# THE FOURTH NATIONAL REPORT OF THE REPUBLIC OF BELARUS

# UNDER THE JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

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# FOREWORD

The Fourth National Report of the Republic of Belarus under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management is covering activities, events and evidences for period after 2008 and takes into account the recommendations of the Third Review Meeting of the Contracting parties (IAEA, May 11-20, 2009).

Several issues of the implementation of the Convention articles, which were stated in the three previous National reports of the Republic of Belarus and have not been changed during the latest period, are stated in this report briefly.

# CONTENTS

## ABBREVIATIONS

AS of BSSR – Academy of Science of the Belorussian Soviet Socialist Republic;
NPP – nuclear power plant;
TRWR - temporary radioactive waste repository;
PSI "JIPNR - Sosny" - Public Scientific Institution "Joint Institute for Power and Nuclear Research - Sosny" of the National Academy of Sciences of Belarus;
Gosatomnadzor - Department on Nuclear and Radiation Safety of the Ministry for Emergency Situations of the Republic of Belarus;
Gospogrankomitet - the State Border Committee of the Republic of Belarus;
SRS - sealed radionuclide source;
IRS - ionizing radiation source;
HRR – heat research reactor;
MIA - Ministry of Internal Affairs of the Republic of Belarus;
IAEA - International Atomic Energy Agency;
MES - Ministry for Emergency Situations of the Republic of Belarus;
UNO - United Nations Organization;
SNF - spent nuclear fuel;
MNPP - mobile nuclear power plant;
RDW - repository of decontamination waste;
RRW – repository of radioactive waste;
USSR – the Union of Soviet Socialist Republics;
STB – State Standard of the Republic of Belarus.

## Section A. INTRODUCTION

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter referred to as "Convention") was ratified by the Republic of Belarus on July 17, 2002 and entered into force for the Republic of Belarus on February 24, 2003. According to the Law of the Republic of Belarus of the 17th of July, 2002 "On the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", the Ministry for Emergency Situations of the Republic of Belarus together with the Ministry of Foreign Affairs of the Republic of Belarus are responsible for the implementation of the liabilities under the Convention.

There are no nuclear power plants in Belarus, however, radioactive sources, nuclear and radioactive methods and technologies were widely used and are still being used in industry, science, medicine and other different spheres of the national economy. It pays the most serious attention to the issues of provision of nuclear and radiation safety.

Over the past three years the following steps were made in order to improve the legislation and regulation of nuclear and radiation safety:

Decree of the President of the Republic of Belarus from October 16, 2009, N510 "On the Improvement of the Control (Supervisory) Activities in the Republic of Belarus" entered into force [19];

Decree of the President of the Republic of Belarus from September 1, 2010, N 450 "On Licensing of Certain Types of Activities" entered into force [16];

11 regulatory documents in the sphere of nuclear and radiation safety were entered into force [21, 22, 25, 26, 32, 34, 37-41].

This National report was developed in accordance with "Guidelines regarding the Form and Structure of National Reports" INFCIRC/604/Rev.1 from July 26, 2006.

## Section B. POLICIES AND PRACTICES

### B.1. Spent fuel management policy

In accordance with the Law of the Republic of Belarus “On the Use of Atomic Energy” the activity on the use of atomic energy is based on the following principles:

priority of the protection of life and health of present and future generations, and environment against all other aspects of using of atomic energy;

ensuring that benefits from the using atomic energy for citizens and society are higher than possible harm;

ensuring nuclear safety and radiation protection;

compensation of harm from ionizing radiation or activity on use of atomic energy;

provision of total, reliable and timely information concerning the activity on the use of atomic energy if this information does not contain any secret or restricted data;

prohibition of the production of nuclear weapons and other nuclear explosive devices.

According to the Law of the Republic of Belarus “On the Use of Atomic Energy” the activity on the use of atomic energy is a well-founded activity of persons relating to siting, design, construction, commissioning, operation, limitation of operational characteristics, prolongation of the operation life, decommissioning of nuclear facility and (or) storage facility as well as nuclear materials, spent fuel and (or) operational radioactive waste management.

In addition to the national legislation, the policies of spent fuel management are determined by international agreements in this sphere, for which the Republic of Belarus is a Contracting party. For example, the Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963 [5], the Convention on Nuclear Safety of June 17, 1994 [6].

### B.2. Spent fuel management practices

Since August 1985, there have carried out tests of mobile nuclear power plant "Pamir-630D" at the research complex "Iskra" of PSI "JIPNR - Sosny".

Investigations of mobile nuclear power plant were terminated and decommissioning works were started by decision of the Council of Ministers of the USSR in November 1987. Design institutes of the USSR developed the project for the decommissioning of mobile nuclear power plant "Pamir-630D" in 1989. Works on dismantling the station, transfer of radioactive waste for long-term storing have been conducted in accordance with the project.

The fuel assemblies, discharged from the reactor core, were stored in basin storage for spent assemblies at the research complex "Iskra" from 1990 to 2010.

In 2010 the spent fuel was discharged from the storage and sent to the Russian Federation for reprocessing in accordance with the intergovernmental agreement. Obtained after reprocessing uranium and radioactive waste will remain in the Russian

Federation. Works of discharge and transportation of spent fuel were carried out in accordance with requirments in the sphere of nuclear and radiation safety.

The program for the organization of decommissioning works of the complex systems of storage and spent fuel management, including measures for the further use of the complex site, was approved.

## B.3. Radioactive waste management policy

In accordance to legislation the basic principles of radiation safety in radioactive waste management are following [37]:

ensuring of a reasonable level of personnel and public protection against radiation exposure of radioactive waste in accordance with the principles of justification, standardization and optimization;

ensuring of a reasonable level of environmental protection against radiation exposure of radioactive waste;

predicted levels for radiation exposure of future generations, due to the disposal of radioactive waste, should not exceed the permissible levels for population exposure, established by legislation and regulation;

accounting of interdependencies between stages of radioactive waste generation and radioactive waste management;

not imposing of undue burdens on future generations, related to the need to ensure the safety of radioactive waste management;

limitation of radioactive waste generation and accumulation at the minimal practically achievable level;

prevention of emergency situations with radiological consequences and minimization of possible consequences if they occur.

According to the given principles the main directions of activity are defined as follows:

keeping radioactive waste generation at the minimal practically achievable level;

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

operation of the State system of accounting for and control of radioactive waste;

scientific, technical and information support of activities in the field of radioactive waste management;

development of regulations for radioactive waste management;

extension of international cooperation in the sphere of radioactive waste management.

## B.4. Radioactive waste management practices

Works on transporting, processing, long-term storage and disposal of the radioactive waste are carried out only by the specialized enterprises having the authorization (license) from the Ministry for Emergency Situations:

**the radioactive waste management facility "Ekores"** performs all operations with radioactive waste, generated due to radioactive sources use;

**the radioactive management facilities "Polesie" (Gomel city) and "Radon" (Mogilev city)** carry out disposal of unusable buildings and decontamination of areas contaminated by the Chernobyl disaster. These facilities are also responsible for collection, transportation, storage, disposal of the radioactive waste, resulting from this activity and the maintenance and safe operation of the Chernobyl waste repositories.

The responsibilities of radioactive waste producers include the collection, sorting and, if necessary, primary treatment and interim storing of waste.

## B.5. Criteria, used to categorize radioactive waste

According to Law of the Republic of Belarus "On Radiation Safety of Population" [7] radioactive waste is ionizing radiation sources being used during economic or other activity of operators which they do not intend or able to use for the previous purposes, and also the sources generated during the works on elimination of the consequences of the radiation accident in which the content of radionuclide exceeds levels established by legislation and regulation.

As radioactive waste from radionuclide sources, the classification of radioactive waste is performed in accordance with "Sanitary Rules for Radioactive Waste Management" (SPORO-2005) [30].

Depending on physical state, radioactive waste is divided into solid, liquid and gaseous.

Liquid radioactive waste include organic and inorganic liquids, pulps and tailings which are no more used and have the specific activity of nuclides over 10 times higher than the intervention levels, given in Annex 3 of the Radiation Safety Standards (NRB-2000) [28].

Solid radioactive waste include spent radionuclide sources, materials, manufactures, equipment, biological materials, soil and solidified liquid radioactive waste which have the specific activity of radionuclide exceeding the levels from Appendix 19 of NRB-2000 [28].

Gaseous radioactive waste include radioactive gases and aerosols, generated during the industry processes with volume activities which exceed the permissible volume activity, given in Annex 3 of the Radiation Safety Standards (NRB-2000) [28].

If the nuclide content of the waste is known, waste is considered as radioactive if the sum of the ratio of the specific activity of the radionuclide to its minimal activity exceeds 1.

In case of unknown radionuclide content, solid waste are considered radioactive if its specific activity is more than:

100 kBq/kg - for beta emitters;

10 kBq/kg - for alpha emitters;

1 kBq/kg - for transuranium radionuclide.

Gamma-emitting waste of unknown content are considered as radioactive if the surface dose rate (0,1 m) exceeds 0,001 mSv/h above background, if the measurement conditions provided by the approved methods.

Solid and liquid waste is divided into three categories according to its specific activity (see table B.5.1).

**Table B.5.1. Classification of solid and liquid radioactive waste by its specific activity**

| Waste category | Specific activity, kBq/kg | | |
|---|---|---|---|
| | Beta emitting radionuclides | Alpha emitting radionuclides (except the transuranium ones) | Transuranium radionuclides; |
| Low active | less than $10^3$ | less than $10^2$ | less than $10^1$ |
| Medium active | from $10^3$ to $10^7$ | from $10^2$ to $10^6$ | from $10^1$ to $10^5$ |
| High active | over $10^7$ | over $10^6$ | over $10^5$ |

For preliminary sorting of solid radioactive waste the classification of solid radioactive waste according to the level of radioactive contamination (see table B.5.2) and gamma dose rate at the distance of 0,1 m from the surface should be used:

low active – from 0,001 mSv/h to 0,3 mSv/h;

medium active – from 0,3 mSv/h to 10 mSv/h;

high active – over 10 mSv/h.

**Table B.5.2 Classification of solid radioactive waste according to the level of radioactive contamination**

| Waste category | Level of radioactive contamination, particles/($cm^2$×min) | | |
|---|---|---|---|
| | Beta emitting radionuclides | Alpha emitting radionuclides (except the transuranium ones) | Transuranium radionuclides |
| Low active | from $5\times10^2$ to $10^4$ | from $5\times10^2$ to $10^3$ | from 5 to $10^2$ |
| Medium active | From $10^4$ to $10^7$ | from $10^3$ to $10^6$ | from $10^2$ to $10^5$ |
| High active | over $10^7$ | over $10^6$ | over $10^5$ |

The radioactive waste management requires to take into consideration of not only its aggregative state and specific activity, but also other physical and chemical characteristics, such as explosiveness and inflammability, organic or inorganic nature, etc.

## B.6. Classification of decontamination waste

The special category of radioactive waste includes the decontamination waste of Chernobyl origin. According to SPOOD-2004 (Sanitary Regulation for

Decontamination Waste of Chernobyl Origin Management), the waste of Chernobyl origin is defined as further disused substances, generated as a result of work on elimination of the consequences of the Chernobyl accident and control for reasonable radioecological level of environment, industrial and civil facilities in the radioactive contaminated areas.

According to SPOOD-2004, decontamination wastes are divided into liquid and solid ones.

Waste, which have the specific activity of Cs-137 over 1,0 kBq/kg or the levels of surface contamination exceeding 20 beta-particles/($cm^2 \times min$), are related to the solid ones.

Liquid decontamination waste are organic and inorganic liquids, pulps and tailings produced as a result of decontamination works, which contents the Cs-137 as over 10 times higher than the intervention levels for the water intake for population according to Appendix 3 of the Radiation Safety Standards NRB-2000.

The requirements for liquid decontamination waste management are regulated by OSP-2002 and SPORO-2005.

Decontamination waste with contamination level less than mentioned above can be disposed with the waste from dismantling of buildings or can be disposed in solid domestic waste polygons covering with 0,2 m of local ground.

At all stages of decontamination waste management with mobile and unconditioned waste (ash, rags), the measures for prevention from dispersion should be taken.

## B.7. Classification of NPP radioactive waste

According to sanitary regulation “Hygienic requirements for the design and operation of nuclear power plants” liquid and solid radioactive waste of NPP are divided by specific activity in categories listed in Table B.7.1 [32]. In case waste belong to different categories according to the given radiation radionuclide characteristics, the highest value of waste category is issued for it.

**Table B.7.1. Classification of solid and liquid radioactive waste by its specific activity**

| Waste category | Specific activity, kBq/kg | | |
|---|---|---|---|
| | Beta emitting radionuclides | Alpha emitting radionuclides (except the transuranium ones) | Transuranium radionuclides |
| Very low active* | from 0,3 to$10^2$ | from 0,3 to $10^1$ | from 0,3 to 1 |
| Low active | from $10^2$ to $10^3$ | from $10^1$ to $10^2$ | from 1 to $10^1$ |
| Medium active | from $10^3$ to $10^7$ | from $10^2$ to $10^6$ | from $10^1$ to $10^5$ |
| High active | over $10^7$ | over $10^6$ | over $10^5$ |

* - If the nuclide content of the waste is known, the waste is considered to be very low radioactive if the sum of the specific activity is higher or equal to 0,3 kBq/kg, and the upper limit of activity is determined as the sum of the ratios of the specific activity of the radionuclide to its minimal significant specific activity. The sum should not exceed 1.

The waste is exempted from the radiation control, if its total specific activity is less than 0,3 kBq/kg. Its management is realized in accordance to the regulation for domestic waste management.

For a preliminary sorting of solid radioactive waste in the places of its generation and before sending it for the temporary storing, it is recommended to use the criteria for radioactive contamination levels, given in table B 7.2 and below gamma dose rate at a distance of 0,1 m from the surface under the conditions of measurement in accordance with the approved methods:

very low active – from 0,0001 mSv/h to 0,001 mSv/h;
low active – from 0,001 mSv/h to 0,3 mSv/h;
medium active – from 0,3 mSv/h to 10 mSv/h;
high active – over 10 mSv/h.

**Table B.7.2. Classification of solid radioactive waste by the radioactive contamination level**

| Waste category | Level of radioactive contamination, particles/($cm^2$×min) | | |
|---|---|---|---|
| | Beta emitting radionuclide | Alpha emitting radionuclide (except the transuranium ones) | Transuranium radionuclide |
| Very low active | from $2\times10^2$ to $5\times10^2$ | from 20 to $5\times10^1$ | from 2 to 5 |
| Low active | from $5\times10^2$ to $10^4$ | from $5\times10^1$ to $10^3$ | from 5 to $10^2$ |
| Medium active | from $10^4$ to $10^7$ | from $10^3$ to $10^6$ | from $10^2$ to $10^5$ |
| High active | over $10^7$ | over $10^6$ | over $10^5$ |

## Section C. SCOPE OF APPLICATION

This Convention [2] in the Republic of Belarus is applied to the following issues:

- safe management of the spent fuel, resulted from the operation of Mobile Nuclear Plant “Pamir” placed in the Republic of Belarus until 2010;
- safe management of the waste resulted from the use of radioactive materials in industry, medicine, scientific research, education and other spheres of economy within the territory of Belarus if the level of radionuclide contamination of these materials is higher than the one defined in OSP-2002 [29];
- safe management of the radioactive waste, generated in the former places of the USSR military troops deployment;
- safe management of the decontamination waste of the Chernobyl origin.

## Section D. INVENTORIES AND LISTS

### D.1. The list of spent fuel management facilities

The spent fuel storage facility of PSI "JIPNR - Sosny" of the National Academy of Sciences of the Republic of Belarus has been closed in late 2010 after the transfer of spent fuel to the Russian Federation in accordance with the intergovernmental agreement.

**An inventory of spent fuel transferred to the Russian Federation in accordance with the intergovernmental agreement:**

106 fuel assemblies, one of which is leaking and provided with a special container;

total weight of uranium is 43,2 kg, including 18,5 kg of uranium-235;

total weight of the assemblies – 730 kg.

### D.2. The list of radioactive waste management facilities

**Radioactive waste storage/disposal facility "Ekores"**

"Ekores" facility is situated 2 km from Minsk. It is a typical near surface Radon-type facility, widely known in the post-Soviet area.

It was commissioned in 1963 to facilitate the operation of the research reactor of the former Institute for Nuclear Power of the Academy of Sciences in BSSR. Then, being the single facility of this type (purpose), it provided the disposal of a wide range of radioactive waste, produced due to the use of radioactive isotopes in the Republic of Belarus.

At present the following facilities are located at the site:

2 closed "old repositories" (1963-1979);

2 near surface repositories intended for solid waste and sealed radioactive sources;

storage for sealed radioactive sources;

special laundry (100 kg per shift).

**Two old repositories** represent rectangular reservoirs with the volume of 225$m^3$ each, the walls and bottom are a concrete monolith structure with the covering of precast concrete slabs. Its designed dimensions are 5,0x15,0 m, and depth is 3,0 m. During the conservation the upper surface is covered by hot bitumen, and after that by the layers of asphalt (0,03 m) and soil (1,2 m).

**Two near surface repositories** (there were constructed in 1977) have the one-floor part above-ground with a precast metal frame (the designed dimensions are 12×30 m). The underground part (830 $m^3$) consists of 8 vaults (the depth is over 3 m and designed dimensions are 6×6 m) made of concrete monolith with precast concrete slabs. The facilities are equipped with a suspension cat-crane with lift capacity of 3,2 tons. It helps to remove one or two floor slabs, and the radioactive waste packages are loaded into the vaults.

*The designed capacities of the near surface repositories are*

income waste – not over 7,4 TBq per year; the maximum specific activity – not over 3,7 MBq/kg.

*The design operation term of the repositories is 20 years.*

The "Ekores" facility accepts up to 3 tons of solid low and medium active waste annually. It is loaded into the vaults in the producer's package or container. Till recently the sorting of incoming waste has not been carried out. The content of the filled vaults represents the conglomerate of different materials (plastics, glass, rag, etc.), contaminated with both short-lived and long-lived radioisotopes.

**The wells for disposal of sealed spent radioactive sources** are equipped with a S-shaped pipe of 108 mm in diameter for source loading. The depth of these wells is 6 m.

*The design capacity*

does not exceed 20kg-equiv.of Ra of total activity in a single well without any limitation for loading time.

*The design operation term of the wells is 20 years.*

The following methodology was accepted for managing spent sealed sources (SRS):

SRS, delivered in transport containers with bottom unloading, are loaded into the wells through the S-shaped pipe;

SRS, delivered in containers, which do not provide for bottom unloading and some radiation devices with built-in protection (for example, gamma-radiography devises) are stored in special vaults under a concrete slab together with its shielding, because of there is no equipment for its reloading at the "Ekores" facility;

SRS with radioactive isotopes Pu, Am are collected into a separate container, which is stored in one of the concrete vaults.

In the course of reconstruction works at "Ekores" site the new storage for sealed radioactive sources was constructed and commissioned in 2003. It consists of 7 wells for spent gamma-sources and 4 wells for alpha- and beta-sources. This storage is considered as a *long-term storage facility* with technical capability to take out sealed sources if it is necessary to remove its to another storage. For this matter the upper part of a well is movable and the weight of separate components does not exceed 2 tons.

The vaults for alpha- and beta-emitting isotopes have a simple structure, because of the powerful biological protection for its sources is not required.

The list of SRS which were incame to "Ekores" facility in 2008-2010 is given in Annex 1.

## D.3. Disposal facilities for decontamination waste of Chernobyl origin (DFDW)

Depending on specific activity or surface contamination of decontamination waste solid decontamination waste is disposed in DFDW. According to the engineering structure DFDWs are divided into three categories.

**DFDW-I** is a special engineering structure (reservoir), which intended for disposal of decontamination waste with the Cs-137 specific activity of 100 kBq/kg

and more, with reliable isolation using special engineering protective barriers and hydrotechnical measures, with the permanent system of radiation control of environment. Currently, there is only one such disposal facility – “Khatki”. It is situated in the South of Belarus Chernobyl exclusive zone, as several kilometres to the border with the Ukraine. It consists of 9 trenches, which equipped with concrete cells (3×3×3 m), where 3088 tons of radioactive meat with the total activity of $74{,}5\times10^{10}$Bq (20,14 Ci) were disposed in 1991.

**DFDW-II** is an engineering structure as near surface repository with clay protective barriers intended for disposal of decontamination waste with the Cs-137 specific activity from 1,0 kBq/kg to 100 kBq/kg. The arrangment of DFDW-II proved the possibility to realize the radiation control of environment. There are 9 DFDW-II: 4 – in Mogilev Region, 4 – in Gomel Region, 1 – in Brest Region. The summarized inventory data for all the DFDW-II, is given in Annex 2.

**DFDW-III** are near surface repositories for decontamination waste, which were generated in the primary post-accident period, constructed, as a rule, without designs and without taking into account the hydro-geological limitations in order to provide additional engineering measures and arrangments, environmental control. The total amount of DFDW-III is 79. Almost all of its were erected in extreme situation and equipped sporadically as a rule without designs in former pits, ravines, lowlands, sometimes in specially dug trenches or on flat sites. Only three of its have protection of basis in the form of a clay layer or a plastic foil, 11 of its have test bore holes for control over contamination of ground water.

As it was already mentioned, the collection, transportation and disposal of waste originated from the territory decontamination, as well as the construction, maintenance and radiation control of DFDW, are executed by specialized organizations as “Polesie”, “Radon”, “Brestoblselstroj” in Brest region (one – DFDW-II, two – DFDW-III).

## D.4. Radioactive sources repositories at the former deployment sites of the USSR military troops

Currently, one of the priority objectives in the sphere of radioactive waste management in Belarus is the provision of safety for radioactive waste disposal facilities, generated at sites of the former deployment of the USSR military troops.

According to the order of the Commission for Emergency Situations under the Council of Ministers of the Republic of Belarus in November 2008, the "Republican special response team" (abbrv. in Russian – ROSN) of the Ministry for Emergency Situations of the Republic of Belarus fulfilled a complex of works for liquidation of radioactive waste disposal facilities "Kolosovo". The regulation of woks was agreed with Gosatomnadzor, the Minsk Regional Center for Hygiene, Epidemiology and Public Health, Ministry of Defense, the "Ekores" storage facility.

As a result of the liquidation works, 23 containers with radionuclide sources (19 Cs-137 sources and 4 Co-60 sources) were extracted and transferred to “Ekores” storage facility.

The “Gomel-30” radioactive waste disposal facility is located in Retchitsa district of Gomel region. It was commissioned in 1964 at deployment site of military troops for the disposal of spent radionuclide sources of man-made origin.

The outer diameter of the facility is 1800 mm, the height is 2500 mm. The building structures of the walls, basis slab and top coating are made of 150 mm thick precast concrete elements. The basis slab and walls have metal 4 mm thick cladding of steel. There are bitumen insulations made in 2 layers inside on the metal surface and outside the facility on the concrete surface. There is a clay waterproof barrier around the perimeter of the external contour of the facility.

In order to investigate the spread (diffusion) of contamination there were drilled wells at the site both in the immediate vicinity and at varying distances far from the facility.

## Section E. LEGISLATIVE AND REGULATORY BASIS

### E.1. Implementing measures

Since the presentation of the third National report, there are changes took place in the Republic of Belarus in the sphere of improving the legislation and regulatory infrastructure in the sphere of nuclear and radiation safety. More detailed information is provided in the subsequent sections.

### E.2. Legislative and regulatory framework

An updated list of legislative and regulatory documents in the sphere of nuclear and radiation safety is provided in Annex 3.

The most important document, establishing the safety requirements for radioactive waste management, is the Law of the Republic of Belarus “On Radiation Safety of Population” [7]. In 2008 this Law was essentially amended and added about aspects of radiation safety, which relates to radioactive waste management.

In 2008 the Law of the Republic of Belarus “On the Use of Atomic Energy” came into force, which establishes the requirements for spent nuclear material and operational radioactive waste management and for repositories its also.

The Law of the Republic of Belarus “On Sanitary and Epidemic Well-being of Population” establishes the legal and organizational basis of preventing the harmful effects of the environmental factors on humane organism for the purposes of providing the sanitary and epidemic well-being of population. Article 33 of the Law provides requirements for the management of ionizing radiation sources, including radioactive waste.

The Chernobyl origin decontamination wastes management is regulated by the Law of the Republic of Belarus “On the legal regime of the territories, contaminated as a result of the Catastrophe at the Chernobyl Nuclear Power Plant” [13] and Sanitary regulations and norms “Management of decontamination wastes, resulting from the activity on overcoming the consequences of Chernobyl Catastrophe” (SPOOD-2004) [31]. The Law establishes a special legal status of the territories of

the Republic of Belarus contaminated as a result of the Chernobyl accident, and which is aimed for the reduction of radiation influence on the population and ecological systems, for conducting the remediation and protection arrangements, for the efficient use of the natural, economic and scientific potential of these territories.

The Decree of the President of the Republic of Belarus, dated September 1, 2010 № 450 “On Licensing of Certain Types of Activities” regulates the licensing relationships for the sphere of the use of atomic energy and ionizing radiation sources, including radioactive waste and spent nuclear materials management [16].

The Decree of the President of the Republic of Belarus, dated October 16, 2009, № 510 “On the Improvement of the Control (Supervisory) Activities in the Republic of Belarus” approved the Regulation on the organization and conduct of inspections. The Decree has also established that the Department on Nuclear and Radiation Safety (Gosatomnadzor) realizes the State supervision in the sphere of providing of nuclear and radiation safety [19].

The procedures of sanitary supervision and the competence of concerning organizations, which are responsible for sanitary supervision, are regulated by the Statute on State Sanitary Supervision in the Republic of Belarus, approved by the Act of the Council of Ministers of the Republic of Belarus № 1546 of November 17, 2006 [20].

The Act of the Council of Ministers of the Republic of Belarus № 2056 of December 31, 2008 approved the Statute for State Supervision on industry safety, transportation of dangerous goods and providing of nuclear and radiation safety [26].

The Act of the Council of Ministers of the Republic of Belarus № 562 of April 30, 2009 approved the Statute on the state registration of ionizing radiation sources and management of the united state system of accounting and control of ionizing radiation sources. The Statute established the procedure and the frequency of information provision for the state registration of radioactive waste in the united state system of accounting and control of ionizing radiation sources [25].

The requirements for safety of spent fuel management are provided by the “Safety rules for storage and transportation of nuclear fuel at complex of system for storage and spent fuel management systems” [35] and “Safety rules of storage and transportation of nuclear fuel at nuclear power facilities” [36].

On January 1, 2011 norms and rules on ensuring nuclear and radiation safety “Safety of radioactive waste management. General provisions” came into force. The document specifies the goals and principles of safety management of radioactive waste and establishes the general requirements for the safety of radioactive waste management. The rules introduced the need to develop the safety analysis report for radioactive waste management facilities [37].

On January 1, 2011 norms and rules on ensuring nuclear and radiation safety "Requirements for the structure and content of the safety analysis report for radioactive waste management facilities" came into force. The rules established the necessary list of information sufficient to ground the provision of the radiation safety level for the population, personnel and the environment during the operation of the radioactive waste management facility and after closing in accordance to requirements of legislation and regulation [38].

In the Republic in Belarus there is the Sanitary Regulations of Radioactive Waste Management (SPORO-2005) for radioactive waste classification, basic principles of radioactive waste management, radiation safety criteria for radioactive waste management, basic requirements for the safety of public and personnel at the stages of radioactive waste management (collection, storage, transportation, processing and disposal). SPORO-2005 establishes the requirements for radiation safety of the personnel and population in al types of radioactive waste management. These requirements don't apply to irradiated fuel and nuclear materials, industrial waste with high concentration of natural radionuclides, to the disposal of liquid waste in deep geological horizons (reservoir beds) [30].

The transportation of radioactive materials is regulated by Sanitary rules "Hygienic Requirements for Ensuring of Radiation Safety for Public during Transport of Radioactive Materials (Substances)" [33]. These requirements apply to shipment, transportation, transit storage, unloading and receipt of radioactive materials including radioactive waste during all types of transportation within the whole territory of the Republic of Belarus.

On January 1, 2011 the "Rules of safe transportation of dangerous goods by road transport in the Republic of Belarus" entered into force [34]. These rules determine general requirements and basic conditions of ensuring safe transportation of dangerous goods by road transport, regulate interactions, rights and obligations of the participants of dangerous goods transportation.

For the purpose of realization of the provisions of the Law "On Radiation Safety of Population" [7] in 2009 the Acts of the Ministry for Emergency Situations established:

the procedure for developing, approving and accepting the scheme of radioactive waste management [39];

the form of for radioactive waste transportation, as well as the procedure of its filling.

The Act of the Ministry of Health № 39 of March 31, 2010 approved the Sanitary norms, rules and hygienic standards "Hygienic requirements for nuclear power plants development and operation", which regulate the rules of radioactive waste and spent nuclear fuel management, generated as a result of a nuclear power plant operation [32].

The abovementioned documents constitute the basis of ensuring protection and safety of the population and staff from harmful effects of radiation, taking into account the requirements of the basic safety norms for protection from occupational exposure and population protection, and establish the licensing system for activities in the field of spent fuel and radioactive waste management.

### E.2.1. Licensing of activities in the sphere of spent fuel and radioactive waste management

The Decree of the President of the Republic of Belarus № 450 of September 1, 2010 "On Licensing of Certain Types of Activities" established the list of works and

(or) services, which constitute the activities in the sphere of atomic energy and ionizing radiation sources use [16].

Licensing of activities in the sphere of atomic energy and ionizing radiation sources is conducted by the Ministry for Emergency Situations.

Licensable activities, related to radioactive waste and spent fuel management, include the following constituting works and services:

1. For activities in the sphere of the atomic energy use:

design, siting, construction, operation and decommissioning of nuclear facilities and radioactive waste management facilities (or a selection from the abovementioned list of facilities);

nuclear materials, nuclear fuel, spent nuclear materials, spent nuclear fuel, operating radioactive waste management (or a selection from the abovementioned list of elements).

2. For activities on radioactive waste management:

decontamination, processing, storing, disposal of radioactive waste (or a selection from the abovementioned list of works);

design, siting, construction, decommissioning (or a selection from the abovementioned list of works) of radioactive waste storages.

3. Activities for the safety expertise in the sphere of atomic energy and ionizing radiation sources use:

safety expertise in the sphere of atomic energy use;

safety expertise in the sphere of ionizing radiation sources use.

Thus, the activities of spent fuel and radioactive waste management are carried out only on the basis of special permitions (licenses) issued by the Ministry for Emergency Situations of the Republic of Belarus. For the production of abovementioned operations organizations have also to receive permission from the Ministry of Health – the sanitary passport, which is a compulsory prerequisite for the application for a license.

## E.3. State administration and regulation of nuclear and radiation safety

According to Article 6 of the Law of the Republic of Belarus “On Radiation Safety of Population” [7] the state administration in the sphere of radiation safety is realized by the President of the Republic of Belarus, the Council of Ministers of the Republic of Belarus, the Ministry for Emergency Situations, the Ministry of Health, the Ministry of Natural resources and Environmental Protection, local executive and administrative authorities, another state institutions and organizations under the competence (see Annex 5).

**The President of the Republic of Belarus** in the sphere of radiation safety:

determines united state policy;

exercises other powers in accordance with the Constitution, this Law and other legislative acts.

**The Council of Ministers of the Republic of Belarus (the Government)** in the sphere of radiation safety under the competence:

ensures the implementation of united state policy;

arranges the development, approve and ensure implementation of national programs in the sphere of radiation safety;

determines in consultation with the President of the Republic of Belarus the list of ionizing radiation sources, which are restricted for movement across the customs border of the Republic of Belarus to import and (or) export on the grounds of non-economic nature;

establishes in consultation with the President of the Republic of Belarus the administrative means and conditions for the issuance of permitions for import and (or) export of ionizing radiation sources, limited to moving through the customs border of the Republic of Belarus on the grounds of non-economic nature;

establishes the administrative means of interaction of state administration, other state agencies and organizations in the detection of ionizing radiation sources, as well as in the case of its arrest when moving across the State Border of the Republic of Belarus;

establishes the administrative means for providing of the state supervision in the sphere of radiation safety;

establishes the administrative means for state registration of ionizing radiation sources and maintenance of the united state system of accounting and control of ionizing radiation sources;

establishes the administrative means for creating and maintaining the united state system for monitoring and recording of individual exposure doses;

approves the Statute of the National Commission of Belarus on Radiation Protection under the Council of Ministers of the Republic of Belarus and its staff;

makes the decision on radioactive waste management siting;

coordinates and organize the implementation of the obligations of the Republic of Belarus under the international treaties of the Republic of Belarus in the sphere of radiation safety;

establishes the administrative means of radiation monitoring;

approves the form of radiation-hygienic passport of an operator, the administrative means of its filling and use;

realizes other powers in accordance with the Constitution, other laws and acts of the President of the Republic of Belarus.**The Ministry for Emergency Situations of the Republic of Belarus** in the sphere of radiation safety under the competence**:**

takes measures for realization of united state policy;

coordinates the activities of state administration bodies, other state institutions and organizations;

organizes and carry out state supervision;

approves regulation acts in the sphere of radiation safety and also approve (implement) technical regulation acts;

issues and cancels permissions for import and (or) export of ionizing radiation sources restricted for movement across the border of the Republic of Belarus;

makes decisions on complete or temporary suspension of activities on ionizing radiation sources management and operation of radioactive waste management facilities until detected violations of requirements of normative legal acts and technical normative legal act in the sphere of radiation safety is eliminated;

establishes the administrative means of development, agreement and approval of a centralized scheme of radioactive waste management;

establishes the form and execution procedure of an accompanying certificate for transportation of radioactive waste;

realizes other powers in accordance with this Law and legislation.

**The Ministry of Health of the Republic of Belarus** in the sphere of radiation safety under the competence:

takes measures for realization of the united state policy;

approves (carry into effect) sanitary norms, rules and hygienic standards;

organizes and conduct the state sanitary supervision;

creates the united state system of monitoring and accounting of individual exposure doses of the population and ensure its functioning;

realizes other powers in accordance with this Law and legislation.

**The Ministry of Natural Resources and Environmental Protection of the Republic of Belarus** in the sphere of radiation safety under the competence:

takes measures for realization of the united state policy;

realizes the state control over observance of requirements for environmental protection;

arrange the radiation monitoring;

realizes other powers in accordance with this Law and other legislation.

**Local executive and administrative bodies** in the sphere of radiation safety under the competence:

organize work for ensuring radiation safety in their respective territories;

make the assessment of radiation safety;

organize the development and ensure the implementation of regional (territorial) programs in the field of radiation safety;

realize other powers in accordance with this Law and legislation.

**National Commission on radiation protection under the Council of Ministers of the Republic of Belarus** is an inter-branch consultative, scientific and expert body in the sphere of radiation safety, radiation protection and radiation control.

**State Committee on Standardisation** provides the accreditation of laboratories and radiation control stations, attestation of methods for performing of radiological measurements, and realizes the verification and metrological checking of measuring devices.

**National Academy of Sciences of the Republic of Belarus** carries out the scientific maintenance of works for improving of technologies and safety grounding in the field of radioactive waste management; takes part in development of corresponding legal basis.

Other state authorities and organizations in the sphere of radiation safety within its jurisdiction:

takes measures for realization of the united state policy;

make the assessment of radiation safety;

realize other powers in accordance with this Law and legislation.

According to Article 10-1 of the Law "On Radiation Safety of Population" [7] the state supervision in the sphere of radiation safety includes the following supervision of:

observance of the regulations in the sphere of radiation safety, ionizing radiation sources management;

observance of licensing requirements and conditions for the use of ionizing radiation sources by licensees;

radioactive waste management;

security of ionizing radiation sources, radioactive waste management facilities;

planning for emergency preparedness to ensure the safety of the workers (personnel) and the population in cases of radiation accidents.

The State supervision in the sphere of radiation safety is organized and implemented by the Ministry for Emergency Situations of the Republic of Belarus in the manner, prescribed by the Council of Ministers of the Republic of Belarus, as well as other state bodies under competence in accordance with legislation.

The State sanitary supervision in the sphere of radiation safety includes the supervision of the observance of sanitary norms, rules and hygienic standards for exposure by radon and gamma radiation from natural radionuclide, food production and consumption of drinking water, medical exposure, exposure by ionizing radiation due to work with ionizing radiation sources, for radioactive waste management.

The State sanitary supervision in the sphere of radiation safety is conducted by the Ministry of Health, other state authorities and organizations, engaged in the state sanitary supervision in the manner, prescribed by the Council of Ministers of the Republic of Belarus.

## E.3.1. Regulatory body

The Ministry for Emergency Situations is responsible for organization and conduct of state administration in the sphere of nuclear and radiation safety. The Ministry for Emergency Situations is authorized to approve regulation in the sphere of nuclear and radiation safety.

In order to carry out the state supervision in the sphere of nuclear and radiation safety the Department on Nuclear and Radiation Safety (Gosatomnadzor) was established in the Ministry for Emergency Situations (Annex 7). According to the Statute on the Department, the main tasks of Gosatomnadzor are:

the state supervision in the sphere of ensuring of nuclear and radiation safety;

control over observance of legislation requirments in the sphere of nuclear and radiation safety.

While conducting the state supervision Gosatomnadzor:

carries out inspection of:

implementation of the requirements of the legislation in the sphere of nuclear and radiation safety by operators;

organization of emergency preparedness and response;

readiness of troops for radiological emergency elimination of state authorities and organizations;

carries out analysis:

nuclear and radiation safety for operators activities;

accounting of and control for ionizing radiation sources, radioactive waste, nuclear materials by operators;

physical protection of dangerous radiation facilities;

causes of radiation accidents;

keeps records of radiation accidents and radiological incidents;

carries out the development of recommendations for emergency sustainability of operators;

takes measures to prevent, suppress violations of the requirements of legislation in the sphere of nuclear and radiation safety by operators;

participates in commissions for commissioning of dangerous radiation facilities;

appoint an extraordinary technical expertise or diagnostics of dangerous radiation facilities, as well as the expertise of its project and design documentation for observance to the requirements of legislation in the sphere of nuclear and radiation safety;

controls the terms of technical re-equipment of dangerous radiation facilities;

approves training, retraining and upgrade training programs of persons responsible for nuclear and radiation safety of operators, as well as those responsible for radiation control of operators; participates in the checking about implementation of programs and quality assurance procedures for these categories of professionals;

participates in the development and implementation of national, regional and specialized scientific and technical programs and concepts in priority areas of nuclear and radiation safety, atomic energy use;

makes decisions about full or partial suspension of activities on ionizing radiation sources, atomic energy use, dangerous radiation facilities operation under a violation of its normal operations or violations of legislation in the sphere of nuclear and radiation safety, which might cause or has caused loss of control for its sources of radiation.

**The Department on eliminating consequences of the catastrophe on the Chernobyl NPP of MES** implements measures to improve the sanitary state of the area of primary and subsequent evacuation zones, from which the population was resettled and of the settlements, related to the evacuation (alienation) zone of primary and subsequent resettlement, as well as other settlements that were evacuated, provides the maintenance of radioactive waste repositories system, generated as a result of eliminating the consequences of the Chernobyl disaster, and its safe operation.

The structure of the Ministry for Emergency Situations (without the Department on eliminating consequences of the catastrophe on the Chernobyl NPP), related to the safety of radioactive waste and spent fuel management, is presented in Annex 8.

## Section F. OTHER GENERAL SAFETY PROVISIONS

### F.1. Responsibility of the license holder

The license holders, conducting activities in radioactive waste and spent fuel management are responsible for radiation safety and ensure the fulfilment of the requirements of the Law of the Republic of Belarus "On Radiation Safety of Population" and the other acts of legislation in the sphere of radiation safety.

In accordance with the Regulation on licensing of activities in the sphere of atomic energy use and ionizing radiation sources, approved by the Decree of the President of the Republic of Belarus of September 1, 2010 № 450 a license applicant have to provide the following general requirements and conditions [16]:

to have at least 3 employees (technical managers, specialists) with the main occupation for this employer, having adequate to the licensed activities qualification, as well as trained, instructed and assessed as far as their knowledge of legislation in the sphere of nuclear and radiation safety, as duly to the manner prescribed by the Ministry for Emergency Situations;

to present the management and (or) quality control system of the licensed activity;

to be technical and software equipped (by technologies, devises, riggings, tools, techniques, documentation, software, etc.), corresponded to requirements of regulations in the sphere atomic energy use and ionizing radiation sources, allowing high quality provide of work and (or services in the licensed activity;

to be authorized for work with ionizing radiation sources (to have the sanitary passport) issued by competent authorities and organizations engaged in the state sanitary supervision.

As the activities for safety expertise in the sphere of atomic energy and ionizing radiation sources use, additionally, there is requirement about authorization the admission of Gosatomnadzor for specialists in order to provide the safety expertise in the sphere of atomic energy and ionizing radiation sources use.

For activities in the sphere of atomic energy use and radioactive waste management there is some additional requirements for the availability of documents justifying nuclear and radiation safety; the availability of at least two specialists responsible for the safe provision for works and (or) services of licensed activities; the correspondence of design, engineering and technical documentation to requirements of regulation; the provision of adequacy of the facility state, realized works and (or) services for licensed activity to design, engineering, technical documentation and documents justifying the provision of nuclear and radiation safety.

In addition, the activities on radioactive waste management require: correspondence of accounting systems, as well as physical protection of ionizing radiation sources, accounting for and control of individual exposure doses of the personnel and population with the requirements of regulation, the elaboration of the procedure of radiation safety control, approved by the Ministry for Emergency Situations and the Ministry of Health, as well as the plan of measures to protect

workers (personnel) and population from radiation accidents and its consequences (see Annex 6).

In addition to the above requirements for activities in the sphere of atomic energy use it is necessary:

the availability of appropriate storage conditions for nuclear materials, spent nuclear materials and (or) operational radioactive waste, the control and accounting system for such materials and substances, plans of measures to protect workers (personnel) and population from radiation accidents and its consequences, as well as preparedness to implement these plans;

the provision of adequate physical protection of nuclear facilities, ionizing radiation sources, repositories, nuclear materials and radioactive substances;

the ability to provide conditions for the safe termination of the licensed activity and decommissioning of the facility, as well as the availability of appropriate projects;

the granting of the positive issue for the state ecological expertise, conducted in accordance to legislation.

On the basis of Article 10 of the Law of the Republic of Belarus "On Radiation Safety of Population" [7], the operator has to realize the control over radiation safety of own facilities and activities. The monitoring procedure is determined by each operator especially, taking into account the features and conditions of real work, and agreed with the Ministry for Emergency Situations and the state authorities and organizations, engaged in the state sanitary supervision.

The implementation of legislation and regulation requirments is achieved within the established system of the state supervision over the safe provision of works in the sphere of nuclear and radiation safety and the system of the state sanitary supervision system. The state supervision system provides regular inspections to check the observance of the regulation requirments and license conditions. By the inspector' report, persons, which are responsible for or violating of the rules of radiation safety, may be subject to administrative (notice, fine) or criminal liability.

The liability for failure to carry out regulations in the sphere of radiation safety is determined by the Code of Administrative Violations [14] and the Criminal Code of the Republic of Belarus [15] (see Annex 4).

According to the Statute on the administrative means for state registration of ionizing radiation sources and the united state system of accounting for and control of ionizing radiation sources [25], the special enterprise "Ekores" provides information for the state registration of radioactive waste in the united system of accounting for and control of ionizing radiation sources, quarterly. Besides "Ekores" keeps a computerized database of income radioactive waste.

## F.2. Human and financial resources

The operator has to provide own radioactive waste management facilities with qualified personnel in the sphere of nuclear and radiation safety.

The Act № 55 of the Ministry for Emergency Situations of November 30, 2010 approved the Instructions for administrative means on the procedure for training,

instructing and assessing of the knowledge of regulation in the sphere of nuclear and radiation safety [41]. According to the requirements, specialists have to be trained on the nuclear and radiation safety not later than one month from the date of appointment and periodically, but at least once every five years.

Training of specialists is carried out in educational institutions (centers), authorized by Gosatomnadzor to realize the training, retraining and upgrade training of those responsible for nuclear and radiation safety, as well as those responsible for radiation control for the facilities and industries, supervised by Gosatomnadzor. Training of specialists is carried out in accordance with the curricula and programs approved by the head of institution, based on the model curricula and programs agreed with Gosatomnadzor.

The maintaining the necessary level of specialists' knowledge is also carried by instructions for providing of nuclear and radiation safety, as well as periodic testing of knowledge of regulations in the sphere of nuclear and radiation safety.

All radioactive waste facilities are managed by state-owned institutions, so the financial resources to maintain its safety during the lifetime and for decommissioning are provided and allocated from the state budget on the request of the licensee as duly. The funding for the activities to maintain the safety and institutional control of waste disposal at points deactivation of the Chernobyl origin is carried out under the State program of overcoming the consequences of the Chernobyl accident.

According to the Act of the Council of Ministers the Republic of Belarus №1329 "On Approval of the State Program on Specialists Training for Nuclear Power for the period of 2008-2020" of September 10, 2008 the financing of this program realized from the state budget [27]. Nowadays four Belarusian higher educational establishments provide training in the sphere of nuclear power.

Within the framework of this State Program, in 2009, specialists from Gosatomnadzor were trained in Non-state educational institution of additional professional education "Training Center of Nuclear and Radiation Safety" (Russian Federation) in accordance with program "Audit and expertise in the certification system of equipment, products and technologies for nuclear facilities, radiation sources and repositories" and got knowledge of the functioning of the certification system, as well as the procedure and methods for conducting of audits and examinations.

## F.3. Quality assurance

The necessity of arrangment the management and (or) quality control system is the general requirement for obtaining the special authorization (license) to carry out activities in the sphere of nuclear energy and ionizing radiation.

In accordance to "Safety of Radioactive Waste Management. General provisions", the operator, in order to ensure safety at all stages of work on radioactive waste management and safe operation of systems (elements), structures and components of the facility, develops and applies the quality assurance program [37].

The quality assurance program is carried out at all stages of the radioactive waste management facility life cycle, which includes site selection, construction

(including design), equipment manufacturing, commissioning, operation and decommissioning of radioactive waste management facilities. An integral part of the quality assurance is monitoring of its implementation. The basic responsibility for achieving the quality in performance of activities is assigned on personnel, who are charged to provide this work.

"Ekores" has developed the quality management system for radioactive waste management. The National authority for conformity assessment of the Republic of Belarus issued to "Ekores" the certificate about the quality management system meets according to requirements of STB ISO 9001-2009.

## F.4. Operational radiation protection

The Law of the Republic of Belarus "On Radiation Safety of Population" [7] established the following basic hygienic standards (acceptable dose limits) of radiation on the territory of the Republic of Belarus as a result of exposure to sources of ionizing radiation sources:

the average annual effective dose for population is 0,001 Sv or the effective dose for life (70 years) is 0,07 Sv; larger values of the effective dose are allowed in certain years, in condition that the average annual effective dose, calculated for five consecutive years, does not exceed 0,001 Sv;

the average annual effective dose for workers is 0,02 Sv or the effective dose for the period of employment (50 years) is 1 Sv; the exposure of the annual effective dose up to 0,05 Sv is allowable, in condition that the average annual effective dose, calculated for five consecutive years, does not exceed 0,02 Sv.

In order to maintain the radiation exposure of the population, personnel of radioactive waste management facility at a reasonably achievable low level, taking into account economic and social factors, there are the following measures according to regulation:

elaboration of safety analysis report;

determining and adoption of reference levels for the radiation factor exposure on the personnel and population with regard to the principle of optimization and efficiency of measures to improve the radiation situation;

creation of the work conditions, which corresponded to requirements of regulation, provision of all workers with personal protective equipment;

providing the systematic monitoring of the radiation situation at workplaces, in the facility site, in the sanitary protection zone and the surveillance zone, as well as of the injections and discharge of radioactive substances, which shall not exceed the prescribed limits;

realization of monitoring and accounting of individual exposure doses of the personnel and population in accordance with the requirements of the united state system for control for and accounting of radiation doses.

The effective exposure dose of population due to radioactive waste, including storage and disposal stages, have not exceed 10 μSv per year.

## F.5. Emergency preparedness

The requirements for radiation safety for radiation accidents are defined in Articles 17-19 of the Law “On Radiation Safety of Population” [7].

The operator has to elaborate, adopt and agree with the Ministry for Emergency Situations, the Ministry for Health and local administrative bodies the plan of measures to protect workers (personnel) and population from radiation accidents and its consequences. Requirements for the content of this plan are listed in Annex 6.

In addition, in accordance with Chapter IV of the OSP-2002 each facility must have "Instructions for the actions of personnel in emergency situations," which have to be known to whole personnel [29]. The facility design documentation have include a list of potential radiation accidents with a forecast of consequences, as well as including the chapter "Engineering and technical measures to prevent emergency situations", defining the nomenclature, amount and places of storing for personal protective equipment, medical supplies, the emergency reserve of radiometric and dosimetric equipment, decontamination and sanitary means, tools and equipment, needed to carry out urgent activities on liquidation of radiation accidents consequences.

Also the operator has:

to elaborate emergency response procedures and training programs for personnel actions in the event of an accident and to provide periodic (at least once every two years) conduct of these training, taking into account the current activities at the facility;

to provide the preparedness of personnel to act in the design basis accidents and beyond design basis accidents. In the relevant regulations and guidances there has be determined primary actions of the personnel to localize possible accidents and eliminate its consequences.

The administrative body of this system is the Ministry for Emergency Situations, which coordinates and organizes measures to prepare of preparedness for the specified types of accidents (see Annex 8). Measures include exercises, information exchange and the interactions with states which possess spent fuel or radioactive waste management facilities, the revision of plans, etc.

Safety requirements in carrying out measures to eliminate the consequences of radiation accidents are also determined in the norms and rules of nuclear and radiation safety "Safety of Radioactive Waste Management. General provisions" [37].

In 2010, IAEA experts within the EPREV mission assessed the national system of prevention and response to nuclear and radiation accidents of the Republic of Belarus. The main conclusion of the group is that Belarus has a reliable system of emergency preparedness and response, which needs to be reviewed in connection with the plans to build NPP in Belarus. The mission also gave recommendations for further improvement of the existing system of preparedness and emergency response in accordance with international requirements and standards.

### F.6. Decommissioning

In accordance with the requirements of the Law "On Radiation Safety of Population" [7] the complex of measures for decommissioning of radioactive waste management facility has be provided in the design in order to bring it to safe state for population and the environment.

The information about planned activities related to the decommissioning of the radioactive waste management facility is presented in the Safety analysis report.

The necessary technical and organizational measures for the decommissioning of the facility have been provided at the stage of design and construction for the facility also.

The operator prior before the expiration of the design life cycle has ensure the development of the decommissioning project that includes:

the organization of works for safe disposal of spent nuclear fuel from storage for subsequent transportation its outside;

decontamination in order to reduce the overall level for exposure of personnel and population during works;

carrying out the dismantling of the on-site facility equipment;

radioactive waste management;

organizational and technical measures to ensure radiation safety. On the design stage there has to be provided measures to ensure not exceeding the established limits for individual exposure doses of personnel during decommissioning activities;

assessment of radiation impact on the environment during the works;

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

the number and qualification of required personnel for the works;

measures to ensure safety for possible accidents in the process of the facility decommissioning;

organizational and technical measures to ensure physical protection.

The limits of basic equipment functioning have to be justified and the criteria for its replacement have to be established for the designing.

Before the beginning of the design work for the facility decommissioning the quality assurance program of works have to be developed.

Decommissioning works have to be carried out by the specially trained facility personnel or personnel of other organizations in the manner prescribed by legislation. Where necessary, personnel training should be carried out on models and simulators with imitation of basic operations for the forthcoming works.

## Section G. SAFETY OF SPENT FUEL MANAGEMENT

The necessary measures were taken in Republic of Belarus for the purpose of providing appropriate protection of the personnel, population and environment from the radiological risks connected with storage of spent fuel of the facility at PSI "JIPNR - Sosny" of the National Academy of Sciences of Belarus before its transfer to the Russian Federation.

All nuclear fuel is under IAEA Safeguards according to the Agreement between the Republic of Belarus and the International Atomic Energy Agency on the application of Safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons of April 14, 1995 (INFCIRC/495) during the whole period of its actual presence in territory and under jurisdiction of Republic of Belarus [1].

## Section H. SAFETY OF RADIOACTIVE WASTE MANAGEMENT

### H.1. General Safety Requirements

According to article 12 of the Law of Republic of Belarus "On Radiation Safety of Population" [7] every operator is obliged:

to plan and carry out actions for provision of radiation safety;

to realize the systematic working control of the radiation situation on workplaces and indoors, territories of the organizations, in the sanitary-protective zones and the surveillance zones, and to monitor of injection, discharge and disposal of radioactive substances;

to carry out the control and accounting of individual exposure doses of workers (personnel);

to carry out the training and attestation of managers and executive workers, specialists of control services, other persons, constantly or temporarily performing works with ionizing radiation sources, concerning the radiation safety provision;

to organize preliminary (at the beginning of work) and regular medical examinations for workers (personnel);

to regularly inform workers (personnel) about ionizing radiation levels on their workplaces and on the value of the collected individual exposure doses;

to inform the authorized state structures (the Ministry for Emergency Situations, the Ministry of Health) about emergencies and violations of process regulations, threatening to radiation safety;

to carry out the decommissioning of facilities;

to implement the conclusions, resolutions, instructions of the officials from the authorized state bodies, who are conducting administration, supervision and control in the sphere of radiation safety;

to provide the registration of radioactive waste according to the procedure according to legislation;

to carry out the assessment of efficiency of actions for provision of radiation safety;

to provide the realization of the rights of citizens in the sphere of radiation safety.

The operator is obliged to have a scheme of radioactive waste management elaborated by operator, approved by the Ministry for Emergency Situations, the Ministry of Natural Resources and Environmental Protection, the authorized state bodies and organizations, that conduct the state sanitary supervision, local executive and administrative bodies, taking into account the features and conditions of works, in order to plan and realize actions in the sphere of radiation safety [7].

In order to implement radioactive waste management it is necessary to provide:

keeping of radioactive waste formation at the minimum practically achievable level;

revealing of dangerous properties (toxicity, pathogenicity, explosion hazard, fire hazard, high reactivity, ability to form persistent organic pollutants during neutralization) of radioactive waste for the purpose of safe radioactive waste management;

collecting and separation of radioactive waste by types according to regulation.

Transportation of radioactive waste is allowed at the presence of the expedite passport for radioactive waste transportation.

Norms and rules on provision of nuclear and radiation safety “Safety of radioactive waste management. General provisions” establish requirements for the design and operational documentation, to the radiation control of facilities, for siting for long-term storage (disposal) of radioactive waste, to the quality assurance program, to the performance of actions on elimination of radiation accident, and also for the accounting for, monitoring and inventorying of radioactive waste [37].

OSP-2002 [29] indicates that during radioactive materials management it is necessary to provide:

minimum exposure of the personnel;

maximum automation and mechanization of the operations;

minimum injections and discharges of radioactive substances;

the reliability for operation of the process equipment.

These and other requirements, issuing from the liabilities of the Contracting parties under the third chapter of the Convention, are determined in the Sanitary Regulations of Radioactive Waste Management (SPORO-2005) [30] in details.

The requirements for the management of solid, liquid and gaseous, including combustible radioactive waste generated at NPP are established according to the Sanitary norms, rules and hygienic standards “Hygienic requirements for nuclear power plants development and operation” [32]. The requirements for the accounting for, radiation control during radioactive waste management, as well as for safety of radioactive waste transportation, are established.

The general safety requirements for radioactive waste management are established by legislation and regulation, which are indicated in section E.

## H.2. Existing facilities

There is realized the task for providing of radiation safety for whole facilities and activities listed in Section D.

In 2009 according to the established procedure, the design documentation was developed, and works on the reconstruction of specialized enterprise "Ekores" were started. According to the legislation and regulation the following principles of radioactive waste management are realized in the process decisions of the reconstruction project:

preliminary sorting of the incoming radioactive waste by categories in accordance SPORO - 2005 [30];

sharing of radioactive waste management systems of each category;

conditioning of radioactive waste and its identification upon the completion of this process;

separate storing of radioactive waste of different categories;

approval of the architecture and construction decisions providing simplified decommissioning technologies for radiation facility.

These specified methods will be applied not only to newly arriving waste, but also for the waste which is disposed in already sealed "old" repositories. Upon the completion of building and erection works on the 3rd launching complex, the waste from "old" repositories will be withdrawn, whenever possible, identified, processed and turned into conditioned forms that are suitable for long-term storage or transportation. According to the works performance schedule, the commissioning of the 3rd launching complex is planned in 2012.

**Decontamination waste repositories**

In order to prevent an unauthorized access and ensure the security of disposed waste the barrier and radiation hazard signs were installed around the perimeter of the disposal facilities. The sanitary protection zone of at least 500 m, where all kinds of activity, nonrelated to disposal facilities operation are restricted, there was established around the disposal facilities.

After filling up the DFDW-II and DFDW-III, the disposal facilities are covered with a clay shield with local ground of 1 m thick on the top.

The service organizations carry out the set of annual activities.

The ground water level is controlled in DFDWs monitor wells. To monitor the radionuclide migration from repositories to the ground water there is sampling of water.

The radiation monitoring and surveillance procedures are provided for both operating and closed DFDWs. The frequency of radiation monitoring activities and observation, the set of works for DFDW surveillance are issued in the Schedule of the radiation monitoring, surveillance and maintenance of disposal facilities of decontamination waste, elaborated by service enterprises annually.

For DFDW-I and DFDW-II the following types of radiation monitoring are realized:

measuring of the dose rate in regular control points;

measuring of the specific activity of Cs-137, Sr-90 in water samples from control wells not less than twice a year;

measuring of the ground water level in control wells.

At operating DFDWs the monitoring of the dose rate is conducted:

daily – in case of active works in places of the most probable contamination waste out (driveways, places of the machinery works for planning and unloading of waste);

at least once a month during the disposing - in 5 permanent control points out of the disposal container and within the barrier in accordance with the monitoring scheme.

At DFDW-III the dose rate are being measured in the control points. The number of control points for DFDW-III surveillance, depending on the area, is given in table H.2.1.

**Table H.2.1. The number of control points for supervision for DFDW-III surveillance, depending on the area**

| DFDW-III, ha | The number of control points |
|---|---|
| less than 0,01 | 1 |
| 0,01-0,10 | 4 |
| 0,11-0,50 | 8 |
| 0,51-1,00 | 15 |
| 1,01-2,00 | 25 |
| over 2,01 | 30 |

DFDWs control includes examinations of technical condition. The DFDW observation is realized, as a rule, simultaneously with radiation control procedure, as well as after floods, heavy rains, hurricane winds, etc. The visual inspection of technical equipments is conducted to examine condition of protection barrier, upper protective layer, radiation hazard signs and roads.

**Radioactive waste repositories in places of the former deployment of the USSR military troops**

In order to decrease radiological risks and to adjust the territories in accordance with the requirements of radiation safety, as well as the provision of necessary physical protection of ionizing radiation sources, in Republic of Belarus there is realized activities on searching and discovering of disposal facilities for radioactive waste, generated in places of the former deployment of the USSR military troops.

Such DFDW are the facilities, which do not have the official status within the framework of legislation, because there are no design documentation and no data on the placed ionizing radiation sources. Besides that, the facilities safety is not provided it's duly the organizational and technical surveillance and monitoring. The majority of the discovered DFDWs have not the proper physical protection endangering for unauthorized access to ionizing radiation sources.

About 30 known sites of the former deployment of strategic military troops, which may have disposal facilities of decontamination waste. The present result of the search is 12 such DFDWs.

As of 2010, 12 of such facilities have been monitored:

in Brest region - DFDW "Shereshevo", “Zamshany-1”, “Zamshany-2”;

in Vitebsk region - DFDW "Kursevichi", "Kosteni", "Farinovo";

in Gomel region - DFDW "Gomel-30";

in Grodno region - DFDW "Gezgaly", "Minojty", "Volkovtsy", "Vasyuki";

in Minsk region - DFDW "Kolosovo".

According to the results of preliminary radiometric and radiochemical studies, there is no essential Cs-137 and Sr-90 pollution of the ground near the disposal facility of radioactive waste and water in the wells.

It is planned to continue work on the search and inspection of DFDWs.

The decision to carry out the liquidation "Gomel-30" DFDW in two stages was approved by the Commission on Emergency Situations of the Council of Ministers of the Republic of Belarus:

I stage – carrying out of safety expertise for DFDW;

II stage – development of the technology and the procedure of liquidation of the facility, process of works, taking into account the results of safety expertise for DFDW.

Within the framework of the I stage of works performance, the safety expertise for DFDW "Gomel-30" was carried out by Scientific Research Institute of Fire Safety and Problems of Emergency Situations of the Ministry for Emergency Situations with the assistance of the Republican Special Response Team of the Ministry for Emergency Situations, as well as the Republican Center of Radiation Control and Environmental Monitoring of the Ministry of Natural Resources and Environmental Protection in October-December, 2010.

The works were carried out according to the procedures of the first stage of works on "Gomel-30" DFDW liquidation. The procedures were approved by Gosatomnadzor, the Republican Sanitary and Epidemiological Station of the Ministry of Health, PSI "JIPNR - Sosny" of the National Academy of Sciences of Belarus, "Ekores", as well as the administration of the organization, where the facility is located.

According to provided investigation, the internal filling of the well is a concrete matrix of different solidity. As the preliminary estimations, the volume of the column of the DFDW well, excluding the top and bottom plates, is 4,863 $м^2$, approximate weight is 12 tons.

The results of carrying out of the first stage of "Gomel-30" DFDW liquidation allowed to make the following issues:

1. The "Gomel-30" DFDW design, in general, corresponds to the standard design of repository № 62-II-04 (the height is 2,4 m from the ground, the diameter of the well is 1,76 m).

2. The radionuclide composition of the disposed sources includes Cs-137 and Co-60 radioactive isotopes.

3. Currently the condition of the constructional materials of the DFDW radiation protection provides necessary tightness and protection from radionuclide penetration into the environment.

4. Currently there is no threat of the irradiation of the population and workers of nearby facilities above the established dose limits, providing that the organization of necessary physical protection of the DFDW is provided.

5. The technical condition and constructive scheme of the DFDW demonstrate the ability of the structure to resist dismounting and transport loads.

On the basis of the above mentioned data there was issued, as reasonable, to develop the technology and procedure of the liquidation of temporary disposal

facility of radioactive waste "Gomel-30" by the direct removal for the long-term storage at "Ekores" of the whole well column with disposal radioactive sources without fragmentation.

In accordance with the decision of the Commission on Emergency Situations of the Council of Ministers of Belarus the second stage of works on DFDW "Gomel-30" liquidation is planned to be performed after the reconstruction of "Ekores". Currently, placing DFDW "Gomel-30" at "Ekores" is not possible with regard to the existing restrictions on weight and volume of accepted radioactive waste.

## H.3. Siting and design

The Law "On the Use of Atomic Energy" [8] and the Law "On Radiation Safety of Population" [7] establish requirements for the activities on siting, designing and construction of radioactive waste management facilities.

The siting of radioactive waste management facilities is carried out according to the decision of the Council of Ministers of the Republic of Belarus, taking into account proposals of related republican state authorities. The provision of territories and depths for siting of such facilities is realized according to administrative means on protection and use of land and depths legislation.

The development of the design documentation on radioactive waste management facilities is carried out in accordance with the requirements of the legislation on building, architecture and town planning, environmental protection and rational use of natural resources, sanitary and epidemic well-being of the population.

During the designing of radioactive waste management facilities the factors, influencing the safety of those facilities both in its operation, and after its decommissioning, are taking into account. The environmental impact assessment is prepared for those facilities and activities in according to the legislation environmental protection.

The requirements for the siting, designing of radioactive waste management facilities are established by the Basic Sanitary Rules of providing radiation safety (OSP-2002) [29], as well as Chapter 8 of the Sanitary Regulations of Radioactive Waste Management (SPORO – 2005) [30].

The sites for the construction of specialized radioactive waste management institutions must have the following properties:

located in low populated, flood-free territories;

having a steady wind mode;

restricting the possibility of spreading radioactive substances outside the industrial site of the facility due to its topographical, geological and hydro-geological conditions.

The site for a new facility to be built have to correspond with its potential radiation, chemical and fire hazards for the population and the environment.

The siting of specialized radioactive waste management institutions have be estimated to the influence of meteorological, hydrological and seismic factors on the designed facility safety during normal operation and in case of an emergencies.

The general requirements for the design documentation of radioactive waste management facilities are established by norms and rules «Safety of radioactive waste management. General provisions» [37].

## H.4. Safety assessment

In accordance with Article 11 of the Law "On Radiation Safety of Population" [7] the safety assessment for facilities is conducted by the following directions and parameters:

description of radioactive contamination of the environment;

analysis of effectiveness for measures on radiation safety and observance of norms, rules and sanitary guidelines;

probability of radiation emergencies and its estimated scale;

level of preparedness for efficient elimination of emergencies and its consequences;

analysis of exposure doses from all ionising radiation sources to certain groups of population;

number of people, exposed to radiation beyond the defined level of radiation dose.

The assessment issues are annually registered in the radiation-sanitary passport of the facility, which is the main document confirming its safety for the personnel, population and the environment.

The preparation of Safety assessment report to justify the safety for radioactive waste management facilities is required according regulation [37]. This report is elaborated for safety justification for radioactive waste management facilities, both for the period of its operation, and after its decommissioning. Now in order to implement of safety requirements, "Ekores" develops Safety assessment report.

## Section I. TRANSBOUNDARY MOVEMENT

The Law "On the Legal Regime of the Territories, Contaminated as a Result of a Catastrophe at the Chernobyl Nuclear Power Plant" determines that "the receiving of radioactive waste for disposal from outside of Belarus is prohibited, except for the cases of return of radioactive waste, originated from the services provided by another country to the Republic of Belarus and which are covered under the agreement about return of waste to the Republic of Belarus" **[**13**]**.

According to the Law of the Republic of Belarus "On Radiation Safety of Population" [7] the import of radioactive waste for the storage or disposal purposes are allowed only for the radioactive waste generated within the territory of the Republic of Belarus. The procedure is regulated by mentioned law and legislation on the use of atomic energy.

Since the 6$^{th}$ of July, 2010 the Customs Code of the Customs Union concluded by the Republic of Belarus, the Republic of Kazakhstan and Russian Federation entered into force [3]. The Decision of the Customs Union Commission № 240 of April 16, 2010 "On the control of ionizing radiation sources' movement" defines that

for the purpose of ensuring control over radiation sources' movement and for preventing its unauthorized import to the Customs territory of the Customs Union, before the completion of the joint export control measures development within the framework of the Customs Union, member states of the Customs Union make arrangements to control the movement of ionizing radiation sources according to the national legislation.

Import and (or) export of radiation sources across the border of the Republic of Belarus is allowed in case of availability of the appropriate authorization issued by Gosatomnadzor.

The list of radiation sources restricted for movement across the border of the Republic of Belarus on non-economical grounds is regulated by the Act of the Council of Ministers of the Republic of Belarus № 1397 "On Certain Issues of Transporting Certain Kinds of Goods across the Customs Border of the Republic of Belarus" of September 23, 2008 [21].

The permission for spent fuel and radioactive waste transit or for own fuel and waste export for utilization in another country can be issued in case the state of destination agrees the receiving those materials and has administrative and technical possibilities to realize this (it have to be confirmed by appropriate documents).

According to the Act of the Council of Ministers of the Republic of Belarus № 560 of April 30, 2009 state authorities' competences in the case of finding out ionizing radiation sources, as well as its arrest during transportation across the State Border of the Republic of Belarus, are established. The Customs service and Border service bear responsibility for detection of illicit trafficking of nuclear and radioactive materials across the State Border of the Republic of Belarus and inform the relevant administration bodies about cases of illicit trafficking [22].

The State Border Committee of Belarus fulfills the obligations in the sphere of combating illicit trafficking of nuclear and radioactive materials provided by the Joint Convention and by involving into international technical cooperation projects. This is an issue of special importance with regard to the measures being taken by the world community in the struggle against international terrorism, taking into account that the Republic of Belarus is a transit country with a great flow of cargos crossing the boundary and it has a common border with the European Union.

In order to organize the proper work on combating illicit trafficking of nuclear and radioactive materials the State Border Committee of Belarus cooperates with the IAEA and other international states and organizations. In April 2011 the working meeting on finalization of the Integrated plan for nuclear security of the Republic of Belarus was held in the headquarters of the IAEA and carrying out of this plan was organized.

Within the framework of cooperation with the Initiative of the United Nations Development Programme, called "Environment and Security" (ENVSEC), the work on the project's realization was planned in 2011-2012. This project provides the evaluation of radiation-ecological situation on the section of the State border, passing through the zone of radioactive contamination from the Chernobyl accident in order to provide the further border control strengthening and prohibiting of illicit trafficking of nuclear and radioactive materials in this direction.

In July 2011 the realization of the Project with the Committee on Cooperation in the sphere of nonproliferation of nuclear weapons of Japan, aimed at modernization of the system for combating illicit trafficking of nuclear and radioactive materials at the State Border of the Republic of Belarus was finished. Within the framework of this Project four mobile laboratories as well as radiation control equipment were set up in order to strengthen the protection of the State Border, radiation safety training class in the Public educational institution "Institute of Frontier Service of the Republic of Belarus" was arranged, the departmental centre and regional sites to respond to radiological incidents at the State Border were deployed.

All troops of the Border service are involved in the protection of state border, including the prevention of illicit trafficking of nuclear and radioactive materials. During the routine tasks by the Border Service specialists no facts of illicit trafficking of nuclear materials have been detected. Since 2007 to the present there were prevented 14 attempts of illicit trafficking of radioactive materials.

Despite the efforts made in the field of combating illicit trafficking of nuclear and radioactive materials, the ongoing activity requires further continuation and development with the participation of involved state authorities of the Republic of Belarus and neighbouring countries, as well as international support. Nowadays, the border points require additional equipment with stationary and mobile radiation detection systems as well as portable radiation detection devices.

The issue of the establishment of an Integrated system for combating nuclear terrorism and illicit trafficking of radioactive materials and its subsequent integration with the State system of response to emergencies needs to be resolved. The establishment of this complex will strengthen nuclear security in the Republic of Belarus, will increase the efficiency and effectiveness of measures for smuggling of nuclear and radioactive materials and, thus, will contribute to the efforts of the international community on suppression to international terrorism.

## Section J. DISUSED SEALED SOURCES

Sealed radionuclide sources, which are not intended for further use, are considered to be radioactive waste as far as the regulatory aspect is concerned.

Use or storage of a sealed radionuclide source should be stopped after the termination of the designated service life. It is acceptable to consider the question on the prolongation of the term of sealed radionuclide sources operation in justified cases, when the radiation parameters are preserved within the satisfactory limits, tightness is preserved and detected defects together with its signs are absent. The operator have to develop and agree with the bodies, which conduct supervision in the sphere of radiation safety, on a program for the re-examination of the sealed radionuclide source, in order to prolongate the operation term of the sealed radionuclide source.

Radionuclide sources after its decommissioning are transferred to "Ekores" for long-term storage.

Legislation allows to import radioactive waste with a view of its storage or disposal within the territory of Belarus, only if this radioactive waste was generated in the Republic of Belarus [7].

The close corporation «Isotope technologies» carries out delivery of sources of ionizing radiation outside the border of Belarus. Existing practice provides return to the manufacturer to Belarus the withdrawn from the use radioactive sources. The Republic of Belarus has undertaken the obligation on the fulfillment of the provisions of the Code of behavior on safety and safety of radioactive sources.

## Section K. PLANNED ACTIVITIES TO IMPROVE SAFETY

As it is obvious from the previous sections, the fulfillment of the obligations of the Republic of Belarus under the Convention [2] has been conducted in coordination with the development of legislation, regulation and infrastructure for providing of radiation safety. The following elements of the framework were realized and further there are planning to improve:

the licensing system;

the system of prohibition of unauthorized facility operation without a license;

the system of the corresponding departmental, as well as regulating control and supervision;

documentation and reports;

the system of maintenance of performance of existing regulating provisions and license conditions;

maintenance of emergency preparedness plans preparation, etc.

The priority directions of the planned activity in the field of radioactive waste management include:

further development of the legislation in the sphere of radioactive waste management in conformity with the requirements of the national laws and international agreements and recommendations;

completion of reconstruction of the radioactive waste repository of "Ekores" and its radioecological safety;

providing of long-term safety for radioactive sources repositories in the places of former deployment of military troops of the Soviet Union.

* * *

In conclusion, it is necessary to emphasize, that the safety system of radioactive waste management and spent fuel management continues to improve. On the part of the Government, regulative bodies of the Republic of Belarus it will be necessary to make considerable efforts, to provide financial and other means for development of management system according to the Convention provisions.

The integrated activities of Contracting parties for realization of the Joint Convention' provisions will trend to joint aspiration for support high level of radioactive waste and spent fuel management safety of countries and in the world.

**Annex 1**

## The list of SRS which were brought to Ekores facility in 2002-2010

| **Year** | **α-emitter** quantity, items activity, Bq | **β-emitter** quantity, items activity, Bq | **γ-emitter** quantity, items activity, Bq | **n-emitter** quantity, items activity, Bq |
|---|---|---|---|---|
| 2006 | 8320<br>$2{,}51 \cdot 10^{10}$ | 399,00<br>$1{,}65 \cdot 10^{11}$ | 1661<br>$2{,}72 \cdot 10^{14}$ | 2<br>$7{,}20 \cdot 10^{11}$ |
| 2007 | 6795<br>$1{,}4 \cdot 10^{10}$ | 1316<br>$9{,}94 \cdot 10^{11}$ | 1730<br>$3{,}62 \cdot 10^{14}$ | 5<br>$3{,}76 \cdot 10^{11}$ |
| 2008 | 3908<br>$3{,}12 \cdot 10^{10}$ | 272<br>$2{,}41 \cdot 10^{10}$ | 300<br>$3{,}43 \cdot 10^{12}$ | 6<br>$1{,}81 \cdot 10^{9}$ |
| 2009 | 2115<br>$2{,}17 \cdot 10^{10}$ | 1226<br>$2{,}01 \cdot 10^{10}$ | 534<br>$1{,}9 \cdot 10^{14}$ | 3<br>$3{,}4 \cdot 10^{10}$ |
| 2010 | 3320<br>$3{,}7 \cdot 10^{10}$ | 149<br>$8{,}43 \cdot 10^{9}$ | 253<br>$3{,}71 \cdot 10^{15}$ | 10<br>$3{,}06 \cdot 10^{12}$ |

**Annex 2**

## Summarized inventory data on the decontamination waste of Chernobyl origin

### DFDW-II characteristics

| | |
|---|---|
| Number and location | 4 - Gomel Region<br>4 - Mogilev Region<br>1 - Brest Region |
| Total area, $m^2$ | 315 200 |
| Total capacity, $m^3$ | 244 465 |
| Total activity, Bq | $15{,}9\times10^{11}$ |
| Total weight, $10^3$ kg | 236 501 ($\approx$160 000 $m^3$) |

**Annex 3**

## The Updated List of basic legislation and regulation in the sphere of Nuclear and Radiation Safety

### Multilateral and Bilateral International Agreements

1. Treaty of the Non-Proliferation of Nuclear Weapons.
2. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.
3. The Customs Code of the Customs Union. Entered into force on July 6, 2010.
4. Resolution of the Commission of the Customs Union № 240 of April 16, 2010 “On the control of ionizing radiation sources movement”.
5. Vienna Convention on Civil Liability for Nuclear Damage.
6. Convention on Nuclear Safety.

### Legislative Acts

7. Law of the Republic of Belarus “On Radiation Safety of Population” of January 5, 1998.
8. Law of the Republic of Belarus “On the Use of Atomic Energy” of July 30, 2008.
9. Law of the Republic of Belarus “On the Protection of the Population and Territories against Natural and Technology Related Emergencies” of May 5, 1998.
10. Law of the Republic of Belarus “On Export Control” of January 6, 1998.
11. Law of the Republic of Belarus “On Technical Normation and Standardization” of January 5, 2004.
12. Law of the Republic of Belarus “On Sanitary and Epidemic Well-being of Population of November 23, 1993.
13. Law of the Republic of Belarus “On the Legal Regime of the Territories Contaminated as a Result of the Catastrophe at the Chernobyl Nuclear Power Plant” of November 12, 1991.
14. Code of Administrative Violations of the Republic of Belarus of April 21, 2003.
15. Criminal Code of the Republic of Belarus of July 9, 1999.
16. Decree of the President of the Republic of Belarus № 450 “On Licensing of Certain Types of Activities” of September 1, 2010.
17. Decree of the President of the Republic of Belarus № 565 “On certain measures for NPP construction” of November 12, 2007.
18. Decree of the President of the Republic of Belarus № 502 “On Prohibitions and Restrictions of Movement of Certain Kinds of Goods across the Customs Border of the Republic of Belarus” of October 15, 2007.
19. Decree of the President of the Republic of Belarus № 510 “On the Improvement of the Control (Supervisory) Activities in the Republic of Belarus” of

October 16, 2009.

## Acts of the Council of Ministers of the Republic of Belarus

20. Resolution of the Council of Ministers of the Republic of Belarus №1546 “On the Approval of the Regulation on State Sanitary Supervision in the Republic of Belarus” of November 17, 2006.

21. Resolution of the Council of Ministers of the Republic of Belarus №1397 “On Certain Issues of Transporting Certain Kinds of Goods across the Customs Border of the Republic of Belarus” of September 23, 2008.

22. Resolution of the Council of Ministers of the Republic of Belarus № 560 “On the approval of the regulation on the interaction procedures of State Governmental authorities, other state bodies and agencies in the event of revealing ionizing radiation sources, as well as its arrest during transportation across the State Border of the Republic of Belarus” of April 30, 2009.

23. Resolution of the Council of Ministers of the Republic of Belarus № 797 “On radiation-hygienic passports for operators, the manner of its keeping and use and on repealing of Resolution of the Council of Ministers № 391 of March 23, 1999" of June 24, 2006.

24. Resolution of the Council of Ministers of the Republic of Belarus № 929 “On the unified state system of control and accounting of individual exposure doses” of June 17, 1999.

25. Resolution of the Council of Ministers of the Republic of Belarus №562 “On the approval of the Regulation on the state registration of ionizing radiation sources and management of a unified state system of accounting and control of ionizing radiation sources” of April 30, 2009.

26. Resolution of the Council of Ministers of the Republic of Belarus №2056 “On certain issues of state supervision in the sphere of industrial safety, safety of dangerous cargo transportation, nuclear and radiation safety” of December 31, 2008.

27. Resolution of the Council of Ministers of the Republic of Belarus №1329 “On Approval of the State Program on Specialists Training for Nuclear Power of the Republic of Belarus for the Period of 2008-2020” of September 10, 2008.

## Regulations of the Republican State Authorities

28. Hygienic standards 2.6.1.8-127-2000 “Radiation Safety Norms (NRB-2000”. Approved by the Resolution of the Chief State Medical Officer of the Republic of Belarus № 5 of January 25, 2000.

29. Sanitary regulations and norms 2.6.1.8-8-2002 “Basic sanitary regulations of radiation safety (OSP-2002)”. Approved by the Resolution of the Chief State Medical Officer of the Republic of Belarus № 6 of February 22, 2002.

30. Sanitary Regulations of Radioactive Waste Management (SPORO-2005) 2.6.6.11-7-2005. Approved by the Resolution of the Chief State Medical Officer of

the Republic of Belarus № 45 of May 7, 2005.

31. Sanitary regulations and norms 2.6.6.8-8-2004 “Management of decontamination wastes, resulting from the activity on overcoming the consequences of Chernobyl Catastrophe” (SPOOD-2004). Approved by the Resolution of the Chief State Medical Officer of the Republic of Belarus № 121 of November 23, 2004..

32. Sanitary norms, rules and hygienic standards “Hygienic requirements for nuclear power plants development and operation”. Approved by the Resolution of the Ministry of Health № 39 of March 31, 2010.

33. Sanitary regulations and norms 2.6.1.13-60-2005 Hygienic Requirements for Ensuring Radiation Safety of Population during Transport of Radioactive Materials (Substances)”. Approved by the Resolution of the Chief State Medical Officer of the Republic of Belarus № 284 of December 30, 2005.

34. Rules of safe transportation of dangerous cargo by road transport in the Republic of Belarus. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 61 of December 8, 2010.

35. Safety rules of storage and transportation of nuclear fuel at networks of storage and spent fuel management systems. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 72 of December 30, 2006.

36. Safety rules of storage and transportation of nuclear fuel at nuclear power facilities. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 72 of December 30, 2006.

37. Rules and regulations on ensuring nuclear and radiation safety “Safety of radioactive waste management. General provisions”. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 47 of September 28, 2010.

38. Rules and regulations on ensuring nuclear and radiation safety “Requirements for the structure and content of the report on the safety analysis of radioactive waste management facilities”. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 64 of December 13, 2010.

39. Instructions on the procedure of developing, approving and accepting the radioactive waste management scheme. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 21 of April 30, 2009.

40. Instructions on the procedure of execution of the radioactive waste transportation accompanying certificate, as well as the form of the radioactive waste transportation accompanying certificate. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 20 of April 30, 2009.

41. Instructions on the procedure for training, instructing and assessing of the knowledge of regulations, including technical regulations in the sphere of nuclear and radiation safety. Approved by the Resolution of the Ministry for Emergency Situations of the Republic of Belarus № 55 of November 30, 2010.

**Annex 4**

## Articles of the Criminal Code of the Republic of Belarus, regulating liability for violations in the sphere of radiation safety

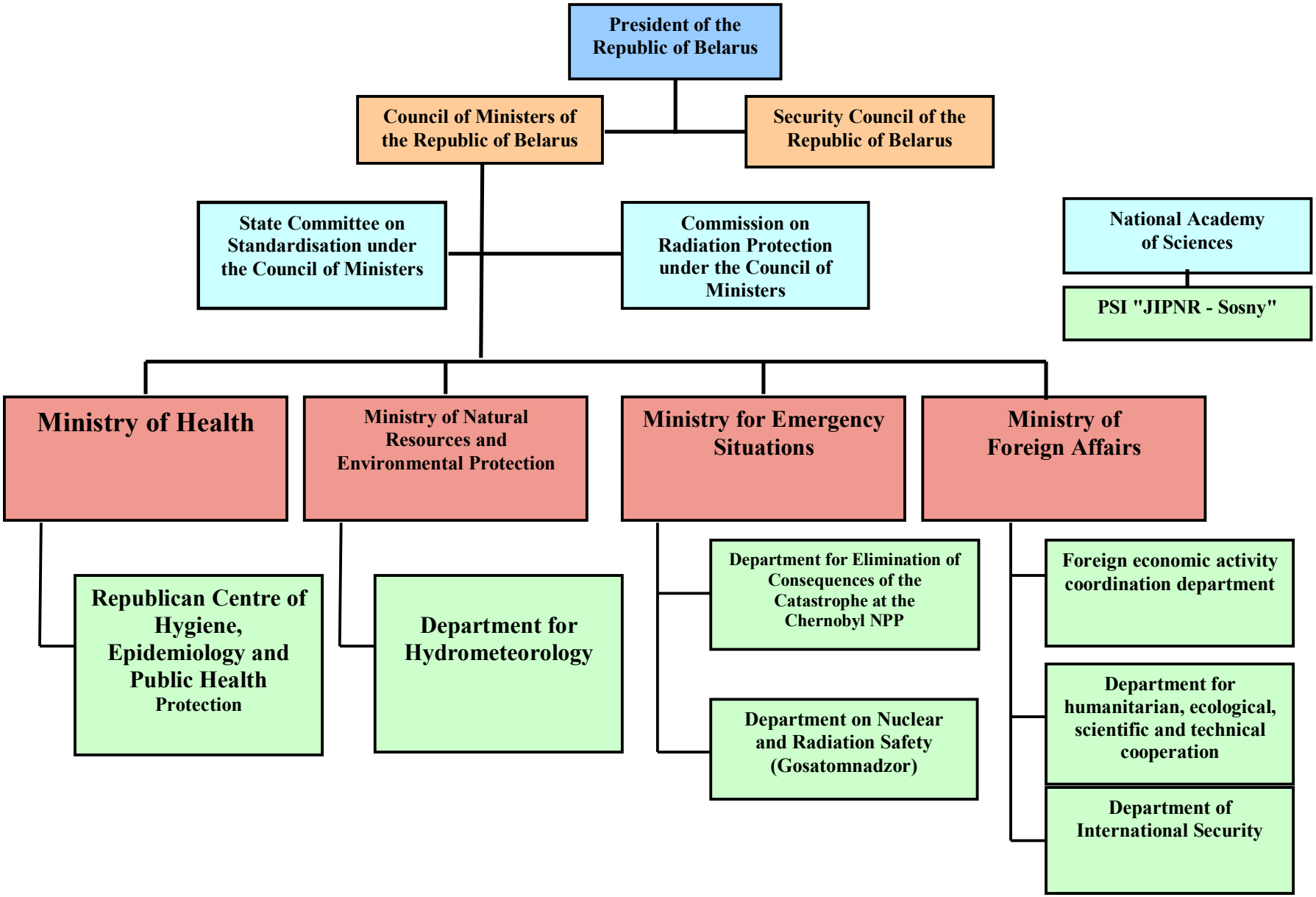
| Article | Content |
|---|---|
| **268** | Hiding or deliberate distortion of the information concerning with environmental contamination |
| **278** | Violation of safety rules radioactive substances management |
| **301** | Violation of industrial and technical rules or safety rules at the facilities with the use of nuclear energy |
| **322** | Illicit radioactive material management |
| **323** | Theft of radioactive materials |
| **324** | Threat of the dangerous use of radioactive materials |
| **325** | Violation of radioactive material management rules |
| **326** | Violation of radiation control rules |

## Articles of the Code of Administrative Violations of the Republic of Belarus, regulating liability for violations in the sphere of public health

| Article | Content |
|---|---|
| **16.3** | Violation of the requirements of the radiation safety regime in the areas affected by radioactive contamination |
| **16.4** | Violation of radiation control rules |
| **16.5** | Application of radiation equipment, which did not pass the technical control or it is in a faulty condition, for diagnostic or therapeutic purposes |
| **16.6** | Violation of regulations in the sphere of nuclear and radiation safety |

**Annex 5**

## State Authorities Responsible for Radiation Safety



**Annex 6**

## The plan of measures to protect workers (personnel) and population from radiation accidents and its consequences

Forecast of possible emergencies at a radiation facility considering the probable reasons, types and scenarios of the emergency, and also of the emergency situations expected at different types of emergencies;

Criteria for making decisions on taking protective measures;

List of participating organization involved in elimination of the emergency and its consequences;

Organization of emergency radiation control;

Assessment of the character and the scale of the emergency;

Procedure of coming into force of an emergency plan;

Notification and information procedure;

Personnel actions during an accident;

Responsibilities of officials during emergency works;

Measures of personnel protection;

Fire prevention;

Measures of population and environment protection;

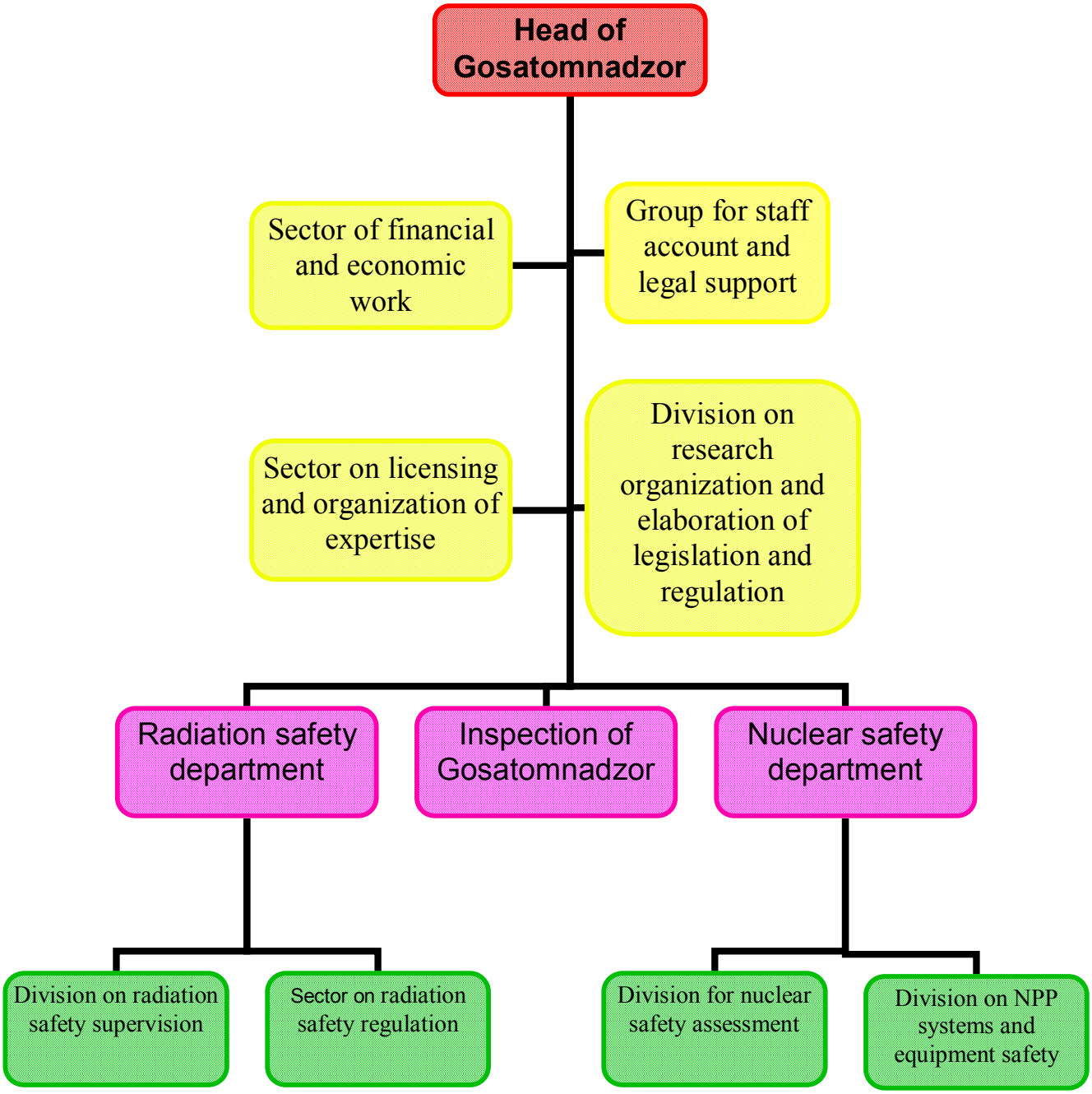
Medical assistance of injured persons;

Measures on localization and elimination of the contamination source;

Personnel training of the actions in case of a radiation emergency.

**Annex 7**

## The structure of Gosatomnadzor (the main part)



**Annex 8**

**The structure of the Ministry for Emergency Situations**
**(without the Department on eliminating consequences of the catastrophe on the Chernobyl NPP),**
**related to the safety of radioactive waste and spent fuel management**