



**NATIONAL REPORT
OF THE REPUBLIC OF BELARUS**

**UNDER
CONVENTION ON NUCLEAR SAFETY**

**MINSK
2013**

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ABBREVIATIONS

AMS – automatic measurement sites
ARSMS – automated radiation situation monitoring system
ARMS – automated radiation monitoring system
NPP – nuclear power plant
PSA – probabilistic safety analysis
VVER – water-cooled power reactor
PSI “JIPNR-Sosny” – Public Scientific Institution “Joint Institute for Power and Nuclear Research – Sosny” of the National Academy of Sciences of Belarus
Gosatomnadzor – Department for Nuclear and Radiation Safety of the Ministry for Emergency Situations of the Republic of Belarus
PI “DSAE” – Public Institution “Directorate of NPP Construction”
PI RCRCEM – Public Institution “Republican Center for Radiation Control and Environmental Monitoring”
UNECE – United Nations Economic Commission for Europe
LRW – liquid radioactive wastes
CJSC – closed joint-stock company
INIR – Integrated Nuclear Infrastructure Review IAEA mission
CNS – Convention on Nuclear Safety
LRC – local response centers
IAEA – International Atomic Energy Agency
ICRP – International Commission on Radiological Protection
MES – Ministry for Emergency Situations of the Republic of Belarus
SAR – safety assessment report
GPSE – general provisions of safety ensuring
EIA – environmental impact assessment
OSP-2002 – Sanitary Regulations and Standards 2.6.1.8-8-2002 “Main Sanitary Rules for Radiation Safety (OSP-2002)”
TSO – technical support organization
PC – pre-commissioning
PSAR – preliminary safety assessment report
RW – radioactive wastes
RF – reactor facility
RRC – regional response centers
CIS – Commonwealth of Independent States
SPORO-2005 – Sanitary Rules for Radioactive Waste Management (SPORO-2005) 2.6.6.11-7-2005
TCCP – technical code of common practice
SRW – solid radioactive wastes
OO – operating organization (operator)
EPREV – Emergency Preparedness Review IAEA mission
NF – nuclear fuel
TCP – Technical Code of Practice

INTRODUCTION

The Sixth regular National Report prepared in accordance with Article 5 of the Convention represents fulfillment of the commitments undertaken by the Republic of Belarus within the framework of the Convention, taking into account the decision made at the state highest level to build the first NPP in the country, and the actions of all the involved state agencies and organizations of Belarus for this project implementation.

Regulatory and legal base is formed in the Republic of Belarus for licensing of activities on implementation of a nuclear power project on construction of the first NPP. The legal basis for use of nuclear energy is the Law of the Republic of Belarus "On Use of Atomic Energy" that regulates all relations associated with siting, design, construction, commissioning, decommissioning of a nuclear facility and (or) storage facility, as well as relations associated with nuclear materials and (or) operational radioactive wastes, and other relations in the field of nuclear energy use.

At the national level the Republic of Belarus takes all the necessary measures to ensure that the fundamental principles of nuclear safety are observed at all stages of the life cycle of the NPP being built in the Republic of Belarus. Public Institution "Directorate of NPP Construction" is stated to be an operator (operating organization) of the NPP in accordance with international standards on the matter of responsibility for nuclear plants safety and in accordance with international agreements on responsibility for caused nuclear damages. By the decision of the Government of the Republic of Belarus for the purpose of efficient organization and implementation of supervision (control) activity at the stage of construction of NPP there was created the working group to coordinate state supervision (control) of the NPP construction.

On May 31, 2012 Public Institution "Directorate for Nuclear Power Plant Construction" was granted with a license for the NPP siting at the Ostrovetskaya site in Grodno region. The licensee for the NPP siting has the right to realize activities for atomic energy use as NPP siting (in accordance with the international practice such activity includes conducting of engineering survey and research at the place of the power unit siting and conducting of primary works of the preparatory construction period before concreting to foundation slabs of main buildings and structures).

The Report article by article covers activities of the state on implementation of the Convention provisions, specifies milestones in the development of infrastructure for nuclear and radiation safety regulation in Belarus. Special attention is given to changes occurred in the legislative and regulatory framework related to nuclear and radiation safety while use of nuclear energy. The Report reflects work and measures of personnel training, ensuring of safety priority, implementation of radiation protection, organization of the emergency preparedness system, etc.

While the Report preparation, there were used materials of self-assessment of national potentialities prepared for the *Integrated Nuclear Infrastructure Review (INIR)* mission held in the Republic of Belarus in 2012.

SUMMARY

The Republic of Belarus is one of the IAEA founders.

The Convention on Nuclear Safety (hereinafter - CNS) was ratified by Belarus in 1999. For the purpose of CNS implementation five National reports were prepared (1999, 2001, 2004, 2007, 2010), as well as one extraordinary report dedicated to lessons of the accident at the NPP “Fukushima-1” (Japan). The present National Report is issue in the context of the country entry into the phase of active measures for implementation of the program for the first NPP construction.

Since 1990 the Inter-regional inspection on radiation safety began operating as a part of the State Committee for Supervision of Safety in Industry and Nuclear Power (Gospromatomnadzor) in sovereign Belarus. From the moment of the Republic of Belarus accession to the Treaty on the Non-Proliferation of Nuclear Weapons in 1993 by the decision of the Government of the Republic of Belarus, Gospromatomnadzor was granted by responsibilities of the state authority (regulatory body) in the sphere of nuclear and radiation safety. In 1995 in accordance with the Decree of the President, the regulatory body were transferred to the Ministry for Emergency Situations and Protection of Population from consequences of the Chernobyl disaster.

In 1998 the Ministry for Emergency Situations and Protection of Population from the consequences of disaster of the Chernobyl disaster was transformed into the Ministry for Emergency Situations of the Republic of Belarus. The Department for Supervision of Safety in Industry and Nuclear Energy (Promatomnadzor) exercised in the Ministry technical functions on the matters of regulation of nuclear and radiation safety. During transformation of the system of state bodies the separate Department for Nuclear and Radiation Safety (Gosatomnadzor) was created within the MES on 12.11.2007 by the decision of the President of the Republic of Belarus.

The MES of the Republic of Belarus is a republican authority for the state management and regulation in the field of nuclear and radiation safety.

The main elements of compliance according to IAEA recommendations for regulatory infrastructure in Belarus are the following:

- the regulatory authority is not responsible for development of nuclear technologies;
- the regulatory authority is independent from operators and licensees;
- there are plans for development of regulatory requirements and regulatory infrastructure;
- the regulatory authority is directly financed from the Republican budget.

Gosatomnadzor, as subdivision of the MES of the Republic of Belarus with the right of a legal entity, is delegated with functions for licensing of activities in the field of atomic energy and ionizing radiation sources use, conducting of the state supervision in the field of nuclear and radiation safety, inspection and monitoring of compliance with the legislation in the field of nuclear and radiation safety.

To the present time legislative and regulation base for nuclear and radiation safety in the Republic of Belarus has been almost created. There is also a decision of the President of the Republic of Belarus on possibility of use the regulation of the Russian Federation in order to resolve some safety matters while construction of "Belarusian NPP" that are not regulated in the domestic legislation and regulation.

At present the largest nuclear site in the Republic of Belarus is the PSI “Joint Institute for Power and Nuclear Research – Sosny” of the National Academy of Sciences of Belarus that was created in 2001 and is the successor of the Institute of Nuclear Energy of the Academy of Sciences of the BSSR founded in 1965. By the time of the institute establishment on its site a bench-top case with thermal physics experimental installation was commissioned, a laboratory of reactors of physical capacity was created. It is the single institution in the country that has experience in scientific support for design of nuclear reactors, critical assemblies, and other nuclear and radiological facilities, as well as scientific management of projects for creation of

mobile NPP. By the moment of the Institute creation, research-and-development reactor IRT-2000 had been already decommissioned.

On the territory of the Republic of Belarus prior to the decision making to build a NPP there were no operating nuclear facilities that met the requirements to Article 2 of the Convention. Gosatomnadzor carried out and continues to perform planned systematic work on safety supervision and inspection of nuclear-physical complexes (critical assemblies) "Gyatsinth", "Kristal", subcritical assembly "Yalina", storage facility for fresh nuclear fuel "Yavor", storage facility for spent nuclear fuel "Iskra" of PSI "JIPNR-SOSNY". Upon decision making by the management of the country to build the first NPP (in 2008), Gosatomnadzor started work on safety supervision and inspection of "Belarusian NPP".

For "Belarusian NPP" the AES-2006 design was selected that meets all the modern requirements and international safety standards. The general contractor for construction of "Belarusian NPP" is "Atomstroyexport", CJSC. Developers of this project are the design institutes "SPbAEP" (Saint Petersburg), JSC, and "Atomenergoproekt" (Moscow), JSC. The special interagency group was created for the purpose of the general designer selection for the said NPP. "SPbAEP" was chosen according to the results of procedures of economic activity conducting. At present the general designer of "Belarusian NPP" project is Nizhny Novgorod Engineering Company "Atomenergoproekt".

On October 11, 2011, "Atomstroyexport", CJSC, company of the state corporation "Rosatom" (Russian Federation) and the Public Institution "Directorate for Nuclear Power Plant Construction" signed the contract agreement for construction of power units No. 1 and No. 2 of the first NPP in Belarus. The agreement defines the basic provisions of the general contract for turnkey construction of two nuclear power units of NPP with the total capacity of up to 2400 MW. "Belarusian NPP" will be built under the full responsibility of the general contractor. The intergovernmental agreement on granting the Republic of Belarus with the state export credit for the construction was signed on November 25, 2011.

PI "DSAE" was established under the Ministry of Energy of the Republic of Belarus in order to carry out functions of the customer to carry out complex preparation, design and survey works during NPP construction. Three possible points of the NPP siting were considered (Shklovsko-Goretsky, Bykhovsky, Ostrovetsky) where later three potential sites were determined (Ostrovetskaya, Krasnopolyanskaya, and Kukshinovskaya). There was complex of survey works for these sites, which was performed for comparative analysis in order to select the priority site for the NPP construction. It was determined that the Ostrovetskaya site possesses the best geological features and water-supply. At present expert works for safety assessment are carried out for the purpose of licensing of the NPP construction.

For the implementation to "Belarusian NPP" project the accumulated experience and practice are fully and widely used; proven technologies of the Russian Federation are being introduced. While preparing substantiation of investment to construction of "Belarusian NPP", Leningrad NPP-2 was used as an analogue. When execution of the architectural design Baltic NPP was defined as an object-analog of "Belarusian NPP".

In 2010, in Belarus the Emergency Preparedness Review IAEA mission was conducted (EPREV mission). The main conclusion of the expert group was an issue that in Belarus a reliable system of emergency preparedness and response was established. Recommendations were given for further improvement of the emergency preparedness and response system in accordance with international requirements and standards with regard to construction of the first NPP in Belarus.

In June 2012, in Minsk the comprehensive IAEA mission took place on integrated assessment of nuclear infrastructure in the Republic of Belarus (INIR mission). In the course of the mission the infrastructure was assessed compliance to the publication NG-G-3.1 "Milestones in the Development of a National Infrastructure for Nuclear Power" with the criteria. There were 12 invited experts from different countries which participated in the mission of Agency. The assessment was conducted on the basis of the publication NG-T-3.2 for the purpose of

compliance to the 2nd milestone. By the beginning of the INIR mission the ground for assessment was prepared - self-assessment. In the course of the mission surveillance were carried out, recommendations and suggestions were worked out. During the INIR mission capacity of nuclear and radiation safety regulation system was rated as a part of the public infrastructure to ensure nuclear power safety. Findings of the mission, as well as measures to be taken for further infrastructure development are stated in the official report of the Agency posted on the website of the Agency.

By the official channels the Republic of Belarus there was made the request to the IAEA on conduction of the international INSServ mission (International Nuclear Security Advisory Service) in Belarus in the second half of 2013.

The Republic of Belarus is an active participant in a number of conventions and fulfills its international obligations. Our cooperation with the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD), Council on Cooperation in Peaceful Uses of Nuclear Energy under the EurAsEC Integration Committee, Committee on using nuclear power for peaceful purposes of the Commonwealth of Independent States (CIS).

Among international contacts, interaction with the countries of the European Union are the most active and effective. Belarusian regulator and organizations for its technical support are interested in maximum utility of knowledge, experience and skills of experts and leading organizations, partners of the EU within the framework of implementation of technical assistance projects.

Instrument for Nuclear Safety Co-operation (INSC) is a powerful program for sustainable cooperation with Belarus in the field of nuclear safety, as well as for creation and development of effective national regulatory infrastructure. Within the framework of the mentioned Instrument, the interaction is carried out by means of implementation of technical cooperation projects "Institutional and technical cooperation with Gosatomnadzor for the purpose of its capacity development by European safety principles and methods transfer" (completed in June 2013) and "Development of technical cooperation in nuclear safety in the field of assistance to Regulatory Authorities" (implementation was started in June 2013).

In Belarus much attention is paid to bilateral cooperation with the neighboring countries. The report of the INIR mission recommended to develop of such bilateral communication. Thereupon active contacts with regulatory authorities in Russia, Ukraine, and Poland are being carried out.

On July 4, 2013, the Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation came into force on cooperation in the field of nuclear safety. Currently the draft Agreement on cooperation in the field of nuclear and radiation safety inspection in the process of peaceful uses of nuclear energy is under development between the Ministry for Emergency Situations of the Republic of Belarus and the Federal Service for Ecological, Technological and Nuclear Supervision of the Russian Federation.

Procedure was carried out regarding internal coordination of the draft Agreement between the Ministry for Emergency Situations of the Republic of Belarus and the State Nuclear Regulatory Inspectorate of Ukraine. Signing of the mentioned Agreement is planned for September 2013.

In May 2013, in Warsaw, the third joint Belarusian-Polish meeting was held within the framework of the Agreement between the Government of the Republic of Belarus and the Government of the Republic of Poland on Early Notification of a Nuclear Accident and radiation safety cooperation.

Cooperation with Armenia, Azerbaijan, Vietnam, Germany, the United States of America, Turkey, France and others is being developed.

In relation to the matters of bilateral agreements with Latvia and Lithuania in the field of emergency response to frontier emergencies, interaction with the government institutions of these countries is carried out. Within the framework of interaction on the matters of environment in 2011, the proposal was sent to Latvia on intergovernmental agreement conclusion on Early

Notification of a Nuclear Accident, exchange of information and cooperation in the field of nuclear safety and radiation protection. Earlier, the similar developed draft for Agreement between the Government of the Republic of Belarus and the Government of the Republic of Lithuania was sent to Lithuania via official channels. In 2011 internal procedures in the Republic of Belarus for signing of the said intergovernmental agreement were completed, via official channels the information was sent regarding willingness to sign the Agreement. Up to the present moment the Ministry for Emergency Situations of the Republic of Belarus has no information from the competent state authorities of Lithuania on the status of this project review.

ARTICLE 6. EXISTING NUCLEAR INSTALLATIONS

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

Nuclear installations (hereinafter – facilities), available in the Republic of Belarus according to Article 2 of the Convention on Nuclear Safety, Amendment to the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, are listed in Table 1.

Table 1. Nuclear Facilities in the Republic of Belarus

| Item No. | Facility | Current Status |
|-----------------|--|---|
| 1. | Nuclear power plant in the Republic of Belarus | Works on the NPP siting are being executed in the Republic of Belarus |
| 2. | Critical assembly “Giatsint” | Operating |
| 3. | Subcritical assembly “Yalina” | Operating |
| 4. | Storage facilities for non-irradiated nuclear material “Yavor” | Operating |
| 5. | Storage facilities for non-irradiated nuclear material “Yavor 1” | Designing |
| 6. | Critical assembly “Kristal” | Extended shutdown |
| 7. | Spent fuel storage facility “Iskra” | Decommissioning |

NPP construction in the Republic of Belarus.

On January 31, 2008 Resolution No. 1 of the Security Council of the Republic of Belarus was adopted “On development of nuclear energy in the Republic of Belarus” that envisaged construction of a NPP in the Republic of Belarus.

In May 2009, in Minsk the Agreement for Cooperation in the Field of Peaceful Uses of Nuclear Energy was signed between the Government of the Russian Federation and the Government of the Republic of Belarus that identified lines of cooperation between the parties and form of implementation of such cooperation.

In March 2011, in Minsk the Agreement was signed between the Government of the Russian Federation and the Government of the Republic of Belarus for cooperation in the NPP construction on the territory of the Republic of Belarus. The Agreement provides turnkey construction of "Belarusian NPP" executed by the Russian party. The general contractor will be “Atomstroyexport” (hereinafter – ASE, JSC), Closed Joint-Stock Company, the customer will be Public Institution “Directorate for Nuclear Power Plant Construction” as defined by the operating organization (hereinafter - PI “DSAE”). "Belarusian NPP" will consist of two power units with total capacity to 2400 (2x1200) MW.

For construction of the first NPP in Belarus the AES-2006 project of Saint Petersburg Research and Design Institute “Atomenergoproekt” (hereinafter – SPbAEP, OJSC), Joint-Stock Company, was selected that features enhanced safety characteristics and technical and economical indicators. A construction of a NPP according to this project provides as follows:

construction of a nuclear power station of new 3+ generation, the feature of which is a new reactor system with additional safety systems: passive heat removal system, passive filtration system of leakage to the intershell space; double protective enclosure vessel; trap for molten corium in case of a beyond design basis accident;

maximum implementation of the defense in depth principle: creation of barriers on the way of ionizing radiation and radioactive substances spreading into the environment and the system of technical and organizational measures to protect the barriers, as well as preservation of their effectiveness at direct protection of the population.

System of barriers at NPP of the AES-2006 project includes fuel matrix, fuel claddings, contour border of reactor coolant; sealed enclosure of localizing safety systems.

All foreseen barriers provide fulfillment of such safety functions as reactivity control, afterheat discharge and localization of radioactive materials in operational states, during and after an accident within the design and, as far as it is practicable, in case of emergency conditions that are beyond design basis accidents.

The project fully complies with international standards and recommendations of the IAEA.

In October 2011, in Kronshtadt (Russian Federation) the Contract agreement was signed by the administration of "ASE", JSC, and SPbAEP for construction of power units No. 1 and No. 2 of "Belarusian NPP". The main provisions of the general contract are identified in the Contract agreement regarding turnkey construction of two nuclear power units with the total capacity of up to 2400 MW with the V-491 reactor facility. The agreement also provides that "Belarusian NPP" will be built under the full responsibility of the general contractor.

In November 2011, the intergovernmental agreement was signed on provision of state export credit to the Republic of Belarus by the Russian Federation for supply of goods, fulfillment of works and rendering of services being executed and provided by ASE, JSC, for construction of two power units of "Belarusian NPP".

The representative of ASE, JSC, Russian exporter of services for NPP construction, in the Republic of Belarus is "NIAEP", JSC, leading engineering company of the Russian nuclear industry.

One considers to use a high-speed turbine K-1200-6.8/50 at the "Belarusian NPP" - a steam, condensing turbine with intermediate separation and two-stage steam superheating, with the running speed of 3000 rev/min provided for converting of thermal energy of the steam generated in the steam generators into mechanical energy of the rotor spinning and direct drive of the generator TZV-1200-2A mounted on the common foundation with the turbine. Turbine plant is designed to operate in the monoblock unit with a water-cooled power reactor of the VVER-1200 type. Nominal thermal power of the reactor facility is 3200 MW.

In January 2012, the contract "For survey works, development of project and priority working documentation" was signed between SPbAEP and ASE, JSC.

In March 2012, the contract for execution of primary works of the preparatory period before the "first concrete" was signed; and in May 2012 the pit development for the unit No. 1 was started.

In July 2012, the General contract for construction of "Belarusian NPP" between PI "DSAE" (Republic of Belarus) and "Atomstroyexport" (Russian Federation), Closed Joint-Stock Company was signed. According to the General Contract the general contractor takes obligation to perform all necessary works, including survey works, to develop working documentation, to execute building and assembly jobs, commissioning, to supply an equipment, and to carry out other works provided by the present contract for NPP construction and commissioning in the Republic of Belarus of the NPP composed of two units subject to the full responsibility of the General Contractor ("turnkey") at the industrial site of NPP, including security fence and checkpoints of NPP (except engineering systems of physical protection), as well as system for process water supply, fire extinguishing, study and training center outside the security fence of NPP. The Customer undertakes to accept executed work and rendered services and effect payment in the amount and under the conditions stipulated by the General Contract.

The “AES-2006” project developed by “SPbAEP”, JSC, is also used in construction of the Leningrad NPP-2 in the Leningrad region and for the Baltic NPP in the Kaliningrad region of the Russian Federation. The main technical characteristics of a power unit of "Belarusian NPP" are listed in Table 2.

Table 2. Main technical characteristics of the power unit of "Belarusian NPP" with VVER-1200

| Characteristic | Value |
|--|---|
| Number of units, pcs. | 2 |
| Service life, years: reactor facility - steam turbine plant - | 60 50 |
| Capacity of a power unit, MW: electric capacity (gross) - thermal capacity - | up to 1200 3200 |
| Heat extraction capacity of a power unit, MW | 300 |
| Installed capacity utilization factor, relative unit | 0.9 |
| Power consumption for auxiliaries (with regard to recycling water supply and area expenses), % | 7.0 |
| Number of fuel assemblies in the active zone, pcs. | 163 |
| Number of fuel assemblies with operation control of reactor control and safety system, pcs. | 121 |
| Duration of fuel-element lifetime, years | 4 |
| Main specifications of the primary coolant: temperature at the inlet of the active zone, °C - temperature at the outlet of the active zone, °C - heating of the coolant in the active zone, °C - coolant flow through the reactor, m ³ /h - pressure at the outlet of the active zone, MPa - | 298.2 328.9 30.7 86000 16.2 |
| Main specifications of the primary coolant: vapour pressure at the outlet of a steam generator, MPa - evaporating capacity of a steam generator, t/h - temperature of feedwater, °C - vapor humidity at the outlet of a steam generator, % not more than - | 7,0 1602 225 0,2 |

At the development of the project the basic characteristics and parameters of NPP with VVER-1200 reactor were compared with the data of the referential NPP with VVER-1000 (V-428) and foreign NPPs.

The operating organization received the special permit (license) from the Ministry for Emergency Situations of the Republic of Belarus in the field of use of nuclear energy and ionizing radiation sources in part which concerns the siting of nuclear facilities (units No. 1 and No. 2 of "Belarusian NPP").

At present, within a framework of licensing of nuclear facilities construction (unit No. 1 of "Belarusian NPP") PSI “JIPNR-Sosny” and Gosatomnadzor are conducting preliminary review

of the documents submitted by the operating organization that justify nuclear and radiation safety during performing of activities in the field of nuclear energy use in part concerned to construction of unit No. 1 of "Belarusian NPP". In accordance with examination of the substantiating documents and evaluation of capabilities compliance of the operating organization with licensing requirements and conditions for carrying out of activity in the field of nuclear energy use, a decision will be made on the possibility to issue a required license.

Nuclear facilities of scientific purpose.

They are include the following facilities of the Public Scientific Institution "Joint Institute for Power and Nuclear Research – Sosny" of the National Academy of Sciences of Belarus (hereinafter – PSI "JIPNR-Sosny"):

- storage facilities for spent nuclear fuel "Iskra";
- storage facilities for non-irradiated nuclear fuel "Yavor";
- subcritical assembly "Yalina";
- critical assembly "Giatsint";
- critical assembly "Kristal".

PSI "JIPNR-Sosny" has a special permit (license) issued by MES for the period till 2015 to work in the field of nuclear energy and ionizing radiation sources use in the course of the following works and services fulfillment:

- design, diagnosis of nuclear facilities (reactor radiation zones, control and protection systems, radiation protection, critical and subcritical assemblies);

- operation of nuclear facilities (subcritical assemblies with $K_{max} < 0.98$ controlled by an external neutron source; electronuclear neutronic unit (subcritical assembly driven by a neutron generator); critical assembly "Giatsint");

- manufacturing, installation, commissioning, repair and maintenance of nuclear facilities (critical assembly "Giatsint");

- decommissioning of nuclear facilities (critical assembly "Giatsint"; critical assembly "Kristal");

- siting, construction, decommissioning of storage facilities for nuclear materials (temporary storage facilities for fissile materials and radioactive substances at the critical assembly "Giatsint" and critical assembly "Kristal");

- operation of storage facilities for nuclear materials (temporary storage facilities for fissile materials at the critical assembly "Giatsint" and critical assembly "Kristal"; complex of storage systems and handing with non-irradiated nuclear fuel (storage facilities for non-irradiated nuclear materials PSI "JIPNR-Sosny"));

- handing of nuclear materials, nuclear fuel (temporary storage facilities of the critical assembly "Giatsint"; complex of storage systems and handing of non-irradiated nuclear fuel (storage facilities for non-irradiated nuclear materials PSI "JIPNR-Sosny"));

- engineering of storage facilities for nuclear materials;

- engineering of processing equipment for nuclear facilities (research nuclear reactors, critical and subcritical assemblies; storage of fissile materials).

The basic requirements for nuclear and radiation safety of the above facilities are set in the regulations referred in [82-87].

Issues of spent fuel and radioactive waste are listed in the national reports on the implementation of the commitments of the Republic of Belarus within the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The subcritical assembly "Yalina"

Subcritical assembly "Yalina" consists of two sub-critical assemblies with zero power "Yalina-Tieplovaya" and "Yalina-Buster" and the NG-12-1 neutron generator. Basic life support, management, safety and security systems are common for both subcritical assemblies.

Subcritical assembly "Yalina" is intended for basic research in nuclear and neutron physics, physics of sub-critical systems managed by the external neutron sources (accelerators of

charged particles of high-energy neutron generators), studying the characteristics of long-lived radioactive waste transmutation of nuclear power and solving a number of applications – carrying out of neutron-activation analysis of geological samples, carrying out of research and testing of radiation resistance of materials and products for various purposes, development of technologies of production of integrated circuits.

Since 1998, the experimental and theoretical studies of the project of the International Science and Technology Center in cooperation with the European Union and the United States have been carried out at the "Yalina". The plant is planned to perform work according to the tasks of the following State Programs: "High-energy, nuclear and radiation technologies", "Fields and Corpuscle", "The scientific support for the development of nuclear energy in the Republic of Belarus for 2009-2010 and for the period up to 2020", newly formed State program of scientific research "Nuclear energy, nuclear and radiation technologies" for 2011-2015.

At present, research is carried out within:

State research program for 2013-2015 "Energy safety, energy efficiency and energy saving, nuclear energy" (sub-program "Scientific support for the development of nuclear energy, advanced nuclear and radiation technologies, the management of radioactive waste and spent nuclear fuel" (Nuclear power, nuclear and Radiation Technology));

State program "Scientific support for the development of nuclear energy in the Republic of Belarus for 2009-2010 and for the period up to 2020" (Task 10.5: to perform a complex neutron physics research at subcritical assembly "Yalina" controlled by an external source of neutrons for studying a formation of neutron fields in the active zones with the different energy spectra in order to select the optimum conditions for the creation of a 5th generation reactor (ADS-technology));

ISTC project No. 1732-P "Analytical and experimental evaluation of the possibility of creating volumetric neutron source in the subcritical booster assembly with a low enriched uranium fuel-driven neutron generator".

The specialists of the PSI "JIPNR-SOSNY" conduct studies of neutron-physical characteristics of the uranium-plastic sub-critical assembly "Yalina-Thermal".

The booster subcritical assembly has currently no fuel. The used fuel has been removed and deposited in the storage of non-irradiated nuclear material "Yavor".

The critical assembly "Giatsint"

The critical assembly "Giatsint" is intended for research in physics and safety of neutron multiplying systems and provides an experimental basis for a wide range of tasks in field of fundamental and applied nuclear technology development. It is planned to investigate with help of the assembly: 9 critical assemblies with a water moderator, 7 critical assemblies with zirconium hydride moderator and three critical assemblies without any moderator. Controlling physical start of critical facility "Giatsint" with uranium-water critical assembly was carried out in 2009.

The experimental studies of critical assemblies are carried out at the critical assembly "Giatsint" in 2013 within the following programs:

The State research program "Nuclear energy, nuclear and radiation technologies";

The State program "Scientific support for the development of nuclear energy in the Republic of Belarus for 2009-2010 and for the period up to 2020";

ISTC project No. B-1763 "Benchmark analysis and experiments on the criticality of the old and new heterogeneous multiplying systems".

In accordance with the Decree of the President of the Republic of Belarus dated December 12, 2005 № 588 "On approval of the state investment program for 2006" the works on the project "Reconstruction of the research reactor physical power (facility "Giatsint"), of "State Investment Program were carried out.

The critical assembly "Kristal"

The critical assembly "Kristal" mothballed in accordance with the decision of the management of the Institute of Energy of the Academy of Sciences of Belarus dated 28 December 1994 No. 529. In accordance with this decision:

maintenance work on control systems and protection were conducted at the assembly, all fuel elements and elements were extracted from the active zones, nuclear materials were deposited;

it is prohibited to remove the systems from critical assembly – it is expected to use them for further experiments.

At present, the critical assembly "Kristal" is in the extended shutdown.

A reconstruction of critical bench "Kristal" is currently considered: preproject calculations of critical assemblies of the critical bench proposed for the reconstruction are conducted within the ISTC project No. B-1763 and a contract with the IAEA for the development of technical proposals for the reconstruction of critical facility "Kristal" is under preparation.

The room where the critical assembly "Kristal" is situated (the operational storage of nuclear fuel of critical assembly "Giatsint"), is used during the acceptance tests coming from the manufacturer of new fuel elements, assembly and acceptance testing of fuel assemblies containing these fuel elements, as well as the operational storage of these fuel elements during the above operations (before putting set of fuel elements, and (or) fuel assemblies in the storage of non-irradiated nuclear material "Yavor").

Storage of non-irradiated nuclear material "Yavor" and "Yavor-1"

The storage of non-irradiated nuclear material "Yavor" is operated by a personnel in accordance with the legislation of the Republic of Belarus. Nuclear material is issued for the critical assembly "Giatsint" and subcritical assembly "Yalina" to perform work on government programs. The justification of the safety of this facility demonstrates that the achievement of the value k_{eff} of the storage is greater than the 0.95 and it is not possible with any initiating events (regrouping of packages in groups, flooding of the storage with water, violation of geometric configuration of fuel rods inside the containers, etc.) and their overlapping [85].

In 2010, activities on construction of a new non-irradiated nuclear material storage "Yavor-1" PSI "JIPNR-SOSNY" were started. In this regard, explanatory note "Justification of nuclear safety of fissile materials in the storage of non-irradiated nuclear material "Yavor -1" was developed.

At present, activities on the development of the project of a new storage of irradiated nuclear material " Yavor-1" PSI "JIPNR- SOSNY" are carried out. The project will take into account the requirements of the legislation of the Republic of Belarus to ensure safety. The Republican Unitary Enterprise EDO "Akademitcheskoe", located on the territory of the PSI "JIPNR- SOSNY " participates in these activities.

Storage facility for spent nuclear fuel, "Iskra"

The storage facility for spent nuclear fuel, "Iskra" is in the process of decommissioning.

All the fuel that was found in the storage facility in 2010 has been transported to the Russian Federation.

“The program of decommissioning of “Iskra" storage facility for spent nuclear fuel” has been developed.

At present, a project of resolution of the Council of Ministers of the Republic of Belarus "On the decommissioning of the "Iskra" storage facility for spent nuclear fuel” in PSI "Joint Institute for Power and Nuclear Research - Sosny" NAS of the Republic of Belarus" is under endorsement with the state authorities of the Republic of Belarus.

ARTICLE 7. LEGISLATIVE AND REGULATORY FRAMEWORK

Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.

The legislative and regulatory framework shall provide for:

- the establishment of applicable national safety requirements and regulations;*
- a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;*
- a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;*
- the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.*

Activities in the field of nuclear safety is carried out according to the standard world practice and IAEA recommendations. The principles of safety defined in the IAEA publication No. SF-1 of a series of the Basis of safety "The fundamental principles of safety", and the majority of general provisions of other IAEA standards of safety of are taken as the base of the Law of Republic of Belarus " On Use of Atomic Energy " and regulations on republican state bodies in the field of use of nuclear energy. The government declared acceptance of a global mode of nuclear safety, as result of commitment to implementation of the nuclear and power program by acceptance and ratification in Republic of Belarus all necessary conventions and contracts [1, 2, 4, 5, 7-10, 12, 14-18].

The Republic of Belarus has signed the international contracts and the activities for bilateral and regional cooperation in the field of nuclear safety [3, 6, 11, 13, 19-23] are carried out.

A plan on realization of the measures directed on maintenance of high level of culture of nuclear safety is in the course of development.

Within the creation of nuclear power in Republic of Belarus activities for improvement of regulatory base of nuclear and radiation safety, licensing system in the field of use of nuclear energy, ensuring of supervision at all NPP stages, staff training, as well as the international cooperation are carried out.

Continuous preparation of the regulatory base necessary for NPP construction is carried out. When developing documents, the documents of IAEA and other countries with the developed nuclear power are considered. Elaboration of normative documents within a state program of scientific maintenance of development of nuclear power in Republic of Belarus is organized.

Creation and maintenance of a legislative and regulating basis for safety of nuclear facilities

Legal regulation of safety in the field of use of nuclear energy is carried out on the basis of laws of Republic of Belarus, Acts of the President of the Republic of Belarus, resolutions of the Government of the Republic of Belarus, regulations of the authorized republican state bodies which carry out state regulation of activity on safe use of nuclear energy, standards and rules in the field of nuclear and radiation safety, and also other technical regulations (technical codes of the established practice, standards and others).

Issues of the organization of works at NPP construction in the Republic of Belarus and ensuring nuclear and radiation safety are settled by the Decree of the President of Republic of Belarus "On some measures for construction of NPP" [31]. For implementation of functions of the customer on performance of a complex of works on NPP construction as a part of the Ministry of Energy of Republic of Belarus PI "DSAE" is created. The decree of the President of Republic of Belarus approved the Provision on Department on nuclear and radiation safety of the Ministry of Emergency Situations of Republic of Belarus, the general engineer defined the design research republican unitary enterprise "BELNIPIENERGOPROM", by the organization which is carrying out scientific maintenance of works on NPP construction – the PSI "JIPNR-SOSNY" in order to coordinate the implementation of design and budget documentation on NPP construction.

Legislation acts in the field of use of nuclear energy, nuclear and radiation safety are available on the web-site of the Gosatomnadzor – www.gosatomnadzor.gov.by (in Russian). Survey materials of the Belarusian legislation and safety requirements in the field of nuclear and radiation safety when using nuclear energy are published in Nuclear Law Bulletin.

The Republic of Belarus expands the cooperation with the states in the nuclear field. Since 1992 the Agreement on the basic principles of cooperation in the field of peace use of nuclear energy [3] works between CIS countries. Agreements on cooperation in the field of use of nuclear energy in the peace purposes are so far signed with People's Republic of China and the Russian Federation [19, 20], the Agreement between the Government of Republic of Belarus and the Government of the Russian Federation about cooperation is concluded at a NPP construction in the territory of Republic of Belarus and the contract on NPP construction [21].

Within the implementation of the national nuclear and power program the General contract on a construction of "Belarusian NPP" dated July 18, 2012 is signed.

For strengthening of a legislative basis in a context of the international relations are concluded:

The agreement between the Government of the Russian Federation and the Government of Republic of Belarus about cooperation in the field of nuclear safety (It is signed in Minsk 01.02.2013);

The agreement between the Government of Republic of Belarus and the Government of the Republic of Armenia about exchange of information and cooperation in the field of nuclear safety and radiation protection (It is signed in Yerevan 13.05.2013).

During the period from June 18 till June 29, 2012 by the invitation of Republic of Belarus the IAEA mission of the assessment of nuclear infrastructure worked in the country. One of key parts of work of INIR mission was the assessment of a legislative and regulating basis. The detailed report of INIR mission is located on IAEA Internet site at the address http://www.iaea.org/nuclearenergy/nuclearpower/Downloadable/News/2013-03-15-NENP/2013-01-23_Approved_INIR_Report_Belarus.pdf. The report of INIR mission contains offers and the recommendations aimed at further improvement of existing regulatory base. Actions for implementation of offers and recommendations are approved by the Government of Republic of Belarus and now are carried out.

National requirements and regulating provisions on safety

Legal basis of the use of nuclear energy in the Republic of Belarus is the Law of the Republic of Belarus "On Use of Atomic Energy", regulating the relations connected with engineering, siting, construction, commissioning, operation, restriction of operational characteristics, extension of term of operation of nuclear and (or) storage facilities, as well as the relations connected with handling of nuclear materials at operation of nuclear and (or) storage facilities, spent nuclear materials and (or) operational radioactive waste, and other relations in the field of the use of nuclear energy. [33]

The Law of the Republic of Belarus "On radiation safety of the population" defines bases of legal regulation in the field of radiation safety of the population, is aimed at the creation of the conditions providing protection of human life and health from harmful effects of ionizing radiation [24].

The Ministry of Emergency Situations of the Republic of Belarus according to the legislation is authorized on acceptance of standards and rules on ensuring nuclear and radiation safety, other technical regulations establishing obligatory requirements in the field of nuclear and radiation safety. A number of new standards and rules for the purpose of ensuring compliance of established standard requirements to the reached level of science and equipment taking into account the international experience in field of the use of nuclear energy is so far developed. [30]

In 2009 issues on safety of nuclear energy facilities included the requirements to dangerous manufacturing facilities and the legislation in the field of industrial safety. [27]

At present, in the Republic of Belarus the main organizational legal requirements to branch of the use of nuclear energy and safety requirement are determined (see. Annex 1):

procedure of the state supervision in the field of industrial safety, safety of transportation of dangerous freights, ensuring nuclear and radiation safety;

procedure of coordination, establishment and designation of borders of a sanitary protection zone, zone of supervision of nuclear and (or) storage facilities and requirement for their protection and use;

procedure of discussion of issues in the field of the use of nuclear energy with participation of public organizations;

list of medical contraindications to performance of separate works during the activity implementation on the use of nuclear energy, list of works during the activity implementation on the use of nuclear energy to which medical contraindications is applied, a certificate form of a dose of the received radiation;

to ventilation systems of normal operation, important for safety, and to ventilation systems which are ensuring or localizing systems safety;

to ensuring the hydrogen explosion protection, realized during engineering and operation, for the purpose of the prevention and elimination of the consequences of the project and beyond design basis accidents, accompanied with the explosion of the hydrogenous mixes which are forming in volume, limited to a tight protection;

to systems of emergency power supply at stages of engineering, installation, adjustment and operation, as well as designing and manufacturing of the corresponding electrotechnical equipment of NPP;

to operating systems of normal operation, important for NPP safety and to operating systems of NPP safety;

the main criteria and requirements regulating the NPP siting in the territory of the Republic of Belarus taking into account the influence of processes, the phenomena and factors of a natural and anthropogenic origin and impact of NPP on the population and environment;

the main requirements to structure and volume of researches for a choice of point and a platform of NPP siting;

development and maintenance of an assessment of impact on environment, justifications of ecological safety of NPP;

the purposes, basic provisions, requirements to structure, contents and procedure of development, coordination and approval of the program of ensuring quality for NPP, as well as supervision and responsibility for their development and performance;

procedure of development of the program of ensuring quality at a choice of a platform of siting NPP and development of justification of investments into nuclear power plant construction;

safety issues specific to nuclear power plant as source of possible radiation impact on personnel, population and environment; the purposes, reference points and the main criteria of safety, as well as the basic principles and character of the technical and organizational measures aimed at achievement of NPP safety;

requirements to a design, characteristics and operation conditions of systems and elements of NPP reactor facilities, as well as the organizational requirements aimed at ensuring nuclear safety during engineering, designing, construction and operation of the NPP RF.

The main areas of development of the system of safety regulation are:

creation and ensuring activity of the regulatory authority which is responsible for delivery of permissions for siting, engineering, construction, commissioning, operation and removal from operation of nuclear facilities after carrying out the corresponding analysis and an assessment;

organization and carrying out the analysis of documentation confirming safety of nuclear facilities, the license presented by the applicant (owner);

carrying out necessary inspections concerning regulation and application of the corresponding sanctions at all stages of process of licensing to guarantee observance of restrictions and the conditions stipulated by the license, applicants, owners of licenses and their contractors;

development of rules and criteria in the field of health protection of people, safety and environment protection, in connection with radiation hazard;

development of rules and procedures on ensuring readiness for emergencies on a platform of nuclear facility.

Regulation in the field of the use of nuclear energy and management in the field of the use of nuclear energy, nuclear and radiation safety are carried out by the Ministry of Emergency Situations [24, 30, 33], the Gosatomnadzor is authorized to implement the state supervision and inspection the performance of the legislation in the field of safety [35].

On the whole inspection (supervising) activity in the field of safety in Republic of Belarus is carried out according to the Decree of the President of Republic of Belarus "On improvement of inspection (supervising) activity in Republic of Belarus" [35]. Since 2012 issues of nuclear and radiation safety during supervision of works on implementation of the project of the first Belarusian nuclear power plant are not regulated by this normative document [41].

The main requirements to nuclear facilities are presented in TCP 170-2009 "General provisions of safety ensuring of nuclear plants" and TCP 171-2009 "Rule of nuclear safety of reactor facilities of nuclear plants" [64, 65].

The Ministry of Health approved and enacted Sanitary standards, rules and hygienic standards "Hygienic requirements to engineering and operation of nuclear power plants" [91]. This document establishes hygienic requirements on radiation safety of the personnel, the population and environment during siting, engineering, construction, commissioning and nuclear power plant operation with VVER reactors. Also Sanitary standards and the rules "Requirements to Radiation Safety", the Hygienic standard "Criterion of an assessment of radiation influence", approved by the resolution of the Ministry of Health of Republic of Belarus dated December 28, 2012 No. 213 were enacted. This document harmonizes requirements according to the management of IAEA of GSR Part 3. Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards - Interim Edition General Safety Requirements.

The decree of the President of Republic of Belarus dated 15.09.2011 No. 418 "On siting and engineering of a nuclear power plant in Republic of Belarus" defines the land plot in the Ostrovetsky region of the Grodno region as the place of siting and construction of a nuclear power plant. This Decree is a legal basis for designing of a nuclear power plant.

Monitoring of environment is carried out within the National System of Monitoring of Environment (NSME) in Republic of Belarus according to the legislation of Republic of Belarus and other regulations:

The Law of Republic of Belarus dated November 26, 1992 "On environmental protection";

The provision on National system of monitoring of environment in Republic of Belarus, approved by the resolution of the Council of Ministers of the Republic of Belarus dated 14.07.2003 No. 949.

According to clause 2 of Provision on National system of monitoring of environment in Republic of Belarus NSME includes the following general, organizational and independent types of monitoring of environment:

- monitoring of a surface water;
- monitoring of underground waters;
- monitoring of atmospheric air;
- radiation monitoring, etc.

Realization of the general principles of monitoring of environment is carried out by means of development and implementation of programs of supervision of environment and natural and anthropogenic impacts on the environment, regulation of data collecting and processing, the analysis and storage of information, providing the information exchange within NSME, development of forecasts of a state of environment and natural and anthropogenic impacts on the environment, providing the information to government bodies, legal entities, citizens.

The procedure of the above types of monitoring is defined by the following regulations:

The provision on procedure of radiation monitoring and use of its data as a part of National system of monitoring of environment in Republic of Belarus, approved by the resolution of the Council of Ministers of Republic of Belarus dated May 17, 2004 No. 576;

The provision on procedure of monitoring of atmospheric air and use of its data as a part of National system of monitoring of environment in Republic of Belarus, approved by the resolution of the Council of Ministers of Republic of Belarus dated April 28, 2004 No. 482;

Regulations on monitoring of surface water and the use of monitoring data in the Republic of Belarus within the National Environmental Monitoring System approved by the Council of Ministers of the Republic of Belarus 28 April, 2004 No. 482;

Regulations on monitoring groundwater and the use of monitoring data in the Republic of Belarus within the National Environmental Monitoring System approved by the Council of Ministers of the Republic of Belarus, April 28, 2004 No 482.

Radiation monitoring is carried out to monitor the natural radiation background, radiation background in the areas of exposure of potential sources of radioactive contamination, including the assessment of transboundary transfer of radioactive materials, as well as to monitor the radioactive contamination of air, soil, surface water and groundwater in areas affected by radioactive contamination as the result of the disaster at the Chernobyl nuclear power plant. [44]

Radiation monitoring of the natural radiation background, radioactive contamination of air, soil, surface water and groundwater in the areas of exposure of potential sources of radioactive contamination and in the radioactively contaminated areas, as well as an overall assessment of the radiation situation in the country, guidance are carried out by the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus (hereinafter - the Ministry of Environment) and by the organizations that are run by the Ministry of Environment [44].

The licensing system

At present, the Republic of Belarus has a developed system of licensing in the field of nuclear energy, nuclear and radiation safety.

Key regulatory requirements are stipulated in regulations on the licensing of certain types of activities, approved by the Decree of the President of the Republic of Belarus dated September 1, 2010 No. 450 "On licensing certain types of activities" identified, and in the area of nuclear security activities in the field of nuclear energy and sources of ionizing radiation are defined as licensed activities. The licensing authority is the Ministry of Emergency Situations.

Considering that "Belarusian NPP" is analogous to the Baltic NPP, therefore the system of licensing in the field of nuclear energy and ionizing radiation sources in the Republic of Belarus is based on the analogous Russian system.

The main licensed activities are:

activities in the field of the use of nuclear energy;

activities in the field of radiation sources;

activities in the field of the radioactive waste management;

activities on engineering and fabrication of processing equipment and means of radiation protection;

activities for the examination of the safety in the field of nuclear energy and ionizing radiation.

The licensing process and the associated safety assessment of the first nuclear power plant in Belarus are the most important functions of the Gosatomnadzor in the short - medium and long term.

Activities in the field of the use of nuclear energy includes the following activities and (or) services:

engineering, manufacture, siting, construction, installation, commissioning, operation, diagnostics, repair, maintenance, decommissioning of nuclear facilities;

engineering, siting, construction, operation, decommissioning of nuclear material storage sites;

handling of nuclear materials, nuclear fuel, spent nuclear materials, spent nuclear fuel, operational radioactive waste.

The Government of the Republic of Belarus has approved the procedure of the examination of the supporting documents on nuclear and radiation safety in carrying out activities in the field of nuclear energy and ionizing radiation " [55].

The State Scientific Institution "Joint Institute for Power and Nuclear Research – Sosny" of the National Academy of Sciences of Belarus is determined as the organization providing scientific and technical support to the Ministry of Emergency Situations of the Republic of Belarus which in accordance with the legislation provides the organization and execution of works on scientific and technical support of nuclear and radiation safety, including the analysis and justification of the criteria and the requirements of such safety, the scientific research to improve the effectiveness of the state regulation in the field of nuclear and radiation safety of nuclear facilities, and the implementation of safety assessment in the field of nuclear energy and ionizing radiation [57]. PSI "JIPNR-SOSNY" is the only organization in the Republic of Belarus, which has a special permit (license) for the safety examination in the field of nuclear energy.

The license shall be issued only in case of a positive assessment of safety of the nuclear facility. At the stage of construction of a nuclear facility the assessment of the design decisions and measures taken to ensure the safety of the nuclear facility is carried out within the licensing process. Issuance of licenses for the operation is carried out after:

safety assessment on the basis of the review and examination of the documents, supporting the safety of operation of the nuclear facility;

audits of the operation safety of the nuclear facility which are carried out to assess the safety directly at the nuclear facility, verification of the information, assessment of the MES capabilities and conditions to conduct of the declared activity.

Documents supporting the safety of the nuclear facility, design, engineering, technological and operational documents for a nuclear power plant which are submitted by the license applicant to the Ministry of Emergency Situations, are subject to the safety examination of the nuclear facility.

Safety examination, appointed by the Ministry of Emergency Situations, is carried out to determine the level of safety of the projected or existing nuclear power plant through comparison of the design decisions and the results of their implementation with the requirements of the regulations, including technical regulations in the field of safety.

Assessment and verification of safety of a nuclear facility is conducted regularly throughout the life cycle of a nuclear facility by the operating organization and the Ministry for Emergency Situations [64].

Associations and other organizations have the right to offer their representatives for participation in the safety examination at the stage of siting, engineering, construction, operation, decommissioning or limitation of the performance of a nuclear facility, as well as to conduct independent examination [33].

The main issues on environmental safety are stipulated in the Law of the Republic of Belarus "On the State ecological expertise" [36]. The document defines the obligation to assess the environmental impact of:

nuclear power plants and other nuclear facilities (except buildings and complexes with experimental and research nuclear reactors, critical and sub-critical nuclear assemblies, whose maximum power does not exceed 1 kilowatt continuous thermal load);

stations for manufacture or enrichment of nuclear material and regeneration of spent nuclear material;

stationary facilities and (or) buildings for storage of nuclear materials, spent nuclear materials and (or) operational radioactive waste.

The system of regulatory inspection and assessment

The inspection (supervisory) activity in the Republic of Belarus is carried out in accordance with the Decree of the President of the Republic of Belarus "On improvement of the inspection (supervision) in the Republic of Belarus". According to the Decree of the President of the Republic of Belarus dated 26.07.2012 No. 332 the supervision over observance of legislation in the field of nuclear and radiation safety in the use of nuclear energy is derived from the scope of the requirements and limitations of the general order of inspection activities.

Implementation of laws and regulations, licensing requirements and conditions is achieved within the established system of state supervision of safety. System of state supervision provides regular inspections of licensed activities with verification of compliance of regulations and licensing requirements and conditions [35].

State supervision of nuclear and radiation safety is carried out by the Gosatomnadzor through scheduled and unscheduled inspections at the stage of engineering, siting, construction, manufacture, commissioning, operation and decommissioning of nuclear facilities. The main method of state supervision is inspection of the compliance of the activities carried out by the audited entity as well as actions (inaction) of its officers and other employees to the requirements of the legislation. The methods of inspection are determined by the MES.

Regulation of the use of nuclear energy and the management in the field of the use of nuclear energy, nuclear safety and radiation is carried out by MES, the Gosatomnadzor is authorized to exercise state supervision and inspection of the implementation of legislation in the field of safety.

If the inspection finds out the gross violation of the licensing legislation or statutory licensing requirements and conditions by the licensee, the decision to suspend or to revoke the license is made. In the case a set of decisions concerning the suspension or termination of the license granting the right to operate a nuclear facility is made, the governmental authority or other state entity in charge of the nuclear facility shall take steps to ensure its safety.

Parties responsible or guilty of violation of safety rules, violation of license terms and conditions may be subject to administrative sanctions (a fine or deprivation of the right to engage in certain activities), in accordance with the Code of Administrative Violations or criminal sanctions (arrest, restriction or deprivation of liberty) in accordance with the Criminal Code of the Republic of Belarus.

The Decree of the Ministry of Emergency Situations of the Republic of Belarus of 24.01.2011 № 4 defines the list of officials with Gosatomnadzor, empowered to draw up protocols on administrative violations and to prepare the administrative cases for consideration of cases on administrative offenses. Resolution of the Ministry of Emergency Situations of April 25, 2013 No. 24 provides the right to draw up reports on administrative offenses stipulated in Part 1 of Art. 12.7 of the Code of Administrative Offences of the Republic of Belarus (in violation of the terms and conditions of the activities stated by the special permit (license)) [28].

Inspections are carried out in the order in accordance with the periodicity determined by rating of the subject of surveillance to a particular risk group [35]. Implementation of activities in the field of nuclear energy, radioactive waste management, engineering and manufacturing of processing equipment for the nuclear facility, for which the license is required, are included in the risk group "High".

The state inspection may be carried out with the help of [31]:

experts, if the resolution of issues emerging during the audit requires special knowledge in the field of safety;

specialists engaged on a contractual basis to assist and (or) participate in specific actions.

If the inspection has revealed violations of legislative acts, the act is drawn up. If the inspection has revealed no violations of legislative acts, the certificate is issued.

Gosatomnadzor carries out inspections during [35, 48]:

engineering, siting, construction and operation of nuclear facilities;

acceptance in the operation of nuclear facilities;

checking of the observance of legislation in the field of safety by the republican bodies of state administration, local executive and administrative bodies, other state organizations subordinated to the Government of the Republic of Belarus;

the performance of work and services in respect of nuclear facilities by licensees;

the review and approval of drafts of technical regulations affecting the requirements of nuclear and radiation safety, local normative legal acts in the field of safety, submitted by the inspection bodies.

Parties responsible or guilty of violation of safety rules, violation of license terms and conditions may be subject to administrative sanctions (a fine or deprivation of the right to engage in certain activities), in accordance with the Code of Administrative Violations or criminal sanctions (arrest, restriction or deprivation of liberty) in accordance with the Criminal Code of the Republic of Belarus [26, 28].

To coordinate the state inspection (supervision) over the construction of a nuclear power plant the Decree of the Council of Ministers of the Republic of Belarus dated 30.12.2011 No. 1791 has established a special working group which includes officials of inspection (supervision) bodies, led by the representative governing body (the Deputy Minister of Emergency Situations of the Republic of Belarus). The main tasks of the working group is to coordinate the interaction of inspection (supervision) bodies during the organization and implementation of state inspection (supervision) over the construction of NPP, consideration of problems during the inspection (supervision).

Ensuring of observance of applicable regulations and the terms of licenses

According to the Decree of the President of the Republic of Belarus dated March, 29, 2011 No. 124 in order to ensure the fulfillment of international treaties on civil liability for nuclear damage by the Republic of Belarus, PI “DSAE” is defined as the operator (operating organization) of NPP.

The operating organization is continuously monitoring the safe operation of the nuclear facility, the purpose of which is the early detection and prevention of deficiencies in its work, it periodically tests the operation of nuclear facility’s systems which are important for safety.

Assessment of the safety of a nuclear facility is carried out with a view of:

verification of the actual state of safety systems and other systems and components important for safety of a nuclear facility;

analysis of the physical security barriers and containment systems;

assessment of the radiation at the nuclear facility and in the environment;

verification of the programs of system and equipment modernization and assessment of the impact of works on the safety of a nuclear facility;

inspection of the status of nuclear, radiation, industrial and fire safety of a nuclear facility;

review and assessment of the violations at NPP and of the personnel mistakes;

identification of measures aimed at improving the safety and reliability of the further operation of the nuclear facility.

The annual reports on the safety assessment of a nuclear facility approved by the operating organization are presented to the MES for review, analysis and assessment of the implementation of inspection activities.

Thus, the Republic of Belarus has the developed legal and regulatory base aimed at ensuring nuclear safety. Its evolutionary changes are aimed at strengthening the role of the Regulatory authority and to increase the efficiency of its activities, and to improve the existing rules and regulations that establish requirements to the safe use of nuclear energy.

Changes in the legislation of the Republic of Belarus, made since the previous national report, meet the obligations of the Republic of Belarus within the Convention on Nuclear Safety.

ARTICLE 8. REGULATORY BODY

Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.

Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

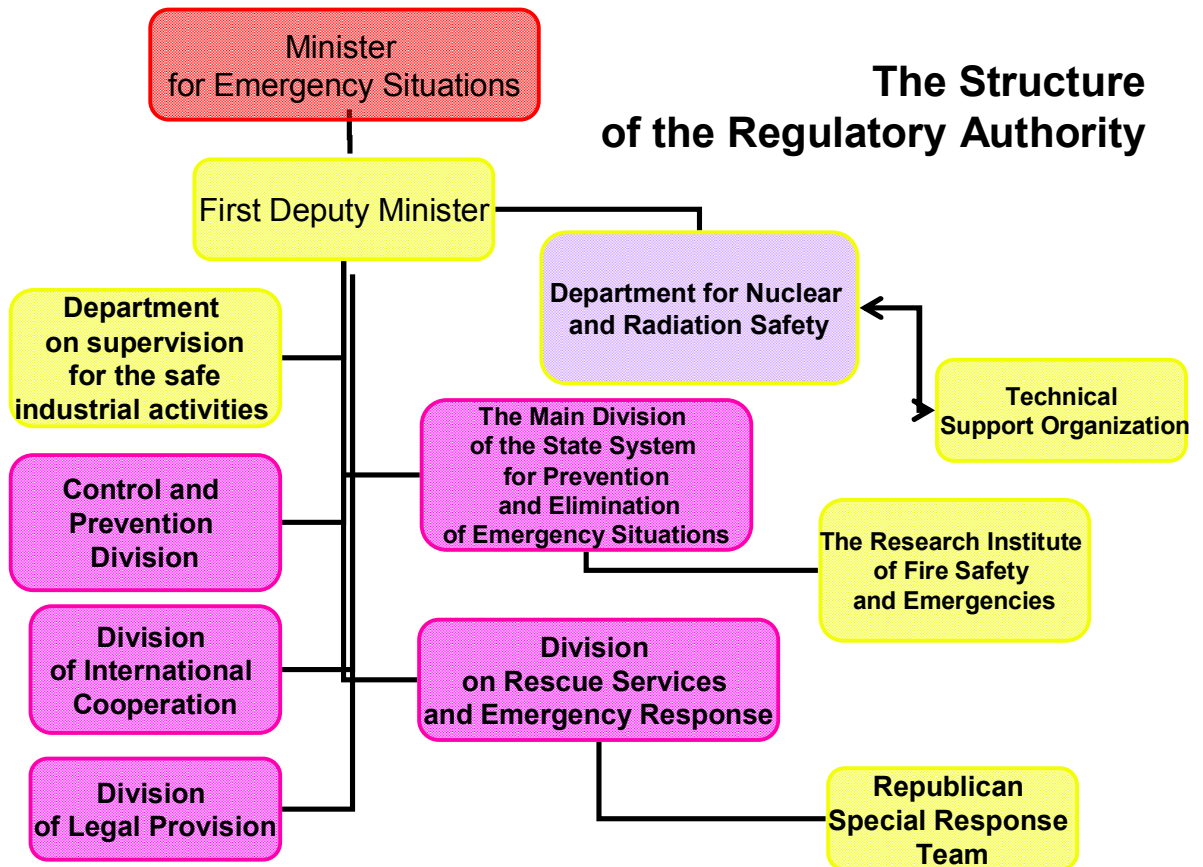
According to the Article 6 of the Law "On Use of Atomic Energy" governmental management in the field of nuclear energy is carried out by the Ministry of Energy of the Republic of Belarus, the Ministry for Emergency Situations of the Republic of Belarus (hereinafter The Ministry of Emergencies of Belarus), and other central governmental authorities and other public or the Gosatomnadzor authorized by the President of the Republic of Belarus.

The regulatory authority and the regulatory infrastructure

In accordance with the Decree of the President of the Republic of Belarus "On Some Issues of the Ministry of Emergency Situations" the Ministry of Emergency Situations of the Republic of Belarus is a republican government authority which carries out regulation and management in the field of nuclear and radiation safety, as well as elimination of consequences for disaster at the Chernobyl NPP [30].

The Ministry for Emergency Situations is headed by the Minister, who is personally responsible for carrying out the tasks entrusted to the Ministry of Emergency Situations. The Minister reports directly to the President of the Republic of Belarus according to the Constitution of the Republic of Belarus, the laws of the Republic of Belarus and the Acts of the President of the Republic of Belarus, and to Prime Minister of the Republic of Belarus according within the jurisdiction of the Government of the Republic of Belarus.

The Ministry of Emergency Situations of the Republic of Belarus is determined as a regulatory authority in the field of prevention and elimination of natural and anthropogenic emergency situations and civil defense, ensuring of fire, industrial, nuclear and radiation safety. The structure of institutions of the Ministry related to nuclear and radiation safety, nuclear facilities is shown in Figure 1:



The Ministry of Emergency Situations within its competence, in accordance with regulations approved by the Decree of the President of the Republic of Belarus [30], provides the state supervision and inspection in the following areas:

Protection of the population and territories from natural and anthropogenic emergency situations;

Nuclear, radiation and industrial safety;

State fire supervision;

Safe transportation of hazardous cargo;

Management of spent nuclear materials and operational radioactive waste.

Decision of the President of the Republic of Belarus dated 12.11.2007 in the structure of the Ministry of Emergency Situations has created a separate department with the formation of a legal entity empowered to inspect activities in the field of nuclear and radiation safety - the Department of Nuclear and Radiation Safety (Gosatomnadzor) [30].

The Gosatomnadzor is led by the head appointed and dismissed by the President of the Republic of Belarus on the recommendation of the Minister of Emergency Situations. The head of the Gosatomnadzor reports to the Minister for Emergency Situations, governs the activities of the Gosatomnadzor and is personally responsible for carrying out of his tasks and functions. The activities of the Gosatomnadzor is funded from the national budget and other sources in accordance with the law. Information on the activities of the Gosatomnadzor can be found on a web page www.gosatomnadzor.gov.by.

The phase of the construction of "Belarusian NPP" imposes on the regulatory authority additional tasks of supervision and regulation. With coming in an active phase of the construction project of "Belarusian NPP" in 2012, and on the basis of the analysis of the structure, size and functions of regulatory authorities of countries operating nuclear power plants

1-2, since 1 July 2013 the staff of the Gosatomnadzor has increased in 43 staff units and has made up 82 units with the creation of a territorial unit directly on the construction site of NPP.

The current structure of the Gosatomnadzor is presented in Annex 2.

In collaboration with experts from the European Union the Strategy of the development of the Gosatomnadzor has been worked out. The document contains the managerial, technical and administrative activities that correspond to the basic tasks of the Gosatomnadzor.

Priority is given to staff development for 2012-2016 and till 2020, and includes detailed measures for each year.

The action plan and the plan of cooperation for capacity-building of the Gosatomnadzor are based on the Strategy. The plans provide measures aimed at the improvement of the organizational structure and the quality of human resources.

The status of the regulatory authority.

The scheme of key state authorities of management and regulation on nuclear and radiation safety and use of nuclear energy is presented in Annex 3.

The state authorities of regulation of the safe use of nuclear energy within the exercise of its power related to government regulation of safety, inspection and state supervision of the use of nuclear energy are independent on the national state authorities and other public organization or engaged in state management in the field of use of nuclear energy (Article 7 of the Law "On Use of Atomic Energy" [33]).

The Ministry of Emergency Situations of the Republic of Belarus reports to the Board of Ministers – the Government of the Republic of Belarus. The Ministry of Emergency Situations directly communicates with state (government) authorities of a higher level when it is necessary for the effective performance of the functions of the regulatory authority.

The staff of the regulatory authority does not have any direct or indirect interest in the facilities and activities, except the interest necessary for achievement of the regulatory goals.

The Ministry of Emergency Situation has all the attributes of an independent regulatory authority.

Authorities, departments and organizations of the Ministry of Emergency Situations are funded and logistically supported from the republican and local budgets, as well as other sources not prohibited by the legislation.

To perform its duties and functions the Ministry of Emergency Situations shall be entitled:

to verify observance of the legislation in the field of prevention and elimination of natural and anthropogenic emergency situations and civil defense, ensuring of fire, industrial, nuclear and radiation safety, elimination of the aftermath of the Chernobyl nuclear power plant, the creation and preservation of material mobilization reserve by the central government bodies, local executive and administrative bodies, other organizations, as well as by citizens, to hear representatives of the organizations on matters within the competence of the Ministry of Emergency Situations, to make binding orders to eliminate identified shortcomings;

in accordance with established order to request and to receive the information they need to perform their duties from the national government bodies, local executive and administrative bodies, other organizations.

In addition to the Ministry of Emergency Situations of the Republic of Belarus the state regulatory authorities in the field of the use of nuclear energy include the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, the Ministry of Health of the Republic of Belarus, the Ministry of Internal Affairs of the Republic of Belarus, the State Security Committee of the Republic of Belarus.

In accordance with the Law "On Use of Atomic Energy" technical normative legal acts in the field of the use of nuclear energy are to be agreed with the state regulatory authorities in the field of the use of nuclear energy.

The Ministry of Health of the Republic of Belarus, through existing regional centers of hygiene and epidemiology, is the regulatory authority which exercises the state sanitary

inspection, including the preparation of sanitary norms, rules and hygienic standards, the creation of a unified state system of monitoring and accounting of individual doses of irradiation for the population and ensuring its functioning; delivery of permits (sanitary certificates) to the workplaces, and carrying out of inspections of such facilities, and realization of other powers in the field of radiation protection.

The competence of **the Ministry of Natural Resources and Environmental Protection of Belarus** includes:

- State inspection over the observance of the requirements of the environmental protection;
- radiation monitoring of the environment;
- development of regulations for the environmental monitoring;
- emergency radiation monitoring of the environment and its activities;
- forecasting of radioactive contamination in the event of an emergency.

The Ministry of Internal Affairs of the Republic of Belarus establishes the procedure for determining the project threat in order to establish the requirements for the physical protection of each facility where nuclear energy is used (paragraph 5 of the physical protection of nuclear facilities [54]).

The State Security Committee agrees gaining access to the nuclear facility, to the storage unit, to nuclear material and radioactive waste (paragraph 8 of the physical protection of nuclear facilities [54]).

Gosstandart is a regulatory authority that implements the common state policy in the field of technical standardization, metrology, energy effectiveness, exercises state supervision during construction, monitoring and assessment of the conformity of draft with regulations and standards, as well as monitoring of fuel, rational use of electric and thermal energy.

Gosstroy nadzor is a department of the Governmental institution. Gosstroy nadzor ensures the state construction supervision and is an integral part of the system of state regulation of construction activity on the territory of the Republic of Belarus.

The main task of this inspectorate is to verify the compliance of participants of investment activity in the field of construction with the requirements of the legislation of the Republic of Belarus, regulatory, technical and approved design documents for construction in order to ensure the reliability and safety of construction projects.

Management of human resources and nuclear knowledge of Regulatory Body

In 2011 The Gosatomnadzor worked out the concept of creation and development of knowledge and human resource management systems based on the requirements of the IAEA to the staff of the regulatory authority, which reflects the following:

- the Gosatomnadzor policy in the field of staff training;
- principles of knowledge management in the State Nuclear Inspectorate;
- usy of a systematic approach to staff training;
- ways of staff training.

In accordance with the policy in the field of staff training the Gosatomnadzor undertakes to provide training and to improve the professionalism of its staff in order to improve the efficiency and effectiveness of its work, to achieve the goals and to contribute to the continuous training of professional, competent personnel, interested in the work.

At present, increase in the level of personnel competence of the Gosatomnadzor is the part of the following national and international projects (contracts)

State training programs for nuclear power industry in the Republic of Belarus for 2008-2020, approved by the resolution of the Council of Ministers dated September, 10, 2008 No. 1329;

National project of international technical assistance of IAEA "Improving the performance of the regulatory authority for nuclear and radiation safety by improving the training of specialists and experts" BYE/9/017 (2012-2013.).

International technical assistance project of the European Commission "Institutional and technical cooperation with the Gosatomnadzor to develop its capacity through the transfer of European principles and methods of safety" (BE/RA/06), 2012-2013;

International technical assistance project of the European Commission "The development of technical cooperation in the field of nuclear safety, to assist regulatory authorities» (BE/RA/07), 2013-2014;

International technical assistance project of the European Commission "Education and training" to enhance the professional level of regulatory authorities' staff and technical support in the field of regulatory base, safety assessment, supervision, inspections;

Framework Agreement on Cooperation in the field of nuclear safety between the Ministry for Emergency Situations of the Republic of Belarus and the Society for Technical and Nuclear Safety (GRS, Federal Republic of Germany).

To ensure a systematic approach to management of quality and human resources on July 1, 2013 the Gosatomnadzor established a department of staff training and quality management.

Openness and transparency of the regulatory authority

The Gosatomnadzor in accordance with the legislation informs the public about the safety state of radiation facilities, nuclear power plants, nuclear power facilities and other issues related to nuclear and radiation safety in the Republic of Belarus.

Information and communication activity of the Belarusian regulatory authority goes through the stage of formation and at this stage includes three components:

institutional reforms;

development of information and communication strategy;

creation of stable channels of communication with the public, the practical measures of informative character.

Institutional reforms include the creation of a respective structural department in the Gosatomnadzor - the Department of Communication and Public Information, as well as involvement of the branch "Belarusian department of the Russian-Belarusian information center on the consequences of the disaster at the Chernobyl nuclear power plant " of the RSRUE "Institute of Radiology" (BBRBC) on a contractual basis since April 2012 for informational, and technical support of the Department's activities. BBRBC actually performs for the Belarusian regulator the role of organization and technical support in this area of activity.

At present, with the study of media companies of overseas regulators in the field of nuclear and radiation safety the information and communication strategy of the Gosatomnadzor is developing, as well as:

intra-republican communication and information policy (establishment and maintenance of various channels of cooperation and feedback with the public);

foreign information policy.

The main target groups, which are subject of information and communication strategy of Gosatomnadzor, are:

the public (citizens, including young people, social organizations);

media (the main short-term objective is to establish a close relationship with local and national media);

specialists in the field of nuclear energy, management of radioactive substances and ionizing radiation (the priority is the preparation of publications and analytical materials, participation in scientific and international conferences, meetings);

institutional representatives (elected officials, government).

Simultaneously with the development of strategies **practical steps, actions, activities**, particularly with regard to the establishment and maintenance of various channels of interaction with different target groups are carried out. Among them:

design and since December 2012 operation of its own website www.gosatomnadzor.gov.by

- the most important channel of communication with the Internet audience;

participation in thematic exhibitions and other public events in order to inform the public about issues related to the development of nuclear and radiation safety in the Republic of Belarus;

negotiations with the national media, news agencies, online portals on the principles of cooperation in covering issues of nuclear and radiation safety.

Organization of technical support

As international experience shows, national regulatory authorities in the field of use of nuclear energy base their activity on scientific and technical support to the organizations specializing in the safety expertise in the field of use of nuclear energy, improvement of the regulatory base in the field of nuclear and radiation safety, research works in respective areas of activity.

State Scientific Institution "Joint Institute for Power and Nuclear Research - Sosny" of the Belarusian National Academy of Sciences (PSI "JIPNR-Sosny") is defined as an organization that provides technical support to the regulatory authority in the field of nuclear and radiation safety (Resolution of the Council of Ministers of the Republic of Belarus [57]) in the following areas of activity:

Expert assessment of nuclear and radiation safety of nuclear facilities and radiation technologies, risk assessment of their use (safety analysis report, a report on the PSA, analysis report of severe accidents);

Carrying out of their own independent deterministic analysis of accidents and review of the PSAR chapters on deterministic safety analysis within the activities of licensing;

development of scientifically substantiated recommendations on the improvement of the safety of nuclear facilities and sources of ionizing radiation;

scientific and technical justification of the principles, criteria and requirements in the v of nuclear and radiation safety; drafting of rules, regulations and standards in the field of nuclear and radiation safety;

scientific, analytical and expert support of the regulation of the activities related to the use of nuclear energy and radiation technologies;

acquisition and application of best practices in the field of safety analysis and risk assessment for nuclear facilities and radiation technologies.

Republican Research Unitary Enterprise "Institute of Radiology" of the Ministry of Emergency Situations within the State program "Scientific support for the development of nuclear energy in the Republic of Belarus for 2009 - 2010 and for the period up to 2020" is working on a data-processing system of support to decisions on the response to radioactive accidents at the nuclear facilities in the Republic of Belarus in order to prepare proposals for the development of an external emergency plan of "Belarusian NPP".

Branch "Belarusian department of the Russian-Belarusian information center on the consequences of the Chernobyl disaster" of the RSRUE "Institute of Radiology" (hereinafter - BBRBC) provides the information and technical support to the activity of Gosatomnadzor, the promotion of awareness on the issues of nuclear and radiation safety (in accordance with IAEA requirements) through the development of approaches and principles of media strategy of Gosatomnadzor, development and promotion of the information products of contemporary format on issues related to its activities.

To perform the support functions of these organizations the Gosatomnadzor provides funding within the State program "Scientific support for the development of nuclear energy in the Republic of Belarus for 2008 - 2015 and for the period up to 2020"

In 2012, the Regulation on the advisory board for nuclear safety issues was approved by Gosatomnadzor, this regulation aims to provide assistance to the Gosatomnadzor on the issues of formation and realization of policy in the field of nuclear and radiation safety, the introduction of the latest scientific and technological achievements, technology and the best practices in the field of safe use of nuclear energy.

ARTICLE 9. RESPONSIBILITY OF THE LICENCE HOLDER

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

According to the Article 10 of the Act "On the Use of Nuclear Energy" licensing in the field of use of nuclear energy is carried out in accordance with the legislation of the Republic of Belarus.

In Belarus, the licensing of activities of the use of nuclear energy and ionizing radiation is regulated by the Regulation on licensing of certain activities, approved by the Decree of the President of the Republic of Belarus dated September 1, 2010 No. 450. The licensing authority is the Ministry of Emergency Situations.

Considering that "Belarusian NPP" is analogous to the Baltic nuclear power plant, the system of licensing in the field of nuclear energy and ionizing radiation sources in the Republic of Belarus is based on the analogous Russian system.

The main licensed activities are:

activities in the field of the use of nuclear energy;

activities in the field of radiation sources;

activities in the field of the radioactive waste management;

activities on engineering and fabrication of processing equipment and means of radiation protection;

activities on the examination of the safety in the field of nuclear energy and ionizing radiation.

Activities in the field of use of nuclear energy include the following activities and (or) services:

engineering, manufacture, siting, construction, installation, commissioning, operation, diagnostics, repair, maintenance, decommissioning of nuclear facilities;

engineering, siting, construction, operation, decommissioning of nuclear material storage sites;

handling of nuclear materials, nuclear fuel, spent nuclear materials, spent nuclear fuel, operational radioactive waste.

The implementation of these activities without a license is illegal.

License for activities in the field of use of nuclear energy is valid for 5 years. The time limit may be repeatedly extended at the request of the licensee.

The Ministry of Emergency Situations of the Republic of Belarus by its decisions delegated its structural department - the Department of Nuclear and Radiation Safety Authority functions of licensing activities in the field of use of nuclear energy and ionizing radiation:

In accordance with the Law "On Use of Atomic Energy" operating organization shall develop and implement measures to maintain and improve the safety of the nuclear facility, if necessary it shall create appropriate services engaged in inspection of safety, it shall provide the information on safety status of these facilities to the authorities that regulate the safe use of nuclear energy in their set time. The operating organization provides:

use of a nuclear facility only for the purposes for which it was intended;

organization and conduct of the works with such scope and such quality that meet the requirements of technical regulations, at all stages of the siting, engineering, construction, commissioning, operation, limits of performance, service life extension, decommissioning of a nuclear facility;

development and implementation of measures to prevent the occurrence of a radiation accident during the activities within the use of nuclear energy and elimination of the negative consequences for employees (personnel), citizens and the environment;

handling of nuclear materials, spent nuclear materials and (or) operational radioactive waste safe for employees (personnel) and citizens;

formation and intended use of the fund for decommissioning of a nuclear facility and the fund financing the operations of maintenance and improvement of the safety of the nuclear facility;

realization of the rights of employees (staff) on social protection;

account of individual doses of radiation to employees (staff);

development and implementation of measures for the protection of employees (staff) and citizens in the supervised zone in case of a radiation accident when carrying out activities in nuclear energy use;

registration and inspection of nuclear materials, used nuclear materials, running radioactive wastes and other ionizing radiation sources;

implementation of physical protection of nuclear facilities;

development and implementation of fire safety measures at the nuclear installation, and (or) in storage facility;

radiation control and monitoring of the controlled access area and the supervised zone;

selection, professional development and proficiency maintaining and the necessary number of employees (staff);

informing citizens about the radiation situation in the supervised zone;

carrying out other duties established in accordance with the legislation.

According to the legislation the operating organization has responsibility for noncompliance of requirements in safety protection of the nuclear installation and (or) storage facility.

In case of adoption of a set of decisions concerning suspension or termination of the special authorization (license), that gives the right to operate a nuclear installation, republican agency of state administration or other state organization, having in their jurisdiction the objects, take measures to ensure their safety. If the renewal of the special authorization (license) is not possible, the appropriate republican agency of state administration or other state organization, having in their jurisdiction the objects, takes measures to create a new operating organization.

According to the licensing legislation, a licensing body or other state bodies, state organizations within the scope of their competence carry out inspection over compliance of licensing legislation, license requirements and conditions by license holders [34].

Gosatomnadzor according to its missions and within the scope of their competence organizes and carries out a government supervision to oversee the license holders to comply with license requirements and conditions in the area of the nuclear energy use and the ionizing radiation sources [31].

According to established procedures, for carrying out the duties and functions Gosatomnadzor has the right to involve qualified specialists to take part in safety auditing of nuclear installations and nuclear power facilities.

In case of detecting inaccurate information, needed (relevant) for taking decisions about extending the validity of the license, in the statement represented by a license holder, the licensing body takes decision to refuse extending the validity of the license. However a license holder's repeat appeal to the licensing body with the statement regarding extending the validity of the license is not allowed [34].

Provided infringements of licensing legislation, requirements and conditions made by the license holder are detected by the licensing or state body which controls licensed activity implementation, the license holder is given an instruction to eliminate detected infringements and a period of eliminating infringements. The period is not more than six months.

If the license holder's infringements indicated in the instruction are not eliminated in time, the licensing body itself or by introducing other state body which is authorized to control licensed activity implementation, takes decision to suspend the validity of the license for a period of six months.

If the license holder's infringements carrying the suspension of the validity of the license are not eliminated in time, or a written notification regarding the elimination of the infringements is not represented to licensing body or other inspection body, licensing body takes decision to suspend the validity of the license.

Persons, who are responsible or guilty in violation of safety rules, violation of license requirements and conditions, may be subjected to administrative (penalty or deprivation of the right to do a certain business) [28] or criminal liability (arrest, limitation of freedom or imprisonment) [26].

ARTICLE 10. PRIORITY TO SAFETY

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

Number of technical and administrative measures required to ensure safety of nuclear installations increases with rising technical complexity of nuclear installations; it is the greatest concerning nuclear power reactors. Applied safety measures should be adapted to risks from certain nuclear installations. Safety assurance of nuclear power reactors, for which the risks are the greatest, is the important goal of nuclear legislation.

Description of the current situation on the priority of nuclear safety in Belarusian legislation

Principles of priority of nuclear safety assurance are included in Law "On Use of Atomic Energy". General principles of activity implementation in nuclear energy use are specified in Section 3 of the Law [33]:

“priority of protection of current and future generations’ life and health, environmental protection over all other activity aspects in nuclear energy use; assurance of rising benefits for citizens and society from nuclear energy use over the harm that may be caused by the activities in nuclear energy use; ensuring nuclear and radiation safety”.

Safety assurance of operations at nuclear facilities during construction, mounting, individual tests and commissioning works is the responsibility of General contractor together with his subcontracting organizations. Administrative management of such organizations is responsible for following safety rules by staff of organizations involved in the procedure of nuclear installation put into operation. Safety assurance of operations from the date of acceptance of premises, buildings, constructions into operation (temporary operation), as well as an equipment for comprehensive testing placed there is the responsibility of "Belarusian NPP" administration.

License holder's measures to implement priority of nuclear safety

Legislative framework

According to the Decree of the President of Republic of Belarus on March 29, 2011 № 124 “Measures to implement international agreements on civil liability for nuclear damage” PI “DSAE” is the operator (operating organization) of nuclear power station (hereinafter – NPP).

The main activity goals of PI “DSAE”, as operator (operating organization), are their own implementation of activity in placement and construction of the NPP, as well as putting it into operation, and other activity mentioned in the Law of Republic of Belarus "On Use of Atomic Energy".

The "General Provisions of Safety Ensuring" (GPSE of NPP) reads that the operating organization ensures safety of the NPP including measures to prevent accidents and reduce their consequences, registration and inspection, physical protection of nuclear materials, radioactive materials and radioactive wastes, radiation control over the state of environment in controlled access area and supervised zone, and also provides the use of the NPP only for the purposes it was designed and constructed.

The operating organization is fully responsible for the safety of the NPP. Responsibility of the operating organization is not removed due to the independent activity and responsibility of organizations working or providing services for the NPP, as well as the government regulatory agencies of safety.

Know-how in creating systems of preparedness and response to radiological emergencies in the Russian Federation will be used to ensure reliability of the nuclear facilities when implementing the nuclear energy program within the framework of creating the related infrastructure in the Republic of Belarus. For that purpose, Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on cooperation in the field of nuclear safety was signed on the 1st of February 2013.

Radiological safety

Radiological safety of nuclear power unit of the "Belarusian NPP" is regulated by legislation and by the instruction for radiological safety of nuclear power unit. Radiological supervising; radiological dosimetric monitoring; radiation control of premises and facilities; radiation control over the environment are organized and provided before delivery of nuclear fuel to the nuclear power unit of the "Belarusian NPP".

Responsibility for compliance of radiation safety rules is imposed on the staff of all the organizations putting the nuclear power unit of the "Belarusian NPP" into operation. Responsibility for ensuring radiation safety is imposed on the operating staff of Customer.

Supervision bodies allow delivery of nuclear fuel to the nuclear power unit after the achievement of preparedness to implement action plans for the protection of employees and population in case of an accident at the "Belarusian NPP" including the preparedness of basic and alternative communication means and notifications.

Before delivery of fuel to nuclear reactor, the staff of the nuclear power unit should take training and should be examined on radiation safety rules.

Nuclear safety

Nuclear safety assurance is a range of organizational and technical requirements and actions excluding the possibility of a nuclear accident.

The basic document defining the safe operation of RF is a process procedure of the safe operation of the nuclear power unit of the "Belarusian NPP". The basic document for safety case of the nuclear power unit is "Preliminary safety assessment report" (PSAR) developed as a part of the project.

Responsibility for compliance of radiation safety rules is imposed on the staff of all the organizations putting the nuclear power unit of the "Belarusian NPP" into operation. Responsibility for ensuring radiation safety is imposed on the operating staff of Customer.

When putting the nuclear power unit of the "Belarusian NPP" into operation nuclear safety is the subject to the following procedures: the instruction for nuclear safety assurance during the transportation, reload and storage of fresh and spent fuel; the instruction for nuclear safety assurance during physical start-up; physical start-up program (the program of the first loading staff active zone, critical reactor output program); power start-up program; experimental-industrial production program.

Requirements to the order and organization of NF transport on the territory of the "Belarusian NPP" in the legislation are regulated [69-71].

Radiation and ecological monitoring in the impact area of "Belorussian NPP"

Proposals to organize the radiation and environmental monitoring in the impact area of “Belarusian NPP” are developed within the frames of preparation of the Report on the Assessment of the environmental impact of the “Belarusian NPP”. Study and preliminary selection of the locations of observation station of the radiation and environmental monitoring and automatic measurement sites (AMS) of gamma-radiation intensity of automated radiation situation monitoring system (ARSMS) is made in 2011-2012 within the frameworks of the State program “Scientific support for the development of nuclear energy in the Republic of Belarus for 2009-2010 and for the period up to 2020”.

Control over nuclear safety

According to the Section 7 of the Law "On Use of Atomic Energy" the Ministry for Emergency Situations of the Republic of Belarus is appointed as the main republican agency of state administration carrying out the state activity regulation to ensure safety when using nuclear energy, which within the scope of its competence:

- “implements the state control in the area of nuclear and radiation safety assurance and over providing physical protection of nuclear facilities;

- organizes and implements the state control over management of spent nuclear materials and operating radioactive wastes;

- implements the state control over compliance of the legislation in the area of nuclear and radiation safety assurance;

- takes part in organizing and carrying out works in assessment of equipment, products and technologies for nuclear facilities;

- ensures a functioning of national registration and control system of ionizing radiation sources and national registration and control system of nuclear materials of the Republic of Belarus;

- organizes a carrying out the expert examination of the safety of a nuclear installation and (or) a storage facility, as well as their projects, including the involvement of independent experts;

- implements other authorization rights according to the current Law and other legislative acts”.

Safety issues of nuclear research facilities

PSI “JIPNR-Sosny” takes all the measures needed to ensure proper protection of employees, population and environment from radiological risks concerning nuclear research facilities operations and storage of spent nuclear fuel. For that purpose the following measures are implemented: annual commission inspection of the nuclear installations safety state; weekly inspection of tightness of the fuel assemblies and canisters of spent fuel and radioactive aerosol measurement in storage; operative and comprehensive inspection of nuclear and radiation safety state of the installation by Gosatomnadzor; twice a year there is a commission inspection of safety and fire alarms efficiency and physical protection of the installation; twice a year there are inventory procedures of spent nuclear fuel.

The operating organization must develop, approve and agree “Action Plan to protect employees and population in case of a radiological accident” with Emergency Situations Ministry, Healthcare Ministry and local administrative bodies. Besides each installation must have “Instruction on human actions in emergency situations” [24, 25, 77].

ARTICLE 11. FINANCIAL AND HUMAN RESOURCES

Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.

Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.

Financial resources

Financing design and construction of NPP in the Republic of Belarus is implemented at the expense of the national budget, as well as borrowings (including foreign ones).

Financing of the preliminary period activities, which include formation of the legal framework, selection of NPP location, NPP project development and other works was made from the national budget of the Republic of Belarus within the framework of the State scientific and technical programs "Energy - 2005" and "Nuclear and Physics Technologies for National Economy of Belarus".

Also on the stage of preliminary work there was the cost evaluation of NPP implementation and creating of infrastructure necessary for NPP construction and operation with defining the financial resources required for every year during NPP construction. Different variants of NPP construction financing were discussed, including ones through the use of internal and external financing sources with involvement of the national budget of the Republic of Belarus, innovation funds of ministries and departments, Belorussian banks, investors, as well as through the long-term target external state loan (credit).

Thus, sufficient financial resources are represented for implementation of a nuclear power project in the first stage of national nuclear infrastructure development.

It is necessary to attract foreign government loans (credits) to implement the second stage of national nuclear infrastructure development along with financing actions of preliminary period at the expense of the national budget.

Timely execution of loan obligations is considered to be provided through the innovation fund, formed by the Ministry of Energy, at the account of free means from the replacement of natural gas by nuclear energy, the earnings from export of electricity produced on spare generation capacity of thermal and condensing power stations and other sources.

Department for Nuclear and Radiation Safety of the Ministry for Emergency Situations of the Republic of Belarus, the Department of Nuclear Energy of the Ministry of Energy of the Republic of Belarus, PI "DSAE" and PSI "JIPNR-Sosny" are public institutions which are financed at the expense of national budget.

The operating organization ensures the organization and performance of works in such scope and of such quality that meet the requirements of technical regulatory legal acts, on all the stages of location, design, construction, putting into operation, limiting the operating factors, extension of operating life, decommissioning of nuclear installation and (or) storage facility [53].

According to the requirements [64] it is specified that the operating organization creates structural subdivisions to implement actions for construction and safety operation of NPP on its territory, and the structural subdivisions are given the necessary rights, financial means, material and human resources. The operating organization also implements control over their actions.

Financing the construction of housing facilities, housing, transportation and production infrastructure of NPP is implemented at the expense of the national budget within the frameworks of the Public Investment Program which is annually approved by the Decree of the President of the Republic of Belarus, according to the submitted orders.

The construction of NPP is financed through the state export loan granted according to the Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on giving the export loan to the Republic of Belarus for NPP construction on the territory of the Republic of Belarus dated 25th of November 2011. The loan is given to finance 90 percent of the cost of the contract for the NPP construction.

Within the frameworks of the concluded contract for the performance of top-priority works of preliminary period on the territory of NPP construction the following works were completed: there was engineering survey necessary for the development of project documentation of major buildings and structures of energy power unit No.1 and No.2; there were construction and installation works on construction of NPP production facilities; the development of No.1 energy power unit's foundation area; and there are works on stripping the energy power unit No.2.

According to the agreements (contracts) the Ministry of Energy of the Republic of Belarus provides permanent and appropriate financing of all the works and services concerning design, construction and putting NPP into operation by PI “DSAE”, and also it provides the supply of all the necessary goods [21].

In order to finance scientific research, engineering and other works to maintain and improve the safety of nuclear installation and (or) storage facility, before putting the nuclear installation into operation PI “DSAE will create a fund to finance works on maintaining and improving the safety of nuclear installations and (or) storage facility [33].

PI “DSAE is to create a fund for putting the nuclear installation out of operation, pre-term putting out of operation or restricting the operation factors of the nuclear installation. The fund of putting the nuclear installation out of operation is used only to finance measures under the programs of putting out of operation, pre-term putting out of operation or restricting operation factors of the nuclear installation and (or) storage facility [33].

Human resources

A national training system necessary to support nuclear energy with highly qualified specialists, as well as to maintain an appropriate level of knowledge for the safe, reliable and efficient NPP operation has formed in the country. Training system includes a set of organizational and technical actions of state administration bodies, higher and secondary specialized educational institutions, industrial and technical schools and other public institutions.

To provide a manpower training in the field of nuclear energy the National Staff Training Program for nuclear energy of the Republic of Belarus implements in Belarus in 2008 - 2020. The Program was approved by the Council of Ministers of the Republic of Belarus on 10 September 2008 № 1329. The goal of this Program is to organize the complex training system ensuring the acquisition of knowledge and skills necessary for NPP construction and safety operation, nuclear and radiation safety, safety for NPP staff, population and environment.

According to the needs, the state order for manpower training is formed on the basis of state bodies' requests: the scope of training, retraining, advanced training of specialists, scientists of high qualification with specialty and workers is defined according to years; educational institutions presenting staff training are defined; training plans according to years in respective educational institutions are formed.

Within the frameworks of the State program:

national institutions for higher educational ("Belarusian State Technical University", "Belarusian State University of Informatics and Radio Electronics", "Belarusian State University", "International Sakharov Environmental University") started students training on eight new professions in the field of nuclear energy, the total amount of training is 220 people per year;

a training of teachers and scientists of higher educational institutions abroad is organized; field trip of students in the countries with developed nuclear energy is organized.

Specialists training is opened in 2008 in higher and secondary specialized educational institutions of the Republic in new specialties such as "Nuclear Physics and Technology", "Construction of thermal and nuclear power stations," "Steam turbine plant of nuclear power stations", "Electronic control system in nuclear power stations ", etc.

The training program of personnel with higher education for NPP operation includes a basic (5-5.5 years) training in the universities of the Republic of Belarus, including practical training abroad, a special (0.5-3 years) training of personnel with working experience at power facilities of the Republic of Belarus in foreign universities, practical training at existing nuclear facilities abroad, individual training programs in the study and training center (STC) in NPP.

Currently there is an update of the state program with the assessment of needs in human resources and financing.

According to the overriding importance of training issues for the nuclear energy program, an IAEA technical cooperation program “Development of human resources and professional training system for the nuclear power program” is in force currently in the Republic of Belarus.

Ministry of Energy and Ministry of Education and the National Academy of Sciences of Belarus are coordinators of this program. The program provides the provision of advice on the issues of a training system creation for nuclear energy taking into account international practices and recommendations of the IAEA. It includes seminars and training sessions, visits of Belarusian scientists' and university teachers' to training centers of NPP and to scientific research institutions abroad, visits of Belarusian specialists to the existing and constructing nuclear power plants, as well as the development and supply computer coursewares for organizations which participate in the project of NPP construction in the Republic of Belarus.

Within the frameworks of IAEA technical cooperation program BYE/0/006 "Development of human resources and training system of professionals for nuclear energy program", applied computer training system and necessary software for the training of Belarusian specialists involved in the nuclear energy development program were supplied to the Republic of Belarus.

IAEA technical cooperation program for 2009 - 2011 includes BYE/0/006 project "Strengthening the state regulatory body", the goal of which is to create a competent and effective state regulatory body for nuclear and radiation safety, strengthening and modernization in the field of licensing and inspection.

An international technical assistance project "Development of nuclear energy infrastructure and training system for the nuclear energy program" for 2012 – 2013 is implemented along with IAEA.

Implementation of the project "Institutional and technical cooperation with Gosatomnadzor in order to develop its capacity through the transfer of European experience and practice in the field of nuclear safety" is planned within the frameworks of cooperation with European Union.

According to the Decree of the President of the Republic of Belarus on March 29, 2011 № 124 "Measures to implement international agreements on civil liability for nuclear damage" PI "DSAE" is nominated as the operating organization "Belarusian NPP".

The quantity of industrial workers of two nuclear power units will number 2,321 people. The number of NPP own staff is not included 575 people of temporary involved staff and 287 attached workers who are involved for the maintenance periods. "Belarusian NPP" management and operating guilds are formed with high qualified and experienced staff with higher and / or specialized secondary education in a relevant field and related disciplines, as well as with working experience in the relevant field.

PI "DSAE" management provides selection, training, access to independent work and maintaining operational staff qualification. "Belarusian NPP" system of selection and operational staff qualification aims at achievement, control and maintenance of qualification level necessary to secure "Belarusian NPP" operation in all regimes, as well as at the implementation of actions for reduction the consequences of accidents when they occur.

The operating organization provides selection, training, retraining and advanced qualification of workers (staff), as well as maintenance of their required number during all lifespan of NPP [33].

Availability of qualified staff in the field of nuclear and radiation safety is a common requirement for a special permit (license) to carry out activities in the field of nuclear energy use and ionizing radiation sources [34].

The specialists of the license applicant (license holder) pass training on nuclear and radiation safety issues not later than one month from the date of assignment to a position and periodically according to the requirements of the regulatory legal acts, but not less than once every five years [104]. Education of specialists is carried out in educational institutions (centers), which have licenses given by Gosatomnadzor to implement training, retraining and advanced training of personnel responsible for nuclear and radiation safety, as well as personnel responsible for radiation control at the facilities and manufactures supervised by Gosatomnadzor.

These permits are issued by Gosatomnadzor within the implementation of administrative procedures [58].

The basic criteria and principles to ensure safety at all stages of the activities related to nuclear safety, the requirements towards the operating organization including the selection and training of operating personnel are established [64].

The operating organization undertakes necessary measures for the selection and training of personnel, creation of an environment in which safety is considered as vitally important issue and the subject of personal responsibility among personnel.

PI “DSAE” organizational structure was formed on a guild principle. PI “DSAE” director is the chief administrative manager and personally responsible for nuclear safety and provides common guidance to ensure it, including general management of training NPP staff. Administrative management subordinates to the director. The NPP chief engineer is the technical manager of the plant and subordinates to the director. Deputy chief engineer in field of personnel training organizes work on training and advanced qualification of the NPP staff, production and economic training, providing maintenance of NPP safe and reliable operation skills.

A principle of hierarchical subordination builds into a structure of the operating personnel.

The number of employees was defined for NPP consisting of two nuclear power units. When calculating the number of operational staff the following points were taken into account:

three-shift work, when each employee works eight hours a day on the basis of five-day work week;

flexible schedule, rest-days, holidays and sick days;

providing extra rest-days to holidays and rest-days for the employee who visits the controlled access zone due to their working week will be formed of a six-hour working day;

training in the educational practice subdivision.

Taking into account the above information one operative working place is provided with six or seven employees.

In order to implement cooperation [21] the State Atomic Energy Corporation "Rosatom" ensures training of Belarusian specialists by general contractor according to the agreements (contracts).

According to the General contract for the construction of the NPP in the Republic of Belarus (signed on 18 July 2012 in Minsk between Open Joint Stock Company “Nizhny Novgorod Engineering Company “Atomenergyproject”, which is a managing company of the Closed Joint Stock Company “Atomconstructionexport” (CJSC ACE) and PI “DSAE”) a training of NPP operating personnel will be implemented by Russian side and held as well in the Republic of Belarus, as on building and operating NPP in the Russian Federation.

This work involves several stages.

During the first stage - two years after the signing of the contract – an enlarged schedule of forming the staff of “Belarusian NPP” will be developed on the basis of the construction schedule. Then, regulatory legal acts regulating the requirements to the operation staff of the “Belarusian NPP” will be developed and selection and the forming “Belarusian NPP” with operation staff will be performed.

At the second stage, before the start of the first nuclear power unit, an educational center will be put into operation and staffed with instructors staff according to the schedule for the first nuclear power unit of “Belarusian NPP”.

The third stage, before the start of the second nuclear power unit, foresee a training of operating personnel for the second nuclear power unit of “Belarusian NPP” and the development of further human resources management strategies, taking into account the further development of nuclear energy.

ARTICLE 12. HUMAN FACTORS

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

The requirements of the Section 12 of the Convention on the assessment of the possible impact of human factors on the nuclear installations safety throughout the life cycle of the Republic of Belarus are introduced into legislation and implemented.

Regulatory requirements

The Law "On Use of Atomic Energy" in the Section 11 states that the "performance of certain types of work are carried out by employees (staff) of operating companies and organizations performing work and (or) services when implementing nuclear energy use, if the workers (staff) have permits, issued by an authorized state body in regulating safety of nuclear energy use, to carry out works when implementing nuclear energy use" [33].

The list of types of works, which require permits to carry out works when implementing nuclear energy use to the employees (staff) of the organizations specified in the Law "On Use of Atomic Energy", requirements presenting to these employees (staff) including education, as well as the procedure for obtaining such permits are determined by the Government of the Republic of Belarus [33].

The list of medical contraindications and a list of works that are subject to these contraindications, as well as the requirements to medical checkups and psychophysical examinations are defined by the legislation.

The requirements necessary for registration of the issues are specified in Sanitary Regulations and Standards 2.6.1.8-8-2002 "Main Sanitary Rules for Radiation Safety (OSP-2002)" and "Rules of nuclear installation safety of NPPs" [65,77].

Human factor in nuclear engineering

Measures to prevent possible faults of the staff, violating the normal operation

Project decisions of the energy power unit include measures to prevent potentially possible faults of staff and limiting their consequences. There are technical measures to prevent and limit the consequences of staff faults violating safety functions and which can lead to accidents: faulty input of positive reactivity; violation of heating from nuclear core; loss of sealing of primary circuit.

Measures to prevent possible staff faults when testing safety systems, engineering service and maintenance

For reducing consequences of faulty output of safety system the following measures are specified: technical measures excluding unauthorized access to the means of installations; automatic input of safety system when arising conditions required actions; the use of passive safety systems along with active systems; equipment reservation; reduction in engineering service of RF operation at power; activities registration of operating staff by automatic means.

Measures to prevent faulty of staff when controlling accident

For excluding faulty actions when controlling accident there are following points:
technical means to control and eliminate accidents;
instructions (symptom-based and functionally oriented).

Measures to prevent possible faulty of staff during refueling

To avoid faulty of staff during storage and refueling, that may lead to fuel criticality, the following solutions are used:

nuclear safety during storage of fresh fuel in the transport cover is provided by a hard spacing in hexagonal stainless tubes at a pitch of 400 mm;

nuclear safety in fuel storage in racks of spent fuel pool is provided by a hard spacing in hexagonal boron steel tubes at a pitch of 300 mm;

in case of accidents related to covering fresh fuel storage facility by water without boron, nuclear safety is ensured through the construction of racks;

the project provides the installation of shock absorbers in place of lifting containers to avoid violations of the safety operation limits in case of accidents with the fall of the cover and the spent fuel container.

Measures of license holder according to human factor in the operation and maintenance of nuclear installation

General requirements to the staff

Work organization and staff selection are determined by the requirements of industry-leading, technical and regulatory documents.

The quality of work is provided by trained operating staff and the staff having access to independent work, as well as the staff of the organizations involved in putting NPP into operation and having practical skills and the necessary qualification. All the staff has the formed safety and security culture by providing necessary selection, education and staff training.

Medical requirements to the staff

The persons involved to servicing, maintaining, testing and repairing NPP equipment, attend preliminary medical examinations according to the approved lists of manufactures and professions, and in future persons involved should attend periodic medical examination in due time.

Workers taken to NPP for position, requiring permits to carry out work in the field of nuclear energy must attend preliminary medical examinations in order to identify medical and psycho-physiological contraindications.

Requirements for testing knowledge

Administrations of the organizations involved in putting “Belarusian NPP” into operation should provide their own training and testing knowledge of rules and regulations on safety in the nuclear energy use among their staff.

The results of testing the knowledge are recorded in the required certificate. When working on the site of the “Belarusian NPP” the staff should have the certificate of testing the knowledge and provide it to the controlling persons if they require.

According to the types of work the staff should be tested for learning: NPP operation rules, manufacturing and duty instructions; labor protection requirements; rules and regulations on fire safety; rules and regulations on radiation safety; rules and regulations on nuclear energy safety; programs and methods of the PC on a certain equipment or “Belarusian NPP” systems.

Administrative-and-managerial and organizational measures of license holder according to human factor

Organizations’ responsibility for arrangement and structure of staff

The quantitative and qualitative structure of the staff, its arrangement is defined by the organizations’ management involved in putting NPP energy power unit into operation.

Organizations involved in putting NPP energy power unit into operation are responsible for the qualification of their staff and its compliance with rules, regulations and manufacturing instructions.

Operation staff

The “Belarusian NPP” administration organizes the work, the basic forms of which are selection, training, maintenance and advanced qualification training.

Selection of staff involved in putting the energy power unit into operation is implemented according to Standard Wage-Rates and Skills Reference Book.

Before each stage of putting the energy power unit into operation, jobs must be fully staffed with operation staff according to the schedule of opening and staffing jobs with operation staff on the stages of putting the “Belarusian NPP” energy power unit into operation.

The “Belarusian NPP” administration must complete all the works related to staffing, training and staff access to independent work in due manner before delivery of nuclear fuel to NPP.

The “Belarusian NPP” operation staff before access to independent work is tested in learning the information necessary for the current position.

The leaders of all ranks and operators responsible for the safe operation of the “Belarusian NPP” or providing institutional safety inspection have special permits (license) for its activities, and also they must attend medical psycho-physiological examination.

Staff of pre-commissioning organizations

Staff training of pre-commissioning organizations involved in putting “Belarusian NPP” into operation includes recruitment, training and testing knowledge according to the schedule of works at NPP. Staff training is implemented by duty instructions, standards, schemes and other regulatory and technical documentation according to staff professions.

Regulatory supervision and inspection activities according to human factor

Testing knowledge of the rules and regulations on safety of nuclear energy use by “Belarusian NPP” operation staff is implemented by commissions with the inspectors of Gosatomnadzor.

ARTICLE 13. QUALITY ASSURANCE

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

Regulatory requirements

According to the legislation requirements[33] the operating organization ensures the organization and work of such scope and of quality which meet the requirements of technical regulations, at all stages of the location, design, construction, putting into operation, limits of operation factors, life extension, putting nuclear installation out of operation and (or) storage facility.

Organizations implementing project and exploratory, scientific and research, design and experimental, technologic works, construction and production of equipment for the nuclear installation and (or) storage facility, scientific support, and other works performance (or) the provision of other services in the implementation of activities in nuclear energy use, provide works and (or) services in such scope and of such quality which meet the requirements of technical regulatory legal acts and bear responsibility for the quality of the work performed and (or) services provided during the normal life cycle, which is set out by the project for nuclear installation and (or) storage facility.

In the Republic of Belarus there is a number of technical regulatory legal acts, which specify requirements fulfillment to ensure the quality [62-64].

It is determined that the operating organization ensures the development and programs implementation to assure quality at all stages of NPP life cycle [64]. For these purposes it develops a common quality assurance program and controls the activities of the organizations, performing work or providing services for NPP. Organizations performing work and providing services to operating organizations of NPP, within the overall quality program develop private quality assurance programs for the assorted activities.

Aims, basic provisions, requirements to the structure, contents and procedure development and quality assurance program approval for NPP, as well as supervisory and responsibility for the development and implementation are determined [62]. Nuclear quality assurance program consists of a total quality assurance programs and private programs defined by the activity. Overall quality of NPP assurance program is a program of the first level and it determines the level of provisions that are common to all stages and for all the organizations involved in the construction and operation of NPP. It is developed by the operation organization, agreed with the

general contractor, the regulatory body and approved by the head of the operating organization. Each private quality assurance program is developed and approved by the organization, which fulfill the respective activity, and agreed by the operator.

All the programs include a review of their status. In case of some defects in general and private programs, the organizations which are responsible for these programs implementation take measures to eliminate the defects. Review is fulfilled by the organization management that is responsible for the appropriate program quality.

In the operating organization an establishment of the quality department is provided. Similar departments (or similar structural units) will be set up in all the organizations involved in the A-plants construction and responsible for ensuring of respective works quality.

The operating organization will develop a staff recruitment plan and staff training. This staff will include specialists who are directly responsible for the quality of work that they perform, and professionals who control the quality, as well as professionals who are engaged in the audit.

At the present time a development of technical regulations to ensure other private quality assurance programs is continuing and they cover all the stages of NPP life cycle.

The requirement for a control system and (or) quality control is a common requirement for a special permit (license) to carry out activities in the field of nuclear energy and ionizing radiation. License applicant (license holder) should give to the Ministry of Emergency Situations documents supporting nuclear and radiation safety in the activities in the field of nuclear energy, which include the safety analysis report (including Chapter 17, "Quality Assurance"), a quality assurance program [34.105].

The operating organization creates a quality assurance system, which is developed within the framework of the overall quality assurance program for NPP (QAPNPP (O)) and private quality assurance program [64]. Organizations which perform work and provide services for the operator, develop within QAPNPP (O) private quality assurance program for the concerned activities.

The law establishes the requirements for quality assurance programs, the requirements for the presentation of quality assurance issues in the safety analysis report [62, 63, 68].

The actions of operation organizations

Quality control system PSI "JIPNR-Sosny"

The main purpose of the PSI "JIPNR-Sosny" in quality assurance is to achieve a safety quality level of nuclear energy use facilities. The safety quality level is provided by the requirements of IAEA international agreements, legislation in the field of nuclear and radiation safety.

PSI "JIPNR-Sosny" goals in the quality assurance is achieved by the following ways:

- permanent improvement of the organizational structure and quality control methods;
- professional training and advanced qualification training of scientific and technical employees and specialists of all categories;
- recruitment and training of specialists of suitable qualification and technical orientation, review and timely retraining;
- creating interest among the staff in advanced qualification training and maintenance of high motivation to conscientious work;
- division of powers and responsibility between all parties ensuring safety;
- compliance with safety of nuclear energy facilities according to the requirements of the legislation in the field of nuclear and radiation safety and recommendations of IAEA guidelines.

According to the above information PSI "JIPNR-Sosny" provides:

- implementation of quality assurance and permanent improvement;
- necessary training and advanced qualification training of the specialists to maintain their competence;
- maintaining safety and security culture;
- quality assurance programs implementation;

implementation of other actions aimed at improving the quality and efficiency of the work.

Requirements for security of nuclear energy facilities are achieved provided ensuring the quality of work at all stages of the life cycle of nuclear energy facilities: design, location, construction, putting into operation, operation and putting out of operation.

Quality control system PI "DSAE"

PI "DSAE" besides the customer's functions in implementing a complex of preparatory, design and survey works on NPP construction, carries out control of the work quality and acceptance of the following areas: nuclear technology, surveying, geological, seismic and tectonic, environmental work, as well as taking part in the election of the required design, technological schemes, equipment, safety systems, and other works related to NPP construction [31].

Safe and reliable operation of nuclear power plant is possible provided quality assurance at all stages of the NPP life cycle.

PI "DSAE" head officially formulates and documents the quality policy - the brief statement of the company's attempts to quality, as well as the company has all possibilities to implement its goals. The Quality Policy provides the key priorities and values which the manager will comply with.

According to the Quality Policy the main quality goals of PI "DSAE" are:

achievement of NPP quality level provided by NPP project and regulatory and technical documentation;

NPP construction and operation with the economic efficiency not lower than the efficiency set by NPP project.

PI "DSAE" top priority in quality assurance is to ensure safety of NPP. This means that when considering any issues, alternative design solutions and engineering development, choosing a supplier of products and services, following the schedule, power generation etc., unconditional priority is given to nuclear safety requirements.

PI "DSAE" quality policy provides control over common and private quality programs at all stages of NPP life cycle and defines PI "DSAE" responsibility for effectiveness of the common quality program.

The quality policy is mandatory for all managers and those responsible for the NPP quality issues when locating, constructing, operating and putting out of operation of NPP.

PI "DSAE" head is personally responsible for NPP quality at all stages of NPP life cycle.

Chief Engineer provides technical guidance of PI "DSAE" activity. The Chief Engineer's main goal is PI "DSAE" unified technical policy implementation aimed at high quality assurance level, high economic efficiency, "Belarusian NPP" quality.

The head of each department is responsible for:

bringing quality policy guidelines to the notice of subordinate employees, ensuring its understanding and steady implementation;

defining and documenting the duties, rights, and responsibilities of officers and the order of interaction within the subdivisions of quality assurance;

improving working methods, prevention of errors;

maintaining compliance with the requirements of the current quality system on their site works.

PI "DSAE" controls implementation of works on NPP sites and controls the development and implementation of private quality assurance programs at all stages of the NPP life cycle.

The General contractor of "Belarusian NPP" construction in the Republic of Belarus is CJSC "Atomstroyexport". Organizations performing work and providing services for the operating organization and (or) the general contractor involved in the "Belarusian NPP" construction under the contract as subcontractors. PI "DSAE" places requirements to the contracting organizations, and these in their turn to subcontracting ones. The General contractor along with PI "DSAE" carries out control over the activities of products and services suppliers in the process of performance of the contractual obligations in the course of the supply for NPP.

PI "DSAE" provides the development and implementation of quality assurance programs at all stages of NPP life cycle. For these purposes it develops the common quality assurance program for NPP (from 16.11.2008 QAPNPP (O) #P. SMD /01, from 28.06.2011 QAPNPP (O) #P. SMD /02, from 30.07.2013 QAPNPP (O) #P. PES /03) and controls the activities of organizations performing work or providing services to the PI "DSAE" and (or) the general contractor, which, in their turn, within the common program develop private quality assurance programs according to relevant activities (quality assurance program of activity of the General Contractor for the "Belarusian NPP" project (QAPNPP (O1)), as well as other develop private quality assurance programs when constructing and selecting site.

QAPNPP (O) for "Belarusian NPP" contains the basic criteria and principles which should be taken into account when ensuring the quality and safety of NPP at all stages of its life cycle. QAPNPP (O) refers to all activities effecting the quality of work and services that are important for the NPP safety. The activities are design, manufacture and supply of equipment, construction, putting into operation, operation, putting out of operation, upgrading. QAPNPP (O) also refers to all natural and legal persons responsible for the NPP safety: designers, suppliers, builders, installers, operational and commissioning organizations and other organizations involved in the work which quality assurance depends on.

QAPNPP (O) activities applies to systems which are important to NPP safety, as well as elements of these systems in order to achieve such NPP quality level that would guarantee its safety, reliability, ensuring efficient operation, compliance with environmental requirements for the protection of the environment.

To implement a differentiated approach to quality assurance there are quality assurance categories 1(QA1), 2(QA2), 3(QA3), 4(QNC). Objects, systems and equipment of "Belarusian NPP" units according to safety influence are classified in accordance with the rules and regulations in the field of nuclear energy use, taking into account the technological complexity of manufacturing equipment and their effect on the generation of electricity [64].

Information on inspections of quality systems of PI "DSAE" and organizations implementing work and providing services to operating organization to ensure the quality is specified in QAPNPP (O) and internal procedures of PI "DSAE".

SI "DSAE" in order to improve the quality management system carries out planned and unplanned external inspection of the actual implementation of quality assurance programs, and evaluation of the effectiveness of the implementation.

Requirements to performance of audit systems are included in the quality assurance program of all levels.

Representatives of SI "DSAE", general contractor and government supervised bodies have the right to inspect design, development and manufacture of equipment for NPP and the performance of construction work in any organizations involved in the NPP construction in order to inspect compliance of materials, parts, systems, components, structures, as well as processes and procedures with the quality requirements as well as regulatory requirements.

Activities in the field of regulatory review and monitoring

Quality assurance programs are developed and agreed by Gosatomnadzor [62].

According to [34] for the implementation of activities in the field of nuclear energy use it is necessary to have a license issued by the Ministry of Emergency Situations of the Republic of Belarus. The grounds for the decision to give the license are to have a positive expert's conclusion of documents justifying the nuclear and radiation safety, conducted in the manner specified [55], as well as the positive conclusion of the conformance evaluation of the applicant (the applicant of license) to license requirements and conditions within of which there are:

conformance evaluation of the applicant to license requirements and conditions (including the availability of the management system and (or) quality control);

conformity assessment of organizational decisions and the results of their implementation to the requirements of regulatory legal acts, including the technical regulatory legal acts in the field of nuclear and radiation safety;

determination of completeness, sufficiency and justification of the organizational and technical approaches aimed at ensuring non-exceedance of limits and conditions of safe operation, established basic dose limits and permissible levels of exposure of workers and the population, radioactive effects on the environment.

Licensing or other state bodies, other state organizations within their competence, implement control over the compliance by license holders with licensing legislation, licensing requirements and conditions [34].

Currently, the Ministry of Emergency Situations planned to introduce special licensing requirements and conditions for the license holders, including requirements of quality assurance:

1. for operating organization:

Compliance with the requirements of existing control system of documents and (or) quality control of the licensed activity and the requirements specified in the quality assurance programs;

quality control of the organizations carrying out work and (or) providing services for operating organization in the field of nuclear energy use;

2. for organizations carrying out work and providing services for the operating organizations, compliance with the requirements of existing control system of documents and (or) quality control of the licensed activity and the requirements specified in the quality assurance programs;

The Ministry of Emergency Situations implements state supervision (inspection) concerning the nuclear and radiation safety issues in the selection of sites, design, construction, putting into operation, operation and putting NPP out of operation.

Within the frameworks of supervision the Ministry of Emergency Situations controls the activity of PI "DSAE" and organizations carrying out work and providing services for operating organizations.

ARTICLE 14. ASSESSMENT AND VERIFICATION OF SAFETY

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

comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

Regulatory requirements

For all users of ionizing radiation is required the presence of radiation-hygienic passport, which is a mandatory document in the examination (examination) for the licensing of the user in the field of industrial safety [45]. Results are recorded in the passport assessment of the radiological safety of the user, in accordance with the basic parameters according to the Law "On radiation safety of the population". Users, which include those of radiation facilities of first and second category of potential radiation hazards, have to get the passport to the Ministry for Emergency Situation and Ministry for Public Health. Requirements for assessment and verification of safety regulated by a number of regulatory documents listed in Annex 1.

There are rules for the preparation and content requirements for SAR NPP with VVER reactors. On the basis of the information contained in the SAR, the regulator must be able to assess the adequacy of substantiation location, construction, commissioning, operation and

decommissioning of NPP at a specific site in order to avoid exceeding the doses to workers and the public, and standards on emissions and content of radioactive substances into the environment during normal operation and design basis accidents, as well as the ability to limit this impact by design basis accidents. Work on the preparation, formulation and revision of the SAR should be carried out at all stages of the life cycle of nuclear power plants [68].

Emergencies and GOSATOMNADZOR, as a regulatory body, has the organization, providing services for technical support - PSI "JIPNR - Sosny".

In the field of scientific and technical support to the efforts aimed at the development of scientific and technical knowledge through:

Study, adaptation and implementation of best practice safety assessment; The development, implementation and verification of modern computer programs and models to simulate the processes inside and outside the plant (for example, in the reactor, the first and second circuits, protective shell, emissions through the barriers); Study and analysis of the experience in the production of components and systems in nuclear power plant operation;

Creation of analytical information and information systems and databases; Collection, analysis and validation of input data for the reactor facility;

The introduction of probabilistic safety analysis methods;

Definitions of safety issues, analysis of the nature and measures to address them. Organizational and legal aspects of a strong peer review system will be further developed. For this it is necessary to introduce the concept of measures to improve the public evaluation of nuclear and radiation safety.

One of the main tasks of the organization of scientific and technical support is to coordinate and conduct the examination of safety as their own, and with the involvement of experts in the work of other organizations.

In addition, PSI "JIPNR - Sosny" continuously improve the scientific and technical level of support provided to the regulatory body using the latest advances, innovative approaches and techniques developed in the field of peaceful uses of nuclear energy, ensuring high quality of expertise.

Conducting assessments of safety and scientific and technical support of the regulatory body are made subject to and on the basis of the achieved level of development of science and technology. With expertise and expert support is taken into account operating experience of Russian and foreign nuclear facilities are used all the available information about the events that took place in the Russian and foreign nuclear and radiation hazardous facilities, an evaluation of the adequacy of measures to ensure nuclear and radiation safety in the work related to the peaceful use of nuclear energy.

State Scientific Institution "Joint Institute for Power and Nuclear Research - Sosny" of the National Academy of Sciences of Belarus has received a license for the examination of security in the field of nuclear energy.

Assessment and verification of safety of nuclear research installations

In 2010, in connection with the design of the new store non-irradiated nuclear fuel, "Yavor-1" developed "Justification of nuclear safety of fissile materials in the storage of non-irradiated nuclear material" Yavor-1 ", corresponding to the requirements of safety [86]. Organizations engaged in the operation of storage facilities, transportation equipment, handling of nuclear fuel, must provide the necessary organizational and technical measures aimed at compliance with the requirements of nuclear safety and the monitoring of their performance [85,86].

Periodically (at least once a year), the commission of the operating organization checks the safety status of storage, transportation, handling of nuclear fuel. Commission Act approved by the head of the organization and forwarded to the bodies of state supervision and institutional inspections.

Willingness to stand for physical start-up is defined by [82,83]: departmental Commission on acceptance of stand-up, back-end systems and facilities; Nuclear Safety Commission of the operating organization.

On the basis of the stand and the report (act) as a result of physical start-issued passport booth, which contains information about installed in the project main parameters of the assembly, composition and characteristics of the safety systems, as well as experimentally validated operational limits. Passport approved by the state authority responsible for the supervision and inspection in the field of nuclear and radiation safety. SAR is a list of the main PCB documentation and COP related to nuclear safety.

Evaluation and verification of safety of nuclear installations nonscientific

1. Safety assessments are carried out and documented by the operator in order to verify compliance with safety requirements at all stages of the life cycle of "Belarusian NPP", and the identification of measures to be taken to ensure the safety of the nuclear installation. The results are submitted to the Authority, subject to state regulation in the field of nuclear and radiation safety (hereinafter - the regulatory body), in the process of licensing in the field of nuclear energy at all stages of the life cycle "Belarusian NPP".

The basic document on justification of nuclear safety "Belarusian NPP" is a safety analysis report. Development of the SAR is provided by the operator, subject to compliance with the SAR project documentation "Belarusian NPP".

On the basis of the information contained in the SAR, the regulator must be able to assess the adequacy of substantiation location, construction, commissioning, operation and decommissioning of "Belarusian NPP" on the site in order to avoid exceeding the doses to workers and the public, and standards for releases and levels of radioactive substances into the environment during normal operation and design basis accidents, as well as the ability to limit this impact by design basis accidents.

Work on the preparation, formulation and revision of the SAR should be carried out at all stages of the life cycle "Belarusian NPP". The requirements to the information provided in the SAR for ""Belarusian NPP"" [65,68].

SAR is the basic document, which is part of the supporting documents on nuclear and radiation safety in the activities in the field of nuclear energy (hereinafter - the supporting documents) subject to examination. [55]

The purpose of the examination is to determine the level of nuclear and radiation safety, "Belarusian NPP" by comparison of the design decisions and to implement them with the requirements of the regulations, including technical normative legal acts in the field of nuclear and radiation safety.

Under the licensing of the use of nuclear energy in terms of nuclear installations (unit number 1 and number 2 "Belarusian NPP"), an examination of the following supporting documents submitted by the operator:

Safety Analysis Report for the power plant, comprising: a rationale for the chosen site nuclear power plant unit with the lighting of safety-related aspects. Technical Report on the heads of the number 1, 2, "Preliminary Safety Analysis Report" (General description of the plant. Area features a nuclear power plant site);

Overall quality assurance program for nuclear power plants; Quality assurance program for the site selection for placement of nuclear power plants. The examination results are presented in the expert opinion of the examination of documents justifying the nuclear and radiation safety in the activities in the field of nuclear energy in terms of nuclear installations (unit number 1 and number 2 "Belarusian NPP"), prepared by the Public Scientific Institution "Joint Institute Power and Nuclear Research - Sosny "of the National Academy of Sciences of Belarus, providing scientific and technical support to the Ministry of Emergency Situations of the Republic of Belarus.

According to the results of the examination and the comments of experts of the Department of Nuclear and Radiation Safety Emergencies (GOSATOMNADZOR) in May 2012 approved the conclusion of GOSATOMNADZOR on the results of conformity assessment capabilities of the license applicant licensing requirements and conditions under which issued a special permit

(license) to the use of nuclear energy and ionizing radiation of nuclear installations (unit number 1 and number 2 "Belarusian NPP").

The results of examination of supporting documents and conformity assessment capabilities of the license applicant licensing requirements and conditions showed that: requirements for the composition and volume of study and research when selecting the site and "Belarusian NPP" are made in an amount sufficient for the work placement; adopted by the technical characteristics of AES-2006 are reasonable and do not interfere with the placement of "Belarusian NPP" on the selected site; made comments, recommendations and proposals in the light of additional materials, such PSAR Baltic NPP unit 1 shall not prevent the issuance of the operating license for the placement organization. At the conclusion of the Expert Opinion of GOSATOMNADZOR and are depending on the timing of their comments following correction:

to select the location of the main buildings and structures on the site, "the Belarusian nuclear power plant";

prior to the filing of an application for a construction license unit number 1 "Belarusian NPP".

At present, the licensing of the use of nuclear energy in the construction of a nuclear facility (unit number 1 "Belarusian NPP") conducted a preliminary review of GOSATOMNADZOR and PSI "JIPNR-Sosny" presented by the operator the following supporting documents: Preliminary Safety Analysis Report for the unit number 1 "Belarusian NPP" (part of the SAR in the volume containing the demonstration of safety in the construction of the unit number 1 "Belarusian NPP");

Probabilistic Safety Assessment Level 1 units number 1 and number 2 "of "Belarusian NPP";

Overall the quality assurance program of nuclear power stations;

Quality assurance program for the construction of "Belarusian NPP"; project documentation for the unit number 1 "Belarusian NPP" (the amount of information provided is determined by the Ministry of Emergency Situations). Probabilistic Safety Assessment Level 1 units number 1 and number 2 "Belarusian NPP" must include the identification of the sequence of events that can lead to core damage, estimate of the frequency of core damage and provide an understanding of the strengths and weaknesses of the safety systems and procedures designed to prevent core damage. After examination of justifying documents and conformity assessment capabilities of the operating organization licensing requirements and conditions for the activity in the field of atomic energy regulator will decide whether to issue a license application.

2. To check for any stage of the design, development and manufacture of equipment, construction, installation, commissioning and operation "Belarusian NPP" the correctness of the process (matching his bill) and the quality of the products and services the operator must exercise control through inspections [62].

The operating organization organizes periodic basis (at least once every two years) [65] verify that the requirements of nuclear safety and establish the procedure for checking the status of nuclear safety "Belarusian NPP" internal commissions. The results of inspections carried out by the operator, shall be submitted to the regulatory body.

According to the general contract for construction "Belarusian NPP" between PI "DSAE" (Republic of Belarus) and Closed Joint Stock Company "ASE" (Russian Federation):

The operators must carry out technical supervision (quality control and volume of work performed). To perform these functions in the operating organization established technical supervision, one of whose tasks is to implement the inspection of the general contractor and other subcontractors; the general contractor is required to:

conduct inspections: compliance of construction and assembly works of technical documentation and regulatory requirements, implementation of quality assurance programs subcontractors;

Construction supervision to ensure compliance with the requirements of the project and documentation at all stages of construction, "Belarusian NPP" and its commissioning.

Activities in the field of regulatory review and monitoring

To provide assurance that all the activities in the field of nuclear energy is performed in a safe manner consistent with the goals and safety, should be the state inspection (supervision) authorities at all stages of the life cycle "Belarusian NPP".

Construction supervision "Belarusian NPP" is the authorized bodies of the Republic of Belarus [35]. To coordinate the construction supervision "Belarusian NPP" the Government of the Republic of Belarus, a working group made up of managers and are included (or) Representatives of inspection (supervision) bodies. General requirements for supervision does not allow a rapid response to violations of law in the implementation of the construction "Belarusian NPP" and take appropriate action. An exception is the work of GOSATOMNADZOR on inspection (supervision) over observance of legislation in the field of nuclear and radiation safety in the use of nuclear energy, derived from the scope of its action [41].

Currently, there is supervision of "Belarusian NPP" siting, including the preparatory period, the Architectural design of "Belarusian NPP" which is highlighted and approved.

Primary supervision is provided by the Department of the inspection and supervision of the construction of the State Committee for Standardization of the Republic of Belarus (Gosstroy nadzor). GOSATOMNADZOR constantly monitors compliance by the operator licensing requirements and conditions of "Belarusian NPP" siting.

Since the issuance of an authorization to place GOSATOMNADZOR organized and held together with Gosstroy nadzor comprehensive inspections of the activities of the operating organization. Conducted inspections have shown that the operator has its regular inspections of the activities of the general contractor and other subcontractors.

Based on the results of inspections in its oversight GOSATOMNADZOR and construction watchdog issued orders to the operating organization, the implementation of which are continuously monitored. For the organization of continuous surveillance on the construction site, GOSATOMNADZOR realize periodical supervision of "Belarusian NPP".

ARTICLE 15. RADIATION PROTECTION

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

Regulatory requirements

Basic principles and requirements for radiation protection are defined in the Laws of the Republic of Belarus "On Radiation Safety" and "On the Use of Atomic Energy" [24,33].

The laws defined for standardization radiation values and establishes the requirements for the basic dose limits, permissible levels of exposure to ionizing radiation and other requirements to limit human exposure, the requirement to protect people from the harmful effects of radiation exposure in all circumstances from sources of ionizing radiation [110.111]. These rules apply to all types of ionizing radiation on humans under normal operating conditions and man-made sources of radiation in the situation of a radiation accident.

Health standards, rules and hygienic standards "Hygiene requirements for the design and operation of nuclear power plants" establish hygienic requirements for radiation safety personnel, the public and the environment (radiation exposure) for the location, design, construction, commissioning and operation of nuclear power reactors type reactors [91]. This document set the priority of the use of the methodology of ALARA planning, preparation and execution of radiation-hazardous work.

Decree of the Ministry of Health of the Republic of Belarus of 28.12.2012 № 213 approved sanitary rules and regulations "Requirements for Radiation Safety" and health standard "criteria for assessing radiation exposure. They define the requirements for radiation safety in different types of ionizing radiation, establish quantitative and qualitative values of human exposure to ionizing radiation of artificial or natural origin in different exposure situations, these documents are developed in accordance with the IAEA «Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards. General Safety Requirements Part 3/Vienna, 2011".

Basic requirements for the management of sources of ionizing radiation, including radioactive waste management, radiological category of objects based on the potential risk for human populations in normal operation and possible failure are defined in the rules and regulations of the Sanitary 2.6.1.8-8-2002 "Basic Sanitary Rules for Radiation Safety (OSP-2002)". The provisions of the OSP-2002 associated requirements of the Law of the Republic of Belarus "On Radiation Safety" and other special regulations to regulate the radiological safety of NPPs [91]. Radiation safety personnel and the population is considered to be met if the basic principles of radiation protection (justification, optimization, normalization) and radiation protection requirements [24,91].

Assessment of radiation safety is based on the basic parameters defined in [24].

Implementation of the ALARA principle by licensees

Hygienic requirements for radiation safety personnel, the public and the environment (radiation exposure) for the location, design, construction, commissioning and operation of nuclear power plants with VVER reactors installed sanitary standards, regulations and health standards "Hygiene requirements for the design and operation of nuclear power plants. "The document set the priority of the use of the methodology of ALARA planning, preparation and execution of radiation-hazardous work.

The legislation identifies the key regulatory requirements to be followed during normal use of sources of ionizing radiation and nuclear facilities [24,33]:

exceeding of the permissible limits of individual doses of citizens from all sources of ionizing radiation (the principle of regulation);

prohibition of all activities on the use of ionizing radiation in which the resulting human and material benefits do not outweigh the risks of possible damage caused by exceeding the natural background radiation exposure (the principle of justification);

maintenance at the lowest level achievable taking into account economic and social factors of individual doses and the number of exposed individuals using any source of ionizing radiation (the principle of optimization).

Priority use of the methodology of ALARA planning, preparation and execution of radiation-hazardous work is set to [91, 110].

Implementation of radiation protection programs by licensees

At present in the Republic of Belarus nuclear facilities are operated on the basis of the PSI "JIPNR-Sosny" NASB.

In order to monitor the radiation safety in PSI "JIPNR-Sosny" a department of radiation safety, which charged with the responsibility to act as radiation safety, defined by the legislation of the Republic of Belarus. The main objectives of the department are:

radiation monitoring in the workplace, in rooms and in the organization, in the buffer zone for emissions, discharges of radioactive substances, inspection and accounting of individual doses to workers (staff) to ensure radiation safety of workers and the public;

monitoring compliance with laws, rules, regulations, requirements, regulations on radiation safety in the subdivisions of the PSI "JIPNR-Sosny" when dealing with sources of ionizing radiation and radioactive waste management;

monitoring compliance with the technical standards in the field of radiation monitoring and radiation safety in the design, construction and decommissioning of radiation installations and areas of work with radioactive substances.

The results of evaluation of radiation safety are recorded annually in the radiation-hygienic certificate by ionizing radiation.

Information about individual doses of personnel sent to the State dosimetric register in forms.

Control licensees emissions of radioactive substances

The project provides for nuclear radiation monitoring system, which should be capable of measuring values of monitored parameters characterizing the radiation situation in the premises and in nuclear power plants, within the sanitary protection zone and the surveillance zone under all operating nuclear power plants, as well as the design and beyond design basis accidents. In order to avoid exceeding the limit dose of man-made exposure of the population to plant a quota on the exposure of the population - 100 mSv per year [91].

This quota is set by the total population exposure from all sources of radioactive gas and aerosol emissions into the air and liquid discharges to surface water in general for nuclear power plants, regardless of the number of units at the site.

The quota value is considered as the upper limit of the possible public exposure to radioactive emissions and discharges of nuclear power plants in the optimization of radiation protection during normal plant operation.

The values of the respective quotas for exposure of the population used to calculate the maximum allowable emissions of radionuclides in nuclear power plant air and maximum allowable discharges of radionuclides in surface water.

Emission limits and discharge limits are the upper limits for the gas and aerosol emissions and liquid discharges of radionuclides into the environment during normal plant operation. As the lower limit of radiation dose in the optimization of radiation protection in normal plant operation adopted minimally significant dose of 10 mSv per year. Allowable discharges of radionuclides in surface water are calculated based on the fact that their compliance-exceed the radiation dose of the population 10 mSv per year. The limits of safe operation of each power plant emissions and discharges into the production schedules are set at the maximum allowable emissions and limit values, and operational limits - at the level of the value of the annual allowable emissions and the annual allowable discharge from the limitation that set for one unit values of the limits of safe operation and operating limits should not be exceeded during operation of NPPs.

Environmental control of licensees

The project "Belarusian NPP" has system for monitoring the integrity of the physical barriers to the spread of ionizing radiation and radioactive substances into the environment, designed to monitor deviations from the established limits of safe operation of nuclear power plants.

The project provides for nuclear radiation monitoring system that will be capable of measuring values of monitored parameters characterizing the radiation situation at the plant and the environment to a certain extent for all modes of NPP, as well as the design and beyond design basis accidents.

The basic principles of the organization of radiation-monitoring in the surveillance zone NPP radiation monitoring system in terrestrial and aquatic biocenosis, location of points of automated radiation monitoring system on the 30-km zone around the plant. The principles and system of conducting radiation monitoring in the surveillance area plant will be an integral part of the National Environmental Monitoring in the Republic of Belarus. Research organizations conducted to further improve the monitoring system using GIS technology and transport models of radioactive contamination in different parts of the environment during normal and accidental releases.

Activities in the field of regulatory review and monitoring

State supervision of nuclear and radiation safety is carried out in accordance with the Regulations of the State Supervision in the field of nuclear and radiation safety. [48]

ARTICLE 16. EMERGENCY PREPAREDNESS

Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.

For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.

Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.

Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.

Emergency plans and programs

Regulatory requirements

The organization of emergency preparedness and response in case of accidents at nuclear facilities and provides for the development of measures to ensure emergency preparedness and response [33]. Measures to ensure emergency preparedness and response are set by external and internal emergency plans.

The conditions and procedure for the development of internal and external emergency plans, establishing measures to ensure emergency preparedness and response in the event of a radiological accident occurred during the implementation of the use of atomic energy, the requirements for their content, the approval process and review [53].

For "Belarusian NPP" in accordance with [53] the internal emergency plan should be developed, consistent with the relevant central government bodies and approved six months before the delivery of nuclear fuel to the first power plant before its physical start. The emergency plan is developed based on the analysis of beyond design basis accidents with the worst consequences for workers and the public, taking into account the phase of the accident.

The main elements of the national plan for emergency preparedness

In Belarus, the system response to nuclear and radiological emergencies integrated into the national system of emergency response. Established and functioning state system of prevention and liquidation of emergency situations (GSCHS). Basic requirements for this system are defined in the Law of the Republic of Belarus "On protection of population and territories from emergency situations of natural and man-made". [25]

Developed, approved and passed the regular updating of the plan of population and territory of the Republic of Belarus of emergency situations of natural and man-made, one of the branches of which is to protect themselves from radiation accidents. On the basis of the Plan of Protection from radiation accidents are developed sections of the territorial and sectoral plans, detailing the events of the Republican Plan.

Implementation of the relevant measures

GSCHS operates in the following modes: daily activities, mode of alert and emergency mode. The main activities carried out in the operation modes GSCHS are defined in the Regulation on GSCHS [42].

In order to protect human life and health, and environmental protection in the event of a nuclear or radiological emergency in the legislation defined the requirements for emergency management system for emergency response. Established criteria for response to nuclear and radiological accidents. [111]

The country continued to upgrade established under GSCHS radiation monitor system and decision support in the event of an accident at NPPs of neighboring states. In the legislation provides the requirements for the organization of the collection and exchange of information in the field of monitoring and forecasting of natural and man-made, in accordance with Resolution [47].

Currently on the basis of SI "National Center for Radiation Control and Environmental Monitoring (RCRCCEM) in the Republic of Belarus has four automated radiation monitoring system (ARMS-1, -2, -3, -4), which are located along the country's borders and provide operational radiation monitoring in the areas of impact of Chernobyl, Smolensk, Rivne, the Ignalina NPP.

The structure of ARMS are:

27 automatic measurement points (API) of gamma radiation, in continuous operation;

4 local centre reaction (LCR) - in Mozyr, Mstislavl, Pinsk, Braslav;

3 Regional Response Center (RRC) - in Gomel, Mogilev, Brest;

1 National Response Center (DNC) - in Minsk based RCRCCEM.

ARMS operates in two modes - normal and abnormal. Radiation monitoring network includes 55 accredited dosimetry posts, combined with meteorological sites where measurements are made of gamma-radiation.

In the zones of influence of Smolensk, Ignalina, Rivne and Chernobyl radiation is carried out monitoring of surface water and soil, natural radioactivity is monitored daily fallout from the atmospheric boundary layer and the content of radioactive aerosols in the air. Currently undergoing modernization and expansion of the atmospheric radiation monitoring, including the observation area of the "Belarusian NPP". Education and teaching, and evaluation of the main results of the exercise For the purpose of practicing questions to respond to radiological accidents and incidents regular training and exercise. Division Ministry of Emergencies of Belarus take part in international activities related to emergency preparedness.

In 2012, held at the local level with training institutions network monitoring and laboratory testing. In addition, the audited performance of centralized automated system alerting the public, businesses and government agencies, as well as clarification of information on the fund fallout shelters and structures dual purpose.

RTSURCHS regularly takes part in emergency drills conducted by the IAEA to test the channels of communication and interaction with the threat of a nuclear accident, the UNECE Industrial Accidents, as well as to alert the CIS states of emergency situations of natural and man-made disasters. With the crisis center IAEA conducted typical exercise ConvEx 1a, ConvEx 1s, ConvEx 2a, ConvEx 2b, ConvEx 2c, ConvEx 3. Total MOE, for example, in 2011, took part in 11 exercises in 2012 - an 8 exercises.

According to the results of the analysis of the exercise of the adoption, if necessary, corrective action.

Informing the public and neighboring countries

Procedure for informing the public about the threat of or emergency situations, including the transmission of information on the projected onset emergencies and their consequences on radiation safety in their respective territories, established by the Council of Ministers of the Republic of Belarus of 23.08.2001 № 1280 "On the procedure of collecting information in protection of population and territories from emergency situations of natural and man-made disasters and exchange of information".

Functioning information management system of the State system of prevention and liquidation of emergency situations and providing information in the field of population and territories from emergency situations of natural and man-made, in accordance with the regulations of the Ministry of Emergency Situations of the Republic of Belarus of 17.08.2009 № 42 "On approval of the Regulation on the order of organization functioning information management system of the State system of prevention and liquidation of emergency situations

"and from 02.08.2005 № 41" On approval of the Instruction on how to submit information in the field of population and territories from emergency situations of natural and man-made".

The Republic of Belarus has ratified a number of international conventions, including the Convention on Nuclear Safety, the Convention on Early Notification of a Nuclear Accident. Concluded a number of other international and bilateral agreements.

In accordance with the Convention on Environmental Impact Assessment in a Transboundary Context and the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, ratified by the Republic of Belarus, the country has committed itself to the collection of information conduct and alert the public about the possible impact of nuclear power plants on the environment [9,17].

ARTICLE 17. SITING

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;

for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.

Article 4 of the Law "On the Use of Atomic Energy", determines that the decision to place nuclear power plant or unit is made by the President of the Republic of Belarus.

In the Republic of Belarus are defined [59-61]:

basic criteria and requirements governing the placement of nuclear power plants in the territory of the Republic of Belarus taking into account processes, phenomena and factors of natural and anthropogenic origin and impact of the NPP on the population and the environment; basic requirements for the composition and volume of surveys and research to select the item and the site of the NPP in the Republic of Belarus;

requirements for the design and content of the EIA study of ecological safety of NPPs. In accordance with the Decree of the President of the Republic of Belarus on November 12, 2007 № 565 "On Measures for the construction of a nuclear power plant":

functions of a customer to implement a complex of preparation, design and survey works on construction of nuclear power plants in Belarus are assigned to PI "DSAE";

general designer to coordinate the implementation of design and construction documents for the construction of nuclear power plants in the Republic of Belarus is a project Research Republican Unitary Enterprise "Belnapienergoprom" (hereinafter - RUE "Belnapienergoprom").

At the stage of selecting a site for building nuclear power plants in Belarus a monitoring of the state of the environment, agricultural and forest lands is held in order to obtain "background" information about radioactive and chemical contamination as a basis for future assessments of the impact of the existing nuclear power plants on the environment.

Work on the selection of a site for the construction of nuclear power plant in Belarus began in the 1992-1993. As a result of this work we chose three possible points of NPP (Shklovsky, Gorki, Bykhovskiy, Ostrovetskiy), where three potential sites (Ostrovetskaya, Krasnopolyanskaya and Kukshinovskaya) were identified later. A research has been conducted on these grounds and

a comparative analysis was done in order to select priority areas for the construction of nuclear power plant in Belarus.

In order to implement the Plan of basic preparatory work that had to be done prior to the construction of nuclear power plant in Belarus the organizations subordinate to the Ministry of Natural Resources and Environment completed the following studies:

- analysis of stock data on radiation-chemical contamination of the environment obtained at fixed monitoring stations of the Department of Hydrometeorology. Field studies to clarify the contemporary radiation-chemical state of the environment were conducted on competitive sites;
- meteorological, aerological, geological and geophysical studies were conducted.

Information about the state of the environment in the Ostrovetskaya site has been prepared on the basis of observations of radioactive and chemical contamination of the environment, held by PI RCRCM of the Ministry of Environment during special field surveys during 2008-2009.

Stock and archival information supplemented by full-scale surveys with further calculations, analysis and generalization on the basis of specialized techniques were used at the preparation of the EIA.

Prognostic estimations were made with use of modern simulation software accepted in countries possessing an advanced nuclear technology; as well as with use of programs, methods and criteria recommended by the leading organizations of the Republic of Belarus and international organizations, such as the IAEA, the ICRP and others.

The results of evaluation of the environmental impact are available on the website of PI "DSAE" <http://www.dsae.by>.

The results of the survey at the Ostrovets site shown that the magnitude of the design-basis earthquake is 6 points, while that of the maximum credible earthquake is 7 points according to MSK-64 scale, which does not affect safety, as the "AES-2006" design is calculated to resist 8 points earthquake according to MSK-64 scale.

After the studies of the NPP impact on the environment it was found that:

- NPP does not have a significant impact on the geological environment and the technical solutions, including funding the reactor building and other 24 major buildings and structures, ensure their stability under all the effects foreseen by the standards (seismic, shock wave, etc.);

- costs to compensate for the withdrawal of land for the construction of nuclear power plants, is fully taken into account in the project;

- industrial water supply will be carried out by water withdrawing from the Vilia river. A deficiency in water in the Vilia river is not expected;

- under normal operating conditions:

- main radiation effects on the environment from the gas and aerosol emissions during operation of nuclear power plant unit is caused by inert gases due to external irradiation. Background radiation level will not increase during NPP operating. Exposure dose near nuclear power plant at a height of 1 m from the soil surface is in the range of 0,10-0,17 mSv/h;

- chemical substances emitted by auxiliary facilities do not adversely impact on the population, because their maximal ground-level concentration, taking into account a background contamination, even within the boundaries of the sanitary protection zone is below the MRL;

- process emissions from NPP will not adversely affect the soil, surface and ground water, flora and fauna;

- measures on biological water treatment are foreseen by the NPP project. The NPP will not affect the groundwater conditions in the 30-km zone, the quality of water (its chemical and bacteriological indicators) in artesian wells are independent of the NPP operation.

At the stage of selection of site for "Belarusian NPP" construction the Gosatomnadzor conducted a constant surveillance over conformity to the technical regulations of the work of all organizations of the Republic of Belarus, who participated in the site selection for "Belarusian NPP" deployment [59-63].

Following the inspections results, Gosatomnadzor issued orders to organizations that establish the terms of elimination of violations. All violations have been corrected.

September 15, 2011 the Decree № 418 "On the placement and design of nuclear power plants in the Republic of Belarus" was signed by the President of the Republic of Belarus, according to which a ground area in Ostrovetsky district of the Grodno region was assigned as a place of NPP location. After the signing of this legislation the following activities continued until 2012: observations by PI RCRCEM of radioactive and chemical contamination of the environment in the course of special field surveys in Ostrovets district of the Grodno region, the results of which allowed to adjust the environmental characteristics of Ostrovets site; evaluation of radiation-ecological condition within 30-km zone around "Belarusian NPP" made in the framework of the activities 5 "Assessment of NPP on the environment and environmental protection at nuclear power plants at all stages of the life cycle" of the State program "Scientific support for the development of nuclear energy in the Republic of Belarus for 2009 -2010 and 2020".

Consultation with the Contracting Parties in the vicinity of a proposed nuclear installation

Ministry of Energy of the Republic of Belarus in cooperation with other government agencies and organizations involved in the project to build nuclear power plant in Belarus organized national public hearings of the EIA report on "Belarusian NPP" with the participation of public associations and citizens.

Procedural requirements for the EIA, the structure and contents of the EIA report, the development and maintenance of ecological safety of nuclear power plants justification are defined in the national legislation:

regulations on the procedure to assess the impact on the environment, approved by the Council of Ministers on 19 May 2010 No. 755;

TCP 17.02-08-2012 "Protection of the environment and natural resources. Rules of the implementation of the environmental impact assessment (EIA) and the preparation of the report".

In accordance with the requirements of the Espoo Convention the Republic of Belarus:

given notice of the planned construction of nuclear power plants in the territory of the Republic of Belarus to Latvia, Lithuania, Poland, Russia and Ukraine (2009);

held a public hearing on the EIA report for the planned construction of nuclear power plants with the public of Lithuania, Austria (which requested to participate in the proceedings in accordance with the Espoo Convention), Ukraine (2009-2010.);

consulted Austria, Latvia, Lithuania, Poland and Ukraine (2010) for the purpose to discuss their comments on the EIA report. Russia agreed on the EIA report without comment.

In 2011, interested parties had been sent a final EIA report.

Analysis of upper-air conditions in the areas studied the possible points of NPP showed that competitive areas are roughly equal from the point of meteorological conditions. Climatic conditions do not pose serious obstacles to accommodate nuclear fueled power source. The geological structure of alternative sites and areas of their location, geophysical fields and the deep structure of the Earth's crust, identified faults and tectonically active structures, seismicity and seismic regime have been studied. The Republic of Belarus is prohibited a siting of nuclear power plants in seismic activity with 9 points and above [59].

Information on the assessment of the environmental impact "Belarusian NPP" is available on the website of the Ministry of Natural Resources and Environmental Protection of Belarus <http://www.minpriroda.by/>.

In 2009, the general designer of the Republican Unitary Enterprise "Belniplerienergoprom", with the participation of other Belarusian specialized organizations developed the rationale of investing in the construction of nuclear power plants, including the Report on Environmental Impact Assessment (EIA).

EIA has been posted on the website of the Directorate of nuclear power plant construction <http://www.dsae.by/>.

During the third Belarusian-Polish meeting under the Agreement between the Government of the Republic of Belarus and the Government of the Republic of Poland on Early Notification of a Nuclear Accident and the cooperation in the field of radiation safety (took place 16-17 May

2013 in Warsaw (Poland)) Belarusian specialists also briefed the Polish colleagues on the development of infrastructure in Belarus state authorities and organizations, preparation of relevant statutory acts, current activities in field of licensing and supervision in the context of the construction of "Belarusian NPP".

Gosatomnadzor within their competence constantly informs the interested public and the media about its work on nuclear and radiation safety, immediately inform the competent public authorities of foreign states, their organizations and officials. For example, in the Republic of Lithuania Gosatomnadzor is in contact with the State Inspectorate for the safe use of nuclear energy (VATESI), the Radiation Protection Centre (RSC), the Lithuanian Energy Institute (LEI). It maintain formal and informal interaction in the framework of the Program of Action of the European Union "Nuclear tool" in field of technical cooperation projects, for example, BE/RA/06 "Institutional and technical cooperation with Gosatomnadzor to develop its capabilities, based on the transfer of European safety principles and practices".

ARTICLE 18. DESIGN AND CONSTRUCTION

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

the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defense in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;

the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

At the stage of preparatory work for the construction of nuclear power plants in the Republic of Belarus one of the major problems was the choice of a reliable, safe and economical nuclear power plant project and, accordingly, the company that will implement the project and supply equipment for nuclear power plants. The Republic of Belarus made long time studies of all NPP construction projects presented on the world market of nuclear technologies, in terms of maximum reliability, safety, sustainable and manageable operation, implementation of the up-to-date technologies. In view of the comprehensive analysis and economic conditions the choice was made for the Russian "AES-2006" project, the implementation of which is currently put into effect. A development of the NPP project was realized in accordance with the requirements of the legislation (see Annex 1).

A construction of nuclear power plant of the "AES-2006" project provides: the construction of a new 3+ generation nuclear power plant, which feature is a new reactor system with additional safety systems: passive heat removal system, the passive filtration system of leaks in the intershell space, double protective containment; trap for molten fuel at a beyond design basis accidents;

maximum realization of the principle of defense in depth - the creation of barriers to the spread of ionizing radiation and radioactive substances into the environment and the system of technical and organizational measures to protect the barriers as well as the preservation of their effectiveness at direct protection of the population;

compliance with nuclear radiation safety criteria contained in national legislation and in the international practice of nuclear power plant designing (European utility requirements for LWR nuclear power plants. Revision C).

To perform safety functions in the design of nuclear power plants, one applies the principles of design offering enhanced reliability through redundancy, use of different approaches and independence. In accordance with the general contract for construction

"Belarusian NPP" between public institution "Directorate of building a nuclear power plant" (Republic of Belarus) and Closed Joint Stock Company "ASE" (Russian Federation) (hereinafter - the general contract), "Belarusian NPP" will be an analogue to the Baltic nuclear power plant in the Russian Federation.

A development of the project at the plant realizes in accordance with the requirements of the regulations, including technical normative legal acts of the Russian Federation and the IAEA recommendations.

In order to ensure effective protection barriers "Belarusian NPP" provides multiple layers of protection. Each level of NPP protection provides some protection efficiency of barriers specific to the level of exposure. Each level provides the necessary technical and / or organizational measures to prevent and / or mitigate the impacts by limiting the normal operation until the end of NPP operation in order to prevent a transition of NPP from a higher safety level to a lower one or to provide an attenuation of the consequences if such prevention would be failed, and to return the plant to the higher level of protection from a lower one. The use of multi-level safety allows to fulfill the requirements of complete taking into account possible states of the NPP and reasonable sufficiency of safety measures.

Taking into account a recommended list of initiating events (based on the NP-006-98 of the Russian Federation), preliminary studies on probabilistic safety analysis of nuclear power plants with VVER-1200 reactor, a list of design-basis accidents (according to the terms of reference for technical design of the reactor facility), one defined basic and auxiliary functions of protection and safety that must be met in order to prevent accidents or limit their consequences. These data form the basis for the development of safety systems and specific technical controls beyond design basis accidents.

Basic principles of design and engineering of special technical equipment to ensure the safety of NPPs with VVER-1200, meet the requirements of normative documents Russia and IAEA recommendations.

Measures to prevent potentially possible human errors and limit their consequences are foreseen in the design of power unit. There are technical measures to prevent and limit the consequences of human error that violate the safety function.

The concept of NPP safety provides management measures for beyond design basis accidents, preventing their transition to severe accidents and mitigation the consequences of severe accidents.

The main objectives of accident management are:

- preventing damage to the core;
- preventing penetration of the reactor vessel;
- preventing failure of containment operation;
- reduction of radioactive discharges into the environment.

The use of nuclear power plant operating experience applicable for the design work for the newly designed nuclear power units, in particular, for:

- the possibility of accumulation of databases on elements of nuclear power plant unit at all stages of its life cycle;

- enhancing the reliability of piecemeal "weak spots" identified in the operation of existing nuclear power units;

- the development of appropriate data bases for use in the performance of the probabilistic safety analysis of nuclear power plant projects, particularly the development of methodology for analysis of defense in depth, identify the weak links and the early detection of precursor event of severe accidents.

Development of reactor facilities and nuclear power plants is based on years of experience of project developers.

Project of "Belarusian NPP" takes into account the experience of start-up and operation of domestic and foreign nuclear power plant, which is reflected in the modernization of systems and

equipment. The adopted design and engineering solutions enhance the reliability and safety of nuclear power plants.

An experience of commissioning of Leningrad NPP-2 and Novovoronezh units of the Russian Federation will maximally applied at the commissioning of the power unit No. 1 of the "Belarusian NPP".

The operator is fully responsible for the safe operation of nuclear power plants, is continuously monitoring all activities at the plant important to safety. In accordance with the Decree of the President of the Republic of Belarus [31] PI "DSAE" is assigned as an operating organization in the Republic of Belarus.

In accordance with the general contract, the general contractor is the Russian company "Atomstroyexport" - state-owned engineering company controlled by the State Atomic Energy Corporation "Rosatom" and implementing inter-governmental agreement on the construction of nuclear power plants abroad.

Contractor under the Contract shall perform all necessary work, including survey, design documentation, perform construction, installation and commissioning works, supply of equipment, as well as perform other work covered by the contract for the construction and commissioning of NPP in the Republic of Belarus, which includes two power units, under condition of full responsibility of the General Contractor ("turn-key") on NPP sites. This work includes the security fence and checkpoints of nuclear power plants, as well as systems for process water supply and fire extinguishing, and a training center outside the NPP security fence. In accordance with the general contract a putting into commercial operation of the starting complex of units No. 1 and No. 2 is scheduled in 2018 and 2020, respectively. Date of the putting into operation of the starting complex of unit No. 2 is the date of entry of "Belarusian NPP" into operation.

Accounting for human error is a necessary element of both deterministic and probabilistic safety analyzes.

The project also includes measures to prevent possible human error during refueling.

The safety analysis performed to confirm the design basis of systems important to safety and security systems, and to prove that the power unit project ensures compliance with the requirements for limits of radiation doses and emissions, which are established by regulations for the design conditions.

In addition to the provisions on the implementation of deterministic analyzes of the design conditions foreseen by the project, the analysis of beyond design basis accidents is realized. This is done in order to identify the needs and to determine the effectiveness of the implementation of the technical and technological measures or procedures for accident management in case of:

complex sequences, which include failures in excess of those considered in the deterministic design conditions, but did not lead to a meltdown of the core;

accidents with core melting.

The deterministic safety analysis showed that an operation of safety systems and systems important to safety, carried out in frame of designed-in principles is efficient and adequate for the safe operation of nuclear power plants in the conditions of a design modes. The possibility of management of beyond design basis accidents was also demonstrated.

Probabilistic analysis of level 1 is developed to achieve the following objectives:

evaluation of progress in the project-level safety. The estimated average value of core damage frequency during power operation and parking modes, according to the technical specifications shall not exceed the value of $1E-6$ per reactor per year;

assessing the effectiveness of the design decisions taken to ensure the required safety of nuclear power plant.

The following sources of radioactivity were considered: nuclear fuel in the reactor core and primary coolant.

As an operational states unit power operation and parking modes were considered. As the initiating events in the reactor facility a beyond design and project initiating events that may occur due to failure of systems, equipment, plant or due to human error shall be considered.

ARTICLE 19. OPERATION

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

the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;

procedures are established for responding to anticipated operational occurrences and to accidents;

necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;

incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;

programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;

the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

Operator (operation organization) of the nuclear power plant in the Republic of Belarus is PI "DSAE". [38] The operating organization is working to commissioning, operation, control performance, life extension and decommissioning of "Belarusian NPP" and, in accordance with the laws of the Republic of Belarus, bears responsibility for the failure to comply with safety requirements. The operator must obtain a special permit (license) for activities in the field of nuclear energy in terms of operating and decommissioning NPP [34]. The license to operate "Belarusian NPP" issued after the completion of all pre-start up works in the prescribed manner in the presence of a final SAR of "Belarusian NPP" corrected taking into account the physical and power start-up and trial operation of the NPP.

a control of a putting a nuclear facility into operation is carried out by:

a development by the operator of a nuclear installation commissioning program, with its approval by government agencies responsible to regulate the safe use of nuclear energy and a confirmation of the program by the person (body), which made a decision to build a nuclear facility;

an acceptance of a nuclear facility in accordance with the legislation in the field of construction, architecture and town planning;

commissioning a nuclear facility on the ground of the program got nuclear facility commissioning.

Start nuclear power unit involves the following steps:

first stage - the post-construction cleaning (washing, flushing) and functional tests of technological systems that provide hydraulic testing and flushing of the primary circuit circulation;

second stage - the hydraulic testing and flushing of the primary circuit circulation;

third stage - the first revision of the equipment (assessment of cleaning quality and preparation of the first circuit of power unit to step "running the nuclear steam supply system");

fourth stage - testing the strength and density of the reactor compartment sealed enclosure (containment);

fifth stage - running a nuclear steam supply system (check the equipment in the power mode, as close as possible to the performance, but with a reactor loaded with steel simulators of nuclear fuel assemblies);

sixth stage - the second revision of the equipment (preparation of the power unit systems and reactor to load nuclear fuel);

seventh stage - the physical start (loading the reactor with nuclear fuel, coming into critical condition and the comprehensive measurement of nuclear-physical characteristics of the reactor core);

eighth stage - the power start (synchronization of the generator to the network and staged development of the power unit with carrying out complex tests proving the possibility of increasing capacity to the level of the next step). Stage is completed by comprehensive test of the power unit at rated power.

Technical head start is the power of "Atomtekhenergo" (Russian Federation) - a specialized engineering company performing the commissioning and testing of the commissioning of new power plant, which provides support for operation of existing nuclear power units and training of operating personnel for existing and under construction units.

The decision to extend operation life of the nuclear installation, after the expiry of rated resource foreseen by project is made by regulatory agency or official, to decide on the construction of these facilities.

In the five years prior to the expiration of the project for a nuclear plant normal period of operation, a program of decommissioning of a nuclear installation, which should include measures to dismantle these facilities handling nuclear materials, spent nuclear materials and (or) operational radioactive waste, as well as measures to further control and state supervision over the specified objects.

Operational limits and conditions for the AES-2006

Under the safety operation limit one understands the nominal values of technologic process parameters, deviations from which can lead to an accident;

Under the terms of the safe operation one understands the minimum requirements on the number, characteristics, health status and conditions of service of systems (components) that are important for safety, for which compliance is ensured safe operation limits and/or safety criteria.

Limits and conditions of safe operation of AES-2006 installed in the project documentation.

Before the unit releases at minimum controllable level should work for all channels of safety systems with the characteristics of the equipment, set by design should be operational. Must be capable of operating valves, instrumentation and control, technology and safety locks, alarm systems in their entirety.

During the period of operation of the unit of power produced by periodic checking of safety system in accordance with the rules of maintenance of safety systems. Had been a violation of the limits and conditions of safe operation of "Belarusian NPP", it should be investigated. The operator must develop and implement measures to prevent the recurrence of violations of limits and conditions of safe operation for the same reasons.

Procedures for the operation, maintenance, inspection and testing

Basic organizational and technical issues on this subject in the law settled.

The first delivery of nuclear fuel to the site, the physical and power start-unit nuclear power plant, pilot operation permitted by the regulatory agencies in the safety of the operating organization under the following conditions: compliance with the terms of the transition from one stage to the other works set in the operating license, after Readiness to the stages of plant commissioning and approval of other government safety regulation, with the availability of plans to protect workers and the public in the event of an accident at the plant. The operating organization provides continuous monitoring of all activities important to safety, "Belarusian NPP". The results of inspections to monitor safety activities, periodic reports on the state of safety shall submit to the regulatory authority. Organization to which the scientific support of the work on the construction of NPP is public scientific institution "Joint Institute for Power and Nuclear Research - Sosny" of the National Academy of Sciences.

The aim is to provide scientific support for the proposals for the optimization of technological processes, enhancing nuclear, radiation, environmental safety, physical protection, and efficiency of nuclear power facilities.

The responsibility for providing scientific support work on the construction of nuclear power plants (scientific organization involved in addressing the issue of design, construction and operation of nuclear power plants on the introduction of new materials, technologies, design and technological solutions as well as for complex calculations) is assigned to the National Academy of Sciences of Belarus, the personal responsibility - to the Chairman of the Presidium of the National Academy of Sciences.

Procedures for responding to anticipated operational occurrences and accidents

The requirements for the procedures for responding to anticipated operational incidents and accidents to the law on radiation safety. [24]

The operating organization has the primary responsibility for the completeness of the safety requirements. [33]

Engineering and technical support

It is assumed that the engineering and technical support during commissioning and operation of nuclear power plants will be carried out by a Russian organization implementing the project "AES-2006" in Belarus, by:

- performance testing, pre-commissioning, commissioning, assistance during the warranty period of nuclear power plants;

- the provision of services for maintenance of the supplied equipment, including consultation, supply of spare parts, the provision of technology preservation and storage of equipment, assisting in the organization of repair service, repairs;

- development and coordination with the customer, "Belarusian NPP" quality assurance programs at all stages of the construction of nuclear power plants; providing engineering and consulting services to Belarusian organizations in developing programs and activities to ensure the physical protection of nuclear power plants; education of Belarusian specialists.

The main document defining the safe operation of a nuclear installation process procedure is the safe operation of nuclear power plants, containing the basic rules and techniques of safe operation, the order of operations related to safety, as well as the limits and conditions of safe operation. Development of this document provides the operating organization in accordance with the project and report to substantiate the safety of nuclear installations and includes it in the documents submitted to the regulatory authority in the field of nuclear and radiation safety for a license to operate a nuclear installation.

Operational feedback

The operation of a nuclear facility operator must provide for the collection, processing, analysis, organization and storage of information about failures of elements of systems important to safety, and wrong actions of the staff, as well as its rapid transfer to all interested organizations.

- Formed a new unit at GOSATOMNADZOR for the analysis of operational experience.

Spent fuel management

The current focus on the nuclear fuel cycle in the Republic of Belarus is governed by the Law of the Republic of Belarus "On the Use of Atomic Energy" and "Safety Regulations for storage and transport of nuclear fuel at the complex systems for handling and storage of spent nuclear fuel," approved by the Emergency Decree "On Approval normative legal acts in the field of nuclear safety "from 30.12.2006 № 72.

Fuel cycle strategy and detail measures for its implementation will be defined in the contract documents for the construction of nuclear power plants, concluded on the basis of the Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on cooperation in the construction on the territory of the Republic of Belarus nuclear power plant.

This strategy will provide that fresh fuel in the form of finished fuel assemblies produced in the Russian Federation, in the amounts required to load and all subsequent fuel overload of power units, control rods about necessary amount for the operation of power units will initially come in the fresh fuel storage.

Then, in accordance with current international practice, the spent nuclear fuel after storage for at least three years in the fuel pool may be removed from the reactor building at the nuclear fuel reprocessing plant, or for long term storage.

Transportation of nuclear fuel for nuclear power plant site is planned to be specially equipped vehicles to transport special sealed containers. Spent nuclear fuel will be transported to the plant for processing it.

In accordance with the design after removing spent fuel from the reactor is stored in the fuel pool of reactor compartment. Then, after standing for 3 years in the spent fuel pool is taken out of the reactor section of the power plant at the nuclear fuel reprocessing.

Storage of fresh fuel (FFS) will be placed on the unit number 1 and is common to the two power units. Indoor FFS is transmitting, storing and holding control input of fresh fuel before loading into the reactor.

In the reactor compartment is loading fresh fuel into the reactor, the overload of nuclear fuel in the reactor and unloading of spent fuel cooling pond.

Receiving and loading to NPP of fresh fuel and stored spent fuel to train are produced by the shifting on station site.

As the nuclear fuel a uranium dioxide is used in nuclear power plants, which is in a form of sintered pellets. Pellets are assembled into rod (cylindrical shaped) fuel element. Fuel elements forms the fuel assemblies that are installed in the reactor core. Fuel assemblies for "Belarusian NPP" in the geometry similar to that of VVER-1000, but have a number of improvements in the design and manufacturing technology.

NPP reactor facility provides for the application of the order of 12 types of fuel assemblies with different fuel enrichment, and the presence and arrangement of the burnable absorber. Average fuel enrichment is from 1.30 to 4.92%.

Characteristics of fresh fuel for the reactor facility "Belarusian NPP" are presented in Table 3.

Table 3. Characteristics of fresh fuel for the reactor plant "of "Belarusian NPP"

| Characteristics and dimensions | Value |
|---|--|
| 1 Total number of fuel assemblies (FAs) in the core units. | 163 |
| 2 Space between the FA, mm | 236 |
| 3 Annual number of overloaded FAs with 12-month fuel cycle units. | 42 |
| 4 Features of FAs: height of FAs, mm; turn-key size of FAs, mm, max; maximum enrichment of FAs, U ²³⁵ , % weight of FAs, kg, nominal; specified lifetime of the absorbing rod control and protection system, years number of absorbing rod control and protection systems in the active zone, units, max | 4570±1 235,1 4,95±0,05 742 up to 10 years 121 |

Radioactive waste management

The main legislative document to set safety standards for radioactive waste is the Law of the Republic of Belarus "On radiation safety of the population".

In Belarus there are a number of regulations that contain the classification of radioactive waste (RW), basic principles of radioactive waste management, radiation protection criteria for radioactive waste management, the basic requirements for ensuring the safety of personnel and the public at all stages of radioactive waste (in the collection, storage, transportation, processing and disposal of radioactive waste), as well as regulating other safety issues (see Annex 1).

Safety requirements for the shipment, transportation, transit storage, unloading and receipt of radioactive materials, including radioactive waste, in all kinds of transporting them across the territory of the Republic of Belarus are regulated sanitary regulations "Requirements for radiation safety and the public during transportation of radioactive materials (substances)".

In accordance with the sanitary standards, regulations and health standards "Hygiene requirements for the design and operation of nuclear power plants" [91], liquid and solid waste are classified according to the specific activity of the categories listed in Table 4.

Table 4. Classification of liquid and solid radioactive waste by specific activity.

| Category of RW | Specific activity, kBq/kg | | |
|-------------------------|-----------------------------|---|---------------------------|
| | Beta-emitting radionuclides | Alpha-emitting radionuclides (excluding transuranic ones) | transuranic radionuclides |
| Very low-activity ones* | from 0,3 to 10^2 | from 0,3 to 10^1 | from 0,3 to 1 |
| Low-activity ones | from 10^2 to 10^3 | from 10^1 to 10^2 | from 1 to 10^1 |
| Medium-activity ones | from 10^3 to 10^7 | from 10^2 to 10^6 | from 10^1 to 10^5 |
| High-activity ones | over 10^7 | over 10^6 | over 10^5 |

* - With the known radionuclide content of waste are very low-level waste if their total specific activity of greater than or equal to 0.3 kBq / kg, and the upper limit is determined by the sum of the activity of the specific activity of radionuclides relations to their lowest significant specific activity, the amount should not exceed 1.

When RW has classified by different categories, there is set the highest one.

Waste whose total specific activity of less than 0.3 kBq / kg are exempt from the radiation control. Management procedures are carried out in accordance with concerning legislation. There is currently being approved by the relevant government authorities a draft resolution of the Council of Ministers of the Republic of Belarus "On approval of the strategy for radioactive waste management in the Republic of Belarus", prepared by the Department of Energy and the National Academy of Sciences.

After the commissioning of two power units the expected average number of solid radioactive waste (SRW) in all categories according to their processing at one power plant for 1 year is 40 m³ - for low-level solid radioactive waste (including a very low level), 5 m³ - for intermediate; 0, 5 m³ - for high-level.

The expected number of solidified liquid waste per year per unit of nuclear power plants - 33 m³.

The total number of operational waste at 1 power plant in a year - 78.5 m³, including highly active.

At NPP decommissioning there are expected volumes of medium- and low-level radioactive waste is 2050 m³, and the high level RW - 85 m³.

Radioactive waste is planned to implement the following way. High-level activity operational waste will be stored in a nuclear power plant during its lifetime. Very low-level, low-level and intermediate-level activity operating waste in the conditioned form will be located in the radioactive waste storage facility of NPP for 10 years. Upon expiration of the temporary storage of radioactive waste in storage plant provides for their movement, starting roughly from

2030 to the planned Republican centralized point for the disposal of radioactive waste storage or disposal.

After decommissioning and its subsequent dismantling produced radioactive waste is planned to locate in the radioactive waste disposal facility.

There are plans issue of high-level operational waste disposal plant, as well as high-level waste generated during dismantling of nuclear power plants.

The project "Belarusian NPP" has the following system of radioactive waste:

the system of gaseous radioactive waste management;

radioactive gas cleaning system is designed to reduce the activity of gas emissions caused by the blowing of process equipment to acceptable limits;

gas cleaning system of blowings for tanks supporting systems, designed to restrict the activity of emissions into the atmosphere due process vent systems from tanks containing liquid radioactive media to acceptable limits;

collection system, treatment of liquid radioactive materials, processing and storage of liquid radioactive waste.

In order to re-use liquid radioactive media are treated in special water treatment plants, after which the treated water will be returned to the process, and the final cleaning products (secondary liquid waste – evaporator of vat residue, pulp spent ion-exchange resins and ion-selective sorbents of waste, sludge) - are sent to the repository LRW.

For intermediate storage and further processing of liquid radioactive waste is planned to use the systems: the intermediate storage of vat residue and used sorbents; conditioning and solidification of liquid waste with preliminary concentration; intermediate storage of liquid radioactive waste.

To obtain a cured product that goes to disposal, there is a system for solidification of liquid radioactive waste. The system provides the opportunity to concentrate vat residue, mixing it with cement and packaging into concrete protective containers. Collection of high-level solid radioactive waste will be carried out during the shutdown of power during scheduled preventive maintenance operations with the help of special equipment. For the collection and temporary storage of solid waste generated during operation of NPP to be used special storages, which are also located there.

CONCLUSION

The current system in the Republic of Belarus of nuclear safety continues to improve. By the Government and the regulatory authorities of the Republic of Belarus there will be required more consistent actions and efforts, financial and other means to ensure its development. IAEA during the mission INIR were given recommendations that accounting plan and implementation of which was approved at the government level, and is currently implemented.

Directions of the regulatory framework development;

Preparation of plans for the development of regulations;

The preparation of new regulations and the development of strengthening for safety requirements;

The development of TSO for regulatory body;

Gain control procedures for safety expertise;

Improving the organization and implementation of procedures for the supervision of nuclear facilities.

Currently, the field of scientific and technical support to the efforts are aimed to the development of scientific and technical knowledge through:

learning, adaptation and implementation of the best practices of the safety assessment;

the development, implementation and verification of modern computer programs and models to simulate the processes inside and outside NPP (for example, in the reactor, the first and second circuits, containment, emissions through the barriers);

study and analysis of the experience in the production of NPP components and systems and NPP operation;

creation of analytical information and information systems and databases;

analysis of initial data for the reactor;

the introduction of probabilistic safety analysis methods;

identifying problems with safety, analyzing the nature and measures to address them.

Organizational and legal aspects of the peer review system will be further developed. To do this, at the present time, the concept of the system of scientific and technical expertise and regulatory authority is developed, which provides, inter alia, and the expansion of the number of scientific and educational organizations involved in the evaluation process of nuclear and radiation safety, conduct research in the field of nuclear and radiation safety.

For rapid assessment of the actual state of the construction, "Belarusian NPP" and the conditions of the inspected organizations identify and prevent the causes and conditions that led to the commission of violations, in Gosatomnadzor there is created on-site inspection of "Belarusian NPP", which will maintain constant supervision of works. After receiving by PI DSAE the construction license and the decision for begin construction of NPP, the construction will start under the constant supervision of Gosatomnadzor.

For Gosatomnadzor advice by the regulatory body of the Russian Federation - the Rostekhnadzor in the field of supervision over the construction of "Belarusian NPP", including the implementation of quality control of the equipment and construction work in 2014 and further there is provided targeted funding.

The use of nuclear energy is a complex task involving both the safe operation of nuclear power plants and the solution of problems related to radioactive waste, spent nuclear fuel. Coordinated activities of countries in the implementation of obligations under the Convention on Nuclear Safety will assist the common aspirations to maintain a high level of nuclear safety in each country, regionally and internationally.

**The list of basic legislation and regulation of the Republic of Belarus
in the sphere of nuclear and radiation safety**

Multilateral and bilateral international agreements of the Republic of Belarus

1. Convention on Early Notification of a Nuclear Accident (since 1987).
2. Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (since 1987).
3. Agreement on Basic Principles of Cooperation in Peaceful Uses of Nuclear Energy signed by countries of Commonwealth of Independent States (1992).
4. Treaty on Non-Proliferation of Nuclear Weapons (IAEA Safeguards) (since 1993).
5. Convention on Physical Protection of Nuclear Material (since 1993).
6. Agreement between the Government of the Republic of Belarus and the Government of the Republic of Poland on Early Notification of a Nuclear Accident and Cooperation in the field of Radiation Safety of 26.10.1994.
7. Agreement between the Republic of Belarus and International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on Non-Proliferation of Nuclear Weapons (1995).
8. Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention) (since 1998).
9. Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (since 1999).
10. Convention on Nuclear Safety (since 1999).
11. Agreement between the Government of the Republic of Belarus and the Government of the Republic of Austria on the Exchange of Information in the field of Nuclear Safety and Protection from Ionizing Radiation of 09.06.2000.
12. Comprehensive Nuclear Test Ban Treaty (since 2001).
13. Agreement between the Government of the Republic of Belarus and the Cabinet of Ministers of Ukraine on Early Notification of a Nuclear Accident and Cooperation in the field of Radiation Safety of 16.10.2001
14. Protocol of Amendment to Vienna Convention on Civil Liability for Nuclear Damage (since 2003).
15. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (since 2003).
16. International Convention for the Suppression of Acts of Nuclear Terrorism (since 2005).
17. Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) (since 2005).
18. Protocol Additional to the Agreement between the Republic of Belarus and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on Non-Proliferation of Nuclear Weapons (signed on 15.11.2005, but not yet ratified).
19. Agreement between the Government of the Republic of Belarus and the Government of the People's Republic of China for Cooperation in the Peaceful Uses of Nuclear Energy (2008).
20. Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on Cooperation in Use of Nuclear Energy for Peaceful Purposes (2009).
21. Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on Cooperation in Construction of a Nuclear Power Plant on the territory of the Republic of Belarus (2011).

22. Agreement between the Government of the Republic of Belarus and the Government of the Russian Federation on Cooperation in the field of Nuclear Safety (2013).

23. Agreement between the Government of the Republic of Belarus and the Government of the Republic of Armenia on the Exchange of Information and Cooperation in the field of Nuclear Safety and Radiation Protection (2013).

Basic legislation

24. Law of the Republic of Belarus of 5 January 1998 “On Radiation Safety of the Population”.

25. Law of the Republic of Belarus of 5 May 1998 “On Protection of the Population and Territories from Natural and Manmade Emergency Situations”.

26. Criminal Code of the Republic of Belarus of 9 July 1999.

27. Law of the Republic of Belarus of 10 January 2000 “On Industrial Safety of the Hazardous Production Facilities”.

28. Code of Administrative Offences of the Republic of Belarus of 21 April 2003.

29. Act of the President of the Republic of Belarus of 11 August 2003 Nr. 359 “On Measures for Improving the Law-making Activity”.

30. Act of the President of the Republic of Belarus of 29 December 2006 Nr. 756 “On Certain Issues regarding the Ministry of Emergency Situations”.

31. Act of the President of the Republic of Belarus of 12 November 2007 Nr.565 “On Certain Measures for Construction of a Nuclear Power Plant”.

32. Resolution of the Council of Ministers of the Republic of Belarus of 31 January 2008 Nr. 1 “On Nuclear Power Development in the Republic of Belarus”.

33. Law of the Republic of Belarus of 30 July 2008 "On the Use of Atomic Energy".

34. Act of the President of the Republic of Belarus of 1 September 2010 Nr. 450 “On Licensing of Certain Types of Activities”.

35. Act of the President of the Republic of Belarus of 16 October 2009 Nr. 510 “On Improvement of Inspection (Supervision) Activities in the Republic of Belarus”.

36. Law of the Republic of Belarus of 9 November 2009 “On State Ecological Expertise”.

37. Law of the Republic of Belarus of Law of the Republic of Belarus of 15 July 2010 "On Objects Owned only by the State and Types of Activities Carried out Exclusively by the State".

38. Act of the President of the Republic of Belarus of 29 March 2001 Nr. 124 “On Measures for Implementation of International Treaties in the field of Civil Liability for Nuclear Damage”.

39. Act of the President of the Republic of Belarus of 15 September 2011 Nr.418 “On the Location and Design of a Nuclear Power Plant in the Republic of Belarus”.

40. Act of the President of the Republic of Belarus of 28 February 2011 Nr.81 “On Adoption of an Amendment to the Convention on Environmental Impact Assessment in a Transboundary Context”.

41. Act of the President of the Republic of Belarus of 26 July 2012 Nr. 332 “On Certain Measures for Improvement of Inspection (Supervision) Activities in the Republic of Belarus”.

Legal acts of the Government of the Republic of Belarus

42. Resolution of the Government of the Republic of Belarus of 10 April 2001 Nr. 495 “On Approval of National System for Prevention and Response in Emergency Situations”.

43. Resolution of the Government of the Republic of Belarus of 30.10.2002 Nr. 1504 "On Cooperation of between the Republic of Belarus and International Organizations”.

44. Resolution of the Government of the Republic of Belarus of 17 May 2004 Nr. 576 “On Approval of Provisions on the Procedure within the National System of Environmental Monitoring, Fauna Monitoring, Radiation Monitoring and the Use of Monitoring Data”.

45. Resolution of the Government of the Republic of Belarus of 24 June 2006 Nr. 767 “On Radiation-Hygienic Passport of a User of Ionizing Radiation Sources, on the Order of its Maintenance and Usage”.

46. Provisions on the Ministry of Foreign Affairs of the Republic of Belarus, approved by the resolution of the Government of the Republic of Belarus of 31.07.2006 Nr. 978.

47. Resolution of the Government of the Republic of Belarus of 19 November 2004 Nr. 1466 “On Approval of Provisions on the System of Monitoring and Forecasting of Natural and Manmade Emergency Situations”.

48. Resolution of the Government of the Republic of Belarus of 31 December 2008 Nr. 2056 “On Certain Issues of State Supervision in the field of Industrial Safety, Dangerous Goods Transportation, Nuclear and Radiation Safety”.

49. Resolution of the Government of the Republic of Belarus of 30 April 2009 Nr. 561 “On National Commission of Belarus on Radiation Protection at the Council of Ministers of the Republic of Belarus”.

50. Resolution of the Government of the Republic of Belarus of 4 May 2009 Nr. 574 “On Some Issues of Performing Works for Nuclear Energy Use”.

51. Resolution of the Government of the Republic of Belarus of 2 April 2009 г. Nr. 411 “On Approval of Provisions for the Procedure of Approving, Establishing and Marking of the Borders of Sanitary Protection Zone, Surveillance Zone of Nuclear Facility and (or) Storage Facility and Requirement for their Safety and Exploitation”.

52. Resolution of the Government of the Republic of Belarus of 21 January 2010 г. Nr. 54 “On Some Issues regarding Inviting Foreign Specialists for Teaching in Universities for Preparation of Specialists in the field of Nuclear Power”.

53. Resolution of the Government of the Republic of Belarus of 27 August 2010 г. Nr. 1242 “On Approval of Provisions on Conditions and Procedure for Development of Disaster Recovery Plans”.

54. Resolution of the Government of the Republic of Belarus of 27 сентября 2010 г. Nr. 1385 “On Approval of Provisions on Physical Protection of Nuclear Power Facilities”.

55. Resolution of the Government of the Republic of Belarus of 7 December 2010 Nr. 1781 “On Approval of Provisions on Expertise of the Documents Regulating Nuclear and Radiation Safety within the Activities of Using Nuclear Power and Sources of Ionizing Radiation”.

56. Resolution of the Government of the Republic of Belarus of 30 December 2011 г. Nr. 1791 “On Formation of Working Group for Coordination of State Inspection (Supervision) over the Construction of the Nuclear Power Plant”.

57. Resolution of the Government of the Republic of Belarus of 11 January 2012 г. Nr. 33 “On Scientific and Technical Support of the Ministry of Emergency Situations and Additions and Amendments to the Resolution of the Council of Ministers of the Republic of Belarus of 28 August 2009 Nr. 1116”.

58. Unified List of Administrative Procedures, Carried out by the State Bodies and Other Organizations in regard to Legal Entities and Individual Entrepreneurs, approved by the resolution of the Government of the Republic of Belarus of 17 February 2012 г. Nr. 156.

Technical regulation of the system of technical standardization

59. TCP (Technical Code of Practice) 097-2007 “Placement of Nuclear Power Plants. Main Criteria and Safety Requirements”.

60. TCP 098-2007 “Placement of Nuclear Power Plants. Main Requirements to the Structure and Scope of Study and Research for the Site Selection for Nuclear Power Plant”.

61. TCP 099-2007 “Placement of Nuclear Power Plants. Guidelines for Development and Content of the Justification for Environmental Safety of Nuclear Power Plants”.
62. TCP 101-2007 “Placement of Nuclear Power Plants. Guidelines for Development of General Quality Programme for a Nuclear Power Plant”.
63. TCP 102-2007 “Placement of Nuclear Power Plants. Guidelines for Development of Quality Programme for Nuclear Power Plant Site Selection”.
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65. TCP 171-2009 “Rules on Nuclear Safety of Nuclear Power Reactors”.
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67. TCP 264-2010 “Rules for Design and Operation of Localizing Safety Systems of Nuclear Power Plants”.
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72. TCP 359-2011 “Requirements to the Quality Programme for Systems of Physical Protection of Nuclear Facilities”.
73. TCP 360-2011 “Regulation on General Requirements to the Systems of Physical Protection of Nuclear Facilities”.
74. TCP 361-2011 “The Procedure for Determining the Level of Physical Protection of Nuclear Facilities”.
75. TCP 389-2012 “Rules on Physical Protection of Ionizing Radiation Sources”.
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Regulation of Republican bodies of public administration

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103. Instruction on the Procedure of Granting Access for Expertise of Exploitation of Nuclear Power and Ionizing Radiation Sources approved by the resolution of the Ministry of Emergency Situations of the Republic of Belarus of 30 November 2010 Nr. 54.

104. Regulation on Training, Instructions and Evaluation of Legal Acts Knowledge, including Knowledge of Technical Legal Acts, in the field of Nuclear and Radiation Safety approved by the resolution of the Ministry of Emergency Situations of the Republic of Belarus of 30 November 2010 Nr. 55.

105. Norms and rules for nuclear and radiation safety “Requirements to the Structure and Content of the Documents Justifying Nuclear and Radiation Safety for Activities involving Use of Nuclear Power and Ionizing Radiation Sources approved by the resolution of the Ministry of Emergency Situations of the Republic of Belarus of 30 November 2010 Nr. 58.

106. Rules for Safe Transportation of Dangerous Goods by Road in the Republic of Belarus approved by the resolution of the Ministry of Emergency Situations of the Republic of Belarus of 8 December 2010 Nr. 61.

107. Norms and rules for nuclear and radiation safety “Requirements to the Structure and Content of the Safety Report for Radioactive Waste Management Facilities” approved by the resolution of the Ministry of Emergency Situations of the Republic of Belarus of 13 December 2010 Nr. 64.

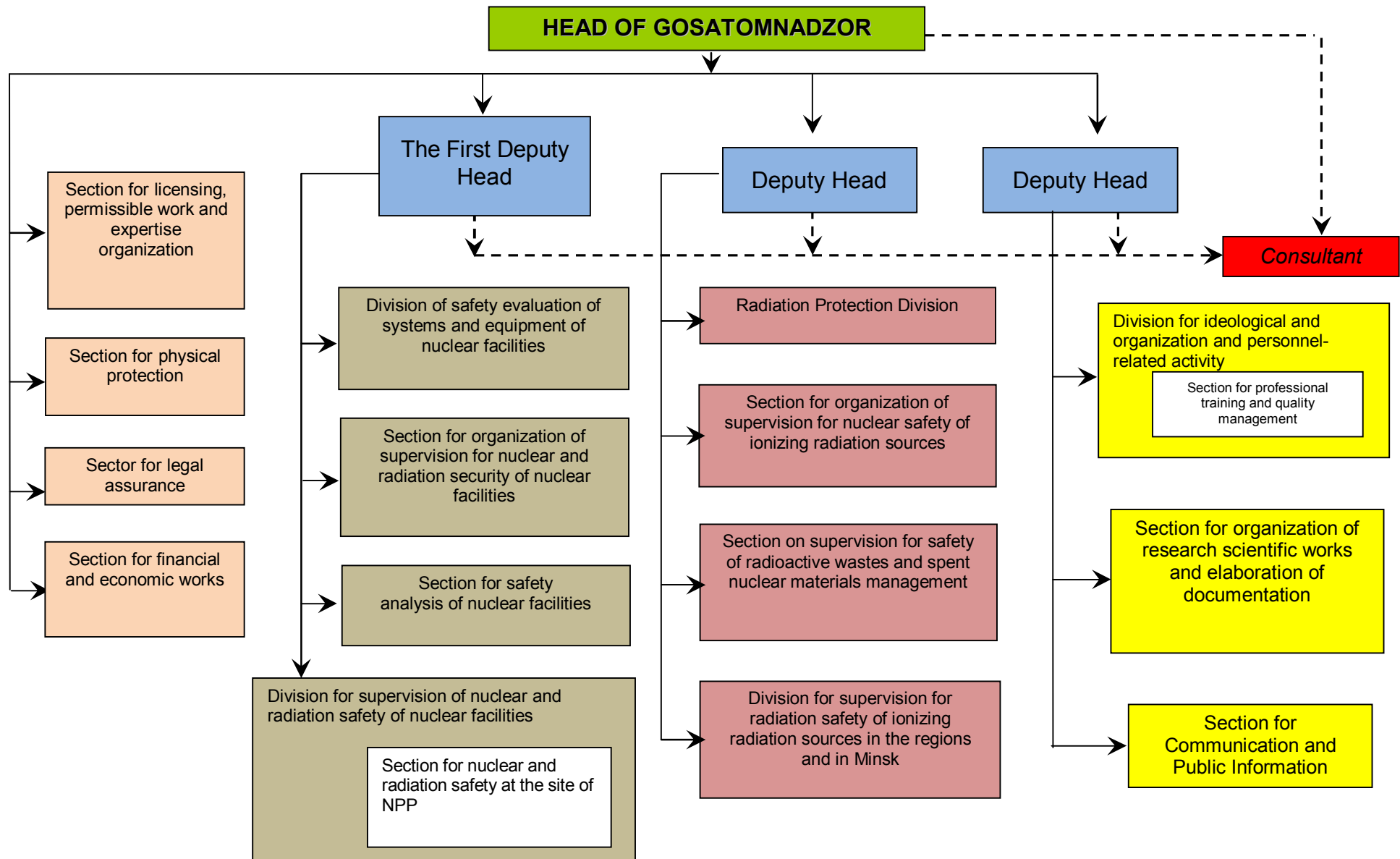
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110. Sanitary rules and norms “Requirements to Radiation Safety”, approved by the resolution of the Ministry of Health Protection of the Republic of Belarus of 28.12.2012 Nr. 213.

111. Hygienic requirements “Criteria for Assessment of Radiation Impact” approved by the resolution of the Ministry of Health Protection of the Republic of Belarus of 28.12.2012 Nr. 213.

Scheme of Gosatomnadzor



ANNEX 3

Scheme of key state authorities for management and regulation on nuclear and radiation safety providing and atomic energy use

