In Gosatomnadzor since *2014*

Education: ***State Engineering University of Armenia*** *(1990 г.)*
Specialty: «Electrochemical production technologies»

Trainings: *Courses and seminars by* ***IAEA, European Commission****, educational institutions of* ***the Russian Federation*** *on nuclear and radiation safety. Internships and scientific visits in regulatory authorities of* ***the Russian Federation, Armenia, Germany, Iran, France, Finland, Sweden.***

Work experience in the field of nuclear and radiation safety: **more than 25 years**

The Armenian Nuclear Power Plant – *18 years*

Gosatomnadzor *– 7 years*

Marukhyan Vigen

Head of Nuclear Safety Regulation Department

Field of activity :

- control over the stages of commissioning of the unit of the Belarusian NPP
- control over the compliance of systems and equipment with design characteristics and parameters,
- sufficiency of nuclear safety substantiation and requirements of safety systems, according to the assessment of the safety review of documents justifying the safety of the Belarusian NPP.

Directly involved in the development of NLA in the field of nuclear and radiation safety.

Department for Nuclear and Radiation Safety of the Ministry for Emergency Situations of the Republic of Belarus (Gosatomnadzor)

National experience in safety assessment and review

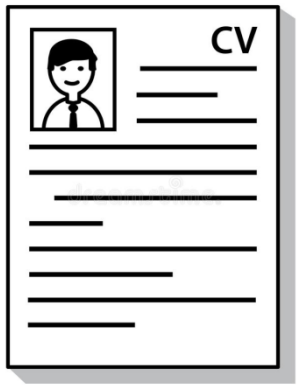
V.Marukhyan,
Head of Division of the Nuclear Safety Regulations

Minsk
8-9 February 2022

Safety assessment and review. Legal framework

Decree of the President of the Republic of Belarus № 137 dated April 5,2021	• determines the need for an expert organization to have a license to conduct a safety review; • sets licensing requirements and conditions for obtaining a license
Resolution of the Council of the Minister of the Republic of Belarus № 558 dated October 06, 2021	• determines the procedure for conducting a safety review; • determines the possibility and conditions for attracting individual experts

Admission to conduct a safety review.



Consideration of the expert's resume and documents containing information on work experience, qualifications, and results of scientific activity

Interview of a candidate in the Gosatomnadzor commission

Registration of a protocol indicating the types of activities for which the expert has been granted admission

Inclusion of an expert in the register of experts, placement of information about experts on the Gosatomnadzor website

Areas of activity of experts

- dose assessment
- radiation protection
- materials science and welding
- emergency preparedness
- seismic safety assessment
- accident analysis, emergency procedures
- probabilistic analysis
- etc.
- radio and dosimetric measurements
- handling of nuclear fuel, spent nuclear fuel, radioactive waste
- internal and external hazards
- aging management
- neutron physics calculations
- NPP technology, operational Limits and Conditions, operational documentation
- radiation monitoring, hydrometeorology
- physical protection
- safety culture, human factor
- fire safety

Organizations with licenses to conduct expertise

ask the experts

- «Joint Institute for Power and Nuclear Research-Sosny» of National Academy of Science of Belarus
- National Scienific Institute of Nuclear Issues of BSU
- STC NRS

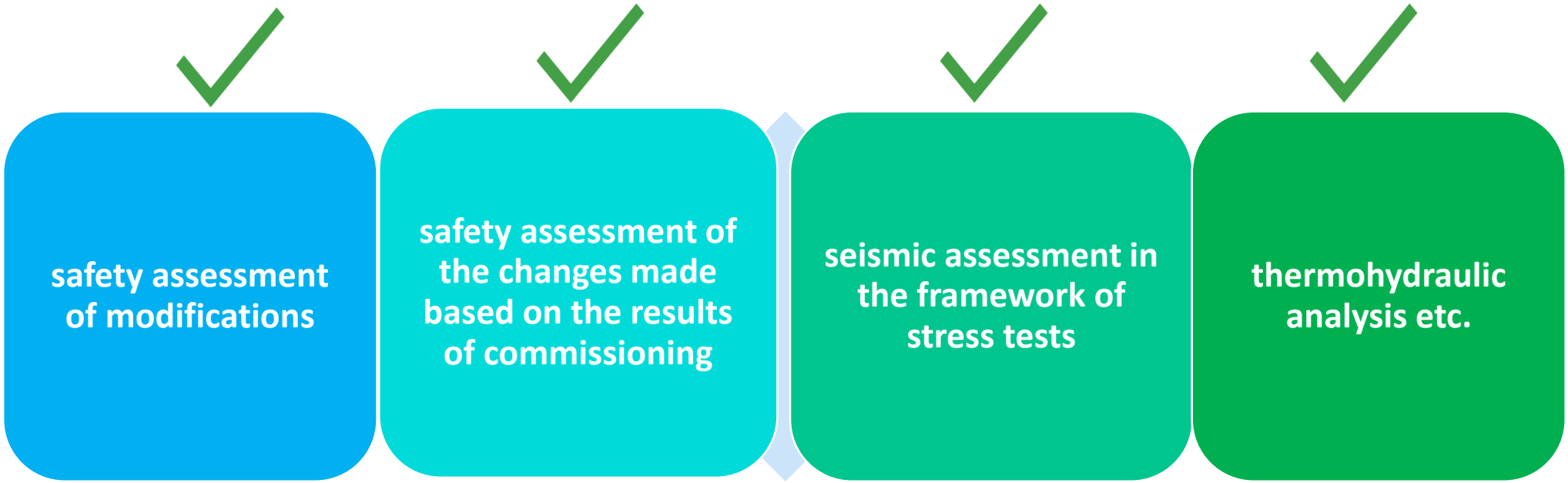
Processes requiring safety review

Licensing process of the unit No. 1 of the Belarusian NPP		
Sitting	October 2011 – May 2012	JIPNR - Sosny
Construction	September 2013 - erecting the foundations and foundations of its buildings and structures; April 2014 - the main stage of construction; December 2014 - the whole complex of works on the construction.	JIPNR - Sosny
Operation and the transition stage from construction to the beginning of operation	Step-by-step licensing : April 2020 - handling of fresh nuclear fuel; August 2020 - carrying out the first loading of the standard reactor core ; October 2020 - performing physical experiments to the minimum controlled level; October 2020 - work on phase power start-up to achieve power level of 50% of the nominal and the treatment of operational radioactive waste ; December 2020 – pilot operation of unit 1 of the Belarusian nuclear power plant. June 2, 2021 - operation of unit 1 of the Belarusian nuclear power plant	JIPNR - Sosny
Safety assessment of **changes at the stages of commissioning** of the unit No. 1	June – December 2021	National Scienific Institute of Nuclear Issues of BSU

Processes requiring safety review

Licensing process of the unit No. 2 of the Belarusian NPP		
Sitting	October 2011 – May 2012	JIPNR - Sosny
Construction	February 2014 (erecting the foundations and foundations of its buildings and structures) December 2014 - the whole complex of works on the construction On December 21, 2021, a license was issued, which allowed to start the physical start-up of the power unit No. 2 of the Belarusian NPP.	JIPNR - Sosny
Operation and the transition stage from construction to the beginning of operation (In process)	Step-by-step licensing (from March 2021): On December 21, 2021, a license was issued, which allowed to start the physical start-up of the power unit No. 2 of the Belarusian NPP. *the results of the safety review are submitted to Gosatomnadzor for each stage of commissioning of the unit.	JIPNR - Sosny

Using the results of the safety in making regulatory decisions



- SSI «JIPNR-Sosny»
- National Scientific Institute of Nuclear Issues of BSU
- National Academy of Sciences of Belarus Centre of Geophysical Monitoring
- A.V. Luikov Heat and Mass Transfer Institute of NAS of Belarus
- STC NRS
- FBU STC NRS (Russian Federation)
- Organizations of the Russian federation (National Research Center «Kurchatov Institute», OKB Gidropress, JSC Atomenergoproekt)

FBU STC NRS (Russian Federation)

Safety assessment during licensing

- Involvement by the JIPNR - Sosny in the framework of the safety assessment of the construction and operation of units No. 1 and No. 2 of the Belarusian NPP

Provision of consulting services to Gosatomnadzor in the field of:

- Evaluation of documents on the justification of nuclear and radiation safety at the stages of physical and energy commissioning of Unit No. 1 (SAR, stage programs and changes to them);
- Consideration of individual test results carried out at the "Physical start-up" stage
- etc.

Additional assessment of the operability of the safety system of the Belarusian NPP

2021

- In order to categorize the premises by the duration of the safety systems in 2021, the **A.V. Luikov Heat and Mass Transfer Institute of NAS of Belarus** carried out work on the development of a conceptual approach to assessing the operability of the safety system of the Belarusian NPP unit in the conditions of thermal disturbance propagation

Further interaction

- Development of software tools for numerical calculations of the propagation of high-temperature disturbances

Scientific and technical support of Gosatomnadzor to ensure the safe development of nuclear power in the Republic of Belarus

«Joint Institute for Power and Nuclear Research-Sosny» of National Academy of Science of Belarus.

A.G.Lukashevich

E-mail: lag@sosny.bas-net.by

JIPNR - Sosny

The main activities of the Institute:

- research and development in the field of nuclear power engineering, scientific support for the construction of nuclear power plant in the Republic of Belarus;
- research and development in the field of nuclear and radiation technologies;
- research and development of technologies of radioactive waste and spent nuclear fuel management;
- fundamental and applied research in the field of nuclear physics, elementary particle physics, high energy physics.

Scientific and technical support for Gosatomnadzor

Scientific and technical support for Gosatomnadzor in the field of ensuring nuclear and radiation safety is provided in the following areas :

- expert review of nuclear and radiation safety of nuclear facilities;
- assessment of the impact of nuclear facilities on the environment, personnel and population;

Scientific and technical support for Gosatomnadzor

- neutron-physical and thermal-hydraulic calculations to justify the safety of nuclear facilities, modeling of the nuclear fuel cycle;
- issues of management of medium-level, low-level and very low-level radioactive waste, including technologies for processing, conditioning, storage and disposal;

Scientific and technical support for Gosatomnadzor

- management of spent nuclear fuel and high-level radioactive waste, including issues of their long-term storage and final isolation;
- physical protection of nuclear facilities, accounting and control of nuclear materials and sources of ionizing radiation;

Scientific and technical support for Gosatomnadzor

- development of draft technical regulations;
- expert scientific and technical support of the system of situational crisis centers in the field of decision-making on the protection of personnel and the public in the event of nuclear and radiation emergencies.

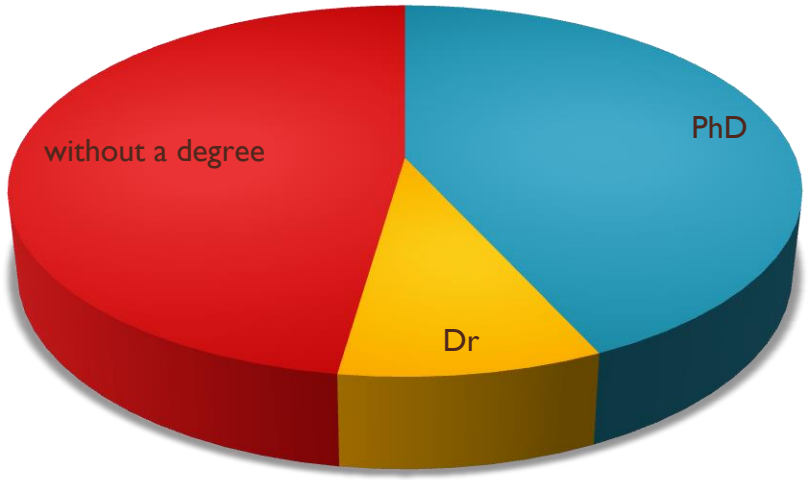
Proposals for new areas of cooperation in the framework of ensuring nuclear and radiation safety :

- Scientific support for the efficient and safe operation of the Belarusian nuclear power plant and promising areas for the development of nuclear energy

Expert Council

Expert potential

32 experts work in the scientific institution "JIPNR - Sosny"



Main areas of expertise

- Nuclear power plant safety concept
- Assessment of the safety justification of the NPP location site: technogenic, hydrometeorological, geological, hydrogeological, seismotectonic and engineering-geological conditions of the location area, characterization of external impacts at the location site
- NPP impact on the environment and population. Information about the effects of radioactive, chemical and thermal pollution on the environment, as well as radiation exposure to humans
- General provisions and approaches to the design of buildings, structures, systems and elements: assessment of the justification of the strength and stability of buildings, structures, building structures, bases and foundations of nuclear power plants
- General Quality Assurance Program

Main areas of expertise

- Reactor
- Primary circuit and related systems
- Steam-turbine plant
- Control and management
- Power supply
- Auxiliary systems of the power unit
- Radioactive waste management
- Radiation protection
- Safety systems
- Analysis of accidents at nuclear power plants
- PSA
- Physical protection
- NPP decommissioning
- NPP Operational instructions

THANK YOU

Organization of expert evaluation in the field of nuclear and radiation safety at the Institute for Nuclear Problems of BSU

Speaker: Kristina Usheva
Contributors: S. Kuten, Ph. Speransky,
A. Lobko, N. Uljanov, I. Skibo
INP BSU

Minsk
8-9 February 2022

Legal Basis

Министерство по чрезвычайным ситуациям Республики Беларусь

(наименование органа, выдавшего лицензию)

СПЕЦИАЛЬНОЕ РАЗРЕШЕНИЕ
(ЛИЦЕНЗИЯ)

№ 33134/615-4

на право осуществления *деятельности в области использования атомной энергии и источников ионизирующего излучения.*

Выдано *Научно-исследовательскому учреждению «Институт ядерных проблем» Белорусского государственного университета».*

220030, г. Минск, улица Бобруйская, дом 11, к. 315.

Учетный номер плательщика *100013276.*

Специальное разрешение (лицензия) выдано на основании решения от *2 мая 2016 г. № 19 км* и зарегистрировано в реестре специальных разрешений (лицензий) *Департамента по ядерной и радиационной безопасности Министерства по чрезвычайным ситуациям Республики Беларусь за № 615.*

Начальник Департамента по ядерной и радиационной безопасности О.М.Луговская

М.П.

0124680

Activities at the Insitiute for Nuclear problems of BSU were developed in frames of the State system for Scientific and technical support of *GOSATOMNADZOR* under the Resolution of Belarus Government of 2016.

Expert evaluations in the field of the nuclear and radiation safety are performing by INP within legitimacy provided by Special lisence issued by GOSATOMNADZOR in May 2016 with Amendment of January 2021

License amendment

On July 27 2021 INP BSU obtained amendment to the license to conduct safety review of the following works (services) related to the construction and operation of nuclear installations:

- documents justifying nuclear and radiation safety;
- operational documentation, including emergency operating procedures;
- modifications associated with changes in structures, systems and elements, changes in settings, protections and interlocks, changes in design limits and conditions for safe operation;
- analysis of accidents and changes in the neutron-physical and thermal-hydraulic parameters of a reactor installation.

Organizational Structure

- To meet the requirements for Special license INP prepared and hired dedicated experts, developed and adopted a number of the regulatory documents and processes

- Next step was the organization of Specialized Laboratory of Radiation Safety in the accordance with the Resolution of Belarus Government of 2017. The Laboratory was established by the Order of INP Director and this document has been endorsed by the Ministry of Emergency Situations.

- Research & Development
- The laboratory staff is performing R&D in area of radiation detection in frames of State Programs for Scientific Research and expert evaluations in area of the radiation safety.

Activities in the Laboratory

- Expert evaluations in area of radiation safety
- In 2021, 75 contracts were signed for conducting ionizing radiation safety examinations, including contracts extending to 2022, in the amount of 215’140 Belarusian roubles, 924 euros, 6900 US dollars. Mostly four experts were in charge.

- Educational activity
- Expert *Inga Skibo* lectures at advanced training courses on licensing issues in the field of the use of ionizing radiation sources. Several qualification projects of BSU students (including Master’s) were recently performed under scientific supervision of *Alexander Lobko*

Safety review - I

In 2021, Safety review of the documents justifying nuclear and radiation safety of Belarusian NPP (unit No.1) was carried out.

INP BSU performed review in terms of the safety assessment of the unit No.1 operation of Belarusian NPP, taking into account changes of the documents justifying nuclear and radiation safety as a result of the commissioning.

As a part of this Safety review, 14 thematic issues were considered.

Safety review - II

In 2021, Safety review of the documents justifying nuclear and radiation safety was carried out (in terms of analyzing anticipated operational occurrences, including design basis accidents with a decrease in heat removal from the primary circuit) in the implementation of the Belarusian NPP activities in the field of the use of atomic energy in terms of performing work constituting licensed activities in the field of atomic energy and sources of ionizing radiation use, in terms of the operation of a nuclear installation (Power unit No.2 of the Belarusian NPP) in accordance with the agreement No.2021/17-03 dated 09.27.2021 between State Scientific Institution “The Joint Institute for Power fnd Nuclear Research – Sosny and Institute for Nuclear Problems, Belarusian State University.

As a part of this Safety review, 7 thematic issues were considered.

Consultative services

In 2021, the Institute for Nuclear Problems, BSU provided consulting services to *GOSATOMNADZOR* on the basis of agreement No. 715/2021 dated 10.11.2021 on the following topics:

Correction of technological protection and blocking algorithms for Belarusian NPP power units No.1 and No.2 in terms of LAB, LCA, LCC systems (permanent modification) based on technical decision No. 55-21-PM dated 09.30.2021.

Determination of the operating procedure for the system for monitoring the level and humidity of steam in the steam generator (KUD) based on technical decision No. 802-21 dated 12.13.2021.

Conclusion

Software tools

Agreements have been reached on signing license agreements involving the commercial use of specialized software:

SAPHIR_95 - for the preparation of libraries of neutron-physical constants for calculations in Rainbow-TPP;

The MVTU software package is a full-scale simulation of nuclear power plants with VVER, including Rainbow-TPP.

Conclusion

Planned support issues

- Review and examination of documents justifying safety;
- Consideration and examination of technical solutions and modifications;
- Examination of the capabilities of organizations providing services to operating organizations;
- Examination of Nuclear Fuel reloads.


INSTITUTE FOR NUCLEAR PROBLEMS
BELARUSIAN STATE UNIVERSITY

THANK YOU

Expert assessment needs for the current period

Safety assessment of justifying safety documents and their changes at the stages of commissioning of the Belarusian NPP Unit № 2, operation of the Unit № 1

Safety assessment of documents within the thematic areas "NPP project management", "Ensuring operational safety and accounting for operational experience" of control and supervisory activities at the stage of operation of the Belarusian NPP.

Safety assessment of fuel loading (refuelling).

Review of information about events at the NPP, assessment of the adequacy of the developed corrective measures

Safety assessment of technical solutions for modifications at NPP

Safety review of the new operating organization (taking into account the planned work on the construction of a research reactor)