Convention on Nuclear Safety
7th Review Meeting – 2017

International Atomic Energy Agency IAEA, Vienna

Country Review Report for

REPUBLIC OF BELARUS

Drafted by Country Group N° 3

Bangladesh, Canada, Ghana, Japan, Latvia, Myanmar, Nigeria, Pakistan, Moldova, Romania and Turkey

Rapporteur: Mr. John Pule

Version: Final

DISCLAIMER: Per INFCIRC 571, Revision 7, Para. 16-19 and Annex IV, Contracting Parties were invited to comment on the implementation of the CNS reporting guidance. Contracting Parties were also encouraged to submit proposed Good Practices, Challenges, and Suggestions prior to the Review Meeting. The draft Country Review Report documents the preliminary observations identified by the Contracting Parties. The Country Review Report is the result of the CNS Review Process and was agreed by consensus by the Country Group.

Glossary

The Glossary provides here the definitions of "Challenges", "Suggestion" and "Good Practice" according to Annex IV of INFCIRC/571/Rev. 7. The definition of "Area of Good Performance" was agreed upon by the Officers of the 7th CNS Review Meeting at the CNS Officers' Meeting on 3-4 October 2016.

A **Challenge** is "a difficult issue for the Contracting Party and may be a demanding undertaking (beyond the day-to-day activities); or a weakness that needs to be remediated."

A **Suggestion** is "an area for improvement. It is an action needed to improve the implementation of the obligations of the CNS."

A **Good Practice** is "a new or revised practice, policy or programme that makes a significant contribution to nuclear safety. A Good Practice is one that has been tried and proven by at least one Contracting Party but has not been widely implemented by other Contracting Parties; and is applicable to other Contracting Parties with similar programmes."

An **Area of Good Performance** is "a practice, policy or programme that is worthwhile to commend and has been undertaken and implemented effectively. An Area of Good Performance is a significant accomplishment for the particular CP although it may have been implemented by other CPs."

Executive Summary

The Republic of Belarus has two nuclear power reactor units which are still under construction. The types of nuclear power reactors are AES-2006 (VVER-1200). Power reactor unit No. 1 is scheduled for commissioning in 2019, according to the updated NPP construction schedule, while unit No. 2 is planned to be commissioned in 2020.

3 out of 6 Challenges and 1 out of 2 Suggestions from the 6th Review Meeting have been closed.

The Country Group highlights the following measures to improve safety in Belarus national nuclear programme:

- Belarus has further developed its legal framework.
- A National Plan for Improving Preparedness and Response System in Case of Nuclear and Radiological Emergency has been approved by the Government.
- Construction on site is in progress, and the training centre with full-scale simulator and firefighting station are in operation.
- Belarus has the intention to introduce periodic safety analyses in the licence, with the obligation to take compensatory measures when new safety requirements are introduced.

The Country Group highlights the following results of international peer review missions of Belarus:

- An IRRS Mission to Belarus took place in October 2016 and a SEED Mission in January 2017. Belarus intends to make the final reports publicly available.
- An EPREV Mission in Belarus is scheduled for March 2018.

The Country Group identified the following Challenges for Belarus:

- Challenge 1: Finishing construction and commissioning of new reactors with assuring that VDNS principle 1 is met.
- Challenge 2: Further development of TSO system of the regulatory body.
- Challenge 3: Continue efforts to establish bilateral cooperation on nuclear safety with the Republic of Lithuania, finalizing bilateral agreements, in particular.
- Challenge 4: Preparation and hosting of all planned peer review missions in the conditions of intensive schedule of activities related to the Belarusian NPP construction and implementation of the recommendations and suggestions including those from the missions already conducted.
- Challenge 5: Ensure adequate regulatory review of the application being submitted by licensee and oversight of the entire process for the issuance of the operating licence.

In addition the country group identified 2 Suggestions and 4 Areas of Good Performance.

The Country Group concluded that Belarus:

- Submitted a National Report, and therefore complies with Article 5 and in time following Rule 39 of INFCIRC/573 Rev. 6.
- Attended the 7th CNS Review Meeting, and therefore complies with Article 24.1.
- Held a national presentation and answered questions, and therefore complies with Art. 20.3.

1. Basic Information on Belarus's Nuclear Programme

The Republic of Belarus has two nuclear power reactor units which are still under construction. The types of nuclear power reactors are AES-2006 (VVER-1200). Power reactor unit No. 1 is scheduled for commissioning in 2019, according to the updated NPP construction schedule, while unit No. 2 is planned to be commissioned in 2020.

2. Follow-Up from previous CNS Review Meeting

2.1 Challenges

Republic of Belarus provided the following updates on Challenges identified during the 6th CNS Review Meeting.

Challenge 1: Finishing construction and commissioning of new reactors in 2018 and 2020 which is still a challenging task

Belarus addressed this Challenge by indicating that the construction of Belarusian NPP are still according to schedule for commissioning of unit 1 and unit 2 in 2019, according to the updated NPP construction schedule, and 2020 respectively.

Follow Up Status: Open

Challenge 2: Ensuring that the regulatory body adequately reviews the documents provided by the licensee, as well as ensuring monitoring of the NPP construction process, including monitoring of equipment production, quality of supplies, etc.

Belarus addressed this Challenge by:

- the State authority that manages nuclear and radiation safety adequately reviewing documents;
- preparing for NPP operation licensing which is underway;
- improving the regulatory and legislative framework for licensing of nuclear works which is underway;
- receiving external methodological and consultancy support in licensing and supervision, when necessary.

Follow Up Status: Closed

Challenge 3: Improving competences and extending opportunities for independent technical support for the implementation of future tasks

To address this challenge:

- technical support is provided by the Public Scientific Institution namely Joint Institute for Power and nuclear research;
- Rostekhnadzor of the Russian Federation provides consulting services when necessary;
- Belarusian regulatory body receives methodological assistance from European experts in the framework of the European Union international technical cooperation projects in the field of nuclear and radiation safety;
- forming a system of TSO (16 organisations providing support to the Regulatory Authorities in specific thematic areas) is ongoing, legal act for this is developed and approved.

Follow Up Status: Open

Challenge 4: Providing review system on the NPP construction site

The relevant supervision system has been established on the NPP construction site. Gosatomnadzor has set up a local subdivision - nuclear and radiation safety control department on the NPP site with 7

inspectors, as well as the other supervision authorities delegated: 2 inspectors for industrial supervision and 5 inspectors for civil construction supervision. A permanent supervision mode is implemented. Coordination of all supervision authorities is provided via the Working Group for Coordination of the Belarusian NPP Construction Supervision is led by the 1-st Deputy Minister for Emergency Situations of the Republic of Belarus. External methodological and consultancy support is organized.

Follow Up Status: Closed

Challenge 5: Recruiting staff and managing fast growing regulatory body, development and improvement of its competences

- Large-scale staff recruitment to Gosatomnadzor was held (45 new employees, including 22 graduates of profile higher education institutes). Their competences were improved and developed with the use of national and external resources.
- IAEA IRRS Mission to Belarus mentioned management of fast growth of Belarusian regulatory body and competence development as a good practice.

Follow Up Status: Closed

Challenge 6: Establishing mechanisms of bilateral cooperation on nuclear safety with the Republic of Lithuania.

- There is a draft agreement on nuclear safety between the regulatory bodies - the Ministry for the Emergency Situations of the Republic of Belarus (MES) and the Lithuanian State Inspectorate for the safe use of nuclear energy (VATESI) - that has been developed and is now being reviewed.

Follow Up Status: Open

2.2 Suggestions

Belarus received two suggestions during the 6th review meeting.

Suggestion 1: To pay special attention to Fukushima-Daiichi lessons during licensing construction and commissioning of the 1st Belarusian NPP

Fukushima-Daiichi lessons have been considered within licensing of Belarusian NPP construction. Licensing of Belarusian NPP operation has not started yet.

Stress-tests of the Belarusian NPP are organised. At the moment, the operating organization completed the preparation of the self-evaluation report, which has been submitted to the regulatory authority. A National Report on the stress-tests will be prepared by the regulatory authority in 2017. Belarus intends to make use of transparent peer review system to discuss the results of the stress-tests.

Follow up status: Open

Suggestion 2: Consider inviting SEED mission as appropriate.

The IAEA SEED Mission took place in Belarus 16-20 January 2017. SEED mission found out that the Republic of Belarus has duly considered all external threats when designing the Belarusian NPP.

Follow up status: Close

3. Measures to improve safety

3.1 Changes to the regulatory framework and the national nuclear programme

Since the last Review Meeting, the Country Group took note of the following changes to the regulatory framework and the national nuclear programme :

The Decree of the President of the Republic of Belarus of September, 1 2010 No. 450 (as amended on November, 26 2015 No. 475) "On Licensing of Certain Types of Activities" [37]

The document tightened the requirements and regulations applied to the economic entities acting in the nuclear energy use industry. Some of the changes are as follows:

- The list of licensing requirements and conditions was significantly expanded;
- The list of the requirements and conditions which, if violated, may cause license suspension, was introduced;
- The list of works and services involving activities in nuclear energy use was amended; Safety-related works and services provided to the operating organizations, including construction of installations, are to be licensed;
- License validity limitation was lifted.

The Decree of the President of the Republic of Belarus of February 16, 2015 No.62 "On Provision of Safety during the Construction of the Belarusian Nuclear Power Plant".

- A special procedure was established on the Belarusian NPP construction site for safety provision and control in the course of the plant construction and commissioning.
- The procedure provides all control bodies with the right to continuous control (supervision) in their fields of expertise, impose sanctions and perform other correction actions (earlier only Gosatomnadzor was entitled to do so).

To implement standards provided in the laws of the Republic of Belarus and the decrees of the President of the Republic of Belarus, starting from 2013 the resolutions of the Council of Ministers of the Republic of Belarus [68-74] have been prepared and adopted in regard of the following issues:

- operation of state system of accounting for and control of nuclear material;
- specifying a list of control (supervision) bodies and (or) control (supervision) areas;
- arranging and implementing safety control (supervision) in the course of construction and commissioning of the Belarusian NPP;
- operation of radioactive contamination control system;
- approving the Strategy of the Belarusian NPP radioactive waste management;
- issuing permits for activities in nuclear power use field;
- training staff for nuclear power industry in foreign countries' organizations, etc.

Ministry of Emergency Situations (MES) of the Republic of Belarus approved and adopted 12 technical codes of practice (TCP) [92-104].

The Ministry of Health of the Republic of Belarus developed and approved relevant sanitary standards and rules [141, 143, 144].

The adoption and implementation of technical legal acts, norms and rules, codes of practice (TCP) and sanitary standards and rules ensured further harmonization of legislative and regulatory framework of the Republic of Belarus and the international requirements necessary to achieve high safety standards.

3.2 Safety improvements for existing nuclear power plants

In Belarus the two nuclear power reactor units are still under construction; therefore this section is not applicable.

3.1.1. Response to international peer review missions

Belarus did not host any international peer review mission during the review period, however after submission of the CNS National Report Belarus hosted the Integrated Regulatory Infrastructure Review (IRRS) mission in October 2016 and Site and External Events Design Review Service (SEED) in January 2017.

The following are planned for the future:

- International State System for accountancy and control of nuclear material Advisory Service (ISSAS);
- Emergency Preparedness Review (EPREV);
- Integrated Nuclear Infrastructure Review (INIR), for the 3rd phase of the nuclear power program implementation;
- International Nuclear Security Advisory Service (INSSERV);
- Pre-Operational Safety Review Team (pre-OSART).

4. Implementation of the Vienna Declaration on Nuclear Safety (VDNS)

On 9 February 2015, the Contracting Parties adopted INFCIRC 872,"Vienna Declaration on Nuclear Safety", which is a commitment to certain principles to guide them in the implementation of the CNS' objective to prevent accidents and mitigate their radiological consequences, should they occur. The Contracting Parties agreed to discuss the principles of the Vienna Declaration on Nuclear Safety in their National Reports and in the subsequent Review Meetings.

4.1 Implementation of the VDNS's principle on new nuclear power plants

The first principle of the VDNS is: "New nuclear power plants are to be designed, sited, and constructed, consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions."

Belarus answered that they did not introduce a separate legally fixed term "new nuclear power plant".

Taking into account that the Belarusian nuclear power plant is being constructed under the latest project with increased safety requirements of generation 3+, it is considered to be a "new" plant in terms of the Vienna Declaration.

Belarus reports that its national requirements and regulation incorporate appropriate technical criteria and standards to address:

- The objective of preventing accidents in the commissioning and operation of new nuclear power plants; and
- The objective of mitigating against possible releases of radionuclides causing long-term offsite contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.

Belarus reports that the design corresponds to the international norms and the IAEA recommendations, as well as to the principle 1 of the Vienna Declaration on Nuclear Safety.

- Belarus reports that the nuclear power plant under construction is of 3+ generation featuring a new reactor system with additional safety systems such as:
  - passive heat removal system;
  - passive filtration system of leakage to the intershell space;
  - trap for molten corium in case of a beyond design basis accident;
  - passive system of residual heat removal via steam generators;
  - molten plutonium isolation system;
  - system of control and removal of hydrogen from containment;
  - The design includes double containment that, together with other isolation systems, ensures safe containment of radioactive products during regular operation, violations of regular operation conditions, design basis and beyond design basis events.
  - The design of the Belarusian NPP includes safety systems, compulsory measures and engineering and technical solutions which would make a reactor facility controllable and stabilize its parameters in case of design basis and beyond design basis events. Special technical systems and means provided by the design ensure reserve of basic safety functions and proper level of nuclear safety at the Belarusian NPP.
  - System of NPP barriers provided in the AES-2006 design includes fuel matrix, fuel claddings, reactor coolant boundary; sealed enclosure of localization safety systems. The systems, ensures safe containment of radioactive products during regular operation, violations of

regular operation conditions, design basis and beyond design basis events.

Belarus answers that a special regulating requirements for defence-in-depth, beyond design conditions and etc. are specified in technical codes of common expertise "General provisions of nuclear power plants' safety assurance (GPS NPP)". According to up-to-date international recommendations and standards these documents are now being reviewed and updated.

At the same time according to the Edict of the President of the Republic of Belarus at the construction stage in the framework of supervision activities technical regulatory legal acts of the Russian Federation as the country being a nuclear technologies' provider are applied if they don't contradict the regulatory acts of the Republic of Belarus and correspond to international recommendations and standards.

NPP's safety is assured by the way of consistent defence-in-depth assurance based on the use of unit physical barriers located on the way of ionizing radiation and radioactive substances distribution to the environment and the system of technical and organizational measures aimed at the protection of barriers and their effectiveness preservation as well as at personnel, civil population and environment protection.

Documents on accidents management including beyond-design accidents are included into the package of documents needed in order to obtain the license to operate an NPP under the requirements to the licensing of a specific type of activities as well as the norms and rules on nuclear and radiation safety assurance " Requirements to the composition and content of documents justifying nuclear and radiation safety assurance in the process of the execution of activities in the field of nuclear energy and ionizing radiation use". The availability of corresponding resources and power for accidents' effective management at the construction site and the remediation of their consequences are justified by NPP's design and are checked by safety analysis. .

According to special legislative decisions the following regulating requirements of the Russian Federation are applied within the territory of the Republic of Belarus: Nuclear energy rules and norms (NERN) «Nuclear power plants. Steel containments. Norms of NPP steel containments' strength calculation", NERN "Main provisions on the welding of the elements of NPP's localization safety systems", NERN "Rules of the structure and operation of emergency cooling systems and the systems of heat removal from a nuclear reactor to the ultimate heat sink", RA-005-16 "Provisions on the procedure of the emergency situation announcement, timely information transfer and the organization of emergency assistance for nuclear stations in cases of radiation hazardous emergencies", RA-015-12 "Standard content of personnel protection activities plan in case of NPP's accident" and etc. (Q3)

Belarus answers that in accordance with the legislation of the Republic of Belarus, one should seek to ensure that the estimated probability value of the accidental release limit established by these requirements not exceed 10-7 per reactor per year. In this case the main purpose of limiting of the consequences of offsite accidents is a restriction and (or) exclusion of public exposure. This aim is achieving by the fulfilment the following tasks:

- taking of precautionary urgent protective measures to avoid or minimize the development of severe deterministic effects;
- taking of urgent protective measures to prevent stochastic effects to the extent that this is practicable;
- adoption of agricultural countermeasures that prevent ingestion of radionuclides and long-term protective measures in agriculture.

The Country Group made the following observations:

- Belarus did not introduce a separate legally fixed term for "new nuclear power plant".

- The Belarusian nuclear power plant being a generation 3+ project, it is considered to be a "new" plant in terms of the Vienna Declaration.

4.2 Implementation of the VDNS's principle on existing nuclear power plants

The second principle of the VDNS is:

" Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner."

Belarus does not have existing nuclear power plants and therefore this principle does not apply.

4.3 Taking into account IAEA Safety Standards and other international Good Practices in the national requirements and regulations addressing the VDNS principles

The third principle of the VDNS is:

"National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA Safety Standards and, as appropriate, other good practices as identified *inter alia* in the Review Meetings of the CNS."

Belarus reports that its national requirements and regulation take into account the relevant IAEA Safety Standards throughout the life-time of a nuclear power plant.

- Belarus reports that its legislative and regulatory framework on nuclear and radiation safety is being improved with the consideration of the IAEA safety standards throughout the lifetime of a nuclear power plant.
- The regulatory and legislative framework for nuclear and radiation safety in the Republic of Belarus is being improved on the basis of regular analysis made to identify new regulatory and legislative documents and (or) amendments to such current documents of any level necessary to be developed with the consideration of the IAEA recommendations (including the newly published ones) and other documents to comply with principle 3.

Belarus answers that the IAEA IRRS mission held in October 2016 mentions, inter alia, that "the Republic of Belarus has used international requirements and guidance to develop a comprehensive, and at times complex, framework for nuclear and radiation safety. The country demonstrates a commitment to meeting international requirements.

The Country Group made the following observations:

- Belarus reports that its national requirements and regulation take into account the relevant IAEA Safety Standards throughout the life-time of a nuclear power plant.

4.4 Issues faced by Belarus in the implementation of the VDNS

Belarus answers that The Belarusian nuclear power plant, the only one in the country, is being constructed according to the Russian "AES-2006" project, which meets the latest international safety assurance requirements, including in the context of the Vienna Declaration on Nuclear Safety.

5. Results of the Review

5.1 General Quality of the National Report

Contracting Parties and officers were invited to provide general comments on the Belarus' implementation of the obligations of the CNS (e.g., report submitted on time), addressed all articles, addressed the Vienna Declaration on Nuclear Safety, and addressed all Challenges and Fukushima lessons learned, the general quality of its National Report, transparency issues, and the compliance with the CNS guidance documents and special peer review topics identified in the previous CNS Review Meeting or specified by the President of the CNS (use of the templates for articles 17 and 18 and reporting on *the management of spent fuel on site and radioactive waste on site - especially for CPs not signatories of the Joint Convention).*

With regards to the general quality of the National Report and transparency issues, the members of the Country Group made the following observations:

- Belarus did not make voluntary use of the National Report template for Articles 17 and 18.

With regards to the compliance with the requirements of the CNS and its Guidelines, the members of the Country Group made the following observations:

- The Report was submitted on the deadline of 15 August 2016.
- The Report has been made publicly available.

5.2 Participation in the Review Process

With regards to Belarus's participation in the Review process, the members of the Country Group made the following observations. Belarus

- posted questions to Contracting Parties.
- delivered answers to the questions of Contracting Parties on time.
- delivered its national presentation.

5.3 Challenges

The Country Group identified the following Challenge(s) for Belarus.

- Challenge 1: Finishing construction and commissioning of new reactors with assuring that VDNS principle 1 is met.
- Challenge 2: Further development of TSO system of the regulatory body.
- Challenge 3: Continue efforts to establish bilateral cooperation on nuclear safety with the Republic of Lithuania, finalizing bilateral agreements, in particular.
- Challenge 4: Preparation and hosting of all planned peer review missions in the conditions of intensive schedule of activities related to the Belarusian NPP construction and implementation of the recommendations and suggestions including those from the missions already conducted.
- Challenge 5: Ensure adequate regulatory review of the application being submitted by licensee and oversight of the entire process for the issuance of the operating licenve.

One Contracting Party participating throughout the Country Group's discussions according to paragraph 20, lit. b, of INFCIRC 571 Rev.7 raised additional challenges which were not agreed upon by the Country Group.

5.4 Suggestions

The Country Group identified the following Suggestion(s) for Belarus.

- Suggestion 1: Have the stress-test report, which is under preparation, subject to transparent peer review in accordance with the joint declaration of 2011.
- Suggestion 2: Complete performing a Level-2 PSA, including extreme natural as well as man-made external hazards.

5.5 Good Practices and Area of Good Performance

During the peer review of Belarus's National Report, the Contracting Parties were invited to recommend Good Practices and to highlight Area of Good Performance.

The following Areas of Good Performance of Belarus were commended by the Country Group:

- Area of Good Performance 1: 81 regulatory employees have studied abroad in the framework of IAEA and EU international cooperation projects and on bilateral basis.
- Area of Good Performance 2: Recognizing the importance of strong collaboration during the construction, commissioning and future operation of the NPP, the Government: has established an "inter-ministerial commission on coordination of the plan of major organizational arrangements for construction of nuclear power plant in the Republic of Belarus and control over its implementation".
- Area of Good Performance 3: The regulatory body has established a variety of tools to manage their rapid growth, and has adopted innovative approaches to building a healthy organizational culture.
- Area of Good Performance 4: Comprehensive international cooperation, including bilateral agreements on nuclear safety.

6 Fulfilment of CNS Review Requirements

The Country Group concluded that Belarus

- Submitted a National Report, and therefore complies with Article 5 and in time following Rule 39 of INFCIRC/573 Rev. 6.
- Attended the 7th CNS Review Meeting, and therefore complies with Article 24.1.
- Held a national presentation and answered questions, and therefore complies with Article 20.3.