning are provided and allocated from the national budget at the request of operating organizations as necessary.

In order to solve the issues of financing activities in the field of spent nuclear fuel management, radioactive waste and decommissioning, relevant experts are calculating the inclusion of these costs in the tariff of NPP electricity output. On the basis of the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes”, a Fund for the Decommissioning of a Nuclear Installation will be created, the sources of formation and directions of spending of which will be determined by a separate decision of the Cabinet of Ministers of the Republic of Uzbekistan.

### F.3. Quality Assurance

*Article 23. Quality assurance*

*Each Contracting Party shall take the necessary measures to ensure that appropriate quality assurance programs concerning the safety of spent fuel and radioactive waste management are established and implemented.*

The operating organization ensures the organization and performance of work in such a volume and of such quality that meet the requirements of technical regulatory legal acts, at all stages of placement, design, construction, commissioning, limitation of operational characteristics, an extension of the service life, decommissioning of a nuclear installation and (or) a storage point. Organizations engaged in design and survey, research, development and technological work, design and manufacture of equipment for a nuclear installation and (or) storage point, scientific support, performance of other work and (or) provision of other services in the implementation of activities for the use atomic energy, ensure the performance of work and (or) the provision of services in such a volume and of such quality that meet the requirements of technical regulatory legal acts, and are responsible for the quality of work performed and (or) services rendered during the standard operating life determined by the project for nuclear installation and (or) storage point.

In accordance with the Regulation on Licensing Certain Types of Activities for Activities in the Field of the Use of Atomic Energy, the requirement for management and (or) quality control system is a general requirement for obtaining a special permit (license) for the right to carry out activities in the field of the use of atomic energy and ionizing sources. radiation.

According to the requirements of the norms and rules for ensuring nuclear and radiation safety “Safety in the Management of Radioactive Waste. General Provisions”, the operating organization develops and applies for a quality assurance program to ensure safety at all stages of radioactive waste management, as well as the safe functioning of systems (elements), structures and components of the facility.

Requirements for the composition and content of quality assurance programs are determined by a number of technical regulatory legal acts. Quality assurance programs are implemented at all stages of the life cycle of a radioactive waste management facility, which includes site selection, construction (including design), equipment manufacturing, commissioning, operation, and decommissioning of a radioactive waste management facility. Quality control is an integral part of quality assurance.

A quality assurance system is established by the operating organization within which a general quality assurance program and private quality assurance programs are developed. Organizations performing work and providing services for the operating organization, within the framework of a general quality assurance program, develop private programs for the relevant activities.

#### **INP AS RUz**

The development, management, implementation and evaluation of a quality assurance program for the WWR-SM research reactor and related experiments are essential to ensure safety. INP AS RUz introduces and implements quality assurance requirements, focused on achieving certain indicators, in relation to the reactor at the stages of use, modernization and decommissioning.

INP AS RUz develops quality assurance programs for all stages of the reactor life cycle on time consistent with the schedule of work associated with this stage. The quality assurance program is reviewed and approved at the appropriate levels of the administrative management

of the INP of the Academy of Sciences of the Republic of Uzbekistan and is presented by the State Committee on Industrial Safety.

The program provisions are based on the following three functional principles:  
 leaders provide planning, leadership, resources and support to achieve the goals;  
 employees perform work in such a way as to ensure the achievement of quality;  
 independent evaluations are carried out by employees in the operating organization or by an external agency to assess the effectiveness of the management and work execution processes.

#### **F.4. Operational Radiation Protection**

*Article 24. Operational radiation protection*

*1. Each Contracting Party shall take the appropriate measures to ensure that during the operating lifetime of a spent fuel and 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; and*

*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.*

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

*2. Each Contracting Party shall take appropriate measures 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.*

*3. Each Contracting Party shall take appropriate measures 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.*

Basic principles and requirements for radiation protection are defined in the Law of the Republic of Uzbekistan “On Radiation Security” and regulated by the sanitary norms, rules and hygienic standards of the Republic of Uzbekistan “Radiation safety standards (RSS-2006) and Basic sanitary rules for ensuring radiation safety (BSRERS-2006)”, No. 0193-06.

The legislation defines radiation values for normalization and sets requirements for the main dose limits, permissible levels of exposure to ionizing radiation, and other requirements for limiting human exposure.

These documents reflect internationally recognized principles of radiation safety that comply with the recommendations of the International Commission on radiation protection (ICRP) and the IAEA SF-1 Fundamental Safety Principles (2007) and others.

#### ***INP AS RUz***

During normal operation of the reactor, the sources of radionuclide inflow into the external environment are the coolant, in which fission products accumulate due to surface contamination with fuel elements, and activation products, as well as the air that ventilates the horizontal experimental channels in which Ar<sup>40</sup> is activated.

The radiation load on personnel and the environment is determined, the first of all, by the integrity of the barriers that perform the functions of a localizing system in the path of the spread of radioactive substances and ionizing radiation.

The functions of the localizing system (barriers) are performed by the following devices: directly in the reactor - fuel assembly cladding, reactor tank, the over-reactor chamber

with biological shielding, biological shielding of the reactor tank, pressure head and suction sections of the primary circuit pipelines located in the under-reactor box, the under-reactor box itself;

in the reactor plant - the premise of the pumping room of the primary circuit, equipment and pipelines of the primary circuit, the Reactor Hall, special ventilation and special sewerage systems, premises for "hot" chambers.

Control of the integrity of barriers is ensured by conducting a periodic inspection of the state of building structures, monitoring the state of metal of equipment and pipelines, maintenance of systems, constant monitoring of the tightness of the fuel assembly cladding when the reactor is operating at power, daily monitoring of the actual dosimetric situation in the rooms of the WWR-SM reactor complex and releases of radioactive substances into the environment.

Composition and amount of radioactive gas emissions into the environment under normal operating conditions:

a) Isotopic composition of radioactive gas emissions:

Kr85, Kr87, Kr88, Kr89, Xe133, Xe135, Xe135m, Xe137, Xe138, Ar41.

b) The average annual value of radioactive gas emissions over the last five years of operation is  $8 \cdot 10^3$  Ci, or  $2.96 \cdot 10^{14}$  Bq, while the total emission of Xe and Kr isotopes are  $\sim 2 \cdot 10^3$  Ci or  $7.4 \cdot 10^{13}$  Bq and Ar 41  $\sim 6 \cdot 10^3$  Ci or  $2.2 \cdot 10^{14}$  Bq.

c) The amount of radioactive substances is:

d) MPE (maximum permissible emissions per year):

Ar41 –  $4,7 \cdot 10^4$  Ci;  $1,75 \cdot 10^{15}$  Bq;

$\Sigma$ Xe, Kr –  $1,6 \cdot 10^4$  Ci.  $5,92 \cdot 10^{14}$  Bq;

e) PE (permissible emissions per year):

Ar41 –  $1,5 \cdot 10^4$  Ci;  $5,5 \cdot 10^{14}$  Bq;

$\Sigma$ Xe, Kr –  $0,54 \cdot 10^4$  Ci;  $1,99 \cdot 10^{14}$  Bq.

The radiation load on personnel from external irradiation under normal operating conditions of the reactor over the last five years of operation, according to the data of individual dosimetric control, is:

the collective dose of the personnel of operating services of the reactor numbering 80 people ( $25 \div 30$ ) person  $\cdot$  rem;

the maximum values of the annual individual dose do not exceed 2 rem (20 mSv);

the maximum value of the average individual dose ( $\sim 0.4$  rem (4 mSv) per year) refers to the employees of the operating services of the reactor.

f) The main types of work, during the performance of which the individual radiation doses of employees of operational services are formed, include:

works on technical examination of equipment and pipelines of the reactor;

planned (preventive) repair work and work to control the state of the metal of the equipment and pipelines of the reactor;

reloading work in the core, work on irradiation of various materials;

control over all work carried out at the reactor (shift supervisors, dosimetrists on duty at the reactor) and maintenance by shift personnel of technological processes at the reactor.

## F.5. Emergency Preparedness

### *Article 25. Emergency preparedness*

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.*
2. *Each Contracting Party shall take the appropriate measures for the preparation and testing of emergency plants 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.*

Requirements for ensuring radiation safety in a radiation accident, in a nuclear and radiological emergency are determined by the Law of the Republic of Uzbekistan “On Radiation Safety” and the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes”.

In accordance with the Decree of the president of the Republic of Uzbekistan “On the State Program for the Implementation of the Action Strategy for Five Priority Areas of Development of the Republic of Uzbekistan in the 2017-2021 year of Active Investments and Social Development”, No. PD-5635 of January 17, 2019, in order to further improve systems for forecasting, early detection and response to radiation accidents, as well as the organization of an automated system for monitoring the radiation situation, the Cabinet of Ministers approved Resolution “On Measures to Improve the Unified State System for Forecasting, Early Detection and Response to Radiation Accidents”, No. 869 of October 15, 2019, which defines The unified state system for forecasting, early detection and response to radiation accidents and monitoring of the radiation situation in the Republic of Uzbekistan.

The unified state system is an organizational and technical system that combines the forces and means of government bodies and other organizations whose powers include protecting the population and the environment from radiation accidents, as well as monitoring the radiation situation.

The unified state system is an integral part of the State system of warning and action in emergency situations of the Republic of Uzbekistan and interacts with the System for monitoring the natural environment of the Republic of Uzbekistan.

The unified state system in its activity is guided by regulatory legal acts and regulatory technical documents of the Republic of Uzbekistan, as well as by this regulation.

The functions performed by state bodies to ensure the functioning of the unified state system fully coincide in the general response criteria established in Addition II of the IAEA Safety Standards Series “Preparedness and Response in the Event of a Nuclear or Radiological Emergency”.

### ***The Ministry of Emergency Situations of the Republic of Uzbekistan***

Measures to eliminate, limit or reduce the consequences of an accident that occurred during activities in the field of atomic energy use, methods of informing the population, as well as measures to check emergency preparedness are determined by the Cabinet of Ministers of the Republic of Uzbekistan on the basis of proposals from a specially authorized body or the Ministry of Emergency Situations of the Republic of Uzbekistan.

Under the coordination of the Ministry of Emergency Situations, local government authorities are developing an external emergency response plan, the implementation of which is entrusted to the relevant functional and territorial subsystems of the State system for warning and action in emergency situations of the Republic of Uzbekistan.

The external emergency plan is approved by the Cabinet of Ministers of the Republic of Uzbekistan.

The internal emergency plan defines the actions of the operating organization to



eliminate, limit or reduce the consequences of an accident that occurred during the construction or operation of a nuclear installation and (or) storage facility.

The internal emergency plan is developed and approved by the operating organization, taking into account the external emergency plan after coordination with the state safety regulatory authorities.

The internal emergency plan must be approved at least six months before the start of the planned commissioning of the nuclear installation and (or) storage facility.

The operating organization, at its own expense and other sources not prohibited by law, develops measures for the internal emergency plan and maintains the necessary level of its material, technical and personnel support.

The internal emergency plan undergoes practical testing before commissioning and during the operating life of a nuclear installation and (or) storage point at a frequency established by a specially authorized body and the Ministry of Emergency Situations of the Republic of Uzbekistan.

According to the above provision, the actions that need to be performed and the organizations (ministries and departments) responsible for each action, as well as the resources necessary for the implementation of the action plan, are determined.

Also, the said decree approved the rules related to emergency preparedness and response to radiation emergencies, the roles and responsibilities of ministries, departments and organizations of emergency preparedness and response at all levels are documented.

The Resolution of the President of the Republic of Uzbekistan “On Approval of an International Treaty”, No. PR-4206 of February 22, 2019, approved the Agreement on the interaction of the CIS Member States on preparedness in the event of a nuclear accident or radiation emergency and mutual assistance in the elimination of their consequences, signed at the meeting of the Council of heads of government of the CIS member States on November 2, 2018, in Astana.

The states parties to this Agreement provide for the creation of groups for assistance in nuclear accidents and radiation emergencies, sent at the request of other countries parties to the Agreement. These groups are also the main unit for responding to nuclear accidents and radiation emergencies within the country itself.

## **F.6. Decommissioning**

### *Article 26. Decommissioning*

*Each Contracting Party shall take the appropriate measures to ensure the safety of decommissioning of a nuclear facility. Such measures 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.*

In accordance with the requirements of the Laws of the Republic of Uzbekistan “On Radiation Safety” and “On the Use of Atomic Energy for Peaceful Purposes”, a set of measures for the safe decommissioning of the installation should be provided for during its design.

To perform work on decommissioning the installation, the operating organization creates a Fund for decommissioning the installation. The decommissioning Fund is used only to Finance measures provided for in the decommissioning program, early decommissioning, or limiting the operational characteristics of the installation.

The operating organization develops a program for decommissioning the installation five years before the expiration of the standard operating period established by the project for

the installation, which should contain measures for dismantling facilities, handling nuclear materials, spent nuclear materials and (or) radioactive waste, as well as measures for further control and state supervision.

The program for decommissioning the installation is approved by the state bodies for regulating safety in the use of nuclear energy and is submitted by the Republican state administration body or other state organization in charge of the installation for approval to the body or official who made the decision on the construction of the installation.

The operating organization must ensure that a decommissioning project is developed before the end of the design life of the installation, which includes:

- organization of work on the safe removal of spent fuel from storage sites and its subsequent removal from the site;

- decontamination to reduce the overall level of exposure to personnel and the public during work;

- dismantling of equipment at the installation site; radioactive waste management;

- organizational and technical measures to ensure radiation safety. At the same time at the design stage measures should be provided to ensure that the established limits for individual radiation doses of personnel during decommissioning of the installation are not exceeded;

- assessment of the radiation impact on the environment during work;

- possibility of further use of the site dismantled equipment and materials;

- the number and qualifications of personnel required to carry out the work;

- safety measures in case of possible accidents during decommissioning;

- organizational and technical measures to ensure physical protection.

When designing, the deadlines for the operation of the main equipment should be justified and the criteria for its replacement should be defined.

A quality assurance program must be developed prior to the start of design work for decommissioning the plant.

Information on planned activities related to the decommissioning of a radioactive waste management facility is provided in the safety justification report.

Decommissioning operations must be performed by specially trained personnel of the facility or personnel of other organizations in accordance with the procedure established by law.

### ***INP AS RUz***

Decommissioning of nuclear installations in Uzbekistan should be carried out in accordance with the decommissioning plan, which is coordinated with the State Committee on Industrial Safety.

Before the start of decommissioning works, a comprehensive engineering and radiation survey (CERS) is carried out, which is aimed at assessing the technical and radiation state of technological systems and equipment, building structures and adjacent territories. On the basis of the CERS materials, the operating organization ensures the development of a decommissioning plan for the facility and prepares a safety analysis report for decommissioning, identifying places requiring the greatest attention from the point of view of radiation safety. Practical work on the decommissioning of a nuclear facility begins after obtaining permission from the SCIS.

The operating organization must ensure the safety of decommissioning, taking into account the maximum reduction in the radiation load on personnel, the public and the environment. During decommissioning, work should be carried out to account for radioactive substances and radioactive waste.

Decommissioning of nuclear installations must be carried out by qualified personnel, whose qualifications have been confirmed by the SCIS.

## Section G. Safety of Spent Fuel Management

### G.1. General safety requirements

*Article 4. General safety requirements*

*Each Contracting Party shall take the appropriate measures 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 measures 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 measures in spent fuel management;*
- iv) provide for effective protection of individuals, society and 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 the future generations greater than those permitted for the current generation;*
- vii) aim to avoid imposing undue burdens on future generations.*

#### **INP AS RUz**

Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan has a license for the right to carry out activities in the field of circulation of ionizing radiation sources, including research and development work in the field of handling ionizing radiation sources, use, storage, maintenance, transportation, disposal, disposal and disposal.

The main task of the reactor is to provide scientific units with a flow of thermal neutrons for research in the field of nuclear physics, radiation solid-state physics, materials science, activation analysis, radiochemistry, as well as for the production of radioisotopes, the development of new radioisotope products, testing of structural materials, mineral raw materials and various products.

The reactor operates on thermal neutrons. Distilled water is used as a moderator, reflector, heat carrier and protection.

The reactor is loaded with uranium enriched to 19.7% in the isotope U<sup>235</sup>. The workload for U<sup>235</sup> isotope at the start of the company is ~ 6.6 kg. The reactor uses nuclear fuel in the form of the FA of the IRT-4M type.

### G.2. Existing Facilities

*Article 12. Existing facilities*

*Each Contracting Party shall take the appropriate measures 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 facility.*

Research reactor WWR-SM of the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan.

### G.3. Siting of Proposed Facilities

*Article 6. Siting of proposed facilities*

*6-1 Each Contracting Party shall take the appropriate measures 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;*
- ii) to evaluate the likely safety impact of such facility on individuals, society and the environment;*
- iii) to make information on the safety of such facility available to members of the public;*
- iv) to consult Contracting Parties in the vicinity of such 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 measures to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with general safety requirements stipulated by Article 4.*

In July 2018, the Decree of the President of the Republic of Uzbekistan “On Measures for the Development of Nuclear Energy in the Republic of Uzbekistan” was signed, which provides for the development of a draft Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” and the preparation of a Concept for the development of nuclear energy in the Republic of Uzbekistan.

Also, within the framework of the intergovernmental agreement on cooperation in the field of peaceful use of atomic energy, Uzbekistan - the Russian Federation, which entered into force in April 2018, work is planned to create and improve the National Nuclear Infrastructure, and training personnel for the Nuclear Energy of Uzbekistan, the construction of nuclear power plants and research reactors in the country, their support throughout the entire life cycle.

In July 2018, the President of the Republic of Uzbekistan made a historic decision to build the first nuclear power plant in the Republic of Uzbekistan.

In this regard, in September 2018, an agreement was signed between the Government of the Republic of Uzbekistan and the Government of the Russian Federation “On cooperation in the construction of a nuclear power plant on the territory of the Republic of Uzbekistan”.

In December 2018, by the relevant acts of the President of the Republic of Uzbekistan, the State Committee on Industrial Safety was created, which is a specially authorized body for state regulation of the safety of the use of atomic energy.

On September 9, 2019, the Law of the Republic of Uzbekistan "On the Use of Atomic Energy for Peaceful Purposes" was adopted.

On October 16, 2019, No. PD-4492, a Decree of the President of the Republic of Uzbekistan “On approval of the Strategy for the development of human resources for the nuclear power program of the Republic of Uzbekistan” was signed.

In connection with the above, in order to determine the site for the location of the future nuclear power plant, in 2019-2020, it is planned to select the site and licensing the location of the future NPP. In this regard, a working group specially formed by the government of the republic, which included specialists from key ministries and departments, research and design organizations, based on archival data and real geographic, geological and socio-economic data, determined the proposed location of the NPP. Based on the conclusion of the working group, the Government decided to conduct all types of engineering surveys (geological, hydrological, meteorological, environmental, seismological, radiological, etc.) at four potential sites at the Tudakul point in the Navoiy region and three potential sites at the Aydarkul point in Jizzakh region.

In order to finally select the site and obtain permission from the regulatory body in the

field of nuclear and radiation safety - the State Committee on Industrial Safety, on May 17, 2019, between the Directorate for the construction of NPP under the “Uzatom” Agency and the Engineering Division of “Rosatom” State Corporation “Atomstroyexport” JSC, a contract was signed for engineering surveys for the development of a technical design for a NPP. Also, in accordance with international practice in the field of construction of nuclear power facilities, in parallel, work is underway to prepare an environmental impact assessment report, which will be presented to public hearings both in Uzbekistan and in cross-border countries.

#### **G.4. Design and construction of facilities**

*Article 7. Design and construction of facilities*

*Each Contracting Party shall take the appropriate measures to ensure that:*

- i) during design and construction of a radioactive waste management facility the relevant measures to limit possible radiological impacts on individuals, society and the environment were taken, 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 were taken into account;*
- iii) technologies used during design and construction of a radioactive waste management facility were supported by experience, testing or analysis.*

In 2020 - 2022, it is planned to design a nuclear power plant and objects of its external infrastructure.

#### **G.5. Safety Assessment of Facilities**

*Article 8. Safety Assessment of Facilities*

*Each Contracting Party shall take the appropriate measures 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;*
- iii) before the operation of a spent fuel management facility, updated and detailed version of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).*

#### **INP AS RUz**

In the design, the site selection took into account the relevant features that may affect the safety of the reactor or which may be influenced by the reactor, as well as the feasibility of implementing emergency plans.

As shown by many years of experience in operating the reactor, the design ensured the suitability of the reactor for reliable, stable and easily controlled operation. The principle of defense in depth is applied at the reactor, i.e. several levels of protection and several barriers to prevent the release of radioactive material, and a provision is made that failures or a combination of failures that could lead to significant radiological consequences are very unlikely.



## G.6. Operation of Facilities

### *Article 9. Operation of facilities*

*Each Contracting Party shall take the appropriate measures to ensure that:*

- i) license for operation of spent fuel management facility is based on the relevant assessments referred to in article 8, and depends on termination of the commissioning program, confirming that the built facility corresponds to the project and meets safety requirements;*
- ii) operational limits and conditions, set on the basis of tests, operational experience and assessments referred to in article 8, are established and reconsidered as and when necessary;*
- iii) operation, technical maintenance, control, inspection and examinations of the spent fuel management facility are carried out in accordance with established procedures;*
- iv) engineering and technical support in all areas associated with safety is rendered during the operating life of the spent fuel management facility;*
- v) license holder in due time informs the regulatory body of incidents that are important in terms of safety;*
- vi) programs of collection and analysis of the relevant information on operational experience was developed and necessary measures were taken by their results;*
- vii) plans of decommissioning of the spent fuel management facility were prepared and updated, as required, with the use of information obtained during the operating life of this facility, and that they are considered by the regulatory body.*

### **INP AS RUz**

For storage of spent fuel, the reactor has three storage facilities equipped in accordance with the requirements of nuclear safety rules. Fuel storage in storage facilities is possible for a long time. All the necessary equipment is available to ensure the physical protection of spent fuel, however, it is necessary to maintain a staff of maintenance personnel and a large staff of paramilitary guards at the expense of budget funds. The reprocessing of spent fuel on the territory of Uzbekistan is not provided, therefore there is a need to conclude an agreement with the Russian Federation and send the spent fuel for reprocessing to Russia. Disposal of nuclear materials on the territory of Uzbekistan is prohibited.

## G.7. Spent Fuel Disposal

### *Article 10. Spent fuel disposal*

*If in accordance with the legislative and regulating basis the Contracting Party designates the spent fuel for disposal, then disposal of such spent fuel shall be carried out in accordance with the obligations set forth in chapter 3 that relates to radioactive waste disposal.*

### **INP AS RUz**

Disposal of spent fuel is not carried out. The spent fuel of the WWR-SM Research Reactor is stored in special storage facilities for spent fuel located on the territory of the reactor itself.

## Section H. Safety of Radioactive Waste Management

### H.1. General Safety Requirements

*Article 11. General Safety Requirements*

*Each Contracting Party shall take the appropriate measures 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 measures to:*

- i) ensure that criticality and removal of residual heat generated during radioactive 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 measures in radioactive waste management;*
- iv) provide for effective protection of individuals, society and 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 the future generations greater than those permitted for the current generation;*
- vii) aim to avoid imposing undue burdens on future generations.*

In the Republic of Uzbekistan, the safety of radioactive waste management is regulated by the laws “On Radiation Safety”, “On the Use of Atomic Energy for Peaceful Purposes” and “On Waste”, as well as regulations and republican norms and rules in the field of the use of atomic energy, sanitary rules and regulations and others.

The legal framework of the Republic of Uzbekistan provides that adequate protection of personnel, the public and the environment from radiation effects associated with the management of radioactive waste should be provided at all stages of radioactive waste management (collection, separation, conditioning, storage, transportation, disposal).

*Article 39* of the Law of the Republic of Uzbekistan “On the Use of Atomic Energy for Peaceful Purposes” provides that during storage and disposal of radioactive waste, proper isolation of radioactive waste from the environment, protection of current and future generations, biological resources from radiation exposure exceeding the limits established by the relevant norms and rules in the field of atomic energy use.

### H.2. Existing Facilities

*Article 12. Existing facilities and past practices*

*Each Contracting Party shall in due course take the appropriate measures 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.*

#### **SUE “RBSRW” INP AS RUz**

SUE “RBSRW” INP AS RUz carries out work on the reception, from enterprises, organizations and institutions of the Republic of Uzbekistan, radioactive waste, their transportation and disposal. There is a license for the right to carry out activities on storage, transportation, neutralization, utilization and disposal of radioactive waste.

There are special vehicles for the transportation of radioactive waste.

The state of the radiation situation at the facility of the SUE “RBSRW” INP AS RUz.

The SUE “RBSRW” INP AS RUz complies with all the requirements of legislation, rules and regulations of radiation safety, as well as rules of engineering and fire safety, labor protection, environmental requirements, state standards, there are also sanitary and epidemiological conclusions for the object and for vehicles intended to perform a licensed type of activity. Systematic monitoring of the radiation situation at workplaces is carried out. Also, radiation monitoring on the site, in the sanitary protection zone.

Individual dosimetric control by the IDC method and the TLM/TLD. The facility conducts exercises on civil protection of personnel in a radiation accident, as well as an annual medical examination of employees directly involved in work with sources of ionizing radiation. The knowledge of radiation safety is checked annually, according to the results of which an order is issued on the admission of employees who have passed a medical commission to work with sources of ionizing radiation, there is also an instruction on radiation safety, an instruction on the prevention and elimination of accidents (fire) and an instruction on radiation safety for the driver and the person responsible for the transportation of radioactive waste and sources of ionizing radiation on special vehicles. Disposal of uranium waste in the SUE “RBSRW” INP AS RUz is not carried out.

### ***Emergency safety system of the facility***

There are a material and technical base, equipment and other technical means to carry out the licensed type of activity. The staff is provided with overalls, individual dosimeters. There is dosimetric and radiometric equipment, which is verified annually by the “Uzstandart” Agency. The emergency set is available.

An emergency safety system has been developed at the facility. A plan of measures to protect personnel in the event of an accident, a safety declaration has been developed. There is a plan of basic measures for civil protection in the SUE “RBSRW” INP AS RUz. Complex exercises are held annually at the facility with practical training of issues: Organization and conduct of work on the prevention and elimination of radioactive contamination at the facility, the elimination of the consequences of an earthquake with the development of pollution issues, training to alert the employees of the facility and the population living in the immediate vicinity of the facility about an emergency at the facility and their actions.

Every month, in accordance with the schedule of classes, classes are held with the employees of the facility on their actions in case of contamination of the area, earthquake, fire, evacuation. Before being allowed to work with radiation sources and radioactive waste, personnel are trained, instructed and tested for knowledge of safety rules. Radiation safety training is conducted once every six months. The knowledge of radiation safety of all personnel of the facility is checked annually. Emergency drills are being conducted according to the plan.

Individual dosimetric control covers all employees working with sources of ionizing radiation. Individual dosimetric control of external exposure is carried out every quarter:

in the radiological laboratory of the ASEW of the Ministry of Health of the Republic of Uzbekistan with TLM dosimeters; in the radiation safety department of the INP AS RUz with IPFCU -1 cassettes.

The data of individual dosimetric control are entered into the radiation dose register and in the dosimetric cards for recording the radiation doses of each employee.

### ***Radiation monitoring***

On a quarterly basis, the radiological laboratory of the ASEW of the Ministry of Health of the Republic of Uzbekistan conducts studies of soil and vegetation, selected from 21 control points for radioactivity. On a quarterly basis, samples of groundwater are taken from observation wells for the determination of radioactivity in the RSD INP AS RUz. On a monthly basis, the “Uzhydromet” service conducts radiometric monitoring of radioactive

contamination of the atmospheric air. Analysis of samples of soil, vegetation, air and groundwater from observation wells showed that there is no contamination with radionuclides. According to the work plan, dosimetric control is carried out in the area of possible contamination, clean and sanitary protection zones, in the buildings of the facility, in special vehicles, special equipment, tools and overalls of employees.

During the operation, the personnel dose limits and radiation incidents were not exceeded.

Disposal of radioactive waste is carried out in radioactive waste storage facilities. Acceptance of radioactive waste and sources of ionizing radiation from organizations is carried out with the permission of the SCIS.

SCIS in the presence of a conclusion of the relevant territorial body of the ASEW of the Ministry of Health of the Republic of Uzbekistan on the sanitary and hygienic state of facilities of organizations associated with the circulation of sources of ionizing radiation. The accounting of radioactive waste and sources of ionizing radiation is kept in the receipt and expenditure journal of the established form. Radioactive waste is accepted in packaged form (boxes, drums, plastic, plastic, kraft bags), preventing the possibility of spraying and scattering. Container sizes no more than 400x400x600mm.

Spent sources of ionizing radiation are accepted in special transport protective containers.

The facility was built on the basis of a typical project of enterprises of this kind, taking into account the geological, hydrological, seismic and environmental conditions of the area in the area, composed of water-resistant clay rocks with low permeability. The site within which the object is located belongs to the foothill zone of the Kuraminsky ridge, covering part of the dry land Aydarlysay. Groundwater within the Aidarlysay has no relationship with the groundwater of the Chirchik field. The contamination of the nearest water bodies is excluded.

Storage facilities for radioactive waste are reinforced concrete monolithic underground rectangular structures. To protect the soil from the ingress of harmful substances into it, the storage facilities are insulated from the inside with cement mortar with subsequent ferruginization, and the outside is waterproofed with hot bitumen. Radioactive waste is disposed of in packages that prevent radioactive substances from entering the environment.

Quarterly analysis of groundwater from observation wells shows that there is no contamination with radionuclides.

The territory of the object is located outside the area of mudflow activity.

The operation and maintenance of the facility are carried out by the facility staff. Inspection of the facility is carried out by the SCIS, ASEW of the Ministry of Health of the Republic of Uzbekistan, IAEA.

Engineering and technical support are provided by the Academy of Sciences of the Republic of Uzbekistan in organizing the physical protection of the facility, purchasing a new special vehicle. After the closure of the installation, radiation monitoring will continue by the sanitary and epidemiological supervision bodies of the Ministry of Health of the Republic of Uzbekistan.

During the operation of the facility, the radiation safety criteria and standards adopted in the Republic of Uzbekistan and the IAEA radiation safety standards are used.

For the classification of radioactive waste, the IAEA recommendations, Classification of radioactive waste, are used. Safety Guide. GSG-1. Vienna, 2014.

### H.3. Siting, Design

#### *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:*

- ⓪ 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;*
- ⓫ to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account the possible evolution of the site conditions of disposal facilities after closure;*
- ⓬ to make information on the safety of such a facility available to members of the public;*
- ⓭ 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.*

*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.*

#### *Article 14. Design and Construction of Facilities*

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

- ⓪ 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;*
- ⓫ 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;*
- ⓬ at the design stage, technical provisions for the closure of a disposal facility are prepared; the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.*

The Laws of the Republic of Uzbekistan “On the Use of Atomic Energy”, “On Radiation Safety” and “On the Sanitary and Epidemiological Wellbeing of the Population” establish requirements for activities related to site selection, design and construction of radioactive waste management facilities.

Development of design documentation for installations for radioactive waste management is carried out in accordance with the requirements of the legislation on construction, architecture and urban planning, on environmental protection and rational use of natural resources, on sanitary and epidemic well-being of the population.

When designing facilities for radioactive waste management, factors affecting the safety of these facilities both during their operation and after their decommissioning are taken into account, as well as assessing the impact of these facilities on the environment in accordance with the legislation on environmental protection.

Requirements for site selection, design of radiation facilities, including facilities for radioactive waste management are defined:

Sanitary norms, rules and hygienic standards of the Republic of Uzbekistan “Radiation safety standards (RSS-2006) and Basic sanitary rules for ensuring radiation safety (BSRERS-2006)”, No. 0193-06;

Sanitary rules and norms of the Republic of Uzbekistan “Sanitary rules for radioactive waste management”, No. 0251-08;

Sanitary rules and norms of the Republic of Uzbekistan “Radioecological monitoring of the environment at the facilities for the disposal of radioactive waste of uranium production”, No. 0361-18.



For the construction of specialized facilities for radioactive waste management, a selection of sites is provided:

located in sparsely populated non-flooded areas;

having a stable wind regime;

limiting the possibility of the spread of radioactive substances outside the industrial site of the facility due to their topographic, geological and hydrogeological conditions.

The site for a newly constructed facility should take into account its potential radiation, chemical and fire hazards for the population and the environment.

The locations of specialized facilities for radioactive waste management should be assessed in terms of the impact on the safety of the designed facility of meteorological, hydrological and seismic factors during normal operation and in emergency conditions.

#### **H.4. Safety Assessment of Facilities**

*Article 15. Assessment of safety of facilities*

*Each Contracting Party shall take the appropriate measures 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 version 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 safety assessment considers all radiation risks that are associated with normal operation and expected operational events and emergency conditions (in which failures or internal or external events that threaten the safety of the installation or operation).

The assessment of the state of radiation safety is carried out when planning and implementing measures to ensure radiation safety, analyzing the effectiveness of these measures by local government authorities, state bodies that regulate radiation safety, as well as users of ionizing radiation sources.

The assessment of the state of radiation safety includes the following main indicators:

characteristics of radioactive contamination of the environment;

analysis of ensuring radiation safety measures and compliance with radiation safety norms, rules and hygiene standards;

probability of radiation accidents and their scale;

degree of preparedness to eliminate radiation accidents and their consequences;

analysis of radiation doses received, received and expected to be received by employees (personnel) and the public from all sources of ionizing radiation;

the number of people exposed to radiation above the established basic dose limits.

When operating a nuclear installation and (or) storage facility, the operating organization periodically assesses the safety of the nuclear installation and (or) storage facility.

The first safety assessment of a nuclear installation and (or) storage facility is carried out ten years after the start of the operation, followed by a periodic safety assessment every ten years until the end of the operation.

The procedure for conducting a periodic safety assessment of a nuclear installation and (or) storage facility and the scope of relevant studies are determined by a specially authorized body.

The legislation also requires that operating organizations of radioactive waste

management facilities develop a report on the justification of their safety. The report is developed to justify the safety of radioactive waste management facilities, both during their operation and after their decommissioning.

The report is developed by the operating organization prior to commissioning of the radioactive waste management facility.

The operating organization must ensure that the report is consistent with the actual state of radioactive waste management during the entire life of the facility.

## Section I. Transboundary Movement

### *Article 27. Transboundary movement*

*1. Each Contracting Party involved in transboundary movement shall take the appropriate measures 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 measures 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 measures 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.*

*2. A Contracting Party shall not license the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees for storage or disposal.*

*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 the 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.*

Environmental problems related to the generation, storage, use and disposal of waste are among the main ones in environmental protection activities due to their complex nature. On the one hand, these problems are inherent in almost all spheres of human activity, and on the other, they affect all areas of the environment – soil, atmosphere, water resources, and in general, the entire nature and life of society.

When analyzing problems related to waste in the region, the following specific main features that affect transboundary aspects should be taken into account:

A significant part of the region's territory is a high-mountain ecological system that is particularly vulnerable to natural and anthropogenic impacts;

the territory of the region is largely affected by natural disasters, such as earthquakes, landslides, mudslides, floods, explosive lakes, rockfalls, landslides, flooding, snow avalanches;

in addition to the usual problems of waste management and generation, the region has a problem of waste inherited from the Soviet mining and processing industry. The region has a

large number of storage facilities for the waste processing of polymetallic and radioactive ores. There is a constant threat of possible environmental disasters due to the destruction of storage facilities located in areas with high seismicity and landslide activity.

***Uranium tailings dumps of the Kyrgyz Republic: current state of the problem***

The Kyrgyz Republic (KR) is located in the center of the Eurasian continent on the high mountain range of the Tien Shan and Pamir-Alay. On three sides: from the North, West and South, the Republic borders with the CIS republics - Kazakhstan, Uzbekistan, Tajikistan, and from the East and Southeast with the people's Republic of China. The total length of Kyrgyzstan's borders is 4508 km. This includes 1,113 km with the Republic of Kazakhstan, 1,374 km with the Republic of Uzbekistan, 972 km with the Republic of Tajikistan, and 1,049 km with the people's Republic of China. Kyrgyzstan is a mountainous country that covers an area of 199.9 thousand square kilometers, where more than 80% of the territory is located above 1500 meters above sea level (mountains 94%, of which: high mountains 70%, other 24% and plains 6%).

On the territory of the Republic, 254.4 million m<sup>3</sup> of mining waste containing radionuclides, harmful and toxic substances for human health are located in 92 facilities. The Ministry of Emergency Situations of the Kyrgyz Republic manages 36 tailings dumps and 25 dumps with a total volume of 15.7 million cubic meters. at the same time, 31 tailings dumps with the radioactive waste of 7.2 million m<sup>3</sup>, 5 with the toxic waste of 5.2 million m<sup>3</sup>, and 25 mining dumps of substandard ores of 3.3 million m<sup>3</sup>.

All the waste of the mining industry of Kyrgyzstan is divided into the conserved and active. Preserved mining waste is on the balance sheet of the Agency for atomic and radiation safety under the Ministry of emergency situations of the Kyrgyz Republic, existing tailings and rock dumps are in operation at enterprises (Kara-Balta mining and processing plant, Kumtor gold mining plant, Kyrgyzaltyn state Agency).

Today, existing industrial enterprises and the legacy of past industrial activities pose a threat to the environment and safety, and mining facilities pose great danger. Tailing dumps of existing and closed mining enterprises are a serious threat due to their poor protection from natural disasters, proximity to waterways, cities and state borders, as well as due to previous accidents. The consequences of accidents and natural disasters can affect far beyond the territory directly adjacent to the enterprise. In addition, there is a possibility of resuming production at old enterprises or opening new ones.

In Soviet times, activities that destroyed the environment were often carried out without taking into account their future consequences. As a result, many dangerous, man-made sites, especially radioactive (and other dangerous) tailings dumps are located in high-risk areas, such as river coasts and foothills, which are prone to mudslides or earthquakes. The most dangerous areas are Mailuu – Suu, Ak-Tuz, Sumsar, Haidarkan and Kadamjay. Several radioactive tailings dumps are located on unstable slopes along the banks of the Mailuu-Suu river, a tributary of the Syr Darya river, which is one of the main waterways of Central Asia, flowing through the Ferghana valley (home to more than 8 million people). Tailing dumps are located in a landslide-prone area, in a zone of high tectonic activity with a possible oscillation frequency of up to 8-9 points on the Richter scale. Landslides caused by an earthquake can wash radioactive soil into the waters of the Syr Darya river, which can lead to contamination of the water supply of several million people in the Kyrgyz Republic and neighboring countries with radioactive elements.

In the territory of the Kyrgyz Republic from 1946 to 1993, several uranium deposits were worked out, and intensive searches for new uranium objects were carried out. Due to inefficient mining and inefficient processing of minerals, more than 70 million m<sup>3</sup> of rocks and waste from mineral processing are stored in dumps and tailings dumps. The most

problematic, from an environmental point of view, are tailing dumps of radioactive uranium waste (Mailuu-Suu, Min-Kush village, Kaji-SAI, Kara-Balta) and thorium-rare earth waste (Orlovka village, Kashka village, AK-Tyuz).

***To reduce the threat of a cross-border problem, it is necessary to:***

main provisions of radioecological monitoring: tasks of radioecological monitoring. Characteristics of types of radioecological monitoring. National and international radioecological monitoring systems. The regional system of radio-ecological monitoring. The local system of radioecological monitoring. Organization of a radioecological monitoring system in the area where radiation-hazardous objects are located;

legal and regulatory support;

sources of radiation pollution of the environment: sources of radiation pollution of the environment (man-made and natural);

radioecological rationing;

methods and means of radioecological monitoring, optimization of the monitoring system, radioecological assessment of the state of the environment;

radioecological monitoring of the territory. Methods for providing radioecological monitoring results;

information support of the radioecological monitoring system;

dam construction.

## **Section J. Disused Sealed Sources**

*Article 28. Disused sealed sources*

*1. Each Contracting Party shall, in the framework of its national law, take the appropriate measures to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.*

*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.*

In accordance with paragraphs, 1.6 and 1.7. of the BSRERS-2006 organizations and individual entrepreneurs engaged in activities in the field of handling radiation sources must have a special permit (license) for the right to conduct these works, issued by the bodies authorized to conduct licensing.

Permission to work with radiation sources is not required if:

electrophysical devices that generate ionizing radiation with a maximum energy of not more than 5 keV;

other electrophysical devices that generate ionizing radiation, under normal operation of which the equivalent dose rate at any available point at a distance of 0.1 m from the surface of the equipment does not exceed 1.0 mSv/h;

products, goods containing radionuclides, for which there is a sanitary and epidemiological conclusion of the state sanitary and epidemiological supervision bodies that the radiation doses created by them cannot exceed the values given in paragraph 1.3 of the RSS-2006.

In the workplace: the specific activity of radionuclides is less than the minimum significant specific activity (MSA) or the activity of a radionuclide in an open radiation source is less than the MSA shown in the table

In table 8.4 RSS-2006, or the sum of the ratios of radionuclide activity to their table values is less than 1; and in the organization: the total activity of radionuclides in radiation sources does not exceed more than 10 times the MSA or the sum of the ratios of the activity of different radionuclides to their table values given in table 8.4 RSS-2006;



the equivalent dose rate at any point located at a distance of 0.1 m from the surface of a closed radionuclide radiation source does not exceed 1.0 mSv/h above the background. This should be provided with the reliable sealing device is radioactive substances, and its normative-technical documentation to have a sanitary-epidemiological conclusion of ASEW the Ministry of Health of the Republic of Uzbekistan.

In accordance with article 17 of the Law “On radiation safety”, users of ionizing radiation sources are required to ensure the disposal of ionizing radiation sources (IRS) that are not used. IRS that are not intended for further use are considered radioactive waste.

The use or storage of IRS must be stopped after the end of the designated service life. It is quite acceptable to consider extending the life of the AI in justified cases when the radiation parameters are kept within satisfactory limits, the tightness is preserved and there are no detected defects along with its signs. The operator must develop and coordinate with the radiation safety Supervisory authorities programs for the re-examination of the sealed AI in order to extend its service life.

IRS after their decommissioning are transferred to the SUE “RBSRW” INP AS RUz for long-term storage.

### **Section K. Planned Activity (General Efforts) for Safety Improvement**

The safety of spent nuclear fuel and radioactive waste management is an important part of the state security of the Republic of Uzbekistan.

An important factor for ensuring nuclear and radiation safety is the improvement of the legal and regulatory framework for the management of spent nuclear fuel and radioactive waste, nuclear and radiation safety, and the decommissioning of nuclear installations.

The policy is based on the legislation of the Republic of Uzbekistan, international obligations and modern technological approaches to the management of spent nuclear fuel and radioactive waste in relation to the conditions of the Republic of Uzbekistan.

The Strategy for implementing the state policy in the field of spent nuclear fuel and radioactive waste management is defined as a priority task in the Resolution of the President of the Republic of Uzbekistan “On Approval of the Concept for the Development of Nuclear Energy in the Republic of Uzbekistan for the period 2019-2029”, No. PR-4165 of February 07, 2019, which will ensure the priority of safety at all stages of the life cycle of nuclear energy facilities.

Currently, the “Uzatom” Agency developed a draft decree of the President of the Republic of Uzbekistan “On approval of the Strategy on the management of spent nuclear fuel, radioactive waste and decommissioning of nuclear installations”, which after consultation with all interested ministries and departments submitted to the Cabinet of Ministers of the Republic of Uzbekistan, currently a draft document is already addressed in the Administration of the President of the Republic of Uzbekistan.

In the Republic of Uzbekistan, the system for ensuring the safety of spent nuclear fuel and radioactive waste management continues to be improved, taking into account the recommendations of the IAEA, as well as international best practices

Summary of measures taken by the country to implement the proposals noted during the review of the First National Report of the Republic of Uzbekistan on the implementation of the Convention.

#### ***Further development of the legal framework***

In the Republic of Uzbekistan, work is continuing to improve the regulatory framework for the management of radioactive waste and spent fuel and bring it into line with the IAEA guidelines, taking into account preparations for the IRRS for a comprehensive assessment of the regulatory infrastructure for nuclear and radiation safety.



The country is working to introduce amendments and additions to the current Laws of the Republic of Uzbekistan, technical regulations that establish safety requirements for the management of spent nuclear fuel and radioactive waste.

Development and approval of strategies for the management of spent nuclear fuel and radioactive waste of the Uzbek NPP. Addressing issues related to the safety of spent fuel and radioactive waste management in the light of the construction of the Uzbek NPP.

Implementation of the provisions of the strategy for radioactive waste management of the Uzbek NPP, including the creation of a radioactive waste disposal facility for very low-level, low-level and medium-level radioactive waste.

At present, there are problems with the radiation safety of radioactive waste management. Performing works on remediation of territories (cleaning up of radioactive waste) require considerable expenses.

*The Charkesar and Yangiabad* sites require a set of works that include a site-specific remediation approach, including construction measures, as well as an integrated approach with long-term sustainable measures.

According to preliminary calculations of the WISUTEC consortium, about 6.1 million Euros, including VAT accounting, are needed for remediation and implementation of measures to improve the environmental situation at the facilities located in Charkesar and Yangiabad.

Major remediation activities include:

- construction of a diversion channel for surface runoff at the Alatanga facilities and the Central dump of poor ores;
- restoration of the old riverbed of the Alatanga river;
- sealing the entrance to the adit by installing concrete slabs and brick walls, coastal protection works on the Exploration site;
- sealing of sinkholes by installing concrete plugs, sealing the entrance to the adit by pouring concrete at the Kattasai, Rudny Dvor and Charkesar -1 objects;
- coastal protection works on the Kattasai river;
- creation of a new central mining dump for the Kattasai site, transfer of dumps with a volume of 115,000 m<sup>3</sup>, delivery and installation of a coating with a thickness of 1m, an area of 30,000 m<sup>2</sup>, construction of drainage channels for the new dump;
- dismantling of the bunker and other concrete elements, transfer of 200 m<sup>3</sup> of concrete fragments and 3000 m<sup>3</sup> of dump rock, delivery and installation of a coating with a thickness of 1 m, an area of 40,000 m<sup>2</sup>, coastal protection measures on the Rudny Dvor site;
- transfer of 7,000 m<sup>3</sup> of the mountain dump to form the base for the diversion channel, construction of a gabion protective wall at the Northern and southern slopes along the road on the central mountain dump;
- dismantling of old industrial structures, collecting leached ore piles and covering them with dump material, etc.

Through this project, all the necessary information, measurement and laboratory analysis results, as well as cost calculations for individual remediation facilities are available for maintenance and remediation of the former Charkesar and Yangiabad uranium mines.

16 March 2017 in the Tashkent, during a visit to Uzbekistan of the President of the European Bank for Reconstruction and Development (EBRD), signed a Framework Agreement between the Republic of Uzbekistan and the EBRD to conduct transactions on the Account of ecological rehabilitation for Central Asia in the Republic of Uzbekistan (hereinafter referred to as the Framework agreement), which entered into force through Resolution of the President of the Republic of Uzbekistan “On approval of international agreement”, No. PR-3078 of June 21, 2017, SCIS determined by the competent authority responsible for the implementation of this Framework Agreement.

In this regard, as part of the implementation of the Framework Agreement between the Republic of Uzbekistan and the EBRD on conducting operations on the environmental rehabilitation account for Central Asia in the Republic of Uzbekistan, in accordance with the Resolution of the President of the Republic of Uzbekistan No. PR-3078 of June 21, 2017, a draft Orders of the Cabinet of Ministers of the Republic of Uzbekistan “On further measures to implement the Framework Agreement between the Republic of Uzbekistan and the European Bank for reconstruction and development on conducting operations on the environmental remediation account for Central Asia in the Republic of Uzbekistan” has been developed and approved with interested ministries and departments.:

- determination of the Directorate for building operation and capital construction under the State Committee of the Republic of Uzbekistan for ecology and environmental protection as a grant recipient;

- creating a project management group under the Directorate;

- approval of the composition of the Uzbek part of the joint Committee for the exchange of information on the implementation of the Framework Agreement;

- take other measures to effectively implement the relevant provisions of the Framework Agreement.

Currently, the draft Orders of the Cabinet of Ministers of the Republic of Uzbekistan “On measures to implement the Framework Agreement between the Republic of Uzbekistan and the European Bank for reconstruction and development on conducting operations on the environmental remediation account for Central Asia in the Republic of Uzbekistan” has been submitted to the Government of the Republic of Uzbekistan.

The experts of the coordination group for former IAEA uranium sites have developed a strategic master plan for environmental restoration at uranium heritage sites in Central Asia (hereinafter referred to as the Master plan).

The master plan is a comprehensive, logically linked, systematic, transparent and effective approach to environmental remediation at uranium heritage sites in Central Asia that ensures the best use of available resources. This plan will ensure confidence between the affected republics and potential donors that the risks and problems associated with uranium legacy sites in Central Asia will be addressed in a timely, coordinated, cost-effective and sustainable manner.

The Master plan is the main action plan for the implementation of reclamation works in Central Asia within the framework of the above Framework agreement.

On September 18, 2017, during the 61st IAEA General Conference in Vienna, a signing ceremony was held for the introduction to the Strategic Master plan for environmental restoration at uranium heritage sites in Central Asia. The signing ceremony was attended by representatives of the IAEA, the EBRD, the European Commission, Kyrgyzstan, the Russian Federation, Tajikistan and Uzbekistan.

In conclusion, it should be noted that the Republic of Uzbekistan is creating a regulatory framework for the safe management of spent nuclear fuel and radioactive waste that meets modern requirements and the latest best practices in this area. The highest priority is given to the safe management of spent nuclear fuel and radioactive waste, ensuring the safety of nuclear facilities and solving problems of the “Nuclear legacy” is enshrined in law. All these efforts and coordinated activities of the Republic of Uzbekistan within the framework of fulfilling its obligations under the Joint Convention will contribute to the common aspirations to maintain a high level of safety in the management of spent nuclear fuel and radioactive waste.

**Inventory list of SFA  
The vault No. 1**

IRT-4M	Unit of measurement pieces	Mass of uranium 238+235	The mass of uranium-235
19H45209	1	1311,34	120,14
19H52010	1	1183,28	121,98
19H52110	1	1183,05	125,75
19H59313	1	1174,39	108,89
19H59413	1	1169,35	107,85
19H59513	1	1192,95	123,65
19H59613	1	1196,75	127,35
19H59713	1	1189,92	114,62
19H59813	1	1191,82	115,72
19H59913	1	1205,25	125,45
19H60013	1	1197,00	121,70
19H60513	1	1232,93	157,73
19H60613	1	1266,82	187,52
19H80318	1	1340,27	254,97
<b>Total IRT-4M</b>	<b>14</b>	<b>17035,12</b>	<b>1913,32</b>

**Inventory list of SFA  
The vault No. 2**

IRT-4M	Unit of measurement pieces	Mass of uranium 238+235	The mass of uranium-235
19H39407	1	1181,81	99,51
19H39307	1	1187,21	106,31
19H39507	1	1191,90	106,80
19H39607	1	1196,20	109,60
19H39707	1	1195,86	110,36
19H39807	1	1201,90	114,80
19H39907	1	1195,29	104,99
19H40007	1	1202,10	111,00
19H40107	1	1203,51	111,21
19H41107	1	1180,70	107,60
19H41307	1	1196,84	114,74
19H41407	1	1166,92	105,02
19H41507	1	1179,60	102,40
19H41607	1	1181,40	103,90
19H41707	1	1185,80	104,40
19H41807	1	1187,84	112,84
19H41907	1	1183,15	103,95
19H42007	1	1195,90	111,10
19H42809	1	1149,23	113,93
19H42909	1	1141,90	103,40
19H43009	1	1139,00	99,90
19H43209	1	1131,18	89,28
19H43109	1	1150,42	108,82
19H43309	1	1139,63	98,43
19H43409	1	1144,15	104,65
19H43509	1	1151,76	110,46
19H43609	1	1148,01	104,41
19H43709	1	1137,44	97,84
19H43809	1	1127,90	90,60
19H43909	1	1130,70	93,40

19H44009	1	1151,30	107,50
19H44109	1	1154,32	107,32
19H44209	1	1151,05	109,65
19H44409	1	1151,83	104,43
19H44509	1	1161,65	110,85
19H44609	1	1318,30	119,90
19H44709	1	1303,97	106,27
19H44809	1	1309,11	113,71
19H44909	1	1317,80	120,80
19H45009	1	1308,45	109,65
19H45109	1	1339,70	123,50
19H51010	1	1155,25	103,55
19H51110	1	1163,06	106,36
19H51210	1	1159,53	96,43
19H51310	1	1157,07	101,27
19H51410	1	1168,90	109,20
19H51510	1	1182,71	120,71
19H51610	1	1167,57	105,57
19H51710	1	1160,51	100,81
19H51810	1	1187,14	123,34
19H51910	1	1172,21	106,81
19H52210	1	1168,40	105,30
19H52310	1	1164,83	100,13
19H41207	1	1312,50	238,30
19H44309	1	1150,30	107,40
19H45309	1	1355,88	160,68
<b>Total</b>	<b>56</b>	<b>66598,59</b>	<b>6175,09</b>
<b>IRT-4M</b>			

**Inventory list of SFA  
The vault No. 3/1**

IRT-4M/EK-10	Unit of measurement pieces	Mass of uranium 238+235	The mass of uranium-235
19E04M00	1	1303,95	99,76
19E05A00	1	1329,56	118,30
19E06M00	1	1148,54	100,48
19E07A00	1	1177,64	105,80
19H40207	1	1174,35	100,85
19H40307	1	1191,07	108,67
19H40407	1	1191,57	109,97
19H40507	1	1179,73	97,63
19H40607	1	1173,31	101,81
19H40707	1	1174,42	105,42
19H40807	1	1181,56	106,86
19H40907	1	1184,80	112,50
19H41007	1	1191,50	114,40
EK-10A	1	1242,00	90,00
EK-10B	1	1242,00	90,00
EK-10C	1	1242,00	90,00
EK-10D	1	1242,00	90,00
EK-10E	1	1242,00	90,00
EK-10F	1	1242,00	90,00
EK-10G	1	1242,00	90,00
EK-10H	1	1242,00	90,00
EK-10I	1	1242,00	90,00
EK-10J	1	1242,00	90,00
EK-10K	1	1242,00	90,00
<b>Total IRT-4M/ EK-10</b>	<b>13 11</b>	<b>15602,00 13662,00</b>	<b>1382,45 990,00</b>

**Radioactive waste storage  
SUE "RBSRW" INP AS RUz**

No.	Name of the storage.	Storage number	Storage capacity, m <sup>3</sup>	Status of the store	Filled, %
1	Storage of solid radioactive waste	1	740	Current	92
2	Storage for spent gamma sources	2	0,18	Conserved	100
3	Storage for spent neutron sources	3	0,18	Current	50
4	Storage of solid radioactive waste	4	920	Conserved	100
5	Storage for biological radioactive waste	5	30	Current	5
6	Storage for liquid radioactive waste	6	200	Current (disposal was not carried out)	Empty
7	Storage for liquid radioactive waste	7	200	Current (disposal was not carried out)	Empty
8	Storage of solid radioactive waste	8	670	Conserved	100
9	Storage for spent gamma sources	9	1	Current	1
10	Storage for spent gamma sources	10	1	Current	50
11	Storage facility for high-level radioactive waste WWR-SM INP	11	3,5	Current (disposal was not carried out)	Empty
12	Storage facility for high-level radioactive waste WWR-SM INP	12	3,5	Current (disposal was not carried out)	Empty
13	Storage facility for high-level radioactive waste WWR-SM INP	13	3,5	Current	60
14	Storage facility for high-level radioactive waste WWR-SM INP	14	3,5	Current	90
15	Storage of solid radioactive waste for JSC Photon	15	1000	Current	4
16	Storage of solid radioactive waste for the IPGEB	16	2000	Current	Empty



## Inventory lists of radioactive waste

No.	Radionuclide	Quantity, pieces	Activity, TBq
1	Cs-137	5417	263,22
2	Co-60	5149	2070,0
3	Sr-90	3252	545,0
4	Am-241	934	1,5
5	Ra-226	45780	0,3
6	Ba-133	20	1,97
7	U-232	19	-
8	U-233	2	-
9	U-234	10	-
10	U-235	51	-
11	U-238	232	0,5
12	Natural uranium	19	-
13	Uranium powder	25 kg	-
14	Uranium disks	200	-
15	C-14	66	0,02
16	Tritium	1422	42,6
17	Pu-239	1163	8,6
18	Pu-238	80	3,0
19	Pu-241	2	0,2
20	Eu-152	2	0,04
21	Kr-85	10	0,04
22	Np-237	2	-
23	Ni-63	14	0,003
24	Bi-207	2	0,001
25	Th-232	196	8,8
26	Pu+Be	241	0,008
27	Ti-44	1	0,00000004
28	Fe-55	180	0,41
29	Tl-204	87	0,13
30	Pm-147	194	2,8
31	Na-22	20	1,0
32	Cf-252	11	0,0007
33	Cd-109	515	0,52
34	Sm-145	104	2,1
35	Zn-65	87	0,1
36	Co-57	214	0,6
37	Ce-144	12	0,01
38	Gd-153	17	0,007
39	Po+Be	451	0,0005
40	Ca-45	2	0,00000004
41	Po-210	210	0,01
42	Tm-170	331	739,0
43	Se-75	400	272,0
44	Sn-115	83	0,24
45	Y-88	2	0,00000004
46	Ir-192	185	4101,0
47	Zr-95	13	0,003
48	I-125	36	0,003
49	Sb-124	40	11,0
50	Hg-204	5	0,37
51	P-32	980	0,0004
52	Mn-54	2	0,0004
53	Sr90+Y90	54	0,012
54	Am241+Be	2	0,004
55	Radioisotope detectors-RID (Pu-238)	1567	0,03
56	Radioisotope detectors-RID	44882	1,0

	(Pu-239)		
57	Radioisotope detectors-RID (Am-241)	2605	-
58	SSGRS	106	0,02
59	Sources of unknown type	71	-
59	Irradiated products	19947	-
60	“Head radiation” from gamma therapeutic devices	17	-
61	“Head radiation” from gamma-ray flaw detectors “Gammarid”.	16	-
62	Containers RGU-U	63	-
63	Filters absorbers ФП-300	32	0,0002
64	Barrels (IOS)	609	0,3
65	Barrels (complex composition)	298	0,04
66	Bags with RW (complex composition)	57021	0,5
	<b>Total:</b>	<b>204034</b>	<b>8079,2</b>
67	Soil	1819 м <sup>3</sup>	-
68	Tubes	2040 м	-
69	Various metal parts of the IIN-3M reactor (metal reactor housing, ФП-2 filter housing with a vacuum pump, fragments of filter support structures, crossbar, heat exchanger, beam, equipment from under the drain, etc.)	20 м <sup>3</sup>	-

## **List of Normative Legal Acts of the Republic of Uzbekistan in the Field of Nuclear and Radiation Safety Governing Spent Nuclear Fuel and Radioactive Waste Management**

### **International Agreements of the Republic of Uzbekistan**

The Republic of Uzbekistan is a State Party to the following international treaties:

Treaty on the non-proliferation of nuclear weapons (the Republic of Uzbekistan joined in 1992);

Agreement between the Republic of Uzbekistan and the IAEA on the application of safeguards in connection with the Treaty on the non-proliferation of nuclear weapons (signed in 1994);

Additional Protocol to The agreement between the Republic of Uzbekistan and the IAEA on the application of safeguards in connection with the Treaty on the non-proliferation of nuclear weapons (signed in 1998);

International Convention on the physical protection of nuclear material (the Republic of Uzbekistan joined in 1997);

Agreement between the government of the Republic of Uzbekistan and the European Atomic Energy Community (Euratom) on cooperation in the field of peaceful uses of atomic energy (signed in 2004);

Treaty on a nuclear-weapon-free zone in Central Asia (signed in 2006 and ratified in 2007);

Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management (the Republic of Uzbekistan joined in 2008);

Amendment to the Convention on the physical protection of nuclear material (the Republic of Uzbekistan joined in 2013);

Agreement between the CIS member States on basic principles of cooperation in the field of peaceful uses of atomic energy of June 26, 1992;

Agreement between the government of the Republic of Uzbekistan and the government of the Russian Federation on scientific and technical cooperation in the field of peaceful use of atomic energy of December 22, 1997;

Agreement between the government of the Republic of Uzbekistan and the Government of the Russian Federation on cooperation in the use of nuclear energy for peaceful purposes of December 29, 2017;

Agreement between the government of the Republic of Uzbekistan and the Government of the Russian Federation on cooperation in the construction of a nuclear power plant on the territory of the Republic of Uzbekistan of September 7, 2018;

Also in accordance with the "Roadmap" for the implementation of the Concept of nuclear energy development in the Republic of Uzbekistan for the period 2019-2029, approved by the resolution of the President of the Republic of Uzbekistan;

In accordance with the Decree of the President of the Republic of Uzbekistan No. PD—4165 of February 7, 2019, it is envisaged that the Republic of Uzbekistan will join the following international conventions in 2019-2020:

Vienna Convention on civil liability for nuclear damage;

Convention on early notification of a nuclear accident;

Convention on nuclear safety;

Convention on assistance in the event of a nuclear accident or radiological emergency.

## **Legislative documents**

### **Codes and Laws of the Republic of Uzbekistan**

The basis of legislation in the field of nuclear energy use and ensuring nuclear and radiation safety are the following documents:

Law of the Republic of Uzbekistan “On the use of atomic energy for peaceful purposes”;

Law of the Republic of Uzbekistan “On radiation safety”;

Law of the Republic of Uzbekistan “On sanitary and epidemiological wellbeing of the population”;

Law of the Republic of Uzbekistan “On waste”;

Law of the Republic of Uzbekistan “On transit of harmful and dangerous goods”;

Law of the Republic of Uzbekistan “On subsoil”;

Law of the Republic of Uzbekistan “On the accession of the Republic of Uzbekistan to the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management (Vienna, 5 September 1997)”;

Law of the Republic of Uzbekistan “On export control”;

Resolution of the Supreme Council of the Republic of Uzbekistan “On accession to the Treaty on the non-Proliferation of nuclear weapons”, No. 760-XII of December 9, 1992;

Resolution of the Oliy Majlis of the Republic of Uzbekistan “On accession to the Convention on the physical protection of nuclear material”, No. 556-1 of December 26, 1997;

Code of the Republic of Uzbekistan on administrative responsibility of September 2, 1994;

Criminal code of the Republic of Uzbekistan of 2 September 1994.

### **Decrees and Resolutions of the President of the Republic of Uzbekistan**

Decree of the President of the Republic of Uzbekistan “On measures for the development of nuclear energy in the Republic of Uzbekistan”, No. PD—5484 of July 19, 2018;

Decree of the President of the Republic of Uzbekistan “On measures to radically improve the system of state control and supervision in the areas of industrial, radiation and nuclear safety”, No. PD—5594 of December 12, 2018;

Resolution of the President of the Republic of Uzbekistan “On the organization of activities of the Agency for the development of nuclear energy under the Cabinet of Ministers of the Republic of Uzbekistan”, No. PR—3870 of July 19, 2018;

Resolution of the President of the Republic of Uzbekistan “On approval of the international Treaty Agreement on cooperation of the member states of the Commonwealth of Independent States on preparedness in the event of a nuclear accident or radiation emergency and mutual assistance in the elimination of their consequences”, No. PR – 4206 of February 22, 2019;

Resolution of the President of the Republic of Uzbekistan “On the organization of activities of the State Committee on Industrial Safety of the Republic of Uzbekistan”, No. PR-4058 of December 12, 2018;

Resolution of the President of the Republic of Uzbekistan “On approval of the concept for the development of nuclear energy for the period 2019-2029”, No. PR—4165 of February 7, 2019;

Resolution of the President of the Republic of Uzbekistan “On approval of the strategy for the development of human resources for the nuclear energy program of the Republic of

Uzbekistan”, No. PR—4492 of October 16, 2019.

### **Normative Legal Acts of the Government of Uzbekistan**

Resolution of the Cabinet of Ministers “On approval of the rules for organizing the system of state accounting and control over of the turnover of ionizing radiation sources”, No. 98 of April 3, 2009;

Resolution of the Cabinet of Ministers “On measures to fulfill the obligations of the Republic of Uzbekistan under international treaties in the field of peaceful use of atomic energy”, No. 179 of June 25, 2009;

Resolution of the Cabinet of Ministers “On approval of Regulations on the procedure for state registration and control of the turnover of radioactive substances and radioactive waste, as well as nuclear materials”, No. 231 of August 13, 2009;

Resolution of the Cabinet of Ministers “On the transportation of dangerous goods by road transports in the Republic of Uzbekistan”, No. 35 of February 16, 2011;

Resolution of the Cabinet of Ministers “On measures to further improve licensing of certain types of activities and licensing procedures in the field of industrial and radiation safety”, No. 782 of October 2, 2018;

Resolution of the Cabinet of Ministers “On additional measures to organize the activities of the Agency for the development of nuclear energy Under the Cabinet of Ministers of the Republic of Uzbekistan”, No. 800 of October 6, 2018;

Resolution of the Cabinet of Ministers “On approval of the National action plan of the Republic of Uzbekistan for the implementation of international documents in the field of chemical, biological, radiation and nuclear safety for 2018-2021”, No. 968 of November 27, 2018;

Resolution of the Cabinet of Ministers “On measures to improve the Unified state system for forecasting, early detection and response to radiation accidents”, No. 869 of October 15, 2019;

Resolution of the Cabinet of Ministers “On the procedure for the conduct of state control and inspection in the field of the nuclear energy use by authorized state bodies regulating the safety and security of nuclear energy use”, No. 368 of June 10, 2020;

Resolution of the Cabinet of Ministers “On the procedure for conducting an expert examination on the basis of the safety of nuclear energy use facilities and (or) activities(works) in the field of nuclear energy use”, No. 390 of June 17, 2020.

### **Sanitary Norms, Rules and Hygienic Standards of the Ministry of Health of the Republic of Uzbekistan**

Sanitary norms, rules and hygienic standards of the Republic of Uzbekistan “Radiation Safety Standards (RSS-2006) and Basic sanitary rules for ensuring radiation safety (BSRERS-2006)”, No. 0193-06;

Sanitary rules and regulations of the Republic of Uzbekistan “Sanitary rules for radioactive waste management”, No. 0251-08;

Sanitary rules and regulations of the Republic of Uzbekistan “Radioecological monitoring of the environment at facilities where radioactive waste from uranium production is located” No. 0361-18.