



**Republic of Lithuania**

**CONVENTION ON NUCLEAR SAFETY  
EIGHTH LITHUANIAN NATIONAL REPORT**

**Vilnius 2019**

State Nuclear Power Safety Inspectorate (VATESI) prepared this Report with the contributions of:

Ministry of Energy of the Republic of Lithuania  
Ministry of Environment of the Republic of Lithuania  
Ministry of Foreign Affairs of the Republic of Lithuania  
Fire and Rescue Department under the Ministry of the Interior of the Republic of Lithuania  
Radiation Protection Centre  
State Enterprise Ignalina Nuclear Power Plant

National Report is available in pdf format at the State Nuclear Power Safety Inspectorate website: [www.vatesi.lt](http://www.vatesi.lt).

All information and data used in the Lithuanian National Report are as of August 1st, 2019 unless explicitly specified otherwise.

ISSN 2424-5658 (ONLINE)  
Convention on Nuclear Safety  
Eighth Lithuanian National Report

Publisher  
State Nuclear Power Safety Inspectorate (VATESI)  
A. Goštauto g. 12, LT-01108 Vilnius Lithuania  
[www.vatesi.lt](http://www.vatesi.lt); [atom@vatesi.lt](mailto:atom@vatesi.lt);  
© VATESI 2019

## Contents

Introduction	6
Summary	6
Compliance with Articles 6 to 19	9
Article 6 Existing Nuclear Installations	9
Article 7 Legislative and Regulatory Framework	10
Article 7(1) – Establishing and maintaining a legislative and regulatory framework	11
Article 7(2)(i) – National safety requirements and regulations	13
Article 7(2)(ii) – System of licensing	19
Article 7(2)(iii) – System of regulatory inspection and assessment	21
Article 7(2)(iv) – Enforcement of applicable regulations and terms of licences	23
Article 8 Regulatory Body	25
Article 8(1) – Establishment of the regulatory body	25
Article 8(2) – Status of the regulatory body	31
Article 9 Responsibility of the Licence Holder	32
Article 10 Priority to Safety	36
Article 11 Financial and Human Resources	39
Article 11(1) – Financial resources	39
Article 11(2) – Human resources	41
Article 12 Human Factors	48
Article 13 Quality Assurance	51
Article 14 Assessment and Verification of Safety	55
Article 14(1) – Assessment of safety	55
Article 14(2) – Verification of safety	61
Article 15 Radiation Protection	63
Article 16 Emergency Preparedness	76
Article 16(1) – Emergency plans and programmes	76
Article 16(2) – Information of the public and neighbouring States	87
Article 17 Siting	88
Article 17(1) – Evaluation of site related factors	89
Article 17(2) – Impact of the installation on individuals, society and environment	90
Article 17(3) – Re-evaluation of site related factors	94
Article 17(4) – Consultation with other Contracting Parties likely to be affected by the installation	94
Article 18 Design and Construction	95
Article 18(1) – Implementation of the defence-in-depth concept	96
Article 18(2) – Incorporation of proven technologies	98
Article 18(3) – Design for reliable, stable and easily manageable operation	99
Article 19 Operation	100
Article 19(1) – Initial authorization	101
Article 19(2) – Operational limits and conditions	102
Article 19(3) – Procedures for operation, maintenance, inspection and testing	103
Article 19(4) – Procedures for responding to operational occurrences and accidents	105
Article 19(5) – Engineering and technical support	107
Article 19(6) – Reporting of incidents significant to safety	108
Article 19(7) – Operational experience feedback	110
Article 19(8) – Management of spent fuel and radioactive waste on the site	114

## Acronyms and abbreviations

ALARA	As Low As Reasonable Achievable
AMC	Accident Management Centre
ASSET	Assessment of Safety Significant Event Teams
AS&QMD	Audit, Safety and Quality Management Division (INPP)
DSAR	Decommissioning Safety Analysis Report
D&D	Dismantling and Decontamination
ECURIE	European Community Urgent Radiological Information Exchange
EIA	Environmental Impact Assessment
EML	Environmental Monitoring Laboratory
ENSREG	European Nuclear Safety Regulators Group
EPA	Environmental Protection Agency
EPO	Emergency Preparedness Organization
EPP	Emergency Preparedness Plan
ERC	Emergency Response Centre
ESI	Emergency Support Instruction
EU	European Union
EURATOM	European Atomic Energy Community
FINAS	Fuel Incident Notification and Analysis System
HERCA	Heads of the European Radiological Protection Competent Authorities
IAEA	International Atomic Energy Agency
IMS	Integrated Management System
INES	International Nuclear and Radiological Event Scale
INPP	Ignalina Nuclear Power Plant
IRS	International Reporting System for Operating Experience
ISFSF	Interim Spent Fuel Storage Facility
ISI	In-Service Inspection
LGT	Lithuanian Geological Survey
LHMT	Lithuanian Hydrometeorological Service
MCC	Main Circulation Circuit
MCR	Main Control Room
NIKIET	Research and Development Institute of Power Engineering
OEF	Operational Experience Feedback
OIL	Operational Intervention Level
OSART	Operational Safety Review Team
PAGD	Fire and Rescue Department
PSAR	Preliminary Safety Analysis Report
QA	Quality Assurance
RATA	Lithuanian State Company Radioactive Waste Management Agency
RBMK	Channel-type Large Power Reactor
RSC	Radiation Protection Centre
RUZA	Guidelines on the management of the beyond design accidents
SAR	Safety Analysis Report

SEED	Site and External Events Design Review Service
SF	Spent Fuel
SFSP	Spent Fuel Storage Pool
SSC	Structures, Systems and Components
TLD	Thermo-luminescent Dosimetry
TS	Training Subdivision
TSC	Technical Support Centre
TSO	Technical Support Organization
VATESI	State Nuclear Power Safety Inspectorate
VNIPIET	All-Union Research and Development Institute for Energy Technology
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators' Association

## Introduction

Republic of Lithuania signed the Convention on Nuclear Safety (CNS) on 23 March 1995. The CNS was ratified on 17 October 1995 and entered into force on 24 October 1996. This Report is issued according to Article 5 of the CNS. It is the eighth in the series and provides updated information as compared to the Lithuanian National Report issued in 2016. All reports on CNS are available on the State Nuclear Power Safety Inspectorate (VATESI) website: [www.vatesi.lt](http://www.vatesi.lt).

The structure and content of the Report was prepared taking into account recommendations provided in International Atomic Energy Agency (IAEA) Guidelines regarding National Reports under the Convention on Nuclear Safety INFCIRC/572/Rev.6.

## Summary

Information presented in this Report demonstrates that Republic of Lithuania fulfils its obligation under the CNS.

Ignalina Nuclear Power Plant (INPP) is the only existing nuclear installation (as defined in Article 2 of the CNS) in Lithuania. It consists of two Units with RBMK-1500 type reactors which are water-cooled, thermal neutron with graphite moderators, pressure-tube type boiling-water reactors. Both Units are permanently shutdown since 2004 and 2009 respectively.

During 7<sup>th</sup> Review Meeting 4 challenges were identified for Lithuania:

### **Challenge 1: To maintain safety of INPP while fuel is at units of INPP.**

The remaining at INPP Units nuclear fuel is stored in the spent fuel (SF) storage pools of both Units. It is planned to remove all spent fuel from storage pools of both Units till 2022.

License holder – State Enterprise Ignalina NPP – has been performing all routine operational activities in accordance with written procedures, including the Technical Specification, which defines required configuration of the safety related systems and operational limits and conditions.

INPP has been further performing maintenance activities to maintain availability of remaining in operation structures, systems and components by controlling degradation and preventing failures. Operation and maintenance of those structures, systems and components is performed by qualified and appropriately trained staff.

In overall, safety of the INPP is being ensured and maintained in accordance with design and regulatory requirements.

### **Challenge 2: To ensure safe transfer of all spent nuclear fuel from INPP unit's pools to the storage facility.**

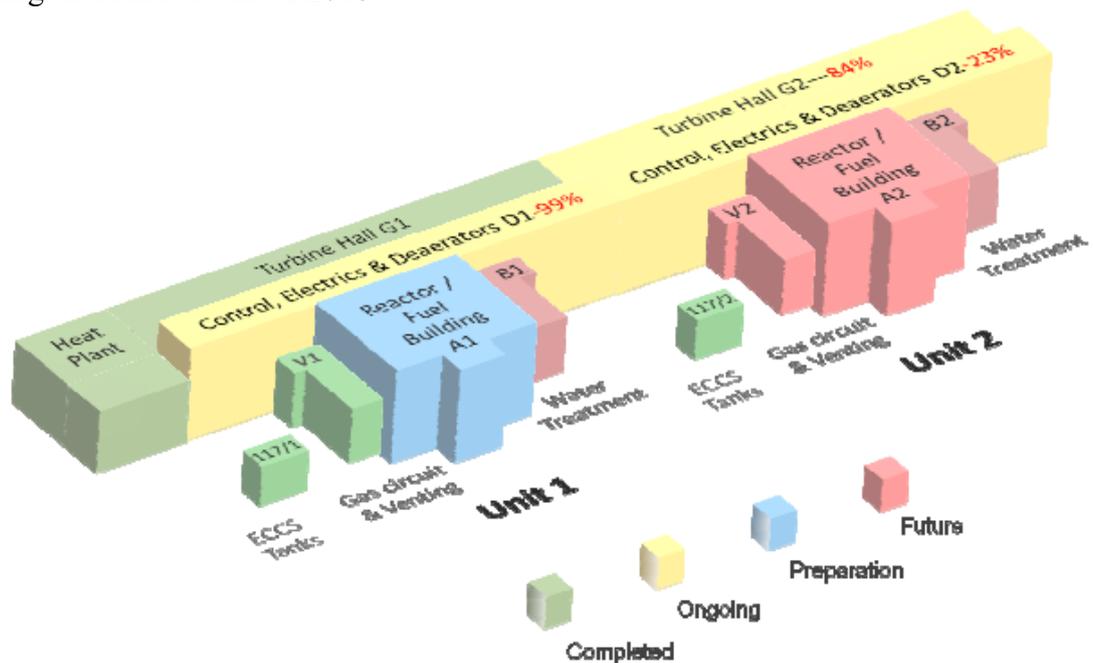
Commissioning of the complex of management and storage of spent nuclear fuel (so called project B1) was started in 2015 and finished in 2017 when VATESI has issued permit for industrial operation of dry spent nuclear fuel storage facility (ISFSF). This let begin removal of spent nuclear fuel (SF) assemblies from INPP Units and transfer it to the ISFSF. By the end of 2018, 86 casks loaded with SF assemblies were transported to the ISFSF for temporary storage. It is planned to store about 190 casks in the ISFSF in overall. It is scheduled to remove all SF from the Units to ISFSF by the mid of 2022.

Transfer of spent nuclear fuel from INPP Units' pools to the storage facility is being performed in accordance with agreed design and safety justification.

### **Challenge 3: To implement projects for decontamination and dismantling (D&D) of appropriate systems and components.**

During the period of 2016–2019 the following D&D activities were completed or are under implementation:

- Unit 1 Turbine Hall (Building G1) project is completed: equipment dismantling was completed in July 2016, pre-treatment of waste of all planned works was completed in the end of June 2019;
- Unit 2 Turbine Hall (Building G2) equipment is in progress: 84% of all to be dismantled equipment have been dismantled. The final date of dismantling completion is set to be the beginning of January 2021;
- Unit 1 Bld. D1 (Control, Electrics & Deaerators) project is completed: equipment dismantling as well as pre-treatment of dismantled waste were completed by the end of June 2019;
- Unit 2 Bld. D2 (Control, Electrics & Deaerators) equipment dismantling started in August 2018 with the final date of the project completion to be the end of 2022. 23% of all to be dismantled equipment have been dismantled;
- Preparation for D&D in Bld. A1 (Main Circulation Circuit piping, main circulation pumps, drum separators and other related equipment located in the Reactor buildings): the Environmental Impact Assessment Report was agreed with the EIA process entities in mid 2016 and the positive decision regarding permissibility of the planned economic activity was obtained on 11<sup>th</sup> July 2016; the Safety Analysis Report and Technological Design are under review by VATESI;
- Preparation of equipment dismantling from Unit 1 reactor working areas R1 and R2: the Environmental Impact Assessment Report was agreed in June 2016; the Safety Analysis Report and Technological Design were developed by the end of 2018 and submitted to VATESI for review;
- Within the scope of the project “Unit 1 and 2 Reactor Facilities Dismantling in Zone R3 and Reactor Waste Storage Facility Development” INPP plans to procure engineering services for optioneering of dismantling and decontamination of Unit 1 and Unit 2 reactor Zone R3 equipment and development of the reactor waste storage facility. For this purpose by the end of 2018 the Project FICHE has been developed for further agreement with the EC. As part of R3 tender preparation the information, ideas, exchange of experiences with regard to Reactor Dismantling and Waste Routes Optioneering, Concept Design and Environmental Assessment Report Development were collected in the form of organising of a set of the consultative meetings/workshops “Experience of Reactors Dismantling” held in November 2018.



**Figure 1.0. Schematic Layout of INPP Buildings and Systems, including the Current D&D Status**

**Challenge 4: To take appropriate steps including conclusion of agreement with Belarus to ensure that competent authorities of the states in the vicinity of Lithuanian Nuclear Installation are provided with appropriate additional information as requested in Article 16(2) of the Convention on Nuclear Safety.**

The draft Agreement between the VATESI and the Ministry of Emergency Situations of the Republic of Belarus on the Early Notification of Nuclear Emergency is under negotiation.

**Safety issues related with Belarusian NPP raised by Lithuania before and during 7<sup>th</sup> Review Meeting and new ones**

Before and during 7<sup>th</sup> Review Meeting Lithuania pointed out deep concern about the site, selected by Belarus for its NPP just 40 km from Lithuania's capital Vilnius. In accordance with the current IAEA recommendations on emergency preparedness, 1/3 of Lithuanian population, including central Governmental organizations, in 100 km (extended planning distance) from the NPP site might need sheltering and iodine prophylaxis and even evacuation or relocation in the case of severe accident. This issue as well as others, for instance, implementation of provisions regarding protection against malevolent crash of large civil airplane, independence of systems dedicated for severe accident management as well as other safety improvements of AES-2006 design, were pointed out and were included in the Annex VII of the Report of the President of the 7<sup>th</sup> CNS Review Meeting. These safety issues were repeated during previous CNS Review Meetings as well as during official correspondence between VATESI and Ministry for Emergency Situations of the Republic of Belarus, but, unfortunately, are not resolved till now.

Belarus NPP "stress tests" in accordance with EU specification and their international peer review, which was done 2017–2018, gave a significant number of rather serious additional recommendations concerning safety justification, design solutions as well as implementation of accident management procedures.

Together with other safety related questions concerning specific site selection, its environmental impact and safety assessment, implementation of modern safety design requirements, quality and safety culture assurance during licensing, construction and future operation of Belarus NPP (which questions were raised in the frames of different international fora) "stress tests" and their peer review recommendations have revealed major deficiencies of this project. Taking into account the number and significance of safety related issues, Belarus NPP must not be put into operation before resolving of all the indicated safety issues, including full implementation of all recommendations of the Belarus NPP "stress tests" and their international peer review. At the time of submitting this national report, Belarus has neither published, nor presented their national action plan for international peer review.

In addition to that, the last Meeting of the Parties to the Espoo Convention (Geneva, 5–7 February 2019) adopted a decision concluding that Belarus failed to comply with the Espoo Convention by not providing sufficient information about the reasons and considerations, explaining the selection of the Ostrovets site over the alternative locations, to be taken into account in the final decision on the activity.

Site selection and evaluation are the problems since the very beginning of the project. If Belarus had timely carried out relevant modules of IAEA Site and External Events Design Review Service (SEED) mission, it would timely have revealed those site selection and evaluation problems and would probably have selected another site. In the light of this, a proper implementation of all recommendations of "stress tests" and their subsequent peer review as well as resolution of all other remaining safety issues before the start of operation of Belarusian NPP becomes even more important.

## Compliance with Articles 6 to 19

### 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.*

#### Existing Nuclear Installations as defined in Article 2 of the Convention

The Ignalina nuclear power plant (INPP) is the only existing nuclear installation as defined in Article 2 of the Convention in Lithuania. It consists of two Units with RBMK-1500 type reactors, which are water-cooled, thermal neutron with graphite moderators, pressure-tube type boiling-water reactors. Both Units are permanently shutdown since 2004 and 2009 respectively.

Reactors of Unit 1 and Unit 2 are defueled since December 2009 and February 2018 respectively. It is planned to remove all spent fuel from storage pools of both Units till 2022.

Currently both INPP Units have the status of the permanently shutdown units. Based on Paragraph 3 of Article 29 of the Law on Nuclear Safety the Licences for operation of the NPP Units are valid as long as nuclear fuel remains in the Units. The Technical Specification, which defined required configuration of the systems and equipment important to safety, valid as well.

Based on the safety justification documents and the regulatory body authorizations dismantling of equipment and systems, which are isolated and no longer perform their safety functions and have no impact on the safe handling of spent nuclear fuel and safe operation of other remaining in operation safety systems and equipment, is undergoing.

#### An overview of safety assessments performed in the light of Article 6 of the Convention

The Ignalina NPP permanently shutdown Units are in defueling phase 2 – a stage starting after complete defueling of reactor of corresponding Unit by the complete defueling of both INPP Units. The Units are operated within frame of Safety Analysis Report (SAR), which cover defueling phases as well.

Periodic safety review of Ignalina NPP Unit 1 was completed in 2017 by license holder and corresponding report was reviewed and agreed by VATESI in 2018.

In response to the events at Japan's Fukushima Daiichi Nuclear Power Plant, the "stress tests" were conducted in 2011–2012 at Ignalina NPP according to ENSREG "stress tests" specification. Appropriate Plan of strengthening nuclear safety in Lithuania (National Action Plan) was prepared in 2013. The last safety improvement measures and appropriate safety assessments related to "stress tests" outcomes for Ignalina NPP Units were finished in 2016. Implementation of all safety improvement measures foresees in the National Action Plan was completed in 2018. More details on safety assessments related to "stress tests" outcomes are provided in Article 14 of this Report.

## **Overview of significant safety related issues, including events that occurred in the nuclear installations over the last three years, and measures taken in response to these issues**

The INPP had reported on 9 events to VATESI, during the period of 2016–2018. All the events were rated at “level 0 / below the scale” in accordance with INES. The events were reported, analysed and preventive and corrective measures directed towards elimination of event consequences and origination causes, as well as prevention of their recurrence were taken in accordance with the established procedures.

## **Overview of planned programmes and measures for the continued safety upgrading of nuclear installations**

Regardless of the fact that Ignalina NPP Unit 1 and Unit 2 are in permanent shutdown, Ignalina NPP, as license holder, further undertakes necessary actions to maintain acceptable level of safety at the Ignalina NPP both Units and other nuclear facilities. The most part of these actions are related to spent nuclear fuel and radioactive waste management.

### **Installations for which decisions on shutdown have been made**

In compliance with the protocol of Lithuania’s accession to the EU, the Ignalina NPP Unit 1 was shutdown on 31 December 2004 and Unit 2 was shutdown on 31 December 2009. Ignalina NPP is going to be decommissioned in accordance with The Final Ignalina Nuclear Power Plant Decommissioning Plan, which is revised every 5 years. The next revision of Decommissioning Plan was presented in the mid of 2019. Revision is under interinstitutional consultation and is expected to be approved at the beginning of 2020. The revised plan addresses the near future and long-term goals and activities.

### **Statement on the position concerning the continued operation of the nuclear installations**

Both Ignalina NPP Units have the status of the permanent shutdown and going to be decommissioned. Based on Paragraph 3 of Article 29 of the Law on Nuclear Safety, the licences for operation of the Ignalina NPP Units are valid as long as all nuclear fuel is not completely removed from the Units.

## **Article 7 Legislative and Regulatory Framework**

- 1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.*
- 2. The legislative and regulatory framework shall provide for:*
  - (i) the establishment of applicable national safety requirements and regulations;*
  - (ii) a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;*
  - (iii) a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;*
  - (iv) the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.*

## **Article 7(1) – Establishing and maintaining a legislative and regulatory framework**

### **Overview of the primary legislative framework for nuclear safety, including interfacing national legislation**

The main laws, regulating nuclear energy, are:

- Law on Nuclear Energy;
- Law on Nuclear Safety;
- Law on Radiation Protection;
- Law on the Management of Radioactive Waste.

*The Law on Nuclear Energy* sets general legal basis for activities involving nuclear materials, for other area of nuclear power involving sources of ionising radiation and for management of nuclear fuel cycle materials, including radioactive waste, managed at a nuclear installation. Regulation and supervision of nuclear safety, radiation protection and safety of radioactive waste management in the area of nuclear energy is carried out under this Law, the Law on Nuclear Safety, the Law on Radiation Protection and the Law on the Management of Radioactive Waste.

*The Law on Nuclear Safety*, among other provisions, establishes a procedure for issuing licenses, permits and other types of authorization, including main documents required and conditions to be fulfilled for granting authorization. This law also establishes the main principles for safety assessment and provides for different types of enforcement measures, including economic sanctions (penalties) for the most severe cases of noncompliance with safety requirements.

The Law on Nuclear Energy and the Law on Nuclear Safety were amended several times over the reported period.

Both the Law on Nuclear Energy and the Law on Nuclear Safety were amended in September 2017 in order to transpose Council Directive 2014/87/Euratom of 8 July 2014, amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations (thereafter – Amendment to the Nuclear Safety Directive). The amendments:

- 1) Set nuclear safety objectives, established by the Amendment to the Nuclear Safety Directive, which are mandatory for the design of new nuclear facilities and are set as an endeavour for nuclear facilities already under construction or in operation;
- 2) Improved requirements for the periodic safety review of nuclear facilities and set procedural aspects of the regulatory review of periodic safety review report;
- 3) Extended regulation related to public communication and public participation in key decisions on nuclear power;
- 4) Extended regulation of the organization of international peer reviews.

Additionally to transposition of the Amendment to the Nuclear Safety Directive, the amendments to the Law on Nuclear Energy and the Law on Nuclear Safety of September 2017 as well as the amendment to the Law on Radiation Protection of September 2017 supplemented the provisions on emergency preparedness in case of a nuclear or radiological accident in order to prepare more effectively for accidents which could occur in the territory of the Republic of Lithuania or abroad.

The amendment to the Law on Nuclear Safety of September 2017 also established new grounds for unplanned regulatory inspections, additional to general grounds, established by the Law on Public Administration.

The main objectives of the amendment to the Law on Nuclear Safety of April 2017:

- 1) To streamline the system of enforcement measures applicable in case of violation of legal acts regulating safety of activities in the area of nuclear energy. In particular, to define cases when certain mandatory requirements (e.g. to eliminate violations, to cease activities) are issued by the

regulatory body more clearly; to heighten the most relevant procedural requirements for issuing decisions on enforcement measures up to the level of law; to introduce formal clause empowering inspectors to take immediate on-the-spot enforcement actions in case of serious violations, etc.;

2) To establish types of certificates for transport of nuclear fuel cycle, nuclear and fissionable materials issued by VATESI as required by international conventions and other instruments regulating transport of Class 7 material as well as the procedure for issuing, suspending and revoking them;

3) To improve procedures for licensing activities in the area of nuclear energy.

*The Law on Radiation Protection* establishes the legal basis for radiation protection, enabling protection of people, subject to occupational, medical and public exposure, and the environment from the harmful effects of ionizing radiation. The law establishes an authorization system for the use of radioactive materials and radiation sources, and prescribes general rules for their use. The law also provides powers and responsibilities to the authorities in this field. It was amended several times over the reported period.

The amendment to the Law on Radiation Protection of 2015 introduced the following changes concerning competence of VATESI, which is since May of 2016 empowered to:

- set requirements in nuclear energy area for obligatory radiation protection training, briefing and evaluation of knowledge of workers and persons, responsible for radiation protection, and supervise their implementation;

- set requirements for certification of persons, seeking to obtain the right to train workers and persons, responsible for radiation protection, to supervise their implementation and perform the certification.

The Law on Radiation Protection was also amended (new revision) in 2018 in order to transpose Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (thereafter – Basic Safety Standards Directive).

*The Law on the Management of Radioactive Waste* establishes the rights, duties and functions of the state executive and supervisory authorities and of persons and legal entities involved in radioactive waste management.

The Law on the Management of Radioactive Waste was amended in June of 2018 to streamline regulation concerning the designated manager of radioactive waste. Provisions on the status of the manager of radioactive waste and its main duties were amended; and State Enterprise Ignalina Nuclear Power Plant was designated as a manager of radioactive waste in Lithuania. The Law was also supplemented with provisions on review and authorisation of the final closure plan of the radioactive waste repository.

The Law on the Management of Radioactive Waste was also amended as a part of the transposition of the Basic Safety Standards Directive. The main objective of the amendment was to transpose new definitions of terms, such as “disused source”, “clearance levels”, etc., and to include new requirements for disused sources.

### **Ratification of international conventions and legal instruments related to nuclear safety**

Lithuania is a party to the main relevant international conventions. There was no new development in the area of ratification of international conventions or other legal instruments over the reported period.

## **Article 7(2)(i) – National safety requirements and regulations**

### **Overview of the secondary legislation for nuclear safety**

Resolution No. 722 of 20 June 2012, of the Government of Republic of Lithuania on the Approval of Regulation on the Issue of Licences and Permits Necessary to Engage in Nuclear Energy Activities was amended to reflect the amendment to the Law on Nuclear Safety of 2017. Namely, procedural provisions related to removing licence conditions from the appendix of the licence and subsequently providing that an application and its associated documents will serve as a basis for oversight were introduced. As prescribed in the Law on Nuclear Safety, the Resolution now includes a list of application documents, which, after the licence or permit are issued, must be provided to the regulatory body for approval prior to changing them, and a list of documents that may be changed without such prior approval (only providing information about the changes). The amendments also intended to reflect the most recent relevant licensing practice, therefore the list of application documents itself was changed.

Resolution No. 83 of 25 January 2012, of the Government of Republic of Lithuania on the approval of Rules of Procedure of the Assessment of the Nuclear Facilities' Site Evaluation Report was amended and it's applicability was extended for all nuclear facilities (previously only applicable to nuclear power plants). The Resolution includes procedural requirements for site evaluation of nuclear facilities, such as aspects to be reviewed by governmental institutions, requirements for format of the site evaluation report, etc.

New Resolution No. 1116 of 20 December 2017, of the Government of the Republic of Lithuania on the approval of Rules of Procedure for Review of National Nuclear Safety Regulation System and Evaluation of Nuclear Installations' Safety was adopted to establish procedures for review of national nuclear safety regulation system in order to ensure streamlined implementation of peer review responsibilities set forth by the Amendment to the Nuclear Safety Directive.

Resolution No. 99 of 18 January 2012, of the Government of the Republic of Lithuania on the approval of National Plan for Protection of Population in Case of Nuclear or Radiation Accident was amended in 2018 to update the emergency preparedness system. Most notably, it establishes and describes threat category V and indicates protective actions in case of an accident at nuclear facility in neighbouring country. Additionally, emergency preparedness zones were described in accordance with IAEA General Safety Requirements GSR Part 7 "Preparedness and Response for a Nuclear or Radiological Emergency".

### **Overview of regulations and guides issued by the regulatory body**

#### *Regulatory system, inspection and enforcement*

A new version of requirements, regulating procedures of application of enforcement measures (Nuclear Safety Requirements BSR-1.1.4-2016 "Rules of Procedure for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate") was approved by the Head of VATESI in March 2016. It was adopted in order to: 1) implement the provisions of the new Code of Administrative Offences, regulating administrative enforcement measures, applicable for natural persons; 2) describe actions to be taken in case any violations are detected during activities other than inspections (e.g., during safety assessment). In October 2016 the aforementioned Requirements were further amended in order to introduce a list of criteria, describing, which infringements of the requirements of legal acts are considered insignificant. The amendment implements the nationwide initiative to streamline the procedures of enforcement measures and ensure, that enforcement measures applied to economic entities are proportional. According to regulation in question,

generally, insignificant infringements have to be immediately addressed in the presence of an official exercising the supervision and the economic entity shall be given an oral remark only. Following the amendment to the Law on Nuclear Safety of April 2017, new version of the aforementioned Nuclear Safety Requirements was issued in July 2017 in order to detail procedural requirements, e.g. forms for regulatory decisions. Nuclear Safety Requirements were further amended to detail procedural issues of enforcement measures, introduced in the new version of the Law on Radiation Protection of 2018.

Nuclear Safety Requirements BSR-1.1.3-2016 “Inspections Conducted by the State Nuclear Power Safety Inspectorate”, approved by the Head of VATESI, were amended in 2017 in order to establish periodicity of inspections of certain areas of activities, establish procedures for drafting and using questionnaires for inspections.

Nuclear Safety Requirements BSR-1.1.5-2017 “Rules of Procedure for Public Participation in Decision-making in the Area of Nuclear Energy” were adopted by the Head of VATESI to describe the procedural requirements of the public participation process, such as, list of information to be provided in the announcements on key steps of procedure, procedural requirements for public hearings, etc.

#### *Radioactive waste and spent fuel management*

In July 2016, the Head of VATESI approved a new version of requirements for management of spent nuclear fuel – Nuclear Safety Requirements BSR-3.1.1-2016 “General Requirements for Spent Nuclear Fuel at Storage Facility of the Dry Type”. The amendment supplements the requirements with provisions on external and seismic hazards, site assessment, content of the site assessment report and monitoring the site characteristics, content of the commissioning programme and on content of the periodic safety analysis report.

Nuclear Safety Requirements BSR-3.2.2-2016 “Radioactive Waste Repositories” were approved by the Head of VATESI in 2016. The new requirements regulate site assessment, design, commissioning, operation, closure and supervision of closed radioactive waste repositories. In comparison to the previous nuclear safety requirements related to radioactive waste repositories, new requirements cover all types of radioactive waste repositories (very low level, low and intermediate level and geological) to be constructed in Lithuania. More detailed requirements were introduced on waste acceptance criteria, safety analysis, design, closure and supervision of closed radioactive waste repositories. Additionally, detailed requirements for site evaluation and commissioning of radioactive waste facilities were introduced.

New version of Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at the Nuclear Facilities” was adopted by the Head of VATESI in 2017. The main objective of the amendment was to supplement requirements with provisions related to evaluation of external and seismic hazards, evaluation of sites of radioactive waste management facilities, requirements on design, safety assessment and commissioning of radioactive waste management facilities as well as periodic safety assessment. New requirements on temporary storage of very low level radioactive waste in order for the radionuclides to decay to clearance levels and requirements for characterization of radioactive waste were added.

#### *Commissioning, Operation, Modifications*

Amendment to the Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” of January 2017 introduced requirements for cyber security system in operating organization for ensuring the safety of technological processes, maintenance of functionality of equipment important to safety and maintenance of safety related information. The amendment also includes other important safety related provisions, such as: clarified classification and marking of security related components, more detailed provisions on lighting systems, handling of nuclear fuel at a unit, water chemistry, operation and accident management procedures, routes of emergency evacuation, provision for overhead lifting equipment. Amendment of Nuclear Safety Requirements BSR-2.1.2-2010 “General

Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” of August 2017 introduces requirements for content of Program on Safety Improvement Measures and its submission for review of the regulatory body. The second amendment of Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” of August 2017, transposing the Amendment to the Nuclear Safety Directive, introduced necessary corrections on terminology, operational limits and conditions as well as on provisions of operating, emergency operating and emergency preparedness procedures, applicable to nuclear power plants with RBMK-1500 type reactors. The amendment of Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” of March 2018, together with previous amendments, transposed WENRA safety reference levels, still relevant to Ignalina NPP, which is under decommissioning.

The Nuclear Safety Requirements BSR-2.1.6-2018 “Design of Nuclear Power Plant” of March 2018 introduced provisions of Amendment to the Nuclear Safety Directive, WENRA safety objectives for new nuclear power plants, including requirements related to impact of large commercial aircraft crash, IAEA Specific Safety Requirements No. SSR 2/1 “Safety of Nuclear Power Plants: Design”.

Nuclear Safety Requirements BSR-1.8.2-2015 “Categories of Modifications of Nuclear Facility and Procedure of Performing the Modifications”, approved by the Head of VATESI, were amended in 2017 to improve the regulation of modifications performed during construction and commissioning phase and to streamline the regulation of modifications of organization structure.

New Nuclear Safety Requirements BSR-1.8.5-2018 “Commissioning of Nuclear Facility” for commissioning of all types of nuclear facilities were adopted by the Head of the VATESI in 2018. The main goal of the Nuclear Safety Requirements was to streamline provisions on commissioning gathering them in one document. The Nuclear Safety Requirements include content of the commissioning programme and requirements for its implementation, organization and management of commissioning of nuclear facilities, requirements for commissioning tests, requirements for verification of operation procedures, including emergency preparedness, during implementation of commissioning programme, requirements for commissioning tests and commissioning programme reports. It also includes provisions on operating, emergency operating and emergency preparedness procedures, applicable for nuclear power plants with pressurized or boiling light water reactors and pressurized heavy water reactors, as required by Amendment to the Nuclear Safety Directive.

Nuclear Safety Requirements BSR-3.1.1-2016 “General Requirements for Spent Nuclear Fuel Storage Facility of the Dry Type” and Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at the Nuclear Facilities” were supplemented with provisions on the design and use of lifting and handling equipment designated for work with containers and other safety-related structures and components.

Amendments to Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at the Nuclear Facilities”, Nuclear Safety Requirements BSR-3.2.2-2016 “Radioactive Waste Repository” and Nuclear Safety Requirements BSR-3.1.1-2016 “General Requirements for Spent Nuclear Fuel Storage Facility of the Dry Type” were adopted in June 2018 to:

- introduce a mandatory requirement to develop and maintain a programme for safety improvement measures, as well as to set its content and requirements for changes; and
- harmonise the requirements of the periodic safety analysis with new provisions on the matter introduced by the Amendment to the Law on Nuclear Safety of September 2017, most notably, to amend the content of periodic safety analysis report.

Nuclear Safety Requirements BSR-1.4.4-2019 “Use of the Experience of the Individuals Operating in the Nuclear Energy Sector” were approved by the Head of VATESI in 2019, replacing Nuclear Safety Requirements BSR-1.8.1-2010 “Notification on Unusual Events at Nuclear Power

Plants” and “Requirements on Operational Experience Feedback in the Field of Nuclear Energy” (P-2009-04), approved by the Head of VATESI. Nuclear Safety Requirements BSR-1.4.4-2019 “Use of the Experience of the Individuals Operating in the Nuclear Energy Sector” establish provisions on the use of experience of the individuals operating in the nuclear energy sector and reporting of unusual events as well as their analysis, updated pursuant changes in legislation and VATESI’s regulatory experience.

Nuclear Safety Requirements BSR-1.8.6-2019 “Maintenance, Surveillance and In-service Inspection of Nuclear Facility’s Structures, Systems and Components Important to Safety” were approved by the Head of VATESI in 2019. These Nuclear Safety Requirements gather requirements for maintenance, surveillance and in-service inspection within one document and is applicable to all nuclear facilities.

#### *Transport*

Following the amendment to the Law on Nuclear Safety of April 2017, Nuclear Safety Requirements BSR-4.1.1-2017 “Rules on the Issue of Certificates for Transport of Nuclear Fuel Cycle, Nuclear and Fissionable Materials” were adopted by the Head of VATESI in order to set requirements for applications for transport certificates and the form of the certificates.

Nuclear Safety Requirements BSR-4.1.2-2019 “Requirements for the Documents which must be Provided with Application to Obtain License for Transport of Nuclear Fuel Cycle, Nuclear and Fissionable Materials” were approved by the Head of VATESI in 2019 in order to set requirements for the content of application documents for license of transport of nuclear fuel cycle, nuclear and fissionable materials.

#### *Decommissioning*

New Nuclear Safety Rules BST-1.5.1-2016 “Evaluation of Compliance with Free Release Criteria of Buildings and Site of Nuclear Facilities” were approved by the Head of VATESI in 2016. The Rules established the methodology for demonstrating compliance with free release criteria. The Rules are applied for free release of buildings and soil of nuclear facilities and include requirements for all stages of radiological survey: planning, conducting, evaluating and recording.

In January 2019 VATESI adopted a new version of Nuclear Safety Requirements BSR-1.5.1-2019 “Decommissioning of Nuclear Facilities”. The goal of the amendment was to update national requirements for decommissioning based on international good practice and national experience of dismantling and decontamination projects of Ignalina NPP. The amendments include:

- Update of several definitions and approval of two new definitions – “brown field” and “green field”, which are possible end states of the decommissioning process;
  - More detailed requirements for assessment of safety of decommissioning;
  - Update of contents of final decommissioning plan and safety analysis report;
  - Establishment of new requirements for demolition of buildings during decommissioning which are on site of nuclear facility and which are not used in operation and not needed anymore.
- Nuclear Safety Requirements BSR-1.8.2-2015 “Categories of Modifications of Nuclear Facility and Procedure of performing the Modifications” were amended to include procedures for modification of aforementioned buildings.

#### *Management systems*

Amendment of Nuclear Safety Requirements BSR-1.4.2-2014 “Management of Construction of Nuclear Facility” was approved in January 2017 by the Head of VATESI. It introduces more detailed requirements for program of tests and inspections of safety important structures, systems and components performed during construction of nuclear facilities, and for transfer of safety important structures, systems and components from construction to commissioning stage.

New Nuclear Safety Requirements BSR-1.4.3-2017 “Managing Human Resources in the Field of Nuclear Energy” were adopted in 2017 by the Head of VATESI. As the new requirements replaced several existing legal acts, the main objective of the new document was to introduce relevant good practice in the area of management of human resources. The new requirements also set more detailed provisions on training of particular groups of employees, including their internal certification.

### ***Technical specification***

Nuclear Safety Requirements BSR-1.8.3-2017 “Technical Specification of Nuclear Facilities” were adopted by the Head of VATESI in 2017. The main objective of the requirements is to establish regulation measures allowing transfer of safety important information from site evaluation stage to design stage. Requirements set the content of the technical specification of nuclear facilities and specify requirements and information that must be implemented in the design of nuclear facilities.

#### ***Ageing Management***

Nuclear Safety Requirements BSR-1.8.4-2018 “Ageing Management of Structures, Systems and Components Important to Safety of Nuclear Facilities” were adopted to replace requirements on ageing management from 1999. The requirements introduce revised provisions on:

- content of a licensee’s internal ageing management-related documents;
  - aspects of ageing management that need to be considered in different stages of a nuclear facilities’ lifetime;
  - mandatory information to collect and store on the ageing of structures and components;
- and
- screening of structures and components for determination of which shall be a part of ageing management programme, etc.

#### ***Radiation protection***

Nuclear Safety Requirements BSR-1.9.4-2016 “Procedure of Obligatory Radiation Protection Training, Examination, Briefing of Radiation Workers and Radiation Protection Officers Involved in Activities with Sources of Ionising Radiation in Nuclear Energy Area and of Certification of Natural Persons Seeking to Obtain Right to Teach Radiation Protection”, regulating obligatory radiation protection training, briefing of workers and certification of persons, seeking to obtain the right to train workers and persons, responsible for radiation protection, were approved by the Head of VATESI in June 2016.

In October of 2016 a new version of requirements for radiation safety at nuclear facilities was adopted by the Head of VATESI – Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”. The amendment introduced the following:

- Quantitative criteria and management requirements for controlled zone of nuclear facility;
- Improved requirements for contamination control, contamination limits for people leaving the controlled area and for items that are removed from controlled area;
- More detailed requirements for monitoring of ionizing radiation of workers and workplaces;
- Mandatory requirement for accreditation of dosimetry services in accordance with ISO 17025 standard „General requirements for the competence of testing and calibration laboratories”;
- New requirements for use of technical measures for protection of workers, individual means of protection, optimisation process.

Lithuanian legislation on radiation protection was amended to transpose the Basic Safety Standards Directive:

– New version of Nuclear Safety Requirements BSR-1.9.1-2011 “Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides” was adopted by the Head of VATESI in 2017;

– New Nuclear Safety Requirements BSR-1.9.5-2018 “Assessment of Justification of Activities with the Sources of Ionising Radiation in the Nuclear Energy Area” were adopted by the Head of VATESI to specify the procedure of applying for justification, assessing a justification application and publishing the list of justified activities;

– New Nuclear Safety Requirements BSR-1.9.6-2018 “Recognition of Radiation Protection Expert for Activities with Sources of Ionizing Radiation in Nuclear Energy Area and Duties of Undertakings carrying out Aforementioned Activities to Consult with Radiation Protection Expert” were adopted by the Head of VATESI to set procedural provisions on recognition of radiological protection experts (e.g. list of documents to be provided with the application, areas of consultation, etc.). The new document also requires persons carrying out activities with sources of ionising radiation in the nuclear energy area to consult with radiological protection expert;

– New Nuclear Safety Requirements BSR-1.9.7-2018 “Rules of Procedure for Recognition of Dosimetry Services” were adopted by the Head of VATESI to specify procedural requirements for the recognition of dosimetry services (e.g. of documents to be provided with the application, etc.);

– New Nuclear Safety Requirements BSR-1.9.8-2018 “Rules of Procedure for Preparation of Radiation Protection Officer Job Description and Radiation Protection Office Statute” were adopted by the Head of VATESI in order to set requirements for content of Radiation Protection Officer Job Description and Radiation Protection Office Statute and set their basic functions.

List of Types of Justified Activities with the Sources of Ionising Radiation in the Nuclear Energy Area were approved by the Head of VATESI in 2018 in order to establish the list of types of justified activities in the nuclear energy area. New types of practices not listed in this list resulting in exposure to ionising radiation in the nuclear energy area shall be justified by undertaking before approval by VATESI.

### **Overview of the process of establishing and revising regulatory requirements, including the involvement of interested parties**

Pursuant to the Article 5 of the Law on Nuclear Safety, the Head of VATESI approves the nuclear safety requirements and the nuclear safety rules, mandatory to all persons acting in the field of nuclear energy and approves the description of the procedure for drafting the nuclear safety requirements and the nuclear safety rules.

Pursuant to Article 22 Paragraph 1 Sub-Paragraph 11 of the Law on Nuclear Energy, VATESI has a right, within its competence and in the manner laid down by the legal acts, draw up and (or) submit to the Government the draft laws and legal acts of the Republic of Lithuania on nuclear safety, physical security, accounting for and control of nuclear materials, as well as radiation protection in carrying out nuclear energy related activities involving sources of ionising radiation and on activity administration of the VATESI.

The procedure for review of regulatory requirements consists of these stages:

1. *Planning*. A five-year Program for Development of Normative-Technical Documents, describing priorities and needs of the development of these documents in the different areas of nuclear safety (the Programme for 2015–2019 is currently in force; it is revised every year) and The Plan for drafting and review of Normative-Technical Documents (for each year) are approved by the Head of VATESI. As per requirement within VATESI integrated management system documents, all new legal acts need to be reviewed no later than within two years of their approval and no later than within five years after that.

2. *Drafting*. The draft legal act is developed by specialists of VATESI and discussed internally.

3. *Agreement*. The draft legal act is provided for agreement of other state institutions (if needed) and for comments or proposals of other interested parties (licensees, such as INPP) by publishing it in the Legislative Information System of Chancellery of Seimas (Parliament of Republic of Lithuania) (the addressees get notifications about a new draft), which is a mandatory procedure. As the database is public, all drafts are also available for the comments of the public. If there are a lot of relevant and complex comments or proposals, meetings can be organized in order to discuss and solve the issues. All comments need to be evaluated.

4. *Approval* by the Head of VATESI and *publishing* in the Register of Legal Acts or submittal for approval of other relevant institutions (The Government or the Parliament).

## **Article 7(2)(ii) – System of licensing**

### **Overview of the licensing system and processes including types of licensed activity**

The Law on Nuclear Energy and the Law on Nuclear Safety together with the regulations under these laws establish the authorisation system for activities related to nuclear materials and nuclear fuel cycle materials, as well as for nuclear facilities during the following life-stages: site evaluation, design, construction, commissioning, operation and decommissioning as well as release from control. The supervision of closed radioactive waste repository, acquisition, keeping, use and transportation of nuclear and nuclear fuel cycle materials is also executed in accordance with the mentioned above laws.

Some of the steps of the licensing process are divided into several sub-steps. Licences, permits and approvals of the documents are used as authorisation steps and sub-steps.

The Law on Nuclear Safety establishes types of licences and permits issued by VATESI. It also should be mentioned that some activities (hold points) during various stages in the lifetime of a nuclear facility require separate authorizations that have to be supported by safety review and assessment.

The Law on Nuclear Safety together with the Regulation on the Issue of Licences and Permits Necessary to Engage in Nuclear Energy Activities and the Rules on Import, Export, Transit and Transport of Radioactive Material, Radioactive Waste and Spent Nuclear Fuel regulates issuance, amendment, suspension, revocation of the suspension and revocation of licences and permits, listed in the Law on Nuclear Safety, as well as supervision of keeping list of documents which have to be submitted for the issue of every type of licences and permits or amendments of a licence or permit, and instructions for providing documents necessary for revocation of suspension of licences and permits. Detailed requirements for the safety documents are determined in respective nuclear safety requirements and rules issued by the Head of VATESI. Some requirements for content of the documents that applicant is required to provide for the issue and amendment of an appropriate licence or permit are established by the aforementioned Regulation as well.

Together with the application to issue a licence or permit a schedule of application documents has to be prepared and agreed with VATESI. The Law on Nuclear Safety sets requirements and conditions for acceptance of application, acceptance of a schedule of application document, as well as time limits of the acceptance of application and agreement on schedule.

According to the VATESI's management system documents "Procedure Document on Review and Assessment of Safety Justifying Documents" and "Procedure Document for Licensing", specialists of VATESI have to prepare review and assessment reports for every safety justifying document in support to VATESI decisions on the issue of authorization. The review and assessment

reports on nuclear installation safety analysis are available to applicant (licence holder) and its summary is available to public on VATESI website. List of the documents, under which a licence or permit is issued is required by the law to be prepared added to a licence or permit.

The Law on Nuclear Safety sets requirements and conditions and time limits for issuance of a licence and permit. Some additional conditions (e.g., necessary authorisations by other national regulatory bodies) are also established by the Law on Nuclear Safety as well as the Law on Nuclear Energy. Licence or permit has to be issued for an unlimited period of time until official decision of the regulatory body in this regard (with an exception for permits to transport radioactive materials or spent nuclear fuel). The permits to transport radioactive materials or spent nuclear fuel are issued for 3 years period. The Law on Nuclear Safety also determines conditions for making decision to refuse the issuance of a licence or permit.

Following the provisions of the Law on Radiation Protection VATESI issues licences and temporary permits for the nuclear energy area activities with sources of ionising radiation. Majority of licences issued in accordance with the Law on Radiation Protection are obtained by Ignalina NPP contractors to perform activities subject to occupational exposure to ionising radiation in a nuclear facility.

### **Involvement of the public and interested parties**

VATESI applicants, licence holders, other interested parties involved as well as public are considered in authorization process as VATESI stakeholders for external communication as prescribed in the VATESI's "Manual of Integrated Management System" and the "Procedure Document on Monitoring of Interested Parties".

According to legal acts regulating provision of information to the public, VATESI has to provide information on VATESI decisions and on the bases for decisions to grant or refuse an authorisation. Usually, the following information is provided:

- list of licences, permits or temporary permits issued and licensed activities (or refusal of an authorisation) on VATESI website;
- comments to the public and regulatory summary for safety evaluation report.

As regards the authorisations for site evaluation, construction, commissioning, operation, decommissioning of a nuclear facility as well as supervision of closed radioactive waste repository, additional provisions are established by the Law on Nuclear Safety. For the purposes of implementation of this Law Nuclear Safety Requirements BSR-1.1.5-2017 "Rules of Procedure for Public Participation in Decision-Making in the Area of Nuclear Energy" were adopted by the Head of VATESI. According to aforementioned Nuclear Safety Requirements, VATESI and (or) licence holder should:

- provide information to the public on the commencement of authorisation process;
- ensure that the public has access to VATESI's draft decisions on authorisations and safety justification documents;
- consider comments provided by the public on VATESI's draft decisions and safety justification documents;
- organize public hearing according to the described procedure (if needed).

Procedure on how VATESI provides information to the public is described in VATESI's management system document "Procedure on Public Communication".

## **Legal provisions to prevent the operation of a nuclear installation without a valid licence**

The Article 22 Paragraph 4 of the Law on Nuclear Safety prohibits the activity laid down in the Paragraph 1 and 2 of the Article 22 (licences and permits related to nuclear facilities, nuclear materials and nuclear cycle materials) without an authorisation issued by VATESI.

## **Article 7(2)(iii) – System of regulatory inspection and assessment**

### **Regulatory strategies**

VATESI carries out inspections of facilities and activities to verify if the authorized party is in compliance with the regulatory requirements. The regulatory inspections are conducted at all stages of the lifetime of a nuclear facility: during the evaluation of a construction site for a nuclear facility, construction, commissioning, operation and decommissioning stages, as well as during supervising the closed radioactive waste repository, procuring, storing or transporting nuclear and (or) nuclear fuel cycle materials and/or nuclear dual-use items. VATESI has a right to inspect the applicants for registered activities with radiation sources (since September of 2018), the applicants for obtaining licenses, permits and temporary permits, economic entities performing registered activities, license, permit and temporary permit holders, suppliers of goods or contractors performing works for the holders of VATESI issued licenses and permits, the entities carrying out the assessment of the construction site of the nuclear facility and other entities performing operations related to nuclear or nuclear fuel cycle materials.

### **Overview of the regulatory inspection and assessment process with regard to the safety of nuclear installations**

The regulatory inspections of nuclear installations include planned inspections and unplanned inspections. In general, the legal basis for inspections of economic entities is set in the Law on Public Administration and it shall be followed by all state institutions, having regulatory supervision functions.

VATESI conducts three general types of inspections, namely Special inspections, Regular (routine) inspections and Technical inspections. Special inspections are carried out by VATESI inspectors to check the specific aspects of safety or to respond to the existing unexpected, unplanned, unusual situations, an incident or obtained specific information. Regular or routine inspections are inspections carried out according to the schedules or other aspects of ordinary activities carried out by economic entity, which must be regularly inspected in pursuit of the objectives of state supervision of the economic entity's activities within the limits of competence of the VATESI. During the technical inspections VATESI inspectors observe technical checks of structures, systems and components or other equipment of nuclear facilities, functional checks of equipment or other checks carried out by economic entity in accordance with the equipment manufacturer's orders, documents of the license holder's management system or other information, which is within the competence of the VATESI.

Inspections are planned and conducted in compliance with the principle of graded approach, in order to ensure a more efficient use of financial and human resources and to target inspections at activity areas which related to nuclear safety, radiation protection and physical security and fulfilment of obligations on non-proliferation of nuclear weapons and pose a higher potential risk to employees of the license holders being supervised, population and environment.

Periodicity of inspections is established considering results of previous inspections and essential events, which has influence on organization activities.

The results of an inspection are provided in the inspection's report, and the economic entity is familiarized with it. If violations of regulatory requirements are identified during the inspection, the enforcement actions shall be applied in accordance with the procedure set forth by the laws and secondary legislation. The inspection's report together with the document formalizing the enforcement measures shall be sent to the inspected economic entity. The economic entity shall prepare plan for corrective measures within the term set by VATESI. VATESI performs supervision of the plan of implementation of corrective measures. If incompliances with good practice are identified during the inspection, the inspected economic entity shall prepare plan of measures for improvement of safety, or justify that corresponding actions are not necessary.

The main regulation for conducting regulatory inspections is Nuclear Safety Requirements BSR-1.1.3-2016 "Inspections Conducted by State Nuclear Power Safety Inspectorate". Based on this regulation, VATESI's management system document "Procedure document for inspections" PR-6 was approved in November, 2014.

Nuclear Safety Requirements BSR-1.1.3-2016 "Inspections Conducted by the State Nuclear Power Safety Inspectorate" are regularly revised in order to streamline provisions related to the procedure of organizing and conducting inspections of supervised economic entities.

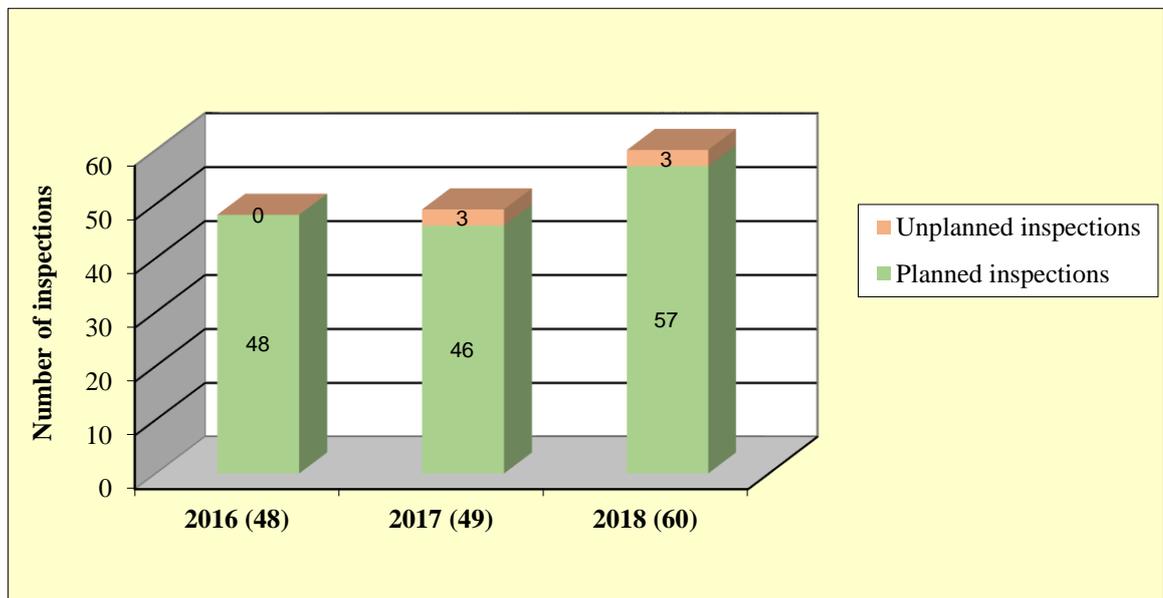
The review and assessment of nuclear safety shall be conducted by VATESI in accordance with the Article 30 Paragraph 4 of the Law on Nuclear Safety. The main goal of regulatory review and assessment process is to verify if the safety justification document complies with normative technical documents of nuclear safety and complies with factual circumstances. The decision on the safety justification document shall be made taking into account results of the review and assessment. The review and assessment of safety justification documents are performed and documented in accordance with VATESI's management system procedure PR-5 "Procedure document for review and assessment of safety justification documents". The review and assessment process is described in the Article 14 (1) of this Report.

### **Basic features of inspection programmes**

VATESI issues two planning documents for the systematic performance of inspections: inspection program and annual inspections plan. The program and the plan are developed in accordance with the established criteria and taking into account risk in the corresponding facility or activity. The inspection program is developed for period of five years. The inspection program is revised annually. Backbone of this program are Regular (routine) inspections with established periodicity. Annual inspections' plan is developed on the basis of the inspection program.

The regulatory inspections are focused on safety of finally shut-down Ignalina NPP units, maintenance, fire protection, ageing management of structures, systems and components important to safety and other safety issues within competence of VATESI. VATESI also monitors how works under projects of equipment dismantling and decontamination are performed, how radioactive waste is managed, how physical security and radiation safety of the nuclear facilities and nuclear material and emergency preparedness is ensured, how employees of Ignalina NPP are trained and how an adequate level of their qualification is ensured.

The number of inspections performed by VATESI during period 2016–2018 are presented in Figure 7.1.



**Figure 7.1. Inspections performed by VATESI in 2016-2018**

## **Article 7(2)(iv) – Enforcement of applicable regulations and terms of licences**

### **Power for legal actions**

In performing the state regulatory and supervision functions of nuclear safety, pursuant to Article 11 Paragraph 2 of the Law on Nuclear Safety, VATESI applies enforcement measures in the manner set out by the Law on Nuclear Safety and other legal acts, requires relevant persons to implement corrective measures and (or) to eliminate the violations, and supervises the implementation of such requirements.

### **Overview of enforcement measures available to the regulatory body**

Enforcement measures are applied in accordance with the legal principle of graded approach. All enforcement measures which are applied by VATESI are arranged progressively considering the character of violation.

Pursuant to the Law on Public Administration and Order No. 22.3-106, 24<sup>th</sup> of October, 2011, approved by the Head of State Nuclear Power Safety Inspectorate “On the Approval of Nuclear Safety Requirements BSR-1.1.4-2017 “Rules of Procedure for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate”, VATESI is empowered to issue to the economic entity, individual referred to in the Article 8 Paragraph 1 of the Law on Radiation Protection, radiation protection officer, dosimetry service with mandatory requirement to eliminate insignificant violations of legal acts.

Pursuant to the Law on Nuclear Safety VATESI is empowered to impose the following administrative enforcement measures:

- to issue mandatory requirement to licence or permit holders, committing them to eliminate detected violations, to suspend the works within the time-limits set by the Head of VATESI and/or to shut-down the nuclear reactor, to decrease its capacity, to discontinue operation of other equipment or activities;

- to impose fines on legal entities according to the Article 47 Paragraphs 1 and 2 of the Law on Nuclear Safety (known as economic sanctions);

- to issue the licence or permit holder with a warning regarding the possible license or permit suspension, to suspend the licence or permit, to revoke the license or permit.

Pursuant to the Law on Radiation Protection VATESI is empowered to impose the following administrative enforcement measures:

- to issue mandatory requirement to the individual, referred to in the Article 8 Paragraph 1 of the Law on Radiation Protection, to eliminate violations of legal acts governing radiation safety and/or physical security of radiological sources, to issue a warning to suspend activities with ionizing radiation sources, to suspend activities with ionizing radiation sources;

- to issue a warning regarding the possible revocation of activity registration, revocation of activity registration;

- to issue the licence or temporary permit holder with a warning regarding the possible license or temporary permit suspension, to suspend the licence or temporary permit, to revoke the license or temporary permit;

- to issue person who provides radiation protection trainings with mandatory requirement to eliminate violations of legal acts governing radiation protection trainings;

- to issue natural person holding radiation protection attestation certificate with a warning about possible suspension of radiation protection attestation certificate, to suspend radiation protection attestation certificate, to revoke radiation protection attestation certificate;

- to issue nuclear facility dosimetry service or other individuals responsible for measurement and/or evaluation of exposure-dose with a mandatory requirement to eliminate violations of legal acts governing recognition requirements, to issue a warning about possible suspension of recognition certificate, to suspend validity of recognition certificate, to revoke validity of recognition certificate;

- to issue radiation protection expert with a warning about possible suspension of validity of radiation protection expert certificate, to suspend validity of radiation protection expert certificate, to revoke validity of radiation protection expert certificate;

- to revoke permission to transport radioactive material or validity of standard document to transport radioactive material.

Pursuant to the Code of Administrative Offences of the Republic of Lithuania VATESI is empowered to impose administrative fines and other administrative sanctions on natural persons.

### **Experience with legal actions and enforcement measures**

During the period of 2016–2019 VATESI issued:

- mandatory requirements to eliminate insignificant violations of legal acts;
- mandatory requirements to eliminate detected violations of the nuclear safety requirements and rules (to take remedial actions);

- mandatory requirements to suspend the works within the time-limits set by the Head of VATESI according to the Law on Nuclear Safety.

## **Article 8 Regulatory Body**

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

*2. 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.*

### **Article 8(1) – Establishment of the regulatory body**

#### **Legal foundations and statute of the regulatory body**

VATESI was established by the Decree of Government on 18 October 1991 to regulate and supervise the safety of nuclear facilities within the territory of Lithuania.

In accordance with provisions of Law on Nuclear Energy, Law on Nuclear Safety, Law on Radiation Protection and the Law on the Management of Radioactive Waste, VATESI is the state regulatory and supervisory authority in the nuclear power area and the safety of activities involving sources of ionising radiation in this area. The Statute of VATESI, adopted in 1992 with subsequent amendments, describes its objectives, main functions and rights.

There was no development or changes in laws or secondary legislation concerning legal foundations of VATESI as a regulatory body. The Statute of VATESI was not amended during the reported period.

#### **Mandate, mission and tasks of the regulatory body**

Legal framework establishes VATESI as a single organization, responsible for state regulation and supervision of nuclear safety in the Republic of Lithuania.

Mission of VATESI is to carry out state regulation and supervision of safety nuclear facilities and activities with nuclear and nuclear fuel cycle materials in order to protect the public and the environment from harmful effects of ionizing radiation.

VATESI sets safety requirements and rules, supervises whether they are complied with (conducts inspections, has a right to apply enforcement measures), issues licenses, permits, temporary permits, other authorization decisions, performs safety assessment of nuclear facilities.

#### **Authorities and responsibilities of the regulatory body**

The Law on Nuclear Energy provides for main legal authority and responsibilities of VATESI as a regulatory body. According the Law on Nuclear Energy, VATESI performs the following main functions:

- creates and improves the state regulatory and supervision system for nuclear safety, radiation safety in the area of nuclear energy, physical security of nuclear installations, nuclear and nuclear fuel cycle materials, as well as accounting and control of nuclear materials, including drafting and submitting to the Government laws and secondary legislation regarding aforementioned areas, and approving mandatory requirements and rules;

- supervises the compliance with requirements of the legal acts regulating nuclear safety, radiation safety in the area of nuclear energy, physical security of nuclear installations, nuclear materials and nuclear fuel cycle materials, accounting for and control of the nuclear materials. Supervision includes inspection and enforcement measures, described in the Law on Nuclear Safety and the Law on Radiation protection;
- supervises the implementation of requirements arising out of the international obligations for non-proliferation of nuclear weapons assumed by the Republic of Lithuania;
- analyses and assesses the documents submitted by applicants for obtaining a licence or a permit, also the documents submitted by licence holders or permit holders or other persons, adopt relevant decisions regarding such documents, review and evaluate the nuclear safety;
- in the event of a nuclear and (or) radiological accident provides the interested state and municipal authorities with the time-critical information about the radiation situation in the nuclear installation, estimated threats of the nuclear and (or) radiological accident and other related information.

Exercising the entrusted functions of state regulation and control of nuclear safety, VATESI has the right:

- to receive all information required for the review and evaluation of nuclear safety from applicants and authorized persons, as well as from their service and goods providers, contractors or persons carrying out other activities related to nuclear and (or) nuclear fuel cycle materials;
- to enter the premises of applicants, authorized persons and perform inspections, use technical equipment for recording and investigation of suspected infringement;
- to coordinate actions with other state regulatory and (or) municipal institutions, if it is required for the performance of the functions of the nuclear safety regulation;
- to obtain the services provided by experts and consultants, scientific-technical support organisations, other independent suppliers that are not related to the applicants, licence holders or persons involved in other activities related to nuclear and (or) nuclear fuel cycle materials.

The Law on Radiation Protection (as amended in 2018 in order to transpose Basic Safety Standards Directive) establishes VATESI as a regulatory body carrying out regulatory control of activities with sources of ionising radiation in the nuclear energy area, which implements state policy on radiation protection of aforementioned activities as described in this Law, including approval of legal acts regulating radiation protection of workers of nuclear facilities, other persons carrying out activities in nuclear facilities, as well as visitors. As a part of the mandate prescribed in the Law on Radiation Protection, VATESI supervises compliance with radiation protection legal acts and has a right to enter premises where activities are carried out, receive and review documents in any format, receive explanations, documents from persons carrying out supervised activities, carry out radiological tests, including collecting samples for the tests, use photography, recording and other technical equipment for recording and investigation of suspected infringement.

Over reported period, both the amendment of the Law on Nuclear Safety of April 2017 and the amendment of the Law on Radiation Protection of June 2018, introduce new grounds for unannounced inspections (additional to general one established by the Law on Public Administration) and more streamlined, clear provisions on enforcement measures, based on graded approach.

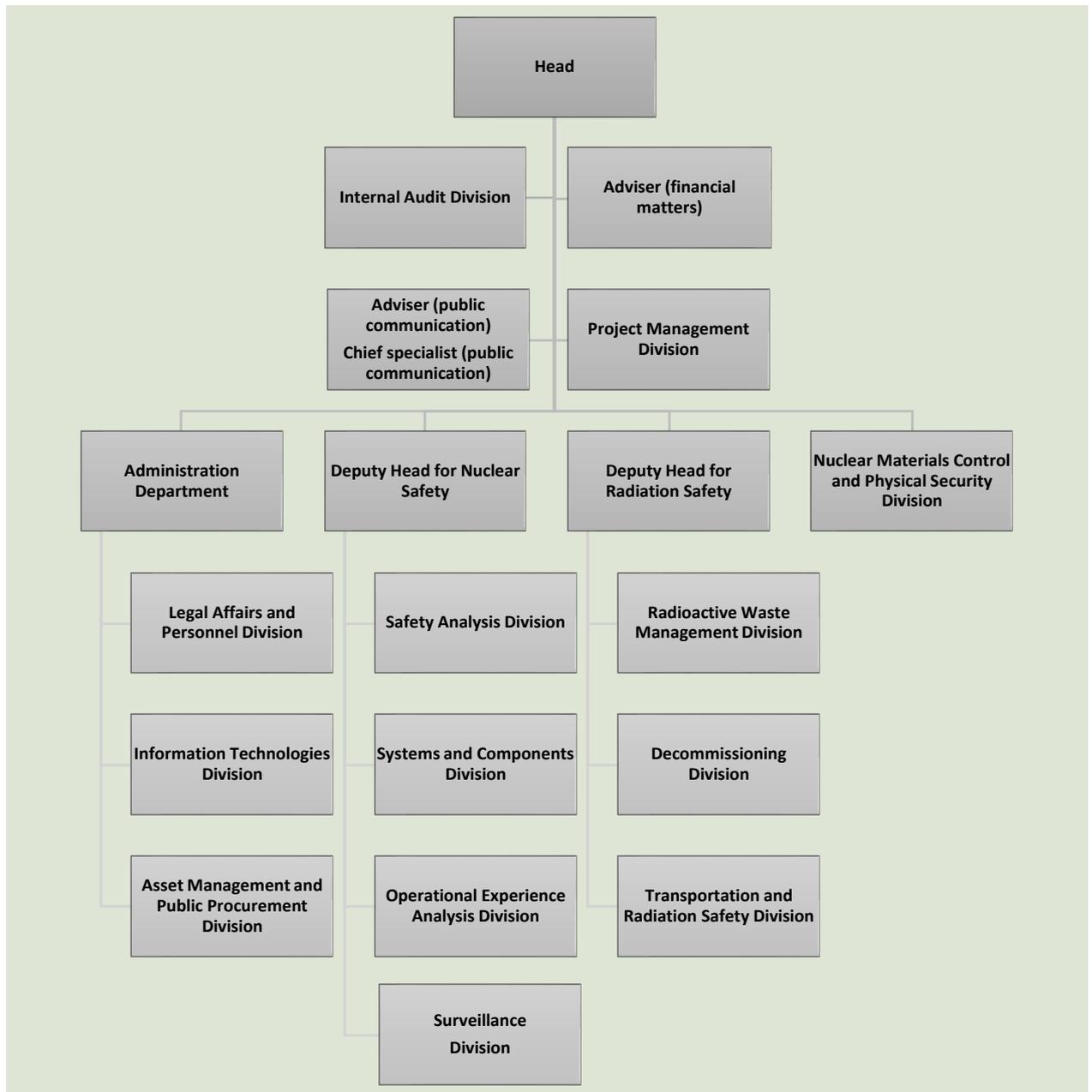
### **Organizational structure of the regulatory body**

The structure and competence of VATESI and its resources corresponds with the nature and scope of the activities in the field of nuclear energy, activities involving nuclear materials and other activities in the field of nuclear energy involving sources of ionising radiation undertaken and planned to be undertaken in the Republic of Lithuania.

Over the reported period, changes of VATESI’s organizational structure and job descriptions were made due to:

- national centralization of personnel administration and accounting functions. Divisions with aforementioned functions were reorganized and the number employees was reduced accordingly;
- amendments to the Law on Public Administration, which redefined rules on the minimum number in a division. As a result, Public Communication division was replaced with positions not assigned to a division;
- long-term (5 years) evaluation of functions and workload (functions and number of positions were reviewed).

Current organizational structure is provided in Figure 8.1.



**Figure 8.1. Current VATESI organizational structure**

### **Development and maintenance of human resources of the regulatory body over the past three years**

VATESI has established 66 full-time staff positions. The number decreased from 75 in 2017 to 66 currently due to factors indicated above.

VATESI issued Rules of Procedure for Planning of Human Resources establishing the following tools for better long-term management of human resources as a part of its integrated management system:

- procedure for management turnover of personnel: all positions are divided into groups indicating their likelihood of turnover, availability of human resources for replacement, the importance of the position, etc.; a plan of measures for compensation of departure of staff is composed for positions, that are deemed to make highest impact upon leaving and most difficult to replace;

- tool for working time tracking, which allows to evaluate the distribution of functions between positions and divisions, adequacy of workload. It can also help to indicate areas where improvement of competence is needed based on time spent on different tasks;

- different methodologies for evaluating how many and what kind of employees are needed in long-term perspective.

Even though the need of human resources is taken into account in yearly planning activities, in early 2017 VATESI carried out a long-term (5 years) evaluation of functions and workload and subsequently established a plan for further actions.

### **Measures to develop and maintain competence**

In the end of 2016 – beginning of 2017 VATESI updated its integrated management system procedures concerning knowledge management and implemented the amendments. Statute of Training of VATESI Personnel now regulates methods of training, methods of evaluation of competence, conclusion of 5-year individual plans for improvement of competence, detailed procedures for training new employees and evaluation of their suitability to start working individually, periodical (every five years) evaluation of knowledge of inspectors, procedures of organizing training, etc.

Over reported period different methods of training – formal training (courses, workshops), initial (introductory and extended) internal training, lecturing by VATESI employees, independent studies, work with more experienced specialists – were used in order to maintain the qualification of more experienced employees and to train new employees.

### **Developments with respect to financial resources of the regulatory body over the past three years**

VATESI is a budget institution financed from the State Budget of the Republic of Lithuania and by other legally generated income. Budget of VATESI is justified by 3 years Strategic Plan of VATESI, approved by the Head of VATESI.

### **Statement of adequacy of resources**

Over the reported period, during which VATESI was financed from State Budget, VATESI financial resources were adequate to its needs.

Over reported period human resources were adequate to VATESI needs, taking into consideration the extent of the nuclear power programme in Lithuania.

### **Management system of the regulatory body**

VATESI has established and implemented integrated management system (IMS), aligned with the safety goals and corresponding to the requirements of standards ISO 9001 and IAEA's Safety Requirements the Management System for Facilities and Activities No. GS-R-3. VATESI IMS was certified as compliant with ISO 9001:2008 in 2015 and ISO 9001:2015 in 2018.

### **Openness and transparency of regulatory activities, including actions taken to improve transparency and communication with the public**

Pursuant to Article 39 of the Law on Nuclear Safety:

- VATESI and licence holders upon request and on their own initiative must provide information on nuclear safety and radiation protection, except if provision of such information is not prohibited by laws;
- VATESI and licence holders are obligated to inform the state and municipal institutions and the general public as well as other persons whose activities are directly related to the licensed activities of a relevant licence holder about the conditions of nuclear safety and radiation protection by publishing reports on their activities at least once a year;
- VATESI has to deliver public announcements on the results of supervision the implementation of nuclear safety requirements at least once a year;
- VATESI is obligated to organize meetings with municipal institutions, the general public as well as other persons in the vicinity of the nuclear facilities, in order to inform them about conditions of nuclear safety and radiation protection in these facilities;
- Organisations operating nuclear facilities must inform their workers, persons entering the site of nuclear facility and the general public on operating conditions and their compliance with normal operation conditions in a manner described in the Law on Nuclear Safety.

While implementing its regulatory functions VATESI provides consultations to interested parties, which can be oral (on the phone, during a meeting), written (e.g. emails), written consultations approved by the Head of VATESI and public consultations (published on VATESI website).

Pursuant to Article 39<sup>1</sup> of the Law on Nuclear Safety (as amended in September 2017), the public has a right to participate in decision making process of the most important authorization decisions related to nuclear safety: approval of the site evaluation report, issuance of licences for construction, operation, decommissioning of a nuclear facility, supervision of a closed radioactive waste repository, issuance of permits for first delivery of nuclear fuel to the site of nuclear facility. In order to facilitate the implementation of this right, VATESI, as well as the applicant, publishes information related to the decision on its website and all interested persons are able to provide their comments, opinion and questions, which then need to be evaluated and considered.

Additionally the following means of ensuring the transparency are used:

- all draft legal documents are public in order to inform and get a response (suggestions, remarks, comments) from interested parties;
- all legal acts are public;
- press releases and other publications on VATESI's website;
- information on issues licences, permits, other authorizations is published on VATESI's website;

– reports on implementation of conventions and the law of EU, VATESI annual reports (Nuclear Power Safety in Lithuania) and annual reports to the President and the Government in terms of activities and finances are published on VATESI’s website.

To improve transparency and ensure feedback, VATESI organizes surveys of stakeholders, including the general public.

### **External technical support**

VATESI cooperates with the TSOs of Lithuania as well as of foreign countries, which provide VATESI with expertise and necessary technical-scientific support during safety reviews, verification of safety justifications, drafting of legal acts. Some TSOs are involved in international projects implemented through international and bilateral cooperation, coordinated by VATESI. Legal acts do not establish an advisory body for VATESI. Pursuant to Article 45 of the Law on Nuclear Safety, in selecting specific contractors, the principle of impartiality of the contractors shall be applied. During the reporting period the main VATESI cooperation directions with TSOs remained in the area of expert services as a support for VATESI while evaluating safety justification documents provided by the INPP.

## Article 8(2) – Status of the regulatory body

### Place of the regulatory body in the governmental structure

Over reported period VATESI's position in Governmental structure remained unchanged (as shown in Figure 8.2.).

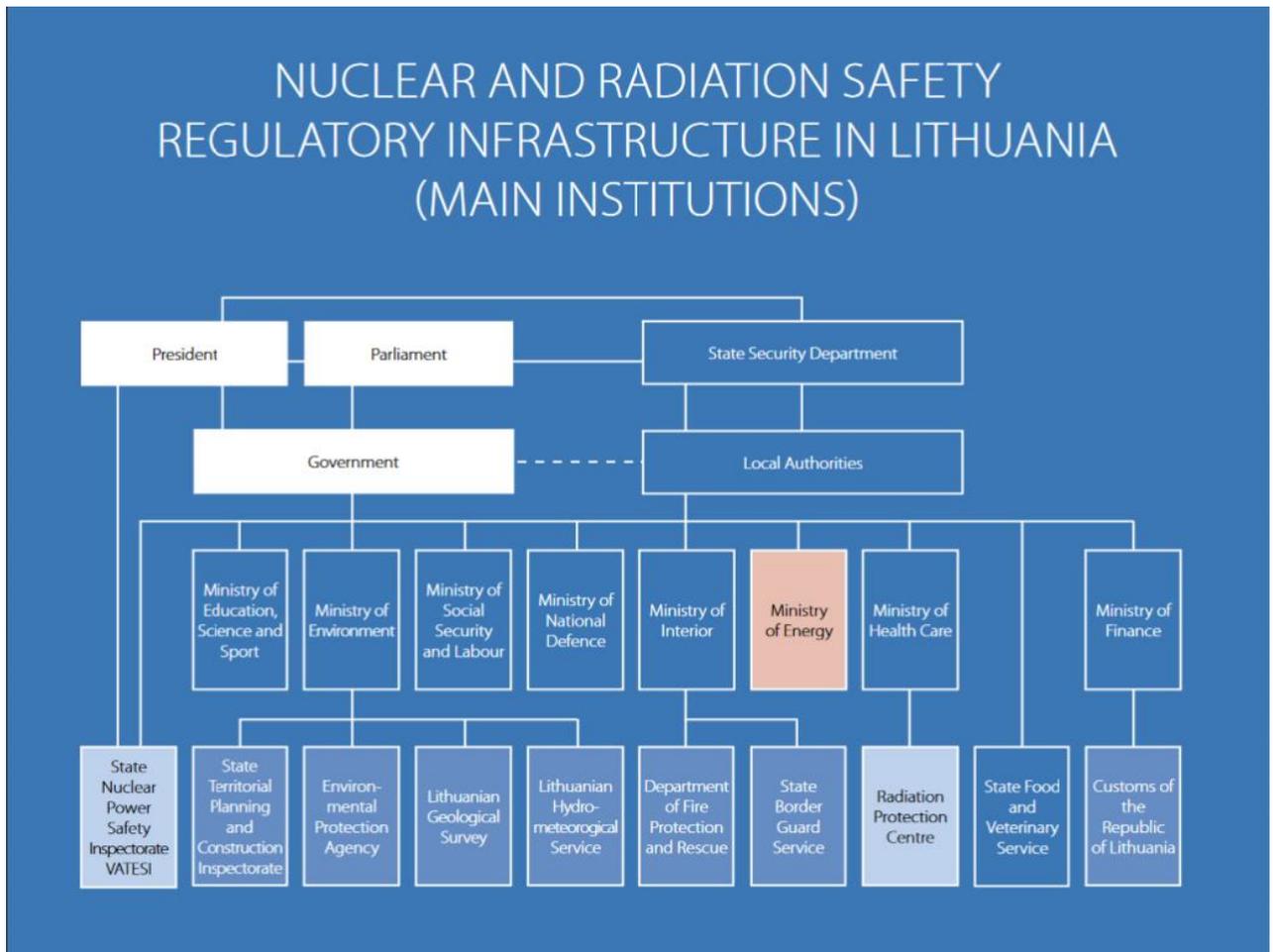


Figure 8.2. VATESI position in Governmental structure

### Regulatory body reporting obligations

The Head of VATESI is responsible for activities of VATESI and accountable to the President and the Government. VATESI informs other national and international bodies about its activities according to the national and international legal acts and treaties.

By 1st May each year VATESI has to submit an annual report on activities of VATESI and a set of financial statements to the President and to the Government of the Republic of Lithuania and have to make them public in the manner laid down in the legal acts. The President and the Government may invite the Head of VATESI to present the annual results of VATESI in terms of its activities and finances.

**Means by which effective separation is ensured between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy, and means by which independence of the regulatory body in making its safety-related decisions is assured**

The nuclear safety regulatory body's independence is of a fundamental importance in the legal framework of Lithuania. The principle of separation of functions is clearly stated both in the Law on Nuclear Energy (Paragraph 3, Article 21) and in the Law on Radiation Protection (Paragraph 3, Article 7).

Clear description of responsibilities and areas of competencies of stakeholders (policy makers (Parliament, Government and Ministry of Energy), implementing entities (licence holders), other state institutions involved and VATESI as the regulatory authority for nuclear safety provided in the laws and procedures for authorisation of nuclear facilities and activities lead to effective independence of regulatory authority and its safety related decision making.

The Head of VATESI is appointed by the President of Republic of Lithuania after nomination of the Prime Minister. The Law on Nuclear Energy includes a finite list of objective grounds for his dismissal. The Head of VATESI is exclusively responsible and reports to the President of Republic of Lithuania and the Government *in corpore*. All safety decisions are made solely and there is no other body that can make direct influence on safety decisions of the Head of VATESI.

There was no new development or changes in laws or secondary legislation concerning separation of functions of VATESI as a regulatory body and other entities.

## **Article 9 Responsibility of the Licence Holder**

<p><i>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.</i></p>
---

### **Formulation in the legislation assigning the prime responsibility for safety to the licence holder**

Article 3 of the Law on Nuclear Safety establishes basic principles for ensuring nuclear safety where the first one is the principle of liability for ensuring nuclear safety.

Article 3 of the Law on Nuclear Energy identifies the legal principles of activities involving nuclear materials and other activities in the field of nuclear energy involving sources of ionising radiation. The first paragraph of the article states, that activities involving nuclear materials and other activities in the field of nuclear energy involving sources of ionising radiation in the Republic of Lithuania shall be permitted only subject to a licence or a permit issued by an authorised state institution. If such activities are conducted without a licence or a permit, they shall be considered illegal and shall incur legal responsibility as provided by the laws of the Republic of Lithuania. The second paragraph states, that a licence holder or a permit holder shall be liable for compliance of the activities pursued thereby with the requirements of this Law, the Law on Nuclear Safety, the Law on Radiation Protection, the Law on Management of Radioactive Waste, other laws and legal acts. The final paragraph of the article prescribes, that an applicant having filed in an application for a licence or a permit, and a licence or a permit holder shall notify state and/or municipal authorities, international organisations and the general public of the intended or pursued activities in the manner prescribed by the Government or its authorised institution.

Article 16 of the Law on Nuclear Safety determines that full liability for the nuclear safety of a nuclear installation and for nuclear safety in carrying out other activities with nuclear and/or nuclear fuel cycle materials shall solely fall on persons that are engaged in such activities and hold relevant licences and/or permits.

The Law on Nuclear Energy identifies the following responsibilities of a licence holder:

- the licence holder shall be responsible for the adequate and safe operation of the installation in accordance with the requirements stipulated in the laws and other legal acts, also in the articles of association, internal work rules of the licence holder and in the terms of the issued licence. The licence holder shall be responsible for safety of its activities and the nuclear installation;

- a nuclear installation shall be used only for the intended purpose as stipulated in its design. The purpose of nuclear installations may be changed in accordance with the procedure provided in the legal acts.

The licence holder shall:

- include into accounting the nuclear materials belonging to the nuclear installation or used in the operation and exercise their control in such a manner as to ensure performance of the obligations of the Republic of Lithuania regarding the safeguards of the IAEA and the European Atomic Energy Community (the EURATOM);

- investigate nuclear and/or radiological accidents and nuclear incidents in the manner prescribed by the laws and other legal acts;

- notify VATESI and other interested institutions in the manner prescribed by the laws and other legal acts about all the violations of conditions and requirements for nuclear safety and all the malfunctions of the structures, systems and components ensuring safety of a nuclear installation, also shall notify promptly about a nuclear accident and/or radiological emergency, and shall inform of level of the accident estimated according to the International Nuclear and Radiological Event Scale (INES) and recommended actions for protection of the population;

- analyse and evaluate the risk of nuclear and/or radiological accidents in the nuclear installation to the population, their property and environment and shall prepare an emergency management plan as well as ensure preparedness to mitigate the consequences of a nuclear accident and/or radiological emergency in the nuclear installation;

- perform other duties established on the grounds of Law on Nuclear Energy and other laws.

In addition, Organisations operating nuclear installations and other holders of licences and/or permits, according to the national legal requirements shall:

- have the material, financial and human resources that are sufficient for involvement in the licensed activity or operations regulated by permits in compliance with the legal acts and technical standard documents of nuclear safety;

- ensure high level of safety culture and competence of the organisation and its workers;

- on a regular basis analyse the state of nuclear safety and improve it;

- consider human factors (human capabilities and their limits) at all stages of life of a nuclear installation;

- maintain an effective integrated management system with due priority on nuclear safety;

- develop an organisational structure which would ensure the fulfilment of nuclear safety policy formation, implementation and control functions;

- ensure radiation protection of staff and population during normal operation, and for design basis and beyond design basis accidents not to exceed the allowed levels of exposure for staff and population;

- ensure quality of the licensed activity, proper management of documentation, its storage during all life-time of a nuclear installation, renewal in time and approval by licensing authority when it is necessary;

- be responsible for the safety of a nuclear installation even if the validity of the licence is suspended or it is revoked;
- monitor emissions of radionuclides into the environment in a systematic manner;
- monitor and investigate the contamination of a nuclear installation/site and environment in a systematic manner and present to the regulatory institutions with the data about emission of radionuclides, contamination of a nuclear installation/site and the environment;
- apply principles of “defence-in-depth” and the ALARA.

A licence holder is liable for the nuclear damage resulting from the activity subject to the licence or related to that activity to the natural and legal persons, their property or to the natural environment. The organization shall insure a nuclear installation or procure in some other way the funds necessary to compensate for the damage after a nuclear accident as assumed by the Republic of Lithuania according to the Vienna Convention on Civil Liability for Nuclear Damage.

### **Description of the main means by which the licence holder discharges the prime responsibility for safety**

Since the final shutdown of both Ignalina NPP units, the Ignalina NPP mission changed from an electricity producer to an organization performing dismantling and decontamination while still a regulated nuclear facility. Therefore, the Ignalina NPP goals are to safely and in an adequate manner carry out activities related to the Ignalina NPP reactors final shutdown and implement the Ignalina NPP dismantling and decontamination activities, nuclear and radioactive material and waste management by effectively and consistently implementing the required measures, as well as reasonably and efficiently using the funds allocated for implementation of the Ignalina NPP decommissioning and related measures.

The integrated management system based on processes (see Article 13 of this Report) implemented at the Ignalina NPP encompasses all organizational components (including its structure, resources, processes and safety culture) in order to set the goals and tasks for the enterprise and to enable to reach these goals and tasks which among others include: safety, security, quality, environment protection, worker safety and health, fire, radiation protection, economic aspects and social responsibility. The main objective of the Ignalina NPP management system is to ensure and improve safety during the decommissioning process in such a manner as other requirements laid down for the enterprise and (or) its needs would not be evaluated separately from the requirements for safety, as well as in order to avoid potential negative impact to safety.

### **Description of the mechanism by which the regulatory body ensures that the licence holder discharges its prime responsibility for safety**

VATESI is obliged to ensure the state regulation and supervision of nuclear safety and radiation protection at nuclear installations and other related organizations. According to the Law on Nuclear Safety the main goal of VATESI in the area of nuclear safety is to exercise the state regulation of, and supervise over the nuclear installations and the activities related to nuclear and nuclear fuel cycle materials, in order to protect the society and the environment against the harmful impact of exposure to ionising radiation. The main tasks of VATESI in the area of nuclear safety is development and regular improvement of the nuclear safety regulatory system, evaluation of safety of nuclear installations and the activities related to nuclear and nuclear fuel cycle materials, issuance of licences and permits, monitoring of the compliance with legal acts by conducting inspections, and if required – application of enforcement measures in the manner set forth by the legal acts of the Republic of Lithuania. See also Article 8 of this Report.

## **Description of the mechanisms whereby the licence holder maintains open and transparent communication with the public**

The Ignalina NPP, according to legislation of the Republic of Lithuania, as well as to management system documents of the enterprise, maintains transparent communication with authorities, public, press and local society about the enterprise's financial status, provides information related to nuclear safety. The enterprise prepares and distributes information about unusual events to state institutions, local authorities, public, as well as by placing information on the Ignalina NPP website [www.iae.lt](http://www.iae.lt).

Pursuant to the provisions of the Law on Environmental Impact Assessment (EIA) of the Planned Economic Activity of the Republic of Lithuania the developed EIA Reports are placed on the Ignalina NPP external website for the notification and familiarization of the general public. Hard copies of the reports are available at the Ignalina NPP Communication Division and the local Municipality for those wishing to read the reports. The affirmative decisions regarding the possibility to carry out the planned economic activity under consideration issued by the responsible institution are published on the Ignalina NPP external website.

Pursuant to Article 39<sup>1</sup> of the Law on Nuclear Safety, the public has a right to participate in decision making process of the most important authorization decisions related to nuclear safety: approval of the site evaluation report, issuance of licences for construction, operation, decommissioning of a nuclear facility, supervision of a closed radioactive waste repository, issuance of permits for first delivery of nuclear fuel to the site of nuclear facility. Accordingly, Ignalina NPP is obligated to make the application documents for aforementioned authorization decisions available to the public and consider all opinions, remarks, etc., provided by the public.

Based on the Nuclear Safety Requirements BSR-1.4.1-2016 "Management system", Ignalina NPP has developed the procedure for information concerning interested parties who raised reasonable claims or expressed their opinion about INPP activities, provision, administration and responsibility for usage of that information.

Pursuant to the established procedure, Ignalina NPP Communication Division informs the society periodically and maintains open communication with the public on the issues related to the enterprise; relevant decisions taken, implementation or completion of the decommissioning projects, structure of the enterprise, environmental safety, technical visits and other INPP activities related information.

The Management Procedure "External and Internal information" was reviewed and approved in July 2015. Activity on external and internal information is performed in order to timely inform the plant personnel, public, mass media and state institutions by means of preparation and transmission of information about Ignalina NPP. Information about Ignalina NPP condition, information about implementation of important projects, information about organizational changes at Ignalina NPP including those related to the decommissioning process of Ignalina NPP power units is presented by the Communications Department personnel placing the constantly updated information at Ignalina NPP website [www.iae.lt](http://www.iae.lt). Internal information includes regular editions of Information bulletins, broadcasting of weekly news by the plant radio and placing of relevant information to the internal website.

## **Description of the mechanism ensuring that the licence holder of the nuclear installation has appropriate resources (technical, human, financial) and powers for the effective on-site management of an accident and mitigation of its consequences**

Ministry of Energy of Republic of Lithuania executes control over financing of the Ignalina NPP, assigns an independent auditor to review financial documentation of the Ignalina NPP, and

approves financial results of the Ignalina NPP. During the process for confirming the adequacy of applicant's financial resources VATESI verifies the applicant's financial capacity in the Register of Legal Entities. According to the requirements of VATESI licensee shall prepare and approve list of safety related staff, specifying the job, competence requirements and the required minimum number of employees, also licensee shall have a long-term plan of obtaining employees. If the licensee intends to change the organizational structure or the number of employees, this change shall be implemented as a modification with the relevant safety justification and shall be approved by VATESI (see also Articles 11, 12 and 14 of this Report).

The Law on Nuclear Safety establishes the general requirements for the prevention, mitigation and management of nuclear and radiological accidents and nuclear incidents as well as legal framework of emergency preparedness. Pursuant to Article 35 of the Law on Nuclear Safety in order to prevent nuclear and radiological accidents, nuclear incidents and other unusual events as well as to avoid their reoccurrence and to assure safety and their continuous improvement in the area of nuclear energy, at all stages of a lifecycle of a nuclear installation, the licence holder is obligated to perform regularly analyse of its own and other persons that are engaged in the nuclear energy sector experience as well as to exchange such experience and take necessary preventive and/or corrective measures that would ensure proper performance of nuclear safety requirements in the manner prescribed by the VATESI (see also Articles 15, 16 and 19 of this Report).

## **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.*

### **Overview of arrangements and regulatory requirements regarding policies and programmes to be used by the licence holder to prioritize safety in activities for design, construction and operation of nuclear installations**

Pursuant to principles provided in Article 3 of the Law on Nuclear Safety effective administration and management with the view to secure safety shall be created and maintained by all persons related to the activities of nuclear installations. The highest priority in the management system of such persons shall be the assurance of nuclear safety. The requirement for operating organization to implement, maintain and develop management system giving due priority to nuclear safety is set in the Article 17 of the Law on Nuclear Safety. Safety as the highest priority is also emphasised in the Nuclear Safety Requirements BSR-1.4.1-2016 "Management System". This regulation requires the licensee to establish integrated, process oriented management system, which includes provisions for use of graded approach, establishment of corresponding safety policies, requirements for processes, arrangements for safety and security culture development and improvement, self-assessments, independent assessments, etc. (see also Article 13 of this Report).

Article 16 of the Law on Nuclear Safety determines that full responsibility for the nuclear safety of a nuclear installation shall solely fall on licence holders. The applicant or the licence holder have a right to involve technical support organisations and external experts, specialists, and consultants for carrying out the analysis and justification of nuclear safety and for preparing other related documents as well as for performing an independent verification of such documents, however, liability for the results of such activities shall fall on the licence holder (Law on Nuclear Safety, Article 30, Paragraph 5).

## **Measures taken by licence holders to implement arrangements for the priority of safety**

### *Ignalina NPP Policy Statement*

The Ignalina NPP, being the Operating Organization, is responsible for nuclear installation safety assurance in accordance with the international practice and pursuant to provisions of Article 3 and 16 of the Law of Nuclear Safety undertakes full responsibility for the plant safety and establishes policy that gives the highest priority to the plant's safety.

### *Safety culture development at Ignalina NPP*

According to Article 17 of the Law on Nuclear Energy Ignalina NPP must guarantee the high level of safety culture in the organization.

Development and maintenance of a strong safety culture at Ignalina NPP is built upon:

- clear declaration of safety, security and quality policies by the top managers and adherence to them at all levels of organization;
- education of the plant personnel to adhere to the Principles of a strong Safety Culture;
- instructing of contractors and subcontractors on importance to assure a safety and security at the Plant;
- periodical evaluation of Safety Culture and Security Culture;
- performance of annual self-assessment of activities;
- proper evaluation of operating experience.

The Safety Culture Management Procedure and procedures for evaluation of safety culture and security culture are in place at Ignalina NPP. They were reviewed and updated within the frame of integrated management system at Ignalina NPP. For safety culture evaluation Ignalina NPP uses questionnaires (every three years), safety culture indicators (quarterly) and self-assessment of activities (once per year). Safety culture evaluation reports are submitted to the VATESI and managers of Ignalina NPP departments.

The Director General of the Ignalina NPP annually approves the Action Plan on safety culture and security culture development at Ignalina NPP providing specific measures on implementation of the Ignalina NPP safety culture and security culture development programme. Mainly those measures are the results of self-assessment of activities and evaluation of safety culture indicators.

The main objective of the programme is to orient behavior and attitude of the plant personnel and contractors, also plant management methods to the achievement of the highest priority – SAFETY.

The results of safety culture evaluation and principles of strong safety culture and additional information related to the Safety culture are posted on the INPP internal website. This information is constantly updated.

Assessment of Safety Culture and Security Culture is based upon the plant personnel questioning and Safety Culture indicators measurement. Assessments of Safety Culture at Ignalina NPP were performed in 1998, 2000, 2004, 2008, 2013 and 2016. Assessment method is based on the questionnaires developed considering the Safety Culture features applied in the world's nuclear power generation industry. The next assessment of Safety Culture by using questionnaires is planned for the end of 2019.

Safety culture indicators at Ignalina NPP were established by using attributes of strong safety culture (as defined in IAEA Safety guide, GS-G-3.5. Appendix I) and by analysing indicators and data of IMS processes. Those indicators have quantitative nature and reflect the conditions under which safety at the plant is ensured, e.g. plant personnel preparedness, operational experience appliance, position of top management to behaviour and results of work of personnel, security culture aspects, as well as events with human factor.

Each division of Ignalina NPP organizational structure annually performs self-assessment. The scope of self-assessment includes:

- evaluation of annual work plans implementation and achievement of MS process indicators over the last year;
- evaluation of implementation of corrective actions related to results of internal and external independent assessments;
- evaluation of personnel preparation and qualification;
- evaluation of inspections results of workplaces, instrumentation, equipment etc. which were performed over the last year;
- evaluation of preparedness of procedures related to operation and technical maintenance of systems and components of the plant important to safety;
- evaluation of improving proposals of employees;
- preparing suggestions to safety culture development programme for the next year.

Quarterly meetings between Ignalina NPP and Regulatory Body top managers are held. The aim of these meetings is to exchange information about the status of the current affairs at the plant, to discuss the important safety and organizational issues.

#### *Training of the personnel*

The significance of Safety Culture, the lessons from the plant's operational experience and examples from practice of performance of works related to Safety Culture are included into the training process of personnel. The Safety Culture training course was updated for plant and contractor personnel in the light of self-assessment and independent assessment results. During this training course the personnel is familiarized with the strong safety culture principles, safety culture evaluation methods and the results of safety culture evaluation for the past period. Updated version of the Safety Culture Training Manual was issued in 2018.

Once a year Ignalina NPP organizes a workshop for plant staff to maintain their qualification. One of the topics of the workshop is the review of reports on events at INPP related to the human factors.

#### *Independent reviews, inspections and audits*

The Audit, Safety and Quality Management Division is established at Ignalina NPP. The main responsibilities of the Division include: performance of independent reviews, safety inspections and internal audits of processes of integrated management system of the organization.

The audit of the Safety culture management process was performed in August 2018. The purpose of the audit was to assess the compliance with requirements established in the "Safety Culture Management Procedure". Weakness in contractors' and their subcontractors training on Safety Culture were identified during the audit, also the Risks of Safety Culture Management process were not evaluated. A Corrective Action Plan has been developed following the Audit Report release. Up to the present moment 7 out of 8 recommendations have been implemented.

### **Regulatory processes for monitoring and oversight of arrangements used by the licence holders to prioritize safety**

The requirement for operating organization to implement, maintain and develop management system giving due priority to nuclear safety is set in the Article 17 of the Law on Nuclear Safety and Nuclear Safety Requirements BSR-1.4.1-2016 "Management System". The management systems of licence holder is the subject for regulatory review and assessment and regulatory inspections as well (see also Article 7(2)(iii)).

The VATESI continuously monitors safety culture of the Ignalina NPP by the following activities:

- inspections and other activities to assess licensees’ compliance with requirements;
- reviewing quarterly safety culture related reports on Ignalina NPP safety culture indicators and organizational issues related to safety culture;
- review of results of the surveys for assessing safety culture at the INPP;
- performing review and assessment of the Ignalina NPP submittals (e.g. on safety important changes to the INPP organizational structure);
- preplanned (quarterly) and reactive meetings with Ignalina NPP management.

### **Means used by the regulatory body to prioritize safety in its own activities**

VATESI has established strategic goal – while performing state regulation and control to seek, that high level of nuclear safety would be ensured. The set of criteria is established in the Strategic Plan for the assessment of achievement of strategic goal and fulfilment of the mission. VATESI sets priorities in the Strategic Plan and allocates necessary resources for the achievement of these priorities. Resources are allocated for different activities commensurate with the radiation risks associated with facilities and activities, in accordance with a graded approach.

Integrated management system of VATESI was created taking into account the principle, that due priority is given to safety in all regulatory activities and decisions. This principle is defined in the Article 3 Paragraph 1 of the Law on Nuclear Safety. The priority of safety in the decision making is set in the Policy of VATESI integrated management system. The main processes of the integrated management system – process for drafting legal acts, process for regulatory inspections, process for review and assessment of safety justification documents, process of supervision of economic entities, – were created and are applied using graded approach and giving priority to safety.

## **Article 11 Financial and Human Resources**

- 1. 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.*
- 2. 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.*

### **Article 11(1) – Financial resources**

#### **Mechanism for the provision of financial resources to the license holder or applicant in order to ensure the safety of the nuclear installation throughout its lifetime**

After the final shutdown of the INPP Unit 2 in December 2009 up to present INPP decommissioning is financed from the following sources:

- EU Ignalina Programme (IP) funds administrated by the national agency CPMA (Central Project Management Agency);
- National Decommissioning Fund (NDF);
- Ignalina NPP own resources;
- Ignalina International Decommissioning Support Fund (IIDSF) administrated by EBRD;
- State Budget Funds (SBF).

Breakdown of planned and actual INPP expenses by the source of financing are shown in Tables

11.1 and 11.2. In 2017, the Government of the Republic of Lithuania took a political commitment to maintain the increased national co-financing of direct decommissioning costs at the level of 14 per cent on average till the end of the project in 2038.

**Table 11.1. Breakdown of planned and actual INPP expenses by the source of financing (KEur)**

Source	2016		2017		2018	
	Plan	Fact	Plan	Fact	Plan	Fact
IP	45 245	41 852	45 862	41 169	44 792	42 340
NDF	3 517	2 510	3 229	2 714	2 718	2 104
INPP	4 465	*3 173	5 892	3 655	5 271	3 296
IIDSF	13 935	15 933	37 703	35 793	20 050	19 251
SBF	6 759	6 759	6 760	6 510	7 253	6 789
<b>Total</b>	<b>73 921</b>	<b>70 227</b>	<b>99 446</b>	<b>89 841</b>	<b>80 084</b>	<b>73 779</b>

*\*sum of 157 000 Eur is included as technical support from Sandia National Laboratory*

**Table 11.2. Breakdown of planned and actual INPP expenses by the source of financing for different expense items (KEur)**

Expense item	2016		2017		2018	
	Plan	Fact	Plan	Fact	Plan	Fact
Payments for personnel	38 341	37 711	38 182	37 396	37 322	36 228
Utilities	11 667	9 756	11 036	9 670	11 092	10 058
Works & Services, Equipment & Supplies	11 962	10 153	12 329	8 016	9 485	6 800
Taxes	385	272	487	329	347	228
Decommissioning projects	11 565	12 335	37 412	34 429	21 838	20 464
<b>Total</b>	<b>73 921</b>	<b>70 227</b>	<b>99 446</b>	<b>89 841</b>	<b>80 084</b>	<b>73 779</b>

As of June 2019 there was 4.6 million EUR accumulated in the INPP National Decommissioning Fund. The average amount to be allocated from the Fund to the INPP decommissioning activities is approx. EUR 2.5 million per year. The order of the Minister of Energy of the Republic of Lithuania No. 1-14, dated 30 January, 2014, states that proceeds from disposition of assets of the State Enterprise INPP shall be transferred to the account of the INPP National Decommissioning Fund.

To ensure smooth and uninterrupted progress of Ignalina NPP decommissioning, the continuity of adequate EU support is vital. The total funding gap until decommissioning completion amounts to EUR 1548 million, required financing from EU until 2038 amounts to EUR 1331 million (if the current co-financing practice is maintained). The negotiations for EU support to INPP decommissioning during the 2021–2027 multiannual financial framework are ongoing. Annual decommissioning financing from IP funds is carried out in accordance with the annual work programs developed on the basis of annual tasks under the INPP decommissioning schedule (Megaproject).

### **Statement with Regard to Adequacy of Financial Provisions**

Lithuania ensures the sufficient financial provisions to ensure safety and activities of the INPP.

## **Processes to Assess Financial Provisions**

The Ministry of Energy executes control over financing of the INPP, assigns an independent auditor to review financial documentation of the INPP and approves the financial results of the INPP.

Director General of the INPP is responsible for INPP safety and undertaken activities and implements decisions regarding the INPP activities and its decommissioning taken by the Parliament (Seimas), the Government, Ministry of Energy and INPP Management Board, formed by the Ministry of Energy.

## **Description of arrangements for ensuring that the necessary financial resources are available in the event of a radiological emergency**

Organisations operating nuclear installations or other persons engaged in the activities referred to in Paragraphs 1 and 2 of Article 22 of the Law on Nuclear Safety must hold a licence and/or permit issued by the VATESI and must have material, financial and human resources that are sufficient for involvement in the licensed activity or operations regulated by permits in compliance with the legal acts and technical standard documents of nuclear safety.

Nuclear Safety Requirements BSR-1.4.1-2016 “Management System” provides requirements on integrated management system, which ensures that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, and gives due priority to nuclear safety in all stages in the lifetime of installation. The licence holder must ensure necessary financial, material, human and technical resources are in place as well as administration rules and technical requirements, scientific support and effective management system during all stages of lifetime of a nuclear installation.

## **Article 11(2) – Human resources**

### **Overview of the arrangements and regulatory requirements concerning staffing, qualification, training and retraining of staff for nuclear installations**

The enterprise employs a number of highly experienced staff with unique expertise. The knowledge and experience of each employee is applied as much as possible in the activity of the enterprise.

Since 1 January 2010 the main activity of INPP is decommissioning. Today many employees employed at the enterprise have a huge experience, unique knowledge that shall be maintained and applied. While implementing the decommissioning projects the knowledge and experience of these employees are applied to the most extent. The procedures, manuals and guidelines in the field of personnel management are developed in accordance with the IAEA standards.

As of 1 January 2019 the INPP personnel is well educated and properly trained (in total of 1901):

- 45% of personnel have higher education (863 employees);
- 19% – specialized secondary education (358 employee);
- 22% – vocational schools (420 employees);
- 13% – general secondary education (241 employees);
- 1% – unfinished general secondary education (19 employees).

Due to the intention of the INPP management to implement as many projects as possible using internal manpower of the enterprise, and taking into account qualification of the INPP personnel and the performed works on equipment dismantling and decontamination, it was decided to refuse the services of external organizations and to perform as many works as possible by the INPP own resources. On the other hand in order to optimize and centralize the activities of the enterprise the INPP performs the outsourcing of subsidiary activities. The need for INPP personnel is determined in accordance with the personnel needs calculation methodologies by types of activities, depending on the scope of work projected in the long-term INPP decommissioning Megaproject schedule and annual work plans.

The Enterprise aiming to ensure the INPP decommissioning processes and works, encompassing:

- defueling of Units and spent nuclear fuel transportation to the Interim Spent Fuel Storage Facility;
- dismantling and decontamination of equipment and buildings;
- design, construction and operation of new facilities for the management and storage of radioactive waste;
- processing and storage of radioactive waste generated during dismantling of the INPP equipment.

The Enterprise constantly strives to use its internal human resources to accomplish the aforementioned works by training, re-qualifying and transferring personnel to vacant positions in case of their origination. If the INPP employees do not want to undertake new positions, then the vacancies are outsourced.

Nuclear Safety Requirements BSR-1.4.3-2017 “Managing Human Resources in the Field of Nuclear Energy” provides requirements on staffing, qualification, training and retraining of staff for nuclear installations.

### **Methods used for the analysis of competence requirements and training needs for all safety related activities in nuclear installations**

Human Resources Management covers all the INPP internal processes by improving operational efficiency; making more transparent and optimized the key activity processes; optimizing servicing functions; creating new organizational structure; providing for staff training, developing necessary competence, upgrading employees’ qualification and preparing replacement of significant for the enterprise positions; creating a unified value-based organizational culture.

Organizational changes at the SE Ignalina Nuclear Power Plant currently undertaking the decommissioning activities are indispensable and reoccurring due to changing character of activities and the need to achieve the main goals in the most efficient way. During the organizational changes in 2016 responsibilities for management and implementation of dismantling projects were separated. In 2017 the maintenance functions were centralized, leading to reorganization of the INPP divisions directly linked to maintenance activities. Changes in the INPP organizational structure related to the centralization of general household and transportation activities, optimization of commercial activities, final centralization of dismantling activities, repair and maintenance works came into force in 2018.

In 2019 it is planned to reorganise the Enterprise’s organisational structure in relation to radiation safety and centralisation of the Enterprise’s laboratories.

In order to mitigate the consequences of the organisational changes, the Enterprise provides the opportunity for the employees to retrain, gain knowledge and expertise; offers job positions at new radioactive waste storage facilities or fill the vacancies which appear due to the staff circulation; however, some employees are dismissed.

Since March 22, 2019, the Enterprise is implementing a new payroll system. During the further development of the payroll system, a comparison of Enterprise's employees' salaries with the Lithuanian market is performed and principles and means for long-term employees' wage growth are being prepared. The implementation of the aforementioned changes is planned to be applied in 2020.

### **Arrangements for initial training and retraining of operations staff**

The purpose of the initial training is to prepare employee for a position at INPP, including the training for promotion.

In INPP initial training is conducted in the following sequence:

- after the corresponding procedures are performed in Personnel Department the employee's manager shall perform the primary on-site instructing of the employee;
- Training Subdivision (TS) instructors determine the knowledge level and skills of a trainee by interview or written test in the presence of the trainee's manager;
- on the basis of the results and in accordance with the approved general training programme for a job position, TS develops the individual training programme for the specific employee;
- upon passing all training stages in accordance with the individual programme the employee shall take internal exam at the enterprise's qualification committee.
- In case of the positive result of the internal exam the employee shall go through position qualification approval procedure.

After the initial training is completed the employee on the basis of the qualification committee conclusion is allowed to work under supervision of the experienced employee (for operation personnel) and/or independent work.

Training of the personnel consists of the theoretical training and on-site training (probation). Number of the theoretical training items and their contents is specified in accordance with the specific activities performed at INPP. Theoretical training of the personnel can be performed in form of courses or individually by the TS instructors or the relevant experts of the INPP departments.

Training using technical means (training computer programmes, equipment mock-ups, actual components and samples, etc.) is provided when required by a training programme and is conducted by the TS instructor.

On-site training (probation) is to acquire practical skills and attitudes in situ and is conducted by the on-site training instructor. During probation period employees study and apply in their work areas the actual rules, required standards, job descriptions and operation manuals in accordance to obtain experience for proper, safe and effective work. At the end of the on-site training (probation) and before the qualification by the appropriate qualification committee the employee's practical skills are checked.

### **Capabilities of plant simulators used for training with regard to fidelity to the plant and scope of simulation**

Pursuant to Decision No. Spr-222 (3.263) on Decommissioning of the Main Control Room (hereinafter the MCR) Full Scope Simulator of 4 October 2013, the simulator is no longer operated. This decision was agreed by VATESI.

## **Arrangements for training of maintenance and technical support staff**

The training system is formed of the following parts:

- training under the programme;
- certification;
- development of the means for technical training aid and its support with relative organizational, training documentation, methodologies, technical and operational documentation;
- recording and archiving documentation on education of personnel.

Maintenance and technical personnel at the INPP is trained using initial training and continuous training. To provide proper qualification and competence of the personnel a systematic way of training is used on different stages of education.

Initial training of the personnel consists of theoretical and in-service (probation) trainings. Theoretical training of the personnel is conducted using course method or individually by instructors of the INPP TS.

In-service training (probation) is conducted for personnel to gain practical experience and skills at their workplace and is performed by in-service training instructors. In the process of probation an employee shall study and use rules, norms, job and operating descriptions at the workplace to the extent required in the job description, and gain experience in provision of accident free, safe and efficient operation of the equipment maintained.

After the in-service training and prior to certification in certifying commission the examination of practical skills is performed.

The trained employee shall be certified for position in the corresponding certifying commission.

The continuous training of personnel includes:

- professional improvement during advanced training courses and special purpose training courses under the training programs;
- periodical and supplementary briefings intended to introduce changes of technological processes of equipment repair and supplementary requirements to repair technology, as well as ad hoc briefings prior to performance of repair works;
- trainings during implementation (application) of new materials, equipment, technologies, procedures and training on practical experience in performance of repair works at NPPs with RBMK type reactors;
- maintenance of required practical skills for performance of operational tasks prior to commencement of works;
- self-education (for managers and specialists).

To ensure the continuing training of the managers and specialists TS periodically performs the INPP personnel training demand analysis and a market of training services exploration. With reference to the result of the performed analysis a general training in-service programme is developed. Such programmes are implemented by services of external organizations.

## **Improvements to training programmes as a result of new insights from safety analyses, operational experience, development of training methods and practices**

Continuous and further training of INPP personnel is performed according to the requirements for a particular position (e.g. periodic training to re-approve compliance to the qualification requirements of a safety important position), need to prepare for new activities or tasks of a division, other needs identified by a manager and discussed with an employee during annual individual appraisal meetings. TS are supporting managers of departments as an internal provider

of training and, when needed, help to find and organise external training according to the established needs. TS continuously is assessing effectiveness of training content and process, develops new programmes and training tools to support implementation of the INPP plans (e.g. to prepare new mock-ups for training on dismantling of contaminated equipment). TS work with line managers to establish training needs, assess training results after a trainee has worked for some time after the training. TS also performs analysis of OEF lessons, organises training for TS specialists and makes practical observations of the related tasks to improve training content and methods.

In line with the commitment under the laws of the Republic of Lithuania to comply with nuclear and radiation safety requirements, the enterprise dedicates special focus to the qualification and psychological preparation of its employees – prerequisites for ensuring that the safety of the INPP is a top priority and an underlying objective that fosters one’s sense of responsibility and self-control in the performance of all safety-related tasks.

The enterprise employs a number of highly experienced staff members with unique expertise; therefore retaining them is vital. The organization encourages employee responsibility, initiative and innovation, develops and implements employee training programmes, creates conditions for employees to constantly improve their qualifications and keeps them up-to-date on the enterprise’s goals, current projects, changes and achievements. In the case of application for the vacant position within the INPP structure the redundant personnel of INPP have the priority to be selected for employment than other applicants.

Nuclear Safety Requirements BSR-1.4.3-2017 “Managing Human Resources in the Field of Nuclear Energy” provides requirements on improvement training programmes as a result of training assessment, operational experience, implemented modifications and other insights described in licensee documents.

### **Methods used to assess the sufficiency of staff at nuclear installations**

The Nuclear Safety Requirements BSR-1.4.1-2016 “Management System” requires from a licensee to assess, plan and ensure sufficiency of staff performing safety important activities and affecting safety related professions of a licensed organization. It is required to assess and establish the number of staff needed for safe operation, and their competence in a systematic and documented way. This regulation also requires establishing and annually updating of the long-term staffing plan for activities that are important to safety.

Additionally, it’s required from a licensee always to have sufficient number of in-house competent staff understanding the safety basis of a plant (e.g. Safety Analysis Report or Safety Case and other documents), as well as to understand the actual design and operation of the plant in all plant stages.

Since 2014, INPP has been making a comparative market analysis of its controlled operating costs using “Make or buy” approach. Therefore, in optimising the organisational structure the INPP further applies “Make or buy” approach criteria, conducts comparative analysis, takes decisions regarding procurement of specific activities.

The regulatory requirements and quality management procedures applied by INPP require to monitor sufficiency of staff for safe operation, their competence, and suitability for safety work on a regular basis and to document results of such assessments. For instance, assessment of the staffing level at INPP is annually indicated within the annual INPP safety report. In order to ensure the sufficient number of employees who are important to safety the programme for long-term provision of personnel who is important to safety was developed. To ensure the reserve of employees who are important to safety the list of forming of the reserve of employees who are important to safety, the long-term plan for preservation of competencies of the employees who are important to safety and the plan of the recruitment and training of the employees who are important to safety for years 2019

- 2023 are developed at the INPP. VATESI during regulatory inspections and other activities verifies suitability of personnel qualifications, quality of safety important training and sufficiency of competent INPP personnel to ensure the INPP safety.

### **Policy or principles governing the use of contracted personnel to support or supplement the licensee's own staff**

Personnel of contracting organizations prior to commencement of works in the INPP controlled area is trained at the INPP TS under the Training program for contracting organizations personnel, performing works within the controlled area of INPP (MC-1410-23), whereupon personnel acquires respective knowledge and competencies in the area of radiation safety, fire safety, physical security, emergency preparedness, safety culture and in other areas important to safety.

Operations managers of contracting organizations are certified in the certifying commission No. 2 of the INPP. Moreover, all the personnel of contracting organizations undergoes induction and initial briefings at the working place on fire safety, health and safety of workers and, if necessary, on radiation safety.

All the enlisted above allows, when necessary, the efficient involvement of the personnel of contracting organizations in employment of vacant positions within the structure of the INPP. In case of application to the vacant position within the structure of the INPP the personnel of contracting organizations is more likely to be selected for employment than other applicants who do not have work experience at nuclear facilities.

### **Methods used to assess the qualification and training of contractor's personnel**

The Nuclear Safety Requirements BSR-1.4.1-2016 “Management System” requires from a licensee to establish personnel qualification requirements for suppliers of the product important to safety within procurement documents, to monitor adherence to those and to this end to have sufficient number of specialists competent to perform such oversight and assess performance of a contractor/supplier.

INPP has implemented the 2 level integrated management system procedure “Procurement” MS-2-017-1 that requires careful assessment of qualification of potential INPP suppliers/contractors. The assessment includes checking of competence of the key personnel of contractors and implemented management system before a contract is awarded.

After a contract for safety important activities is awarded, INPP assigns the competent personnel to perform monitoring and inspections over the contract implementation.

INPP requires from the suppliers/contractors of safety important products to undergo special training programme in compliance with the INPP requirements for safety, application of quality requirements and principles of safety and security culture.

The qualification of Ignalina NPP contractors’ personnel is assessed during the process of licencing of contractor’s activities by VATESI according to the provisions of the Law on Radiation Protection and Nuclear Safety Requirements BSR-1.9.4-2016 “Procedure of Obligatory Radiation Protection Training, Examination, Briefing of Radiation Workers and Radiation Protection Officers Involved in Activities with Sources of Ionising Radiation in Nuclear Energy Area and of Certification of Natural Persons Seeking to Obtain Right to Teach Radiation Protection”, approved by the Head of VATESI Order No. 22.3-73, April, 2016.

## **Knowledge accumulation and preserving system**

The INPP activities are based on knowledge and depend on knowledge and skills of highly-qualified employees ensuring effective and safe operation. INPP has accumulated unique knowledge and expertise during INPP construction, operation and decommissioning. Though it is planned that decommissioning works, such as nuclear fuel retrieval and management, dismantling of reactor facility and other complicated systems, radioactive waste management, operation of newly constructed storage facilities and radiation safety assurance, will take several decades, saving and sharing of unique knowledge required for INPP safe and reliable operation with new generation of employees becomes highly important. Considering the aforementioned, INPP initiated knowledge accumulation and preserving activities, justified by strategic documents of INPP: Business Strategy, Human Resource Management Policy, INPP Human Resource Management Procedure and Knowledge Accumulation and Preserving Programme prepared on the basis of the IAEA guidelines. These activities are aimed at reducing knowledge loss risks when implementing a unique decommissioning project, and to share and effectively use the obtained knowledge upon demand, considering interests of INPP.

## **Description of the national supply of, and demand for, experts in nuclear science and technology**

The legal provisions for funding and financing regarding national infrastructure to support the safe operation of nuclear power plant are implemented.

Pursuant Paragraph 2 of Article 47 of the Law on Nuclear Energy the state shall support and finance the implementation of the science and technology research programmes in the area of nuclear safety and radiation protection.

Pursuant the Article 13 of the Law on Nuclear Energy Ministry of Education, Science and Sport shall organise development and introduction of education and science programmes as well as curricula and other measures to train nuclear energy specialists, including the specialists with functions pertaining to safety of a nuclear installation, inter alia, with the aim of maintaining and increasing the competence and knowledge in the field of nuclear safety.

Preparation of specialists for national infrastructure for safety is implemented in Kaunas University of Technology and Vilnius University with active participation of Lithuanian Energy Institute and Centre for Physical Sciences and Technology.

## **Regulatory review and control activities**

Specialists of VATESI are continuously concentrating their efforts on the supervision of qualification of the employees of the nuclear energy sector. In supervising the training and qualification improvement system at the INPP, the VATESI follows Nuclear Safety Requirements BSR-1.4.1-2016 “Management System”, Nuclear Safety Requirements BSR-1.4.3-2017 “Managing Human Resources in the Field of Nuclear Energy”, the IAEA safety standards, recommendations and the best practice of other countries. Even after the final shut-down of both Units of the INPP, VATESI has not altered the commonly recognized approach that activities related to nuclear facility need to be carried out by a sufficient number of highly qualified employees. VATESI specialists coordinate the training programs, exam questionnaires, take part in the exams to evaluate the competencies of the INPP specialists responsible for safety.

## 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.*

### **Overview of arrangements and regulatory requirements to take human factors and organizational issues into account for the safety of nuclear installations**

Human factors and organizational issues have significant importance for safety of nuclear installation and is addressed in Article 17 Paragraph 2 Sub-paragraph 4 of the Law on Nuclear Safety, which requires consideration of human factors at all stages of life of a nuclear installation. These issues are also covered in the several regulations: Nuclear Safety Requirements BSR-1.4.3-2017 “Managing Human Resources in the Field of Nuclear Energy”, Nuclear Safety Requirements BSR-1.4.1-2016 “Management System”, VD-T-001-0-97 “Nuclear Safety Regulations for the Reactor’s of Nuclear Power Plants”.

The extensive regulatory requirements on human factors are set in Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” and cover the following aspects:

- Operating organization;
- Responsibility and authorities;
- Assurance of resources for adequate performance of functions and tasks;
- Safety culture;
- Staff competence assurance;
- Operational experience feedback;
- Design:
  - Requirements to prevent single human error as well as mitigate its consequences;
  - Control room design;
  - Optimal human-machine interface;
  - Submission with adequate information for operators.

Human factors and organizational issues during modification process are addressed in Nuclear Safety Requirements BSR-1.8.2-2015 “Categories of Modifications of Nuclear Installations and Procedure of Performing the Modifications”. INPP adheres to the requirements and VATESI performs the regulatory oversight of INPP compliance to them.

### **Consideration of human factors in the design of nuclear installations and subsequent modifications**

Human factor management at INPP is based on the consideration of organizational, labour (professional), environmental factors, as well as individual abilities and other characteristics of human behaviour at work to preclude safety problems. Human factors and organizational issues during modification process are addressed in Nuclear Safety Requirements BSR-1.8.2-2015 “Categories of Modifications of Nuclear Installations and Procedure of Performing the Modifications”. Human factors are taken into account in the design of new nuclear facilities for INPP decommissioning and modifications. Work spaces for operational, maintenance and dismantling personnel are arranged on the base of ergonomic principles and norms. Design solutions

of the main control room provide operability and habitability for the staff under nuclear and radiation accident conditions, including a case of blackout.

Working places of all personnel meet current ergonomics requirements. The man-machine interface provides sufficient data about the on-going operating processes, status of process systems as well as systems of control and personnel attention in case of deviations from normal operation. Prior to the beginning of work the medical control of operating personnel is mandatory.

INPP personnel management process includes recruitment, primary and continuous training, certification and permission of personnel to work on their own at INPP, is regulated by the documents indicated in Article 11 of this Report.

### **Methods and programmes of the licence holder for analysing, preventing, detecting and correcting human errors in the operation and maintenance of nuclear installations**

Human factor affects many aspects of safe decommissioning of a nuclear facility and first of all in such activity fields as nuclear, radiation and fire safety assurance, physical security, safety and health of employees.

Human factor management at INPP is based on the consideration of organizational, labour (professional), environmental factors, as well as individual characteristics of a person, which affect his/her behaviour at work in such a way that it may harm his/her health or nuclear facility safety.

The activity related to the “Human Factor” management at INPP is carried out with consideration for the following:

- the personnel is provided with all required attributes to carry out its duties (documentation, materials and equipment) and is duly trained and certified;
- the operating conditions at the enterprise meet current standards and do not allow that hazardous impact of physical, chemical, biological and other harmful factors exceed the specified limits;
- INPP personnel safety and health system is aimed at ensuring the safety and health of the personnel, reduction of occurrence of accidents and rate of personnel occupational diseases;
- conditions for collection, analysis and introduction of the personnel proposals were created. Motivation of the personnel is carried out, labour and social guarantees and benefits for employees being dismissed are established. At the level of the enterprise the group for application of operating experience was formed and currently is working;
- the personnel activities are being monitored;
- there is a system that ensures recording of incidents caused by human error at the INPP, investigation of the causes and development of corrective measures; performs probabilistic safety assessment considering human factor and monitor psychophysical capabilities of personnel providing safe operation of the nuclear facility.

Considering the Human Factor Management Programme existing at INPP, activity on human factor management at the enterprise is performed in the following areas:

- Selection of personnel;
- Personnel recruitment;
- Personnel training and qualification;
- Personnel motivation;
- Provision of information;
- Personnel reliability;
- Workplace organization;
- Documentation control;
- Modifications;

- Using internal and industrial experience;
- Decommissioning organization.

The personnel action, not defined in the instructions, and errors are subjected to reviewing to identify direct and basic causes of the event, to eliminate causes and prevent further recurrence, the corrective measures are developed and taken. In order to insure the safety of INPP activities the system of medical alcohol tests is integrated in enterprise.

Different aspects of motivating in respect of incentives for the personnel are highlighted in the Corporate Policy of the plant. In addition, the motivation issues are considered during training and workshops on safety culture, which are conducted for the plant personnel on a regular basis.

Human factors related to unusual events at INPP are carefully investigated by commissions appointed in accordance with the norms and technical requirements in force. INPP is responsible for ensuring that the investigations are performed appropriately and in full, for reporting the results to VATESI and other interested organizations. Also the licensee is responsible for measures to perform needed corrections and to eliminate the root causes of an unusual event to preclude repetitions of similar events.

Also methods for analysing human errors are presented below in this Article.

### **Self-assessment of managerial and organizational issues by the operator**

The self-assessment of the activity at the levels of INPP divisions is carried out on a yearly basis. The procedure for self-checking and self-assessment is regularly revised. Self-assessment activities of INPP are described in Article 10 of this Report.

### **Arrangements for feedback of experience in relation to human factors and organizational issues**

The blame free work culture, when errors are seen as an opportunity for improvement is continuously being supported by INPP managers.

The importance of the human factor as a significant matter in safety is taken into account in the methodology of the evaluation of operational events. Event analysis methodology applied at INPP is based on ASSET methodology and is directed towards identification of direct and root causes of the event. Direct and root causes of the individual events are classified as equipment failures, documentation deficiency or human error. In case human factor impact is identified during the determination of causes, detailed investigation of human factor impact analysis for the respective event is performed. The analysis results are the integral part of the overall analysis of the respective operational event. To ensure the analysis is performed systematically, INPP applies the special “Procedure for additional analysis of events caused by the incorrect personnel actions during unusual events”. Such analysis identifies measures for prevention of events and their recurrence in the future as well as sharing the experience gained.

Audit, Safety and Quality Management Division carries out analysis of human factor impact on INPP safety. The division is responsible for carrying out special investigation of unusual events due to personnel error and (or) organizational factors. To perform the analysis INPP applies a special document “Method for Detail Analysis of Unusual Events Related to Incorrect Actions of Personnel”. According the document, the division forms a team of competent specialists. The methodology combines Man-Technology-Organization and ASSET methodology.

The analysis is performed by using a relevant method (or their combination) from the following list of methods:

- Task analysis;

- Changes analysis;
- Barrier analysis (for physical and administrative barriers that ensure safety);
- Event cause-effect analysis diagram;
- Fault tree analysis.

The team reviews the relevant documents, perform needed interviews, model and analyse causes of the event, its sequence and the related barriers, and develops the analysis report. Operating experience and feedback related information is presented within Article 19 (7) of this Report.

### **Regulatory review and control activities**

Through the regulatory review and assessment of safety documentation submitted by a licence holder, as well as inspection activities, VATESI ensures that the licence holder adequately addresses human factor issues through all lifetime of nuclear facilities.

VATESI has established the permanent commission for analysis of unusual events. This commission monthly meetings cover reviews of recent and other IAEA IRS and FINAS reports as well as reports from INPP on unusual events, including those on the events due to human factors and (or) organizational issues. Commission provides recommendations to INPP to apply lessons learned, to review relevant IRS and FINAS reports and (or) to present additional information on the events at INPP. The commission also provides recommendations to INPP for application of the lessons and performs follow-up of its recommendations to INPP.

### **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.*

### **Overview of arrangements and regulatory requirements for management systems of the licence holders**

The management systems of the persons engaged in the licensed activities and in other operations related to nuclear and/or nuclear fuel cycles materials, as well as in the evaluation of construction site of a nuclear installation falls under the scope of regulation under the Law on Nuclear Safety and is one of the main areas of nuclear safety regulation. As defined in Article 17 of the Law on Nuclear Safety, the highest priority in the management systems of such persons shall be the assurance of nuclear safety. Organisations operating nuclear installations and other holders of licences and/or permits must ensure high level of safety culture and competence of the organisation and its workers, on a regular basis analyse the state of nuclear safety and improve it, consider human factors (human capabilities and their limits) at all stages of life of a nuclear installation and maintain an effective integrated management system with due priority to nuclear safety.

BSR-1.4.1-2016 “Management System” specify regulatory requirements for development, implementation and maintenance of an effective management system for the organizations operating nuclear facilities and require covering all activities related to the use of safety important systems and components by management system’s documentation and periodically assess effectiveness of the management system. To this end an operating organization must establish an independent

department to oversee application of management system requirements and coordinate its improvement. The licensee and its safety-important contractors shall comply with all national legal requirements and regulations, including those in the area of nuclear safety. According to the BSR-1.4.1-2016 “Management System” licensee by developing management system shall consider application of the IAEA recommendations published in the IAEA guides on management systems.

### **Status with regard to the implementation of integrated management systems at nuclear installations**

The INPP integrated management system (hereinafter, IMS) integrates all organizational components (including its structure, resources, quality assurance, processes and safety culture) so as to establish the goals and objectives of the organization and enable the organization to achieve all of these goals and objectives. The INPP IMS provides a single framework for the arrangements and processes necessary to address all the goals and objectives of the organization. These goals and objectives include safety, quality, environmental, health, security and economic elements and other considerations such as social protection. The application of the IMS requirements is graded so as to deploy appropriate resources, on the basis of the consideration of the significance and complexity of each product or process, the hazards and the magnitude of the potential impact associated with the safety, health, environmental, security, quality and economic elements of each product or process and the possible consequences if a product fails or a process is carried out incorrectly.

The INPP Senior Management is ultimately responsible for the IMS and shall ensure that it is developed, implemented, assessed and continually improved in accordance with the established requirements and objectives. Within the INPP organization this function is assigned to Audit, Safety and Quality Management Division (AS&QMD). This is an organizational unit, which is independent from other functions and reports directly to Director General of the INPP. The AS&QMD Manager in the capacity of the Senior Management Representative has the specific authority and responsibility for coordinating the IMS development, implementation, assessment and continual improvement. The personnel of this department are appropriately trained and qualified to conduct the tasks.

### **Main elements of a management system covering all aspects of safety throughout the lifetime of the nuclear installation, including delivery of safety related work by contractors**

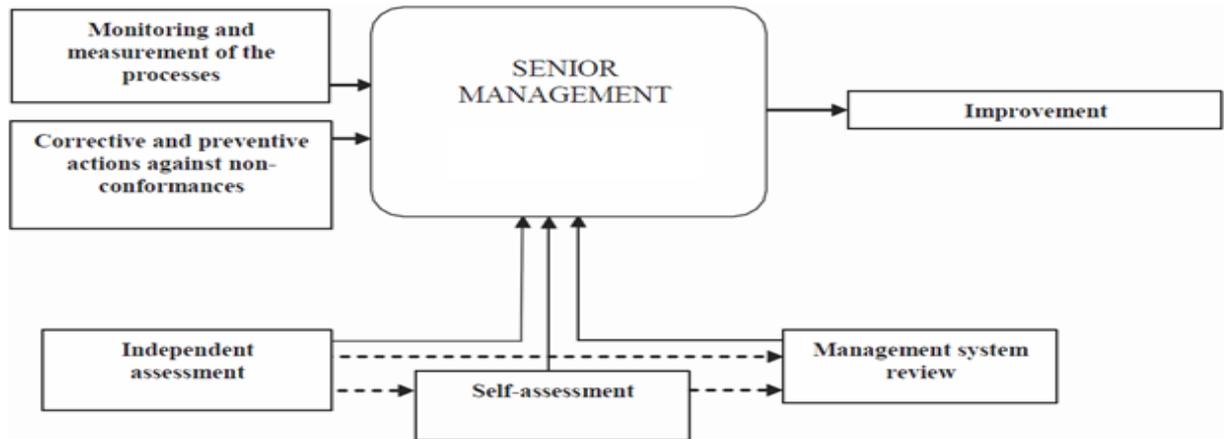
The INPP Senior Management establishes goals, strategies, plans and objectives that are consistent with the policies of the organization and appropriate to the activities and facilities of the organization. Currently, there are 10 documented policies in the IMS, including the Quality Management Policy.

The INPP IMS is a process-based management system. It is described by a set of documents specifying the overall controls and measures to be developed and implemented by the organization to meet the established requirements and objectives. These controls and measures apply to every unit and individual within the organization.

IMS Manual, Policies, Strategies and Final Decommissioning Plan are Level 1 documents applicable to development, implementation, assessment and continual improvement of the IMS. Currently, 41 upper-tier processes are grouped in the IMS Manual. All these processes are described in Level 2 documents (hereinafter, IMS procedures). The IMS procedures are documented process descriptions; they provide specific detail on which activities shall be performed and which organizational units shall carry them out so as to meet the general requirements specified in the IMS Manual. Detailed working documents, such as procedures, instructions, plans and schedules are

Level 3 documents. Developed in accordance with the requirements specified in the IMS procedures, they prescribe the specific details for the performance of sub-processes, projects and tasks by organizational units or individuals. Records stating objective evidence of activities performed or results achieved are Level 4 documents.

The relationship between the measurement, assessment and improvement processes in the IMS is shown in Figure 13.1. These processes are described and detailed in Level 2 and Level 3 documents respectively.



**Figure 13.1. Relationship between measurement, assessment and improvement processes**

**Monitoring and measurement**

The effectiveness of the IMS is monitored and measured to confirm the ability of the processes to meet the established requirements and objectives, and identify opportunities for improvement.

**Self-assessment**

The Senior Management and management at all other levels in the organization carry out self-assessment to evaluate the performance of work and the improvement of the safety culture.

**Independent assessment**

The independent assessment process includes internal IMS audits, audits of management systems of suppliers of safety-related products, surveillance inspections, engineering surveys, review of safety-related operating documents, modifications, decommissioning projects, event reporting, corrective actions developed in response to VATESI inspections, and licensing-related documents. Requirements for the planning, conduct, reporting and follow-up of independent assessments are documented in respective IMS procedures. The owner of the independent assessment process is AS&QMD Manager.

Management system reviews are conducted by the Senior Management annually to ensure the suitability and effectiveness of the IMS, and its ability to enable the objectives set for the organization to be accomplished. Quality management issues are discussed at monthly meetings chaired by General Director.

The procurement process is managed within the IMS. General requirements for procurement are specified in the IMS Manual. Detailed requirements for procurement process (including those for selection, evaluation and control of suppliers) are set forth in the Procurement Procedure and respective working documents. The graded approach is applied, so special attention is paid to control of the suppliers of safety-related products. Procurement documents contain requirements for the supplier organization, products to be supplied, supplier’s capabilities, personnel qualifications and management system. The supplier’s management system shall be equivalent at the least to the

requirements of the standards LST EN ISO 9001. In some cases, such as procurement of construction works, other management system standards may apply too.

After signing the contract, the selected safety-related product supplier is included into the List of Approved Safety-related Product Suppliers, which is reviewed and updated regularly. This list is communicated to VATESI annually.

Control of suppliers and their sub-suppliers is in accordance with the Procedure for Assessment of Safety-related Product Suppliers and Sub-suppliers and Control of Their Activities at the INPP. Suppliers are allowed to start their on-site activities at the INPP after they develop a Quality Assurance Plan subject to approval and control by the interested INPP department(s) and AS&QMD. The Supplier's personnel shall pass special training and certification by the INPP Personnel Division, covering aspects of radiation safety, fire safety, security, health & safety, safety culture and emergency preparedness as appropriate. In case of serial production quality assurance plans are not required.

### **Audit programmes of the licence holders and audits of suppliers of safety-related products**

The internal and supplier audits are conducted by the INPP personnel, who are in the list of qualified lead auditors/auditors. This list is updated annually. There is a procedure specifying requirements for lead auditor/auditor qualifications. The AS&QMD personnel are adequately trained and qualified to fulfil these tasks. Audit reports are distributed to the INPP Senior Management, managers of audited departments, senior managers of audited suppliers and to VATESI as appropriate.

Audits are conducted regularly on behalf of the Senior Management:

- to evaluate the effectiveness of the IMS processes and adherence to the established requirements and objectives;
- to determine the adequacy of work performance and leadership;
- to evaluate the organization's safety culture;
- to monitor product quality;
- to identify opportunities for improvement.

The processes and products that do not conform to the specified requirements are identified, segregated, controlled, recorded and reported to an appropriate level of the management within the organization. Corrective actions for eliminating non-conformances are determined and implemented. Preventive actions to eliminate the causes of potential non-conformances are determined and taken.

Opportunities for the improvements of the IMS are identified, and actions to improve the IMS processes are selected, planned, implemented and recorded. Annual reports on improvement of the INPP IMS are submitted to VATESI.

Audits of suppliers of safety-related products belong to the independent assessment process. They are planned, conducted, reported and followed-up in compliance with the Procedure for Supplier Audits.

### **Regulatory review and control activities**

The Law on Nuclear Safety defines, that the licences and permits shall be issued only to persons with sufficient capacities in terms of technological and financial resources, management system, human resources, emergency preparedness, safe and secure storage and shipment of nuclear materials, including their accounting and control that comply with the provisions on implementation

of the IAEA and the EURATOM safeguards, and allowing to properly fulfil the conditions required by the licence or permit and to ensure nuclear safety.

The Regulation on the Issue of Licences and Permits Necessary to Engage in Nuclear Energy Activities require applicants to submit for VATESI's review and assessment documents such as:

- documentation of 1<sup>st</sup> and 2<sup>nd</sup> level of management system;
- procedures for selection, training and certification of the employees and improvement of their qualifications;
- description of means for safety culture development;
- description of organizational structure;
- procedures related to selection, approval and control of suppliers and quality assurance of safety-important products, services and works;
- description of measures for employment of operational experience.

VATESI performs review of the INPP's management system's documents, reports of audits, including those performed at contracted organizations, reports on safety issues, reports on safety culture monitoring, assessment and carried out surveys, the documentation of modifications' to the nuclear installations including organisational changes whether they comply with legal acts and potential risks on safety are evaluated and properly managed.

During other regulatory oversight activities, e.g. inspections, VATESI specialists inspect management system, analyse management system's documents related to the particular activity or safety issue. When needed, the inspectors of VATESI require to improve activities or to make necessary corrections in the INPP management system's documents and (or) practice. VATESI performs the inspections of the activities of the INPP related to conducting the audits at the contractors' organizations, which provide safety important products and are involved into the INPP's decommissioning projects. The goal of such inspection is to ascertain how the INPP is performing the assessments (audits) of the management systems of the suppliers that are relevant to safety and of the capability of these suppliers to meet the requirements of the procurement documents.

## **Article 14 Assessment and Verification of Safety**

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

*(i) 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;*

*(ii) 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.*

### **Article 14(1) – Assessment of safety**

#### **Overview of arrangements and regulatory requirements to perform comprehensive and systematic safety assessments**

The Law on Nuclear Safety, among other provisions, establishes the main principles for safety assessment. Pursuant to Article 30 of the Law on Nuclear Safety the assessment of nuclear safety shall be a systematic process intended for verifying whether the siting, design, construction,

operation and decommissioning of a nuclear installation are safe – i.e. meet safety requirements established by the legal acts, technical codes and standards and other documents. The assessment of nuclear safety shall be conducted in the prescribed manner at all the stages of a lifecycle of a nuclear installation. The assessment of nuclear safety shall get sufficient attention and shall be assigned sufficient resources. The amount of resources shall be adequate to a possible issue's impact on nuclear safety.

The applicant or the licence holder carries out the analysis and justification of nuclear safety in the area of nuclear energy activities as well as other activities involving nuclear and nuclear fuel cycle materials. The persons implementing a nuclear installation project carry out the analysis and justification of nuclear safety during the evaluation of the construction site of a nuclear power plant. The results of the analysis and justification of nuclear safety are executed in the documents evidencing nuclear safety, which are established in the manner prescribed in the Law on Nuclear Safety and other legal acts. The results of the analysis and justification of nuclear safety are independently verified in the manner set out by VATESI. The applicant or the licence holder is responsible for the performance of such independent verification, whereas in case of the construction site of a nuclear power plant evaluation – the responsibility for performance of an independent verification falls on persons implementing the nuclear installation project design.

In addition to the main safety document evidencing nuclear safety, i.e. safety analysis report, the applicant or the licence holder shall provide to VATESI design documentation of a nuclear installation, which are necessary for the assessment of the safety analysis report. The nuclear installation design documentation shall establish and classify all the structures, systems and components of a nuclear installation according to their functions and importance to safety, and shall contain a comprehensive description of all the structures, systems, components, and operation processes that are important to safety.

Pursuant to Article 32 Paragraphs 7 and 7<sup>1</sup> of the Law on Nuclear Safety, a licensee shall perform a periodic safety analysis and justification and prepare a periodic safety review report at least every 10 years after the issuance of a permit for the commercial operation of a nuclear installation, or after approval by VATESI of the last safety case of corresponding nuclear installation, if the nuclear installation was commissioned before September 2017. The periodic safety review report shall be submitted to the VATESI for review and assessment. Thereafter, the VATESI shall adopt a decision regarding the acceptability of such report. The obligation to conduct the periodic safety analysis is also included into the licence conditions (issued till 2017) for operation of the Ignalina NPP units as well as the Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” detailing the main areas for review.

The review and assessment of nuclear safety shall be conducted by VATESI and results of such review and assessment shall be documented. The main goal of regulatory review and assessment process is to verify if the safety justification document complies with normative technical documents of nuclear safety and complies with factual circumstances. The decision on the safety justification document shall be made taking into account results of the review and assessment. The review and assessment of safety justification documents are performed in accordance with PR-5 “Procedure document for review and assessment of safety justification documents”, which is procedure document of VATESI management system. This procedure document defines formal procedure for regulatory review and assessment of safety justification documents. The outcomes, e.g. safety evaluation report of the VATESI review and assessment are documented in accordance with the provisions foreseen in procedure document PR-5.

VATESI also could require additional documents or conduct inspections, if it finds out that after review and assessment of the submitted documents the information is not sufficient to assess the documents according to the legal acts and acceptance criteria.

## **Safety assessments within the licensing process and safety analysis reports for different stages in the lifetime of nuclear installations**

Pursuant to Article 22 of the Law on Nuclear Safety, VATESI issues licenses and permits that cover all stages (except siting that have separate authorisation process, see below) of the lifetime of nuclear installations foreseen under the Convention:

- licence for construction of a nuclear facility (or facilities);
- licence for operation of a nuclear facility (or facilities);
- licence for construction and operation of a nuclear facility (or facilities);
- licence for decommissioning of a nuclear facility (or facilities);
- permit for first carry-in of nuclear fuel to site of a nuclear power plant or unit, or non-power nuclear reactor;
- permit for the first carry-in of nuclear and/or nuclear fuel cycle materials to site of a nuclear facility, except unit of a nuclear power plant and non-power nuclear reactor, and/or testing of a nuclear facility using nuclear and/or nuclear fuel cycle materials;
- permit for first start-up of a unit of nuclear power plant or non-power nuclear reactor;
- permit for industrial operation of a nuclear facility;
- permit for start-up of a nuclear reactor after its short-term shutdown.

All the necessary safety documents, such as safety analysis reports, operation limits and conditions, emergency preparedness plan etc., to be submitted when applying for each license or permit are listed in the Resolution No. 722 of 20 June 2012, of the Government of Republic of Lithuania on the Approval of Regulation on the Issue of Licences and Permits Necessary to Engage in Nuclear Energy Activities. All the documentation is subject for VATESI review and assessment.

### *Siting*

Pursuant to Paragraph 1 of Article 32 of the Law on Nuclear Safety, prior to starting the preparation of the nuclear installation design adapted to a specific construction site, the safety analysis of the site and the justification of safety have to be performed. The results of such analysis and justification are presented in the Site Evaluation Report which has to be reviewed and approved by VATESI. VATESI can approve the Site Evaluation Report only after verifying that the results of the analysis and justification of the construction site are in line with requirements of the legal acts and after having received positive decisions from other institutions, which are involved in the process of reviewing a report. The detailed procedures for reviewing the Site Evaluation Report are defined in The Resolution No. 83, January 25th, 2012, of the Government of the Republic of Lithuania on the approval of Rules of Procedure of the Assessment of the Nuclear Facilities' Site Evaluation Report and Nuclear Safety Requirements BSR-2.1.3-2010 “General requirements on site evaluation for nuclear power plants”.

Nuclear Safety Requirements BSR-2.1.3-2010 “General requirements on site evaluation for nuclear power plants” based on IAEA Safety Requirements No. NS-R-3 “Site Evaluation for Nuclear Installations” and best international practice. The regulation sets the main requirements for site evaluation, as well as proposals to use IAEA standards and guides for more detailed site’s hazards analysis.

According to the Governmental Resolution, VATESI forwards the Site Evaluation Report to other state institutions, which are involved in the process of reviewing the Site Evaluation Report. The LHMT, the Ministry of Health, Lithuanian transport safety administration, the LGT and the PAGD are involved in the process of reviewing the Site Evaluation Report, because the site evaluation, due to the abundance and the complexity of the possible impacts on the safety of the

nuclear installations, covers many areas – metrology, hydrology, geology, aviation, emergency preparedness and others.

Pursuant to Sub-paragraph 1 of Paragraph 7 of Article 32 of the Law on Nuclear Safety, the siting aspects of the nuclear installation is subject of periodical safety review.

### *Design*

Several issues of safety analysis reports shall be prepared for different stages in the lifetime of nuclear installations. Initially safety of design of nuclear installations is assessed performing preliminary Safety analysis report in accordance with Paragraph 2 of Article 32 of the Law on Nuclear Safety. The preliminary Safety analysis report is issued before acquiring license for construction or construction and operation. The goal of the updated Safety analysis report is to address all changes performed during construction of nuclear installation (Paragraph 3 of Article 32 of the Law on Nuclear Safety). In accordance with Paragraph 2 of Article 32 of the Law on Nuclear Safety, the final Safety analysis report is issued before acquiring permit for commercial operation. All the reports shall be presented to VATESI for review and assessment. The changes in safety analysis report is subject of regulatory review and assessment as well in accordance with Paragraph 5 of Article 32 of the Law on Nuclear Safety. Applicant or license holder shall provide technical documentation as reference material together with the Safety analysis reports. Any changes of the design considers as design's modifications and, taking into account graded approach, shall be approved by applicant or license holder and VATESI in accordance with Paragraph 6 of Article 32 of the Law on Nuclear Safety. The detailed requirements of modifications performing are established in the Nuclear Safety Requirements BSR-1.8.2-2015 "Categories of Modifications of Nuclear Facility and Procedure of Performing the Modifications". In all stages of the nuclear installations, taking into account specific features of the type of nuclear installation, they shall be in line with VATESI issued nuclear safety requirements and rules, as well as with codes and standards chosen by applicant or license holder.

Design issues, including ageing, are subject of periodic safety review in accordance with Paragraph 7 of Article 32 of the Law on Nuclear Safety.

### *Commissioning and Operation*

The Paragraphs 3 and 4 of the Article 32 and the Paragraph 3 of Article 2 of the Law on Nuclear Safety set a requirements for preparation of Commissioning programme that have to be approved by VATESI. A utility can start commissioning of nuclear installation if it holds a license defined in the Sub-paragraph 1 or 3 of Paragraph 1 of Article 22 of the Law on Nuclear Safety. The detailed requirements for commissioning are established in the Nuclear Safety Requirements BSR-1.8.5-2018 "Commissioning of Nuclear Facility". The initial and updated programmes of commissioning are foreseen. Licensees' reports on commissioning are licensing documents, they shall be presented to VATESI when acquiring certain permits (see Article 7(2)(ii) – System of licensing. Overview of the licensing system and processes including types of licensed activity).

Nuclear installations shall be operated in accordance with regulatory requirements and rules, as well as with codes and standards chosen by applicant or license holder, and documents of management system. Regulatory requirements and rules are issued by VATESI and, taking into account specific features of the type of nuclear installation, cover all areas prescribed by the laws regulating nuclear energy. Regulatory requirements and rules are established requirements for management system, operational limits and conditions, radiation protection, maintenance of equipment, ageing management, analysis and application of operation experience, improvement of safety, accidents management, emergency preparedness and others (see Article 7(2)(i) – National

safety requirements and regulations. Overview of regulations and guides issued by the regulatory body).

### ***Re-evaluation of hazards assumptions***

The re-evaluation of hazards' assumptions is performed according to requirement for periodic safety review of nuclear installations that is established in accordance with Paragraph 7 of Article 32 of the Law on Nuclear Safety.

### ***Overview of safety assessments performed***

Periodic safety review of the INPP Unit 1 was conducted and the respective report was developed by the early 2017, pursuant to the conditions set in licence for operation of the INPP Unit 1. The content and the scope of the periodical safety review of the INPP Unit 1 was chosen in accordance with the law on Nuclear Safety and regulatory requirements and agreed with the VATESI. It covered the areas recommended by the IAEA Specific Safety Guide No. SSG-25 "Periodic Safety Review for Nuclear Power Plants".

The performed Periodic safety analysis of the period 2007–2016 demonstrated that the remaining in operation systems of INPP Unit 1 ensure in a reliable manner the safe operation conditions and limits set in the Technical Specifications for Operation and the safety functions performed by the safety systems are fully preserved and performed by the systems remaining in operation and meet the design requirements during the spent fuel pools defueling stage. Remaining in operation equipment is operated, maintained and serviced following the requirements stated in the relevant procedures that are timely updated in respect to changing conditions, i.e. isolation, disconnection, dismantling of separate pieces of equipment that are not needed any more. The performed safety analysis and justification indicated that during the reviewed period the INPP was operated following the requirements of applicable laws, nuclear safety requirements, other normative technical documents and standards regulating nuclear and radiation safety, physical security and emergency preparedness and changes of the legal requirements were timely taken into consideration and transferred to the operational procedures; the performed analysis demonstrated that the safety level is maintained at the level required by the safety requirements, all the events during the reviewed period were rated at "level 0 / below the scale" in accordance with INES scale; the conducted operational and decommissioning activities did not have impact on the radiological situation of the region, ageing of structures, systems and components important to safety was effectively and duly managed and controlled following the established methodology and programme for ageing management and meets the safety criteria and the sufficient safety margin is provided for subsequent years of operation. It was also demonstrated that due to the shutdown of the INPP Units the impact to the environment significantly decreased and could be considered as negligible if compared with the impact during the operation. The radioactive discharges and release pathways comply with those defined in the plan for radioactive discharges into environment. The analysis also demonstrated that the issues of organisational changes, staffing, training in view of changed conditions, i.e. from operation to decommissioning, ageing of personnel is also duly solved by development of programs for long-term provision of personnel whose positions are important for safety assurance, accumulation and preservation of knowledge, etc. in order to ensure sufficient number of highly qualified personnel required for subsequent stages of decommissioning process.

The Periodic safety review report of Ignalina NPP Unit 1 was approved by VATESI in 2018.

In response to the event at Japan's Fukushima Daiichi Nuclear Power Plant, the European "stress tests" were conducted in 2011–2012 at Ignalina NPP according to specification agreed by ENSREG. The "stress tests" were performed for two permanently shutdown Ignalina NPP Units,

existing Dry Spent Fuel Storage Facility and the new Interim Spent Fuel Storage Facility (ISFSF). Appropriate Plan of strengthening nuclear safety in Lithuania (National Action Plan) was prepared in 2013. The National Action Plan also includes measures related to improvement of nuclear safety and emergency preparedness and response management in Lithuania.

The last safety improvement measures and appropriate safety assessments related to “stress tests” outcomes for Ignalina NPP Units nuclear safety were finished in 2015. Implementation of all other measures foreseen in the National Action Plan was completed in 2018. During the period of 2016-2019 such measures of the National Action Plan was implemented:

- transferring of WENRA Safety Reference Levels for Existing Reactors, which were updated on 24th September 2014 in relation to lessons learned from TEPCO Fukushima Daiichi accident, and are still relevant to safety of Ignalina NPP decommissioning (performed by regulatory body);

- implementation of the measures linked to the results of the IAEA mission on Emergency Preparedness Review (EPREV) conducted in Lithuania in 2012 and related to emergency preparedness management for responding to a nuclear or radiological accident (performed by regulatory body and other state institutions);

- evaluation of radiological consequences due to over-tipping of a cask filled with spent nuclear fuel during its transportation from the Ignalina NPP Units to the ISFSF site in case of beyond design basis earthquake and updating of relevant emergency procedures (performed by operator).

More details on participation of Lithuania in European “stress tests” and follow-up activity are provided in 7<sup>th</sup> National Reports of Convention on Nuclear Safety as well as in ENSREG website (<http://www.ensreg.eu/EU-Stress-Tests>).

Following the Law on Nuclear Safety and taking into account IAEA General Safety Requirements No. GSR Part 7 concerning hazard assessment Ignalina NPP performed preparatory works for evaluation of the consequences of postulated accidents that might have an off-site radiological impact. The beyond design basis accidents of very low probability of occurrence, including beyond design basis earthquake and large commercial aircraft crash accompanied with large-scale fire, shall be assessed. The outcomes of the analysis should be used to plan accident mitigation and off-site population protection measures that shall be included into the State Residents Protection Plan in Case of a Nuclear or Radiological Accident. The analysis should take into account installations such as spent nuclear fuel storage pools, reactors, including graphite of the reactor core, solid radioactive waste storage facilities and bitumen solidified radioactive waste storage facility.

### **Regulatory review and control activities**

The necessary safety documents shall be submitted when applying for license or permit that are defined in Article 22 of the Law on Nuclear Safety. These documents are listed in the Resolution No. 722 of 20 June 2012, of the Government of Republic of Lithuania on the Approval of Regulation on the Issue of Licences and Permits Necessary to Engage in Nuclear Energy Activities, and are subject of regulatory review and assessment (see information above in this Article). Any changes in the main licensing documents of commissioning or operation of nuclear installation shall be reviewed and assessed as well as approved by VATESI. VATESI is inspecting operators of nuclear installations during all stages of the lifetime of the nuclear installations.

## **Article 14(2) – Verification of safety**

### **Overview of arrangements and regulatory requirements for the verification of safety**

VATESI performs the supervision of maintenance, in-service inspections of SSC important to safety and ageing management processes at INPP in accordance with Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” and BSR-1.8.4-2018 “Ageing Management of Structure, Systems and Components Important to Safety of Nuclear Facilities”.

### **Main elements of programmes for continued verification of safety (in-service inspection, surveillance, functional testing of systems, etc.)**

In compliance with the “Regulation for Control of Metal Condition of Equipment and Pipelines of Systems Important to Safety of Unit 2 of the Ignalina NPP with the RBMK-1500 Reactor”, DVSEd-1125-1, and the “Regulation for Control of Fuel Channels of Unit 2 during Implementation of the Decommissioning Project”, DVSEd-1125-2, and related in-service inspection programmes the non-destructive in-service inspection of fuel channels, metal condition of piping and equipment of systems important to safety were conducted by the certified contracted organisation providing metal inspection and testing services.

However, after defueling of the Reactor of Unit 2 at the end of February 2018, after nonchemical in-line decontamination of the MCC and auxiliary systems of Unit 2, MCC equipment and pipelines including auxiliary related systems are being isolated for subsequent dismantling, therefore no in-service inspection of metal, technical verification, inspections and testing of Unit 2 fuel channels, MCC equipment and pipes in accordance with requirements of “Rules for Arrangement and Safe Operation of Equipment and Piping of Nuclear Power Installations”, PNAE G-7-008-89, will be conducted in future, but non-destructive control of metal of piping and equipment of other systems important to safety that had been undergoing mandatory inspection and control will be continued.

In compliance with the “Regulations for Inspections and Testing of Systems Important to Safety of Unit 1 and Unit 2”, “Procedure for Performance of Testing of INPP Systems and Equipment”, approved annual inspection schedules, operational procedures, testing programmes, routes and schedules of walk down, inspection of premises and equipment, maintenance flowcharts, etc. periodic inspections, control, surveillance and testing of systems important to safety are performed, including diagnostics of system and components, vibration and failure analysis of equipment important to safety. The results of maintenance are the basis to prepare the plans for repair or replace the components, to carry out modifications. VATESI’s Surveillance Division performs appropriate regulatory oversight (technical inspections) of these activities. The technical verification comprises external and/or internal inspection of equipment and piping, checking of parameters that prove the compliance of pressurized components with safety requirements, testing of the components and other actions aimed at assessing their adequacy in terms of safety.

### **Elements of ageing management programme(s)**

In 2018 the Nuclear Safety Requirements BSR-1.8.4-2018 “Ageing Management of Structures, Systems and Components Important to Safety of Nuclear Facilities” came into force superseding the Ageing Management Requirements of Systems and Elements, important to safety of Nuclear Facilities, VD-E-05-99.

The updated regulatory requirements establish requirements for ageing management of nuclear facility structures, systems and components important to safety that must be assessed during design, construction, commissioning, as well as during operation and decommissioning of nuclear facilities and during surveillance of closed disposal facilities, and implemented throughout the entire lifetime of the nuclear facility.

In compliance with the updated Nuclear Safety Requirements BSR-1.8.4-2018 “Ageing Management of Structures, Systems and Components Important to Safety of Nuclear Facilities” the INPP updated the ageing management system and the Ageing Management Programme. In accordance with BSR-1.8.4-2018 the INPP has prepared:

- procedure and programme for the ageing management of SSC important to safety;
- methodology for evaluation of the technical conditions and remaining life time of the SSC important to safety;
- procedure for screening of SSC for the purpose of ageing management;
- list of the INPP SSC important to safety;
- schedule of evaluation of the technical conditions and remaining life time of SSC important to safety, which are included into the Ageing Management Programme.

The main task of the Ageing Management Programme is to ensure reliable operation of structures, systems and components important to safety of the INPP nuclear facilities. The INPP Ageing Management Programme ensures performance of the following functions:

- general assessment of ageing process according to the design documentation requirements;
- timely assessment of the condition of structures, systems and components important to safety to ensure reliable operation of nuclear facilities during the design lifetime;
- timely detection of degradation phenomena of structures, systems and components important to safety, including determination of unanticipated causes, their elimination and mitigation of consequences;
- performance of necessary modifications and change of operation conditions in order to mitigate degradation phenomena; assessment of residual service life of structures, systems and components important to safety and planning of necessary measures.

The process of ageing assessment included:

- thermo-mechanical equipment;
- building structure;
- electrical equipment and elements of automatics and measurements.

This programme will be implemented as long as the INPP specific systems, structures and components are required to remain in operation and the decommissioning process has not been completed, also for the existing and newly constructed spent nuclear fuel and radioactive waste storage facilities.

#### **Arrangements for internal review by the licence holder of safety cases to be submitted to the regulatory body**

The Law on Nuclear Safety states that the analysis and justification of nuclear safety in the area of nuclear energy activities as well as other activities involving nuclear and/or nuclear fuel cycle materials shall be carried out by the applicant or the licence holder; whereas the analysis and justification of nuclear safety during the evaluation of the construction site of a nuclear power plant shall be carried out by the persons implementing a nuclear installation project. The results of the analysis and justification of nuclear safety shall be independently verified in the manner set out by the Head of the VATESI. The applicant or the licence holder shall be responsible for the performance of such independent verification, whereas in case of the construction site of a nuclear power plant evaluation – the responsibility for performance of an independent verification falls on persons implementing the nuclear installation project design.

Nuclear Safety Requirements BSR-1.4.1-2016 “Management System” defines the requirements for independent internal verification.

License holder is responsible for the performance of independent verification of the documentation of substantiation of modification safety according Nuclear Safety Requirements BSR-1.8.2-2015 “Categories of Modifications at Nuclear Facilities and Procedure for Implementation of these Modifications”.

### **Regulatory review and control activities**

Law on Nuclear Energy states that VATESI shall analyse and assess the documents submitted by applicants for obtaining a licence or a permit, also the documents submitted by licence holders or permit holders or other persons, shall adopt relevant decisions regarding such documents, shall review and evaluate the nuclear safety.

Regulatory review and control activities of the performance of licensed or permitted activities and evaluation of nuclear installations safety as well as safety of operations with nuclear and/or nuclear fuel cycle materials are comprised of: review, evaluation and agreement of nuclear safety documents submitted by the licence or permit holders and inspection activities.

The Head of VATESI has appointed permanent authorised employees who in the manner set out by the Head of VATESI, shall regularly supervise all stages of a nuclear installation lifecycle at its construction site. VATESI inspections are conducted at all stages of the lifetime of a nuclear facility: during the evaluation of a construction site for nuclear facility, its design, construction, commissioning, operation or decommissioning stages, as well as in supervising the closed radioactive waste repository, procuring, storing or transporting nuclear and/or nuclear fuel cycle materials and/or nuclear dual-use items. VATESI inspects applicants for obtaining licenses and permits, licenses and permits holders, suppliers of goods or nuclear fuel cycle materials. Every year VATESI develops a plan of inspections in accordance with the established criteria. VATESI annual inspection plan involves three general types of inspections, namely Special inspections, Regular (routine) inspections and Technical inspections. In addition to planned inspections as well as unplanned inspections which may be announced or unannounced are performed. Each year the following safety-related areas are inspected: training of the INPP personnel, safety systems and safety-related systems, management of beyond-design-basis accidents, management of radioactive waste, safety culture, ageing management, emergency preparedness, management systems and others.

Surveillance Division of VATESI performs periodical checks on technical condition of systems important to safety. The objective of technical checks is to ascertain that the technical condition of individual systems, installations and equipment of nuclear facilities complies with the requirements set in special operation, testing and repair regulations.

### **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.*

## **Overview of arrangements and regulatory requirements concerning radiation protection at nuclear installations**

Protection of the general public, workers of nuclear facilities and the environment against the possible radiation impact is regulated by the laws, norms and standards.

The basic standards and safety requirements for occupational and public exposure (including dose limits) are established in the Lithuanian Hygiene Standard HN 73:2018 “Basic Standards of Radiation Protection”, which is in line with the General Safety Requirements No. GSR Part 3 “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards” and the Basic Safety Standards Directive.

The basic regulation setting out requirements for radiation protection of workers working at the nuclear facilities is Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”. These requirements are in compliance with the General Safety Requirements No. GSR Part 3 “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards” and the Basic Safety Standards Directive as well.

The radiation protection requirements for contractors’ personnel are set in the Lithuanian Hygiene Standard HN 73:2018 “Basic Standards of Radiation Protection”. The principal requirement is that the radiation protection of contractors’ personnel shall be at the same scale as of permanent workers of the NPP. The employers, whose workers are performing their activities within the controlled area of the nuclear power plant, shall establish the co-operation agreements with license holders, where the order and procedure of registration and estimation of workers exposure, measures of exposure reduction and other significant means from the radiation protection point of view shall be described.

Pursuant to the Law on Nuclear Safety the plan for radioactive discharges into environment is one of documents that shall be submitted to VATESI together with documents accompanying the application for the issuance of licences for activities indicated in the Law. A plan for radioactive discharges into environment shall be prepared and updated in accordance with the procedure established by the Nuclear Safety Requirements BSR-1.9.1-2017 “Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides”. These requirements regulate the limitation of the release of radionuclides from nuclear installations and establishes that the activity of the radionuclides released from nuclear facility including controlled temporary increases of pollution shall be restricted insomuch that the annual effective dose of a member of a critical public group would not exceed a dose constraint. Annual effective dose constraint of general public applicable while designing, operating (during normal operation and anticipated operational events) and decommissioning of nuclear facility is 0.2 mSv. If the public exposure resulted from the operation of more than one nuclear facility, a total annual effective dose, caused by operations of all nuclear installations, shall not exceed the established annual effective dose constraint.

### **Regulatory expectations for the licence holder’s processes to optimize radiation doses and to implement the ALARA principle**

Relying on the Basic Safety Standards Directive, as well as on the international recommendations, Lithuanian regulation (the Law on Radiation Protection, Lithuanian Hygiene Standard HN 73:2018 “Basic Standards of Radiation Protection” and Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”) clearly refer to the ALARA principle: *any kind of exposure of individuals and society must be as low as reasonably achievable, economic and social factors being taken into account*. There is a regulatory requirement that the optimisation

of radiation protection is to be applied, together with the principle of justification of practices and the principle of limitation of individual exposures.

According to the requirements of Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”, one of the items of the radiation protection programme must be the application of optimisation principle (ALARA). For this purpose the ALARA programme shall be carried out at nuclear facility. ALARA programme shall contain description of organizational arrangements for implementation of ALARA principle, procedures for implementation of ALARA principle and the list of high dose tasks for the next year, which shall be reviewed annually. For high dose tasks ALARA analysis document shall be prepared well in advance before the planned activities to ensure implementation of ALARA measures indicated in ALARA analysis document (i.e. modification of equipment, modification of procedure, installation of protective equipment, installation of new working tools etc.) in due time. Analysis of the effectiveness of ALARA measures shall be implemented after completion of every high dose task and the results of this analysis shall be taken into account for optimization of radiation protection in other tasks where appropriate.

### **Implementation of radiation protection programmes by the licence holders**

To ensure adequate radiation protection of workers during decommissioning of INPP the Radiation Protection Program is established in accordance with the requirements of BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”. Following items are included in the Radiation Protection Program programme:

- Organizational arrangements for radiation protection (Radiation protection officer or Radiation protection unit, responsibilities and functions, rules and procedures);
- classification of working areas and access control;
- arrangements for individual and workplace monitoring;
- individual protective equipment and rules for their application;
- implementation of engineered controls;
- work planning;
- ALARA programme;
- programme of health surveillance;
- radiation protection training of workers and instructors.

### ***Observation of dose limits, main results for doses to exposed workers***

According to the Lithuanian Hygiene Standard HN 73:2018 “Basic Standards of Radiation Protection” the dose limits for the occupational exposure, apprentices and students, and members of public are presented in Table 15.1.

**Table 15.1. Dose limits for occupational exposure, apprentices and students, and members of public**

	Dose limits for occupational exposure, mSv	Dose limits for apprentices and students, mSv		Dose limits for members of the public, mSv
		Aged between 16 and 18 years	Aged 18 years or over	
Annual effective dose	20 <sup>1</sup>	6	20 <sup>1</sup>	1
Annual equivalent dose for the lens of the eye	20 <sup>2</sup>	15	20 <sup>2</sup>	15
Annual equivalent dose for the skin	500 <sup>3</sup>	150 <sup>3</sup>	500 <sup>3</sup>	50 <sup>3</sup>
Annual equivalent dose for extremities	500	150	500	-

<sup>1</sup> In special circumstances, a higher effective dose of up to 50 mSv in a single year may be authorized by the regulatory authority provided that the average annual dose over any five consecutive years, including the years for which the limit has been exceeded, does not 20 mSv.

<sup>2</sup> 100 mSv in any five consecutive years subject to a maximum equivalent dose of 50 mSv in a single year.

<sup>3</sup> Annual equivalent dose limit shall apply to the dose averaged over any area of 1 cm<sup>2</sup>, regardless of the area exposed.

Individual monitoring of personnel exposure at the INPP aims at assessing and ensuring radiation protection of workers in the INPP controlled area, obtaining the information about internal and external exposure doses, timely identification of cases of increased radionuclide content level in organism, and as a proof of the fact that the dose limits are not exceeding both in normal plant operation and in possible emergency conditions.

Individual monitoring of internal and external exposure of the INPP personnel is carried out by means of the individual dosimetry control computer-based system, which includes:

- thermo luminescence dosimetry system RADOS;
- direct-reading electronic dosimetry system RAD-51, RAD-52, RAD-62, EPD-MK2, EPD-N2, DMC-2000;
- gamma spectrometric system WBC ACCUSCAN 2260-G2KG (Whole Body Counter);
- local net;
- software support for collecting, storing, processing and displaying the information of individual personnel radiation monitoring from individual dosimetry control system RADOS and WBC ACCUSCAN 2260-G2KG.

Individual monitoring of external exposure of INPP personnel and contractors personnel is set for a period of one month. If according to the results of operational control total individual dose of worker exceeds 2.0 mSv reading of the TLD dosimeter is performed without delay. The results of individual monitoring of INPP personnel and contractors personnel for 2016 – 2018 are given in the tables 15.2 and 15.3.

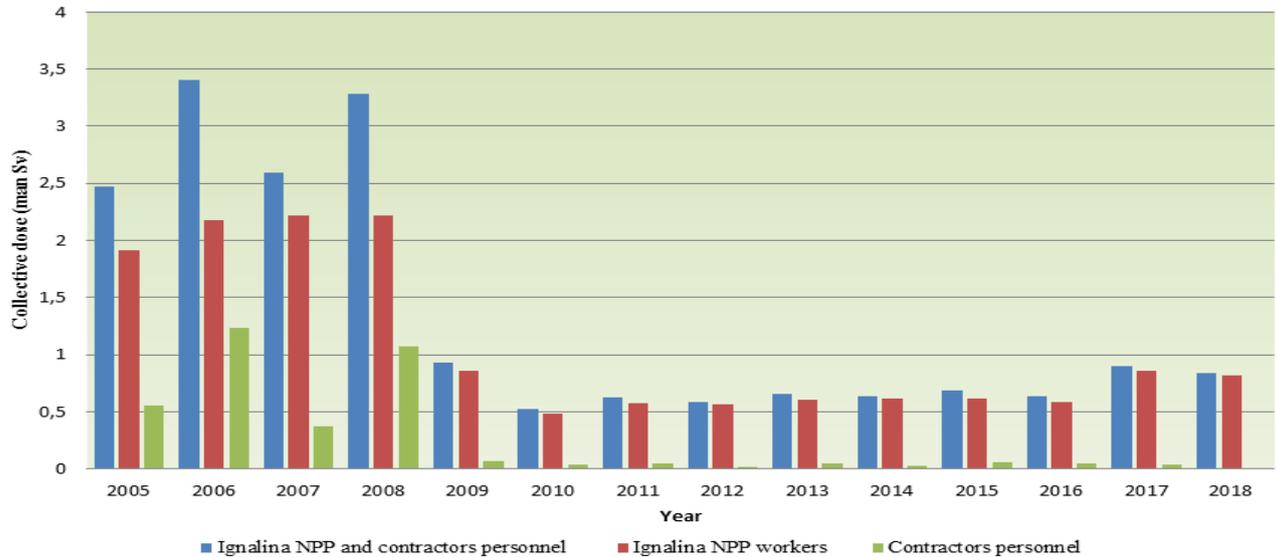
**Table 15.2. Exposure and collective dose dynamics of the INPP workers 2016–2018**

Year	Collective dose, Man·Sv	Highest individual exposure dose, mSv	Average dose, mSv
2016	0.589	11.77	0.34
2017	0.856	17.67	0.51
2018	0.823	15.47	0.50

**Table 15.3. Exposure and collective dose dynamics of the contractors’ personnel 2016–2018**

Year	Collective dose, Man·Sv	Highest individual exposure dose, mSv	Average dose, mSv
2016	0.045	2.51	0.04
2017	0.041	3.10	0.05
2018	0.013	1.40	0.02

In the Figure 15.1. the collective doses of INPP and contractors’ personnel from 2005 to 2018 are presented in graphic form.



**Figure 15.1. Collective doses of the INPP and contractors’ personnel from 2005 to 2018**

Individual monitoring of the neutron exposure was performed according to Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation Protection at Nuclear Facilities”, which allow assessment of the neutron dose applying gamma/neutron dose factor established separately for each room if planned annual neutron dose of the worker is below 3 mSv. The results of neutron dose assessment of the INPP and contractors personnel is given in Table 15.4

**Table 15.4. Collective doses against the neutron exposure of the INPP and contractors' personnel from 2016–2018**

Year	Collective dose from neutron, Man·Sv	Highest individual exposure dose from neutrons, mSv	Average dose from neutrons, mSv
INPP personnel			
2016	0.006	0.47	0.11
2017	0.032	1.77	0.19
2018	0.027	1.33	0.20
Contractors			
2016	0.006	0.58	0.16
2017	0.006	0.59	0.10
2018	0.002	0.52	0.17

The maximum individual neutron dose of the INPP personnel is 1.77 mSv, for the contractors' personnel is 0.59 mSv.

The annual individual exposure doses at the INPP did not exceed established dose limits. Individual monitoring of internal exposure of INPP personnel and contractors' personnel is conducted by gamma spectrometric measuring system WBC ACCUSCAN with the aim of obtaining the information about internal exposure doses, timely identification of cases of increased radionuclide content level in organism and prevention of fixed annual exposure dose exceeding. Personnel internal exposure control is realized in accordance with the "Time Schedule for Radiation Safety Monitoring at INPP". The values of an effective dose of the personnel internal exposure from 2016 till 2018 are given in Table 15.5.

**Table 15.5. Monitoring results for nuclide content in personnel organisms 2016 – 2018**

Year	The internal exposure effective dose of INPP personnel and contractors personnel, man								Number of people measured with WBC, man
	Less than minimal registration level of WBC (RLWBC=0.001 mSv)	RLWB C-0.1 mSv	0.1-0.2 mSv	0.2-0.3 mSv	0.3-0.4 mSv	0.4-0.5 mSv	0.5-0.6 mSv	0.6-0.7 mSv	
2016	1662	125	11	1	-	-	-	-	1799
2017	1509	135	18	3	1	-	-	-	1551
2018	1374	142	15	3	1	-	-	-	1535

The highest internal exposure value of INPP worker was registered in 2017, which amounted to 0.38 mSv. The highest measured activity of Co-60 radionuclide equals 544 Bq, Cs-137 radionuclide equals 5800 Bq.

According to the "Program of Monitoring of the Workers and Workplaces Exposure", carrying out of the following kinds of the personnel internal exposure monitoring is foreseen: confirmative, target, regular, monitoring prior to the beginning of works, monitoring after the completion of works.

The confirmative monitoring of personnel internal exposure is carried out once a year for all personnel in order to prove that the radiation protection of personnel is ensured and is sufficient. The target monitoring of internal exposure is carried out during and after radiation hazardous works for the INPP personnel and contractors' personnel depending on radiation conditions at working places and results of external exposure individual dose measurement. Regular monitoring of the

personnel internal exposure is carried out at least once every 3 months for the workers, whose expected effective annual dose of internal exposure is higher than 0,1 mSv/year according to the results of confirmative monitoring. Monitoring prior to the beginning of works is carried out with the purpose of internal irradiation individual background levels establishment for the personnel who have got a job in the controlled area. Monitoring after the completion of works is carried out with the purpose of estimation of internal exposure dose for the workers upon completion of work in the INPP controlled area at dismissal or transfer of the worker from the controlled area.

***Conditions for the release of radioactive material to the environment, operational control measures and main results***

Provisions of Nuclear Safety Requirements BSR-1.9.1-2017 “Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides” limiting discharge of radionuclides into environment are applied in order to protect humans, other living organisms, natural resources (the land, forest, water) and other environmental entities from harmful influence of ionizing radiation and contamination by radionuclides from nuclear installations. The requirements of this document are obligatory to nuclear facilities when designing, constructing and operating them as well as to nuclear facilities during decommissioning. This normative document regulates limiting of discharges of radionuclides into environment from nuclear facilities under normal conditions, including short-time anticipated operational transient, and it is not applicable for accidents. If more than one nuclear facility contributes to the exposure of the population, the total sum of annual effective doses to members of the public from all contributing nuclear facilities shall not exceed the dose constraint. The established dose constraint for members of the public is 0.2 mSv per year.

Operational control of radioactive releases into the atmosphere at INPP is ensured in accordance with the “Schedule of Monitoring for Ensuring Radiation Safety at INPP”. The control of radioactive substance releases into the environment is implemented by the following technical means:

- Automated Radiation Safety Monitoring System SAMRB;
- Laboratory equipment for taking, preparation and specific activity measurement of samples.

***Operational control measures of discharges to atmosphere and main results***

Automated Radiation Safety Monitoring System SAMRB ensures the control of radioactive releases into the environment by means of the Radiometric Facility PKC-07II. Measurements are made by means of determination of the activity of each controlled environment component in the samples constantly taken into the facility detection units. Limits of authorized discharges from INPP to atmosphere are presented in Table 15.6.

**Table 15.6. Authorized discharges limits from INPP to atmosphere**

<b>Airborne discharges</b>	<b>Bq/year</b>
Noble radioactive gases	$2,22 \cdot 10^{15}$
Particulate Pollutant	$1,72 \cdot 10^{12}$

Sampling of air releases for analysis is ensured by means of the sampling device fit into the air medium pipes. The sampling device faces the flow. Samples are taken from the central area of the flow. Gas and aerosol media are delivered to the place of sampling by the sampling routes made of stainless steel. Laboratory control is based on the stationary and portable sampling equipment, as well as on the stationary radiometric and spectrometric equipment. Discharge rates of noble

radioactive gases, radioactive aerosols from INPP during period 2016–2018 are presented in Table 15.7.

**Table 15.7. Discharges of noble radioactive gases, radioactive aerosols from INPP**

Year	Noble radioactive gases, $10^{12}$ Bq		Radioactive aerosols, $10^7$ Bq	
	Sum	% from DL*	Sum	% from DL
2016	0.00	0.00	5.725	0.0033
2017	0.00	0.00	5.411	0.0031
2018	0.00	0.00	7.016	0.0041

\*DL – Discharge limit.

No exceeding of limits in discharges was fixed.

Radiometric measurements of the specific activity of air releases are carried out with the help of devices which use the Geiger-Mueller meters and scintillation detectors as a detector. Pulse amplitude analyzers together with semiconductor detectors are used for determination of radionuclide composition of air releases.

***Operational control measures of discharges to water and main results***

Radiological monitoring of the environmental contaminants, removed by the waterway, at INPP is carried out in accordance with the “Environmental Monitoring Programme”. The facilities for monitoring of pollutant discharges into the reservoir-coolant are the service water intake channel, service water discharge channel, INPP industrial site industrial and storm water sewage system.

The periodicity of sampling from the intake and discharge channels, from the industrial and storm water sewage system – 3 times a month. The control of radioactive substance discharges into the reservoir-coolant is ensured by means of application of the laboratory equipment for taking, preparation and the measurement of activity concentration in samples.

Water samples for the analysis are taken by the EML laboratory assistants-radiation measurement operators with the help of sampling vessels. Samples are delivered to the EML by the EML laboratory assistants-radiation measurement operators using vehicles. The taken samples are measured by means of the following spectrometric and radiometric equipment:

- gamma spectrometers CANBERRA with semiconductor detectors CANBERRA made of especially pure germanium with software GENIE 2000;
- alpha spectrometer ORTEC Octete Plus with 8 measurement vacuum cells, with model BU-020-450-AS silicon detectors;
- liquid scintillation spectrometer TRI-Carb 2770 Tr/SI (for measurement of H-3 content in the water);
- low background gas flow beta counter RISO GM 25 (for measurement of beta emitters).

The discharge limit for the releases to water is  $1.72 \cdot 10^{14}$  Bq/year. No exceeding of limits in discharges was fixed. Discharge rates of gamma emitters into environmental water from INPP during period 2016–2018 are presented in Table 15.8.

**Table 15.8. Discharges of gamma nuclides into environmental water from INPP**

Year	Discharges, $10^7$ Bq
2016	3.45
2017	2.11
2018	4.92

Considering the Sr-90 and H-3 radionuclides are widely spread in the ecosystem and in the Lake Drūkšiai, it is impossible to identify their ingress with the process water, as their concentration in the water of both the intake and discharge channels is practically the same and is equal to the detection limit of the measurement equipment (0.007 Bq/l for Sr-90 and 3 Bq/l for H-3).

Using INPP monitoring data regarding airborne discharges and discharges into the Lake Drūkšiai doses for critical group of public during normal operation of INPP were evaluated. Annual dose for critical group of public during normal operation of INPP did not exceed the dose constraint value (0.2 mSv):

- in 2016 –  $8.496 \cdot 10^{-6}$  mSv and  $8.89 \cdot 10^{-5}$  mSv due to the airborne and liquid discharges respectively, in total  $9.74 \cdot 10^{-5}$  mSv per year;
- in 2017 –  $1.27 \cdot 10^{-5}$  mSv and  $7.05 \cdot 10^{-5}$  mSv due to the airborne and liquid discharges respectively, in total  $8.32 \cdot 10^{-5}$  mSv per year;
- in 2018 –  $1.23 \cdot 10^{-3}$  mSv and  $2.16 \cdot 10^{-3}$  mSv due to the airborne and liquid discharges respectively, in total  $3.39 \cdot 10^{-3}$  mSv per year.

The list of radionuclides and their activity released from the INPP into the environment with air emissions and water discharges in 2018 is of the same order as emissions and discharges from INPP in 2016 and 2017. Increasing the dose values in 2018 from the potential effects of each radionuclide is a consequence of new dose coefficients.

New dose coefficients were calculated according to regulatory requirements BSR-1.9.1-2017 “Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides” that were amended in 2017 in order to transpose Basic Safety Standards Directive. In accordance with the provisions of BSR-1.9.1-2017, all possible irradiation pathways were taken into account when calculating dose coefficients and conservative values of initial parameters were used.

***Processes implemented and steps taken to ensure that radiation exposures are kept as low as reasonably achievable for all operational and maintenance activities***

Implementation of the ALARA Programme at the INPP was started in 1996. The aim of the ALARA Programme at INPP for 2016–2018 is to make the personnel exposure dose as low as reasonable achievable and to provide maintaining of individual exposure limit within 20 mSv/year for 5 years, as well as to reduce the personnel collective annual dose.

The ALARA Programme has the following basic directions at the INPP:

- proper organization of the activities;
- improvement of working conditions and Personnel learning and training;
- perfection of engineering process;
- quality maintenance and Safety culture;
- human factor impact;
- identification of high dose tasks;
- ALARA analysis.

Since 1997 INPP has been implementing the Quality Assurance Program. The procedures of the first and second levels have been prepared and their main purpose was to address safety in all activities paying special attention to ALARA principle.

Responsibility for radiation protection is defined at the INPP in accordance with a Control Procedure of the second level “Radiation Safety” MS-2-005-1.

Director General is responsible for policy making in the field of radiation protection at INPP, distribution of authority and allocation of responsibility, implementation ALARA foundations at INPP as well as financing of radiation protection activity.

Heads of Departments and Services are responsible for organisation of activities at INPP according to radiation protection rules.

Heads of divisions are responsible for organisation of activities on radiation protection in their divisions in accordance with rules and standards, for training and professional skills of their staff, for making such working conditions when personnel exposure doses will be maintained as low as reasonable achievable.

Head of the Radiation Protection Service is responsible for work of the Service workers, their qualification, supply of resources, control of implementation of radiation protection standards and instructions, control of implementation of correction measures in case of inconsistencies.

Head of the Radiation Protection Division is responsible for preparation and review of procedures for establishment of types and levels of impact on radiation protection, implementation of radiation monitoring, control of implementation of radiation protection standards.

Head of the Maintenance and Quality Management Division is responsible for organisation and conducting of audits on radiation protection activity as well as coordination and corrective actions in this document.

Every worker is responsible for fulfilment of radiation protection requirements.

The staff that works in radiation exposure conditions is trained according to the programs on radiation protection training.

Requirements for radiation protection training are included in a worker's Job Description as well as in program for a post preparation. The course duration is 30 hours for workers dealing with the ionising exposure sources and 60 hours for those responsible for radiation protection. The personnel engaged in works related to high exposure doses shall undergo additional training course before they can start working. The training is arranged on a regular basis, and special training simulators are applied. Contractors' personnel are also trained and examined on radiation protection according to the same programs before they are allowed to work in a controlled area. Radiation protection training is implemented in accordance with a Control Procedure MS-2-014-1.

According to the Nuclear Safety Requirements BSR-1.9.3-2016 "Radiation Protection at Nuclear Facilities" the INPP territory and its premises are subdivided into the controlled area and the supervised area. The premises in the INPP controlled area are subdivided into three categories according to their radiation conditions, see Table 15.9.

**Table 15.9. Classification of INPP controlled areas**

Room category	Colour of the area	Frequency of service	Dose rate mSv/h	Surface alpha contamination Bq·cm <sup>-2</sup>	Surface beta contamination on Bq·cm <sup>-2</sup>	Total aerosol activity Bq·cm <sup>-3</sup>
I	Red	No service	>0.056	>20	>266	>1110
II	Yellow	Periodic	0.012-0.056	4-20	40-266	185-1110
III	Green	Permanent	<0.012	<4	<40	<185

The first category premises are unmanned ones. The doors of category I rooms are tagged by a sign with red labels and in addition are tagged by according signs of radiation danger. The access to the room is authorised under the orders, written orders or special programmes approved in accordance with the established procedure with the permission of the Shift Supervisor or Radiation Safety Control dosimetrist.

The second category premises are those, the entrance into which is only permitted for periodic maintenance of the equipment located in them (Central Hall, a Spent Fuel Storage Pools Hall, a sample cutting room). The doors of these rooms are tagged by a sign with yellow labels and in addition are tagged by according signs on radiation danger. The access to the specified rooms is authorised according to INPP valid procedures.

The third category premises are those of personnel permanent residence (for example, operator rooms, control panels, workshops, laboratories, corridors, etc.). Doors of these rooms are tagged by a sign with green labels.

The access to the premises, which under any radiation factor are related to categories I or II, is strictly regulated. The works in these premises are carried out in the following order:

- people responsible for radiation protection shall assess the radiation condition of working places and develop the principles of requirements to safety;
- operators shall prepare the working place;
- workers get appropriate instructions;
- workers shall be followed by a person responsible for dose monitoring, who assess the radiation conditions.

In order to reduce the personnel exposure dose the working area or object is decontaminated before the activities can be started. The activities with increased exposure are usually carried out with the following radiation protection means: lead screens, distance safety equipment, video-monitoring systems.

To provide radiation protection a system of job confirmation procedures has been developed at the plant, a system of permission issue for carrying out of radiation dangerous works is being efficiently used. All activities under ionising exposure conditions are carried out in accordance with “Direction on Radiation Accident Prevention during Work Performance in Controlled Area” requirements.

Medical examination of the personnel who works in a controlled area includes an initial medical examination and a subsequent annual health control. According to the Order No 561 issued by the Ministry of Health the plant personnel shall pass medical examination once a year. In case doctors find any contraindications, this person is not allowed to work with sources of ionising radiation.

#### ***Environmental monitoring and main results***

The operator of a nuclear facility has to work out the monitoring programme and implement it in accordance with requirements for radiological environmental monitoring that are laid down in the Order No. D1-546, 16<sup>th</sup> of September, 2009, of the Minister of Environment “On approval of regulation of environmental monitoring of economic entities”. Measurements shall be made by the laboratory owned by the subject or any other hired laboratory (or laboratories) possessing the required equipment and qualified personnel to ensure data quality.

The monitoring programme shall cover all important routes of radionuclide dispersion and population exposure to enable the proper evaluation of annual airborne and water discharges, likewise their short term changes and consequently doses for critical group members.

Environmental samples shall be taken from the vicinity of release points and from potentially most contaminated (according the radionuclide diffusion calculations and specific conditions of landscape) places of sanitary protection and monitoring zones.

To evaluate the impact of INPP on the environment and population continuous radiation monitoring is carried out on the INPP site and within a radius of 30 km. Measurements of activity concentration of radionuclides in foodstuffs, drinking water and soil have been conducted since the start of operation of INPP. The data of measurements show that the Cesium and Strontium activities concentration in foodstuffs and drinking water do not considerably differ from the activity level in other regions of Lithuania and do not exceed those laid out in the Lithuanian normative documents, see Table 15.10.

**Table 15.10. Concentration of Cs-137 in the fish and soil in INPP Region in 2016-2018**

Sample	Average values in INPP region (Bq/kg)		
	2016	2017	2018
Fish	-*	-*	1,08
Soil	3.17	3.60	1.13

\* – The planned number of fish was not reached because according to the information provided by the Ministry of Environment (Nature Conservation Department) and the Ministry of Agriculture (Fisheries Department), there was no potential suppliers who had the right to fish in Lake Drūkšiai in 2016–2017 (there was no auction for this right).

The monitoring of the population exposure is carried out in the zone of 30 kilometres. The annual exposure dose of the population was found to be below the fixed limit of 0.2 mSv.

All release pathways at the INPP are monitored. Particles and aerosols are continuously monitored in ventilation stacks of INPP. The measurements of activity concentration in water are performed every time before is discharged into the lake. Water samples from intake and outlet channels are measured in laboratory daily.

On the site and in the vicinity there are TL dosimeters set out for measurements of accumulated dose, which are evaluated by INPP at least twice a year. Also, on-line monitors for in-situ dose rate measurement are set around the INPP. The readings of monitors permanently can be made available to the authority.

In order to control the impact of the INPP on the environment, aerosol and atmospheric precipitation (continuous), water, bottom sediments, grass and other environmental samples are taken. The results of measurements are reported to the authority.

The automated Radiation Safety Monitoring System (SAMRB) for control of radiation protection of workers and environment is in operation at the INPP. System operates in the territory of INPP and in the monitoring area of potential radioactive contamination.

SAMRB registers all parameters characterizing radiological situation in the INPP and environment (levels of radioactive discharges into environment, levels of gamma radiation and air contamination in the INPP rooms, contamination of technological media), for all the modes of operation. The data from a radiation control system with signalling or alarming devices is automatically transmitted to the radiation situation supervision service.

### **Regulatory review and control activities**

There are two radiation protection regulatory authorities in Lithuania with clear function separation: VATESI and Radiation Protection Centre (RSC).

VATESI is responsible for supervision of occupational radiation protection in nuclear energy area. For the regulatory purposes, VATESI drafts and approves legal acts related to occupational radiation protection in nuclear energy area, which shall be coordinated with the Ministry of Health. VATESI also sets the requirements for different life stages of nuclear facilities taking into account radiation protection aspects, sets the requirements for clearance of radioactive materials and establishes the procedure and limits for the release of radionuclides from nuclear facilities.

To evaluate how the radiation protection requirements are fulfilled by the license holder VATESI conducts inspections. During the inspections at nuclear facilities VATESI checks how the license holder performs the individual and workplace monitoring, manages the controlled area, implements the principle of optimization, applies personal protective equipment, ensures the radiation protection training of workers and implement other radiation protection measures during the decommissioning of INPP. During the annual inspections on implementation of environmental

monitoring programme, procedures of operational control of liquid and gaseous discharges from INPP are inspected as well.

Also VATESI performs review of safety related documents, including reports on occupational exposure and release of radionuclides, which shall be submitted to VATESI on regular basis. By the end of the year VATESI is provided with the report on the impact of nuclear facilities on the environment.

The radiation protection issues during decontamination and dismantling of the INPP buildings and equipment and the radioactive waste management, control of occupational and public exposure during the decommissioning of the INPP will remain one of the underlying areas of regulatory activities.

RSC is regulatory authority executing regulatory control of exposure of people and environment and practices with sources of ionizing radiation, except of regulation and supervision of the practices in the area of nuclear energy. Among other responsibilities the RSC is responsible for the radiation protection of the general public from negative impact which may cause the ionizing radiation, including ionizing radiation, arising from nuclear facilities in operation and decommissioning.

RSC as regulatory body takes part in evaluation of Environment Impact Assessment Reports of Ignalina NPP decommissioning projects and also is regularly assessing exposure for public due to discharges to the atmosphere and water from Ignalina NPP.

Within State Environmental Radiological Monitoring the measurements of radioactivity in the foodstuffs (milk, meat, vegetables, grains, and fish), raw food, drinking water, and mushrooms are performed at a schedule approved by Minister of Health Care. Milk and drinking water are analyzed on quarterly basis, fish, meat – twice per year, vegetables, grains, mushrooms – during summer time. Results showed that the levels of artificial radioactivity in the samples analyzed are very low, and radioactivity in the samples in Ignalina NPP area is the same as in the other territory of Lithuania.

The Ministry of Environment approves requirements on measurements of environmental radiation while Environmental Protection Agency (EPA) controls the implementation of these requirements. EPA ensures environmental radiological control within the sanitary protection zone of the nuclear facility. There are five automatic gamma dose rate measurement stations in vicinity of INPP. There is a non-automatic station for aerosol sampling in 60 km distance from INPP and automatic aerosol station in Vilnius. Environmental samples are periodically taken within the zone of INPP: water, biota and bottom sediments of the Lake Drūkšiai. Control of INPP laboratory is provided for ensuring of reliability of results.

Automatic gamma dose rate measurement network was upgraded in the year 2017–2018. The total number of a national monitoring network spectrometric measuring stations are 48, including 3 spectrometric measuring stations for measurement of gamma dose rate in major Lithuanian rivers Neris and Nemunas. 14 stations were installed along the border with Belarus due to the current construction of a new nuclear power station on the Ostrovets location, Belarusian Republic, approximately 20 km from the border to Lithuania and approximately 40 km from Vilnius. Measurement data are transferred to the data centre every 10 minutes and analysed.

## 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.*

*2. 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.*

*3. 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.*

### Article 16(1) – Emergency plans and programmes

#### Overview of arrangements and regulatory requirements for on-site and off-site emergency preparedness

The main laws that set and describe the general criteria for ensuring on-site and off-site emergency preparedness and response in case of nuclear and radiological emergencies are:

- the Civil Protection Law. It establishes the legal and organisational framework for the organisation and functioning of the civil protection system, the competence of state and municipal institutions and agencies, the rights and duties of other agencies, economic entities and residents in the sphere of civil protection;

- the Law on Nuclear Energy. It sets the general obligations and assigns responsibilities for licence holders and state institutions for preparedness and response to nuclear and radiological emergencies at nuclear facilities. This law sets the order of preparation and approval of the state plan for protection of population in case of a nuclear or radiological emergency (off-site plan);

- the Law on Nuclear Safety. It sets responsibilities for license holders to ensure the preparedness for possible nuclear and radiological accidents, their prevention at nuclear installations. This law sets the obligation for license holders to prepare and test an on-site emergency preparedness plan.

The arrangements for ensuring the off-site preparedness and response to nuclear and radiological emergencies are established in the National Plan for Protection of Population in case of Nuclear or Radiological Emergency (hereinafter – Plan). The Plan was amended in 2018 due to the current construction of a new nuclear power station on the Ostrovets location, Belarusian Republic. The Plan defines civil protection actions in case of nuclear or radiological emergency at the state level in Lithuania and (or) outside of Lithuania. The Plan is prepared in accordance with IAEA General Safety Requirements No. GSR Part 7 “Preparedness and Response for a Nuclear or Radiological emergency”, IAEA Safety Guide No. GS-G-2.1 “Arrangements for Preparedness for a Nuclear or Radiological Emergency”, IAEA General Safety Guide No. GSG-11 “Arrangements for the Termination of a Nuclear or Radiological Emergency”.

“Recommendations on Determination and use of Emergency Preparedness Categories and Criteria for Preparedness to Radiological Emergencies that may Occur in the Activities with Sources of Ionizing Radiation, except activities in the area of nuclear energy”, approved by the order of director of Radiation Protection Centre in 2016, describes emergency preparedness categories III

and IV and their identification criteria in a case of radiological emergency, that can occur during practice with sources of ionizing radiation (with the exception of generators of ionizing radiation), with the exception of activities with sources of ionizing radiation in the nuclear energy area.

Lithuanian Hygiene Standard HN 99:2011 “Protective Actions of Public in Case of Radiological or Nuclear Emergency” amended in 2016 implements IAEA General Safety Guide No. GSG-2 “Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency” and corresponds to the IAEA General Safety Requirements No. GSR Part 7. Lithuanian Hygiene Standard HN 99:2011 “Protective Actions of Public in Case of Radiological or Nuclear Emergency” establishes generic criteria for acute doses to avoid or to minimize severe deterministic effects, generic criteria for protective actions to reduce the risk of stochastic effects, operational intervention levels (OIL) for environmental measurements, skin contamination, food, milk, drinking water, procedures on administration of stable iodine, clean-up procedures and dosimetric control of contaminated population, etc. This Hygiene Standard is a basis for application of public protective actions.

The main regulatory requirements for ensuring the on-site preparedness and response to nuclear and radiological emergencies at nuclear facilities are set in the following regulations:

Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” set the objectives, guidelines, principles and the main safety criteria for nuclear facilities operating RBMK-1500 type reactors. This document puts the obligation for operator of nuclear facility to make analysis and prepare the list of possible beyond design accidents, which may lead to severe reactor core damage or melting. The BSR-2.1.2-2010 sets the requirement for operator to prepare the emergency preparedness plan taking in account the analysis of possible severe beyond design accidents.

Emergency Preparedness and Response Requirements for the Operators of Nuclear Facilities, approved by Order No. 22.3-107, October 24th, 2008, of the Head of VATESI, set the main requirements for emergency preparedness at the nuclear facilities. The Requirements oblige the operator of nuclear facility to assure prevention of accidents and incidents and, in the event of an accident, to perform the emergency preparedness tasks immediately. This document requires the operator of nuclear facility to develop the Emergency Preparedness Plan complying with its provisions. This document is based on IAEA Safety Guide GS-R-2, GS-R-2.1, “Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency” (TECDOC-953 update) and is being revised according to IAEA General Safety Requirements No. GSR Part 7.

### **Overview and implementation of main elements of national plan for emergency preparedness**

The civil protection and rescue system is comprised of the Government of Lithuania, the Government Emergency Commission, the Ministry of Interior, the PAGD and the agencies subordinate thereto, ministries and other state institutions and agencies, municipal emergency commissions, municipal institutions and agencies, economic entities and other agencies, operations centres and forces of the civil protection system.

National management of emergencies is carried out on two levels: state (governmental) and municipal. The state level comprises the Government of the Republic of Lithuania, the Government Emergency Commission, the State Emergency Operation Centre, the Emergency Operation Centres of the Ministry of Interior and other ministries, Emergency Operation Centres of the PAGD and other governmental institutions, including VATESI. The municipality level comprises the Municipal Administration, the Municipal Emergency Commissions, the Municipal Emergency Operations Centre, the Fire Protection Services, as well as other institutions, economic entities and

theirs Emergency Operation Centres. Preparations for likely emergencies are carried out by means of planning related activities on each level of the civil protection system.

The PAGD is national competent authority that regulates and coordinates the state civil protection system in the country, controls the way the civil protection system is functioning, organizes operation of State Emergency Operations Centre during emergency situations, organizes and conducts civil protection exercises at national level, organizes firefighting operations, rescue of people and property, organizes notification and provides information to public.

In case of nuclear or radiological emergency at nuclear facilities (inside or outside of territory of Lithuania) VATESI is responsible for collecting information about situation at the nuclear facilities, analyzing and forecasting the development of the situation and predicting possible emissions and pathways of radioactive materials, providing information and advice to the Government, PAGD, Ministry of Environment, Ministry of Energy and RSC, providing information and consulting the Government Emergency Commission, providing information to the mass-media and public about the situation in the nuclear facilities, notifying European Commission, IAEA, neighbouring countries in accordance with the Convention on Early Notification and bilateral agreements. In case of emergency situation caused by nuclear emergency VATESI has a right to initiate Government Emergency Commission.

In accordance with the Plan the RSC presents recommendations to the State or Municipal Emergency Commission, to the State or Municipal Operation Centre for the reduction of exposure doses and prevention of deterministic and stochastic effects of radiation on the public and emergency workers. RSC performs analysis of foodstuffs, drinking-water and other samples, contaminated by radionuclides, and presents suggest to the Ministry of Health to approve foodstuffs and their raw materials, drinking-water, feeding stuffs temporary maximum permissible levels of radioactive contamination for the emergency consequences liquidation period, organizes supervision and control of their compliance. RSC also presents proposals to the Ministry of Health about the necessity of applying thyroid blocking and provides information to the public, within the limits of its competence, about protection actions.

In the event of a nuclear accident PAGD is responsible for organization of warning, fire protection and rescue and public information and a real surveillance of contaminated territory. In the case of emergency, actions of ministries and government authorities shall be coordinated by the Government Emergency Commission, which is comprised of ministerial and governmental officers entitled to decisions making. Operation body of the Government Emergency Commission is the State Emergency Operations Centre comprised of ministerial officers and the headquarters of the PAGD.

In the event of an emergency the State Emergency Operations Centre shall:

- manage rescue operations and liquidation of consequences of the general emergency, aggregate the existing national forces and material resources, if the accident covered territories of more than three Municipalities;
- organize aggregation and co-ordination of assistance required for rescue operations and liquidation of the consequences of the emergency;
- if necessary, prepare and submit the Government proposals and drafts of decisions related to liquidation of the consequences of the emergency, organization of related operations and provision of assistance;
- prepare and submit the Government a report on material resources required for liquidation of the consequences of the emergency and proposals concerning compensations to victims;
- inform the general public on the accident and related actions according to issues delegated under authority of the Government Emergency Commission.

PAGD is responsible for dissemination of information on the emergency to the ministries, municipalities of cities/towns. For this purpose it shall use automatic system for the national managing bodies and warning of the population, public means of communication (subscribers'

telephone, fax for general purposes) and direct telephone and radio communication channels additionally arranged by PAGD. In addition, the PAGD also transmits information on the emergency to state civil protection management bodies in the neighbouring countries. International notification and information issues lay on VATESI.

Radiation surveillance is planned and coordinated by the RSC on the basis of information provided prognosis of EPA, needs and recommendations of the Ministry of Environment, Ministry of Health Care and other authorities. If there is a need PAGD also has a capability to make additional reconnaissance of contaminated area.

Decisions concerning regular prophylactic application of iodine preparations in the event of an emergency shall be made by municipal Emergency Operation Centres. Population in the zones of long-term protection measures (100 km) shall be supplied with stable iodine preparations in advance by local municipalities of cities and regions. The latter shall acquire such preparations on their own account, consequently distributing iodine preparations for the population and replacing them prior to the date of expiration.

In the event of the general emergency evacuation of the population shall be managed on the municipal level by director of Municipal Administration or at highest level by a head official for civil protection operations assigned by the Prime Minister. Proposals concerning evacuation shall be given by municipal Emergency Operation Centres on the basis of the situation analysis and likely future forecasts.

Evacuation might be implemented in the urgent procedure, if a territory has already been contaminated, or in the planned procedure through population collecting posts, taking into consideration a particular situation and specific features of the area. In the event of urgent evacuation from the territory contaminated with radioactive materials, the population is evacuated right from their places of residence or/and work. The population collecting points serve for evacuation of people from the territory, which, according to forecasts, might be contaminated with radioactive materials and therefore might be dangerous for work or living. Taking into consideration meteorological conditions (direction of the wind), evacuation might be carried out in three directions.

### **Implementation of emergency preparedness measures by license holders**

To protect the personnel of INPP and the population of the Republic of Lithuania and the neighbouring Countries against potential consequences of nuclear and radiological emergencies, the INPP carries out emergency planning and emergency preparedness activities. Emergency planning process at the INPP includes:

- analysing of potential emergencies and assessing of their consequences to the personnel, people and the environment considering the worst-case consequences;
- establishing of the Emergency Preparedness Organization (hereinafter – EPO) capable to eliminate potential emergencies and their consequences;
- performing permanent monitoring of the operability of the technical means ensuring accident prevention, their localization and elimination;
- stocking of the material and technical resources required for the EPO functioning;
- maintaining of continuous preparedness of the Accident Management Centre (hereinafter – AMC) and training of the personnel of EPO headquarters, services and teams, and the personnel not involved in the EPO services;
- timely updating of the INPP Emergency Preparedness Plan (hereinafter – EPP) with due consideration of the full-scale exercises results, changes in requirements as well as results of inspections conducted by VATESI, Visaginas Fire-rescue Board, and other state management and control institutions.

The INPP Director General is in charge of emergency preparedness and planning at the enterprise through the Manager of Fire Surveillance and Civil Protection Group of the Audit, Safety and Quality Management Division (hereinafter – AS&QMD).

### ***Classification of emergencies at Ignalina NPP***

The following emergency classes are defined at INPP:

*Alert* is a violation of a nuclear facility state capable to develop into a nuclear or radiological accident during which:

- the acceptable concentrations of radionuclides in nuclear facility premises can be exceeded;
- the established limits of irradiation doses of the personnel can be exceeded;
- failure of structures, systems and components important to safety (hereinafter – SSC important to safety) occurred, which can lead to decrease in a level of protection of the core or the spent nuclear fuel.

**Note:** In case of such violations the appropriate nuclear facility EPP instructions come into force, members of the nuclear facility EPO headquarters are gathered at EPO AMC. EPO headquarters carry out an estimation and, if necessary, management of elimination of the arisen emergency. Investigation of radiation conditions within the limits of the nuclear facility site is conducted on a regular basis.

*Facility emergency* is a violation of a nuclear facility state during which:

- the acceptable concentrations of radionuclides in nuclear facility premises are exceeded or the maximum permissible activity of radionuclides released into environment is exceeded;
- the established limits of exposure doses of the personnel are exceeded;
- the failure of SSC important to safety occurred, which led to decrease in a level of protection of the core or a safety level of the spent nuclear fuel.

**Note:** Consequences of the accident on equipment do not go outside the limits of the controlled area. In case of such accidents the EPP, the appropriate instructions on emergency preparedness and, if necessary, beyond design accident management guidelines (hereinafter – RUZA) are put into action. Members of the EPO headquarters are gathered at AMC, the required EPO services and teams are gathered and brought to readiness. EPO headquarters carry out an estimation and management of elimination of the arisen emergency. Investigation of radiation conditions within the limits of the controlled area is conducted on a regular basis. In case of such accidents the protective actions for the population outside the controlled area, and for limitation of nuclear facility personnel exposure doses, which should be specified taking into consideration the created circumstances, should be prepared in the EPO headquarters in advance.

*Site area emergency* is a violation of a nuclear facility state during which:

- release of radioactive products within the limits of the controlled area occurred in the quantities exceeding the regulated values, which demand urgent performance of measures on protection of the personnel of the entire enterprise;
- excess of the established limits of exposure doses of the population is possible;
- failure of SSC important to safety occurred, which can lead to the core or the spent nuclear fuel damage.

**Note:** In case of such accidents the EPP, the instructions on emergency preparedness and appropriate RUZA are put into action. Members of the EPO headquarters are gathered in AMC. All EPO services and teams are gathered and brought to readiness. EPO headquarters carry out an estimation and management of localization and elimination of the arisen emergency. Investigation of radiation conditions within the limits of the controlled area and outside it is conducted on a regular basis. In case of such accidents protective actions for the population outside the controlled area, as well as the protective actions for limitation of nuclear facility personnel exposure doses, which

should be specified taking into consideration the created circumstances, should be prepared by the EPO headquarters in advance.

*General emergency* is a violation of a nuclear facility state during which:

- release of radionuclides into environment occurred that can cause environmental contamination and the population exposure, wherefrom the protective actions should be applied established by the Lithuanian Hygiene Standard HN 99:2011 “Protection of the Population in Case of Radiological or Nuclear Accident”;
- damage of the core or the spent nuclear fuel;
- failure of SSC important to safety occurred, which can lead to the core or the spent nuclear fuel melting.

**Note:** In case of such accidents the EPP, the instructions on emergency preparedness and appropriate RUZA are put into action. Members of the EPO headquarters are gathered in AMC. All EPO services and teams are gathered and brought to readiness. EPO headquarters carry out an estimation and management of elimination of the arisen emergency. Investigation of radiation conditions within the limits of the controlled area and outside it is conducted on a regular basis. Urgent actions on protection of the nuclear facility personnel are carried out. In case of the accidents of such class the municipalities of the nearby cities should execute the urgent actions on protection of the population suggested by the EPO headquarters.

Accidents at INPP are classified in accordance with the INPP Accidents Classification Instruction.

At the beginning the decision to apply protective actions is based on the class of emergency, and then the necessity to perform protective actions is reviewed on the basis of environmental monitoring results. The decision to apply protective actions is based on the operational intervention levels (hereinafter – OIL). There are six OIL in the Republic of Lithuania that are regulated by the Lithuanian Hygiene Standard HN 99:2011 “Protection of the Population in Case of Radiological or Nuclear Accident” and that correspond with the IAEA General Safety Requirements No. GSR Part 7 “Preparedness and Response for a Nuclear or Radiological Emergency” and the IAEA Safety Guide GS-G-2.1 “Arrangements for Preparedness for a Nuclear or Radiological Emergency”.

#### ***Main elements of the on-site and off-site emergency plans***

The INPP EPP is the main procedure to follow during organizational, technical, medical, evacuation and other activities in order to protect the personnel and the environment against the consequences of accidents, natural disasters and man-made impacts. The EPP requirements apply to the EPO managers and personnel, as well as to the personnel not involved in the EPO services and to the contractors’ personnel working at INPP. The EPP is developed in accordance with national legal acts and the IAEA requirements.

The EPP consists of two parts:

- general part of the plan (descriptive) with appendices;
- operational part of the plan (instructive) containing 13 instructions on emergency preparedness and civil protection.

The EPP shall be agreed with VATESI and other institutions of the state management and surveillance and shall be updated every three years or after important alterations in the NPP operation and activities.

#### ***Facilities provided by the licence holder for emergency preparedness***

The INPP EPO AMC is established at the enterprise for beyond design basis accidents management (in Bld. 185 basement), which is maintained in constant (round-the-clock) preparedness, has special premises for EPO headquarters and EPO services working groups operation, equipped with necessary furniture, computers, communication equipment, personal

protection equipment (hereinafter – PPE), and other life-support systems. For organization of the EPO TSC experts work the following is foreseen:

- main TSC premises located at Unit D-1 in Room 300/56;
- spare TSC premises located at EPO AMC in Room 48.

The description of TSC premises, their equipment and communication means are presented in the TSC Instruction on Emergency Preparedness. The following premises are foreseen for accidents management by the operation personnel:

- MCR-2 – power unit 2 Main Control Room;
- CCR – Central Control Room for the enterprise electrical part;
- RPMCB – Radiation Protection Main Control Board.

Working premises of EPO Services are indicated in the instructions on emergency preparedness of the specified EPO services. The INPP EPO applies monitoring systems which includes automated radiation safety monitoring system (control of emissions, control of effluents, control of radiation conditions on the site via stationary posts, as well as gamma background control in 30 km zone) and seismic warning and control system, which consists of an independent subsystem performing the function of the seismic alert system (hereinafter – SAS).

SAS system is intended for informing on the earthquake prior to arrival of its waves at the INPP. When a seismic wave arrives at one or several external seismic stations, the system sends alarms to Unit 2 MCR, the information from SAS is also transmitted to the main TSC and reserve TSC. Time from the alarm start up to arrival of seismic waves at the INPP is defined approximately as 10 sec. The information received from the seismic sensors is kept in SAS archive.

The resources, equipment, tools, accessories and technical means required for EPO services for elimination of accidents are defined and specified in instructions on emergency preparedness of EPO services.

### ***Severe accident management within the common issue of “Emergency preparedness”***

Following the National Action Plan (see Article 14(1)), such measures related to enhancement of Emergency Management at INPP were implemented:

- evaluation of radiological consequences due to over-tipping of a cask filled with spent nuclear fuel during its transportation from the INPP Units to the ISFSF site in case of beyond design basis earthquake;
- assessment of INPP Accident Management Centre structures robustness calculation and modelling, in case of beyond design basis earthquake, and blocking of the INPP Accident Management Centre access due to fallen structures of the nearby administrative buildings No. 185 and No. 140/2 in case of a beyond design basis earthquake;
- installation of water level control systems at Unit 1 and 2 spent fuel storage pools to ensure water level control during the normal operation conditions and in case of design and beyond design basis accidents;
- performance of upgrade of the INPP computerized data system enabling to receive data on water level and temperature in Unit 1 and 2 spent fuel storage pools as well as radiation level within the spent fuel storage pools halls in conditions exceeding the normal operation limits including in case of beyond design basis accidents;
- installation of screen “Beyond design basis accident management” in the Automated Radiation Safety Monitoring System;
- modification related to provision of additional possibility for Emergency Preparedness Organisation, Technical Support Organisation and Control Room staff to control the spent fuel pools water level and temperature by directly obtaining data from the Unit 2 data-computing system.

At the end of 2018 the INPP together with the Technical Support Organization started work on evaluation of consequences of nuclear and radiological accidents at INPP nuclear facilities of very low probability, i.e. large commercial aircraft crash and extreme seismic events. The work is

going to be carried out in accordance with amendment of the Law on Nuclear Safety and the scope of this work is to update the State Residents Protection Plan in Case of a Nuclear or Radiological Accident.

### **Training and exercises, evaluation activities and main results of performed exercises and lessons learned**

Taking into account that in 2019 it is planned to start operations at the Belarusian NPP, proper attention has been paid for strengthening of municipalities, which are located in the emergency preparedness zones and emergency planning distances, preparedness to respond to a possible nuclear emergency at the mentioned NPP. During the mentioned period RSC has organized at 6 municipalities exercises, participated at 8 Municipal Emergency Commissions or Municipal Operation centres meetings giving presentations on hazard assessment and possible consequences of severe transnational emergency.

On 10th of May 2018 national top table exercise on civil protection actions in case of nuclear accident in Belarusian NPP was organized. The goal of exercise was to test new draft of State Residents Protection Plan in Case of a Nuclear or Radiological Accident. The exercise provided an opportunity to evaluate arrangements for early notification, provision of information to public, prognosis and evaluation of nuclear accidents, thyroid blocking and dissemination of iodine tablets, relocation and evacuation of public. Draft of State Residents Protection Plan in Case of a Nuclear or Radiological Accident was updated according to findings of exercise evaluators and approved in October of 2018.

In 2017–2018 RSC participated in the preparation of 2 state level and 3 interinstitutional scope exercises. Every year RSC has also organized internal institutional exercises for better preparedness of RSC staff to fulfil its own functions in case of nuclear or radiological emergencies. Main tasks of response to a nuclear or radiological emergency were checked and discussed during the exercise.

Strengthening the preparedness of first responders to respond to the nuclear or radiological emergency is an important part of RSC activities. Every year approximately 300 of rescue, medical and police personnel are trained for safe performance of their functions without breaching radiation protection requirements.

VATESI, RSC, FRD and other institutions took part at the IAEA international exercises: ConvEx-2d (2016), ConvEx-3 (2017) and ConvEx-2c (2018).

According to paragraph 33 of VATESI procedure for Preparedness for Management of Emergency Situations in Case of Nuclear and Radiological Emergencies, administrator of Emergency Response Centre (ERC) shall prepare a 3 year period training and exercise programme. This programme shall include a list of training courses and exercises for VATESI ERC staff. Training and exercise programme is prepared according to Chapter VII of “VATESI Emergency Management Plan in Case of Nuclear Emergency”, which sets the requirements for training and exercising.

Besides VATESI training and exercise programme, the staff of VATESI ERC takes part in various IAEA’s ConvEx and European Commission drills and exercises. Additionally VATESI ERC staff is trained on civil protection topics in the Branch of the Fire Fighters Training School of the PAGD.

#### ***Training of personnel at Ignalina NPP***

The INPP Director General (if he has not appointed the authorized person regarding the enterprise EP and CP) shall undergo initial training under the programme on EP and CP for the Senior Managers of the state importance facilities in the PAGD Civil Protection Training Branch of the Fire Fighters Training School.

The Director of the Decommissioning Department, as the authorized person appointed by the order of the INPP Director General regarding the enterprise EP and CP activities organization, is obliged to undergo initial training under the programme on EP and CP for the Senior Managers (or the authorized by them persons) of the state importance facilities in the PAGD Training Centre on Civil Protection.

The Head of the Technological Processes Service, as the person who can act as the Director of the Decommissioning Department, is obliged to undergo initial training under the programme on EP and CP for the Senior Managers (or the authorized by them persons) of the state importance facilities in the PAGD Civil Protection Training Branch of the Fire Fighters Training School.

The Head of AS&QMD Fire Surveillance and Civil Protection Group, as the head of EPO headquarters, and the AS&QMD Fire Surveillance and Civil Protection Group civil protection engineer, as the assistant of the Head of EPO headquarters, should undergo initial training under the programme for the permanent EP and CP staff, in the PAGD Civil Protection Training Branch of the Fire Fighters Training School.

Managers of EPO services and teams with their subordinates (that are involved and those not involved in the EPO) in compliance with the approved training schedule conduct annual theoretical practice on emergency preparedness and civil protection in the class of Accident Management Centre for the members of all training groups. As all the EPO services and teams personnel shall be trained to respond in the event of an emergency training of the EPO headquarters administrative board is also carried out according to the Schedule of studies, trainings and exercises on emergency preparedness and civil protection at the INPP. The duration of training is not less than 2 hours – theoretical training and not less than 2 hours – practical training in group exercises or full-scale exercises.

The INPP Director General not less than once per 3 years organizes emergency preparedness full-scale exercises, where all EPO personnel participate, where the emergency preparedness level of all EPO services and teams headquarters personnel is checked, as well as their ability to work in complicated conditions while performing the assigned tasks. During the full-scale exercises the actions of managers and personnel of the EPO services are observed and assessed by the appointed exercise controller and supervisors. When analysing the full-scale exercises, the supervisors report on positive actions and flaws in the actions of managers and personnel of the EPO services as well as on the disadvantages and misjudgements made during the exercises.

After completion of full-scale exercises the controller of the exercises together with the Head of EPO headquarters (or its assistant) prepares a report on performance of full-scale exercises. The report is to be approved by the INPP Director General, registered and stored at the Audit, Safety and Quality Management Division. Two copies of the report are to be sent to the Ministry of Energy of the Republic of Lithuania and VATESI.

On the basis of the reports of the supervisors, participated in the exercises, the workers of the Fire Surveillance and Civil Protection Group of Audit, Safety and Quality Management Division prepare the Plan of Corrective Actions for Emergency Preparedness in order to eliminate the detected disadvantages, and send the report to VATESI for control.

### **Regulatory review and control activities**

VATESI is performing regular inspections at INPP to check that the emergency preparedness arrangements are implemented properly. This includes control of training and exercising of Emergency Response Organization staff and facility workers, review of emergency planning and response procedures and documents, inspection of equipment and functionality of Emergency Operation Centre, inspection of self-protection equipment and tools for emergency response

organization workers. Additionally inspectors of VATESI participate in training and exercising activities as observers and give recommendations.

In accordance with the Plan RSC presents recommendations to the State or Municipal Emergency Commission, to the State or Municipal Operation Centres for the reduction of exposure doses and prevention of deterministic and stochastic effects of radiation on the public and emergency workers. RSC performs analysis of foodstuffs, drinking-water and other samples, contaminated by radionuclides, and presents suggest to the Ministry of Health to approve foodstuffs and their raw materials, drinking-water, feeding stuffs temporary maximum permissible levels of radioactive contamination for the emergency response and transition period, organizes supervision and control of their compliance. RSC also presents proposals to the Ministry of Health about the necessity of applying iodine thyroid blocking, coordinates decontamination of public and provides information to the public, within the limits of its competence, about protection actions.

EPA has upgraded a national monitoring network based on innovative spectrometric measuring technology stations SARA (produced by the Envinet GmbH). This network was built in the year 2017–2018 and being upgraded with a 14 new stations, which are installed along the border with Belarus. This is due to the current construction of a new nuclear power station on the Ostrovets location, Belarusian Republic, approximately 20 km from the border to Lithuania and approximately 40 km from Vilnius. By commissioning the new SARAs, Lithuania is effectively investing in the future and in greater security: the high-dose spectrometer extends the probe's detection range by two orders of magnitude and enables spectroscopic measurements of up to 100 mSv/h. Communication with the monitoring centre is carried out via modern Long Term Evolution (LTE) communication. Measurement data are transferred to the data centre every 10 minutes and analyzed by modern software solution for environmental monitoring networks. In parallel the on-line measurement data are transferred to the European Radiological Data Exchange Platform (EURDEP) network for the exchange of radiological monitoring data between most European countries. EURDEP is maintained by the Joint Research Centre of the European Commission. Obligation of the data transmitting is regulated by the Council Decision 87/600 and the Recommendation 2000/473/Euratom. The total number of a national monitoring network spectrometric measuring stations are 48 (five of them are located in the vicinity of Ignalina Nuclear Power plant), including 3 spectrometric measuring stations for measurement of gamma dose rate in major Lithuanian rivers Neris and Nemunas.

### **International arrangements**

Government of Republic of Lithuania has signed a number of international agreements with neighbouring countries and other States in the field of cooperation assistance in case of emergency situations:

- Agreement between the Republic of Lithuania and the Federal Republic of Germany concerning mutual assistance in natural calamity and large accident cases (signed in 1994);
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Poland on mutual support in the event of natural calamities and large-scale accidents (signed in 2000);
- Agreement between the Republic of Lithuania and the Republic of Hungary on Co-operation and Mutual Assistance to be provided in the Event of Catastrophes and Severe Accidents (signed in 2001);
- Agreement between the Government of the Republic of Lithuania and the Cabinet of Ministers of Ukraine on Co-operation and Mutual Assistance in the Field of Prevention of Emergencies and Elimination of their Consequences (signed in 2003);

- Agreement between the Government of the Republic of Lithuania and the Government of the Kingdom of Sweden on collaboration within the field of Emergency Prevention, Preparedness and Response (signed in 2003);
- Agreement between Belarus and Lithuania on Cooperation in the Field of Prevention and Liquidation of Natural Disasters and Severe Emergencies (signed in 2003);
- Agreement between Azerbaijan and Lithuania on Cooperation and Assistance in Case of Disasters and Severe Emergencies (signed in 2012);
- Agreement between the Government of the Republic of Lithuania and the Government of Georgia on Cooperation and Mutual Assistance in the Field of Emergency Prevention and Response (signed in 2013);
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Moldova on Cooperation and Mutual Assistance in the Field of Emergency Prevention and Response (signed in 2016);
- Agreement between the Government of the Republic of Lithuania, the Government of the Republic of Estonia and the Government of the Republic of Latvia (signed in 2017).

The 7th CNS Review Meeting highlighted the importance of development of harmonized approaches for cross-border emergency planning zone definition and management as well as bilateral arrangements to coordinate and exercise emergency preparedness and response capabilities. Due to possible nuclear accident at Belarusian NPP, there is a need for an agreement between Belarus' and Lithuania's competent authorities for early notification in accordance with Convention on Early Notification of a Nuclear Accident. The draft bilateral agreement is currently being negotiated. Emergency preparedness zones and measures to be applied in case of an accident at the Belarusian NPP shall be in line with the international recommendations set by the IAEA and recommendations of HERCA-WENRA (Gosatomnadzor of Belarus has an observer status in WENRA). Due to the short distance from the Belarusian NPP to the Lithuanian capital Vilnius, Lithuania shall be prepared to implement protective actions defined in these recommendations. The exchange of information to be prepared for development of appropriate emergency preparedness and response measures is one of the issues, which currently remains unsolved, in regard to the site in close vicinity to the Lithuanian border selected for construction of nuclear power plant in Belarus.

Lithuania is seriously concerned about Belarusian NPP project and these key questions on nuclear safety raised and continuously reiterated by Lithuania to Belarus are still unanswered:

- The selected site is not acceptable taking into account the risk of severe accident;
- The selected site is not properly investigated;
- Compliance of design with some modern safety standards is not justified;
- Lack of information on capabilities of operating organization and regulatory authority;
- Gaps in the national legislation of Belarus in the field of nuclear power persist;
- Recommendations of the IAEA INIR (2012), IRRS (2016) and EPREV (2018) missions are not fully implemented;
- Belarus NPP “stress tests” and their international peer review recommendations are not fully implemented. Belarus NPP “stress tests” in accordance with EU specification and their international peer review, which was done 2017–2018, gave a significant number of rather serious additional recommendations concerning safety justification, design solutions as well as implementation of accident management procedures.

Together with other safety related questions concerning specific site selection, its environmental impact and safety assessment, implementation of modern safety design requirements, quality and safety culture assurance during licensing, construction and future operation of Belarus NPP (which questions were raised in the frames of different international fora) “stress tests” and their peer review recommendations have revealed major deficiencies of this project. Taking into

account the number and significance of safety related issues, Belarus NPP must not be put into operation before resolving of all the indicated safety issues, including full implementation of all recommendations of the Belarus NPP “stress tests” and their international peer review. At the time of submitting this national report, Belarus has neither published, nor presented their national action plan for international peer review.

Most of these issues are elaborated in the 7<sup>th</sup> National report of Convention on Nuclear Safety and were included in the Annex VII of the Report of the President of the 7<sup>th</sup> CNS Review Meeting.

In addition to that, the last Meeting of the Parties to the Espoo Convention (Geneva, 5–7 February 2019) adopted a decision concluding that Belarus failed to comply with the Espoo Convention by not providing sufficient information about the reasons and considerations, explaining the selection of the Ostrovets site over the alternative locations, to be taken into account in the final decision on the activity.

Site selection and evaluation are the problems since the very beginning of the project. If Belarus had timely carried out relevant modules of IAEA Site and External Events Design Review Service (SEED) mission, it would timely have revealed those site selection and evaluation problems and would probably have selected another site. In the light of this, a proper implementation of all recommendations of “stress tests” and their subsequent peer review as well as resolution of all other remaining safety issues before the start of operation of Belarusian NPP becomes even more important.

## **Article 16(2) – Information of the public and neighbouring States**

### **Overview of arrangements for informing the public in the vicinity of the nuclear installations about emergency planning and emergency situations**

The State Emergency Management Operational Centre is responsible for providing information to public in case of emergency. The State Emergency Management Operational Centre shall activate the Press Centre in the Press Service of Government of Republic of Lithuania or in PAGD.

In case of an emergency State and municipality’s institutions, public offices and citizens are notified using existing notification public warning and informing system, which consists of 421 central and 406 local electric sirens and cell-broadcast facilities. After notifying signal, the information about situation, possible consequences and process of liquidation of emergency is vocally spread through companies and institutions emergency sound systems and using national and local broadcasters.

The citizens of municipalities are notified using technical and organizational means described in each municipality’s emergency management plan. In places not covered by notification network system citizens are informed by using existing communication system, cell-broadcast facilities and specialized vehicles equipped with sound amplifying systems. Also courier or local police services could be used for spreading the information.

According to the order approved by Director of the FRD, the heads of national importance facilities and those registered in the registry of dangerous facilities are responsible for notification of public, national and municipal institutions and public offices which could be affected by emergency.

Ministries and other national institutions are responsible for notifying their own staff. The PAGD shall notify the population, using national television and radio channels, most of commercial broadcasting companies (which work in FM), as well as through the wire radio communication network.

## Arrangements to inform competent authorities in neighbouring States

In 1994 Lithuania has joined to Convention on Early Notification of a Nuclear Accident and in 2000 to Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. VATESI is responsible for implementation of Convention on Early Notification and PAGD is responsible for implementation of Convention on Assistance. According to IAEA's EPR-IEComm requirements, VATESI is National Warning Point, National Competent Authority for events abroad and PAGD – National Competent Authority for domestic events. VATESI is also a contact point and competent authority in ECURIE arrangements. Mutual assistance policy between Lithuania and the neighbouring countries is based on bilateral agreements:

- Agreement between the Government of the Republic of Lithuania and the Government of the Kingdom of Denmark on the exchange of information and cooperation in the fields of nuclear security and radiation safety has been signed on 16 March 1993;
- Agreement between the Government of the Republic of Lithuania and the Government of the Kingdom of Norway on early notification of nuclear accidents and on the exchange of information on nuclear facilities has been signed on 13 February 1995;
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Poland on early notification of a nuclear accident, and co-operation in the field of nuclear safety and radiation protection has been signed on 2 June 1995;
- Agreement between Lithuania and Latvia on Early Notification of Nuclear Accidents, Exchange of Information and Cooperation in the Field of Nuclear Safety and Radiation Protection has been signed on 3 October 2003;
- Agreement on early notification of Nuclear and Radiological Emergencies between the VATESI and the Swedish Radiation Safety Authority of the Kingdom of Sweden has been signed on 1 January 2009.

## Article 17 Siting

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

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

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

*(iii) 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;*

*(iv) 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 17(1) – Evaluation of site related factors**

### **Overview of arrangements and regulatory requirements relating to the siting and evaluation of sites of nuclear installations**

In accordance with the Law on Nuclear Safety, the safety analysis and the justification of the site shall be performed before preparation of the nuclear installation design specifically adapted to this site. The results of such analysis and justification shall be presented in the Site Evaluation Report which shall be reviewed and approved by VATESI. VATESI can approve the Site evaluation report only after verifying that the results of the analysis and justification of the construction site are in line with requirements of the legal acts and after having received positive decisions from other institutions, which are involved in the process of reviewing a report. The detailed procedures for reviewing the Site evaluation report are defined in the Governmental Resolution of the Republic of Lithuania No. 83 the “Description of procedure on review of the construction site evaluation report of nuclear installation” and Nuclear Safety Requirements BSR-2.1.3-2010 “General Requirements on Site Evaluation for Nuclear Power Plants” and/or other VATESI legislation, regulating site evaluation process.

Nuclear Safety Requirements BSR-2.1.3-2010 “General Requirements on Site Evaluation for Nuclear Power Plants” based on IAEA Safety Requirements No. NS-R-3 “Site Evaluation for Nuclear Installations” and best international practice. This regulation sets the main requirements for site evaluation, as well as proposals to use IAEA standards and guides for more detailed site’s hazards analysis.

In the course of the site safety analysis and justification, all factors related to the site and its environment that could impact safety of nuclear installation, including physical security and planning of emergency preparedness, have to be identified, and corrective measures for the identified deficiencies of the site, if any, have to be proposed.

According to Governmental Resolution, VATESI forward the Site evaluation report for other institutions, which are involved in the process of reviewing the Site evaluation report. The LHMT, the Ministry of Health, the Lithuanian transport safety administration, the LGT and the PAGD are involved in the process of reviewing the Site evaluation report, because the site evaluation, due to the abundance and the complexity of the possible impacts on the safety of the nuclear installations, covers many areas – metrology, hydrology, geology, aviation, emergency preparedness and others.

The final decision on site selection shall be taken as well as taking into account results of environmental impact assessment and opinion of the local authority on whose territory the intended facility will be sited.

### **Overview of design provisions used against human made external events and natural occurring external events and the impact of related sequential natural external events**

In 2018, new Nuclear Safety Requirements BSR-2.1.6-2018 “Design of Nuclear Power Plant” was approved by Head of VATESI. The regulation set the main requirements for design and design principles of NPPs and their separate buildings, parts of buildings and structures, systems and components, which are used for energy production, management of nuclear incidents, nuclear and radiological accidents, emergency preparedness. Based mainly on IAEA requirements “Safety of Nuclear Power Plants: Design”, No. SSR 2/1 (Rev. 1), includes provisions from WENRA documents (WENRA reactor safety reference levels and WENRA safety objectives for new power reactors), ENSREG “stress tests” specification, prepared reacting to Fukushima Daiichi accident, and includes provisions from Nuclear Safety Directive and its amendment. In accordance with

regulation, in designing NPP shall be assessed all external natural and human induced events which have been identified as having potential impact on NPP safety during site evaluation. Moreover, regulation includes provisions for large commercial aircraft crash impact assessment which are based on WENRA position on Intentional crash of a commercial aircraft – despite low probability of large commercial aircraft (maximum take-off weight 200 t) crash this event shall be considered in the design of NPP.

### **Regulatory review and control activities**

The detailed description of the process and activities related to Visaginas NPP, which is cancelled, site selection and evaluation were provided in the 7<sup>th</sup> National report.

### **Article 17(2) – Impact of the installation on individuals, society and environment**

#### **Criteria for evaluating the likely safety related impact of the nuclear installation on the surrounding population and the environment and implementation of these criteria in the licensing process**

According to the Law on Environmental Impact Assessment of the Proposed Economic Activity the safety related impacts of nuclear installations on the population and environment shall be defined in Environmental Impact Assessment (EIA) report. The report shall contain the following information: description of pollutants to be generated; description of waste generation and management; description of components of the environment potentially to be impacted by the proposed economic activity; description and evaluation of any potential direct and indirect impact of the proposed economic activity upon public health, flora and fauna, soil, surface and subsurface of the earth, air, water, climate, landscape and biodiversity, material values, immovable cultural heritage and interaction among the aforesaid components of the environment; description of measures provided for in order to avoid, reduce, compensate the negative impact upon the environment or to liquidate consequences thereof; analysis of alternatives identified by the EIA consultant, including reasons for selection taking into account of best available manufacturing techniques and potential impact upon the environment; information about problems of technical or practical nature that the consultant has encountered in the course of preparation of the EIA documents; information about potential emergencies as well as relevant prevention measures and emergency response measures; analysis of findings of environmental monitoring (if any), outline of any planned monitoring; and summary of all the information contained in the report. Upon the examination of the EIA report, the conclusions of institutions participating in the EIA process and the evaluation of the proposals by the public and the evaluation of comments of countries participating in transboundary EIA procedure, the competent authority adopts the justified decision regarding the feasibility to implement the planned activity at the chosen site.

For the present Environmental impact assessment is carried out in accordance with:

- The Law on Environmental Impact Assessment of the Proposed Economic Activity (1996, last amended in 2017);
- Governmental Resolution on Empowering the Ministry of Environment and the Subordinate Institutions (2000, last amended in 2014);

– Order of the Minister of Environment of the Republic of Lithuania No. D1-885 of October 31, 2017 on the Approval of Regulations on Environmental Impact Assessment of the Proposed Economic Activity;

– Order of the Minister of Environment of the Republic of Lithuania No. D1-845 of October 16, 2017 on the Approval of Regulations on Screening for Environmental Impact Assessment of the Proposed Economic Activity.

Participants of the environmental impact assessment shall be as follows:

– Competent authority – EPA as competent authority coordinates the processes of screening for environmental impact assessment and environmental impact assessment; examines the screening information, proposals of entities of environmental impact assessment, the public concerned regarding the screening information and/or performance of environmental impact assessment and adopts a screening conclusion on environmental impact assessment, examines, evaluates and approves programmes, examines and evaluates an evaluation of the proposals of the public concerned, the proposals of the public concerned, reports, adopts a decision regarding the environmental impact of the proposed economic activity, provides information to the public. EPA also has the right to require amendments or correction of EIA documents, if the quality of EIA documents is not satisfactory, or some topics are not adequately covered.

– Relevant parties of the EIA – governmental institutions, responsible for health protection, fire-prevention, protection of cultural heritage, development of economy and agriculture, and municipal administrations. In specific cases, participation of additional governmental institutions might be required (e. g. State Service for Protected Areas under the Ministry of Environment). As regards nuclear related activities VATESI and RPC participate in the EIA process as relevant parties. The relevant parties of EIA, in accordance with their competence review the EIA programmes and reports and provide conclusions regarding the EIA programmes, reports and the feasibility of the proposed economic activity. They also have the right to require for amendment or corrections of the EIA documents if the topics within the scope of their competence are not investigated sufficiently.

– Organiser of the proposed nuclear activity (developer).

– The drafter of EIA documents that is obliged by organiser (developer).

– The public (including NGOs).

Directive 2011/92/EU of European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (amended by Directive 2014/52/EU) is transposed into national legislation: the Law on the Environmental Impact Assessment of Proposed Economic Activity and acts implementing the law. In accordance with the Law on the Environmental Impact Assessment of Proposed Economic Activity competent authority makes information on screening regarding EIA and/or EIA documentation (scoping document, EIA report) publically available shortly after receiving application from developer of the project. Public has possibility to express and the decision-maker to take account of opinions and concerns which may be relevant to those projects.

The environmental impact assessment EIA procedures, requirements for documentation and public participation also comply with the following international conventions:

– Convention on Environment Impact Assessment in a Transboundary Context, Espoo, 25<sup>th</sup> February 1991;

– Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Aarhus, 25<sup>th</sup> June 1998.

EIA programme (scoping document) shall include at least the following information:

– short description of the technical characteristics, technological process and materials planned to be used, as well as needed amount of natural resources and land use (during the construction and operation phases);

– short description of the main alternatives (locational, time, technical, etc.);

- short description of the territories that are likely to be significantly affected;
- information about components of the environment and impacts that will be analysed during the EIA;
- information on aspects the impacts of the proposed economic activity on public health that will be analysed;
- methods that will be used to predict and assess the effects on the environment, measures envisaged to avoid, reduce or offset negative environmental effects;
- information whether proposed economic activity is likely to cause a significant negative impact on the environment of any foreign State;
- other important information.

The drafter of EIA documents shall inform the public and the competent authority about the programme and submit the programme to the relevant parties of EIA that examine and provide conclusions in accordance with their competence. Relevant parties also have the right to present reasoned requests to supplement or revise the programme. An evaluation of proposals of the public concerned, the conclusions from all relevant parties of EIA and EIA programme are submitted to the competent authority (EPA), which reviews the documents and approves EIA the programme. Competent authority also has the right to require to revise or supplement a programme.

After approval of the EIA programme the drafter of EIA documents prepares the EIA report. The report shall include at least the following information:

- detailed information according to the topics of the EIA program and also additional information: description of the expected pollutants; description of waste generation and management; components of the environment that could be affected by the proposed economic activity; description and assessment of potential impacts of the proposed economic activity on public health, fauna and flora, soil, earth surface and underground, water, environmental air, climate, landscape, biodiversity, economic conditions, cultural heritage and the interaction of these components; methods that were used to predict and assess the effects on the environment; a description of measures envisaged to avoid, reduce or offset negative environmental effects or to alleviate their consequences;
- analysis of the alternatives and the indication of the reasons for the choice, taking into account the best available modes and production of potential environmental impact, at least several alternatives (e.g. Alternative locations, timings, technical and technological solutions, environmental impact mitigation measures) shall be investigated in the report, including the “zero” alternative, that refers to the environmental conditions and natural changes in the environment if the activity is not carried out and is used as the environmental baseline evaluation and a base for assessment and comparisons;
- identification of possible emergencies and accident-avoidance and emergency measures; analysis of environmental monitoring data (if available) and plan for environmental monitoring;
- a non-technical summary of all information considered in the report;
- etc.

The drafter of EIA documents informs the public about the granting to the public of access to the report and the forthcoming public hearing and organises the Public hearing. The public as well as NGO’s and community based organizations are involved in EIA process and have possibility to provide proposals and comments concerning the EIA of proposed activities and their potential environmental and health impacts. The drafter of EIA documents evaluates proposals of the public concerned and revises the report. The amended report together with the motivated evaluation of the proposals of the public concerned is submitted to the relevant parties of EIA. The drafter of EIA documents submits to the competent authority (EPA) a report revised and/or supplemented in accordance with conclusions of entities of environmental impact assessment, conclusions of the entities of environmental impact assessment on the report and the environmental impact of the proposed economic activity and an evaluation of proposals of the public concerned, the competent

authority (EPA) publishes to the public a notice on the report. The public concerned shall have the right to submit to the competent authority written proposals. If needed the competent authority (EPA) submits reasoned requests to revise and/or supplement a report.

Upon examining an evaluation of proposals of the public concerned, examining and evaluating a report and based on conclusions of relevant parties of EIA, revision of report after reasoned requests to revise or supplement the report submitted by the competent authority (EPA), the competent authority (EPA) adopts a decision regarding the environmental impact of the proposed economic activity.

Decisions made during 2016–2018 on EIA of proposed nuclear activities:

- 08/06/2018 EPA made a decision regarding the feasibility of the proposed economic activity – Decommissioning of the Maišiagala radioactive waste storage facility;
- 11/07/2016 EPA made a decision regarding the feasibility of the proposed economic activity – Dismantling and deactivating of INPP Unit 1 equipment in the work areas R1 and R2;
- 11/07/2016 EPA made a decision regarding the feasibility of the proposed economic activity – Dismantling and deactivating of INPP Unit A-1 equipment.

National requirements for radiological environmental monitoring (discharges and impact on environment) of economic entities are laid down in the Order No. D1-546, 16<sup>th</sup> of September, 2009, of the Minister of Environment “On approval of regulation of environmental monitoring of economic entities”. The purpose and content of the environmental radiological monitoring of the economic entities, procedure of agreement, requirements for the quality assurance and control of sampling, analysis and measurements, recording and reporting of results and related information are defined in Annexes 5 and 6 to the Order. In accordance with requirements the monitoring programme shall cover all important routes of radionuclide dispersion and population exposure to enable the proper evaluation of annual airborne and water discharges, likewise their short term and consequently doses for critical group members, changes.

The meteorological and hydrological observations should be done as a part of monitoring. The performance of the meteorological and hydrological observations systems must be effective in different conditions and installed so that data can also be obtained during accidents.

For the purpose of assessing the Monitoring Programme the qualified experts may be involved.

According to the Law on Nuclear Safety licence for operation of a nuclear installation shall be issued only after the VATESI verifies that the radiological monitoring programme has been coordinated with the Ministry of Environment or its authorised institution and with the Ministry of Health in the manner set out by the legal acts. The Ministry of Environment or its authorised institution and the Ministry of Health shall notify the VATESI of the decisions on the coordination of radiological monitoring programme and/or coordination of an update (amendment).

Pursuant to the Law on Nuclear Safety the plan for radioactive discharges into environment is one of documents that shall be submitted to VATESI together with documents accompanying the application for the issuance of licences for activities indicated in the Law. A plan for radioactive discharges into environment shall be prepared and updated in accordance with the procedure established by the Head of the VATESI. Nuclear Safety Requirements BSR-1.9.1-2017 “Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides” establish standards of the release of radionuclides from nuclear facilities and the requirements for the plan on the release of the radionuclides and the control of the release of the radionuclides.

## **Article 17(3) – Re-evaluation of site related factors**

### **Activities for re-evaluation of the site related factors to ensure the continued acceptability of the safety of the nuclear installation**

Pursuant to Paragraphs 7 and 7<sup>1</sup> of Article 32 of the Law on Nuclear Safety, a licensee shall perform a periodical safety analysis and justification and prepare a periodical safety review report at least every 10 years after the issuance of a permit for the commercial operation of a nuclear installation, or after approval by VATESI of the last safety case of corresponding nuclear installation, if the nuclear installation is commissioned before September 2017. Periodical safety review includes the review of the site characteristics which have been taken into account in the design of a nuclear installation. The site related factors that may impact the safety of a nuclear installation shall be revised, and if necessary their reassessment based on new data and new methods shall be performed. If any nonconformities are identified, indispensable corrective measures ensuring the compliance of a nuclear installation with its design documentation and legal acts shall be developed and implemented.

During the periodic safety analysis and justification of Unit 1 operation during the period of 2007–2016 no changes of the site related factors and its surroundings that may impact the INPP Unit 1 safety were identified.

### **Results of recent re-evaluation activities**

Since the INPP is still maintained under the operational licences during the fuel removal from the Units in compliance with the regulatory requirements, the periodic safety analysis of Unit 1 was completed at the beginning of 2017. For the overview of the analysis results, see Article 14 of this Report. The periodic safety analysis and justification of Unit 2 must be performed by the end of 2020.

### **Regulatory review and control activities**

The periodical safety review report shall be reviewed and assessed by VATESI, and approved in accordance with Paragraphs 7, 7<sup>1</sup>–7<sup>9</sup> of the Article 32 of the law on Nuclear Safety. In case if the report is not presented in time, or not approved, enforcement measures may be applied, including halt of operation of nuclear installation either of separate technological processes. The corrective measures, which means measures for assurance of conformity with design documentation and normative requirements within next period of operation, identified during the process of periodical safety analysis and justification, is subject of control of VATESI. The identified safety improvement measures are subject of Safety Improvement Program.

## **Article 17(4) – Consultation with other Contracting Parties likely to be affected by the installation**

### **International arrangements**

Environmental impact assessment in a transboundary context is regulated by the Law on Environmental Impact Assessment of the Proposed Economic Activity and by the United Nations

Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). The parties to the Convention are entitled to participate in an environmental impact assessment procedure of the proposed nuclear activity (nuclear power stations and other nuclear reactors, including decommissioning of nuclear power stations or reactors; production, processing, enrichment, storage and disposal of nuclear fuel) carried out in Lithuania if the detrimental environmental impacts of the project could potentially affect the country in question. For other projects the transboundary impacts are analyzed through screening procedure. If an institution authorised by the Government (currently the Ministry of Environment) decides that project might have significant transboundary effects national shall be subject to the procedures of transboundary environmental impact assessment.

Since May 2010, the Ministry of Environment is only responsible for coordination of transboundary EIA procedure for the proposed nuclear related economic activities, the decisions regarding the feasibility of such activities are taken by EPA.

During the period of 2016–2018 there was no intent for new projects related to nuclear energy that shall be subject to the procedures of transboundary environmental impact assessment in Lithuania. However, in accordance with Espoo Convention Article 7 Lithuania has prepared and provided to Belarus the Post-project analysis programme for the new nuclear facilities of State Enterprise Ignalina Nuclear Power Plant in 2018.

In accordance with the Article 37 of EURATOM Treaty and Lithuanian Regulation on Providing of General Data Concerning Plans for the Disposal of Radioactive Waste, General Data relating to any plan for the disposal of radioactive waste it is submitted to the Commission of the European Communities. In the end of 2018 the General data Set on the Activity Related to Radioactive Waste Disposal from Dismantling of the Equipment from the Ignalina NPP Unit 1 Reactor Working Areas R1 and R2 (Project UP01) was presented to the Commission of the European Communities. The Commission delivered its opinion in May, 2019.

### **Bilateral arrangements with neighbouring States**

Information about nuclear facilities and activities on territory of Lithuania shall be submitted to neighbouring countries according to the bilateral agreements.

In 2004 Lithuania signed an Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Poland on the implementation of the Convention on Environment Impact Assessment in a Transboundary Context.

The draft Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Belarus on the implementation of the Convention on Environment Impact Assessment in a Transboundary Context is being negotiated.

### **Article 18 Design and Construction**

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

*(i) the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence 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;*

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

*(iii) 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.*

## **Article 18(1) – Implementation of the defence-in-depth concept**

### **Overview of arrangements and regulatory requirements concerning the design and construction of nuclear installations**

The common requirement for application of “defence-in-depth” in design, commissioning and operation of nuclear installation stages are introduced in the amendment to the Law on Nuclear Safety of September 2017 (Paragraph 1 of Article 35). In accordance with the law, the specific requirements shall be set by VATESI.

For existing Ignalina NPP requirements concerning “defence-in-depth” stated in the Nuclear Safety Requirements BSR-2.1.2-2010 “General Regulations on Assurance of Safety of Nuclear Power Plants with RMBK-1500 Type Reactors”, Paragraph 10: “10. The safety of a nuclear plant shall be guaranteed by applying of the principle of “defence in-depth”, i.e. by the sequential implementation of protection measures based on a system of barriers to prevent the spread of ionizing radiation and radioactive materials to the environment, and systems of technical and organizational measures to protect these barriers and retain their effectiveness, and also to provide direct protection for the population.”

The issues for implementation of the “defence-in-depth” concept at all stages of safety related activities (including design and construction) for new NPPs comprehensively introduced in regulation Nuclear Safety Requirements BSR-2.1.6-2018 “Nuclear Power Plant Design”. The corresponding provisions are set according to WENRA safety objectives for new NPP, taking into account Amendment to Nuclear Safety Directive, IAEA specific safety requirements SSR-2/1 “Safety of Nuclear Power Plants. Design” and other IAEA recommendations and best international practice. The principle of “defence-in-depth” should be applied in all stages of safety-related activities. During normal operation all barriers and all means designed to protect them must be in proper operating condition. If any of the barriers provided in the plant design or any of the means intended to protect those barriers (in the frames of justified conditions of safe operation) are found to be out of order, operation at power is not permitted. The extent, to which the various safety functions are to be implemented, is specified in norms and technical requirements, and for each individual plant shall be stated and justified in the technical design.

The requirement for defence in depth for dry spent fuel storage installation is set in Nuclear Safety Requirements BSR-3.1.1-2016 “General Requirements for Spent Nuclear Fuel at Storage Facility of the Dry Type”: “10. Safety of the storage facility shall be assured by systematic introduction of principle of defence-in-depth, which is grounded by system of physical barriers, which do not allow spreading of radioactive materials within storage facility and to the environment, and by system of engineering and administrative features, which protect the barriers and assures availability of them during operation of the storage facility”.

The statements concerning application “defence-in-depth” during decommissioning of installations are set in Nuclear Safety Requirements BSR-1.5.1-2019 “Decommissioning of Nuclear Facilities”.

### **Status with regard to the application of the defence in depth concept**

The INPP safety is provided by consistently implementing “defence in depth” principle based on the system of physical barriers preventing spread of ionising radiation and radioactive waste to the environment and the system of technical and organizational measures which protects these barriers and maintains their efficiency and in case of their degradation it mitigates the harmful effects of ionising radiation to the population and the environment. After the final shut down of

Ignalina NPP Unit 1 and Unit 2 the extent of application of “defence-in-depth” principle has been considerably reduced but is still maintained in the appropriate extent, for example a number of inspections of pressure boundary was reduced, but was still conducted till complete defueling of Unit 2 reactor; part of the emergency shutdown system in Unit 2 was in operation until complete defueling of Unit 2 reactor; the control room is still operated by operators, although the number of the staff per shift was reduced due to dismantling of systems and equipment that totally lost their functions and have no impact on the safe spent nuclear fuel handling and safe operation of other remaining in operation systems and equipment important to safety and are not needed any more for subsequent decommissioning purposes. Until complete defueling of Unit 2 reactor only 28 normal operation systems important to safety remained in at Unit 2 operation leading to subsequent decrease during the next defueling stage. All systems important to safety of spent fuel handling and storage at the Units remain under the same safety requirements as during the Ignalina NPP operation.

### **Extent of use of design principles for nuclear installations**

The design principles of increment of reliability of safety related systems and assurance of safety functions such as fail safe function, automation, independence, physical and functional separation, single failure criterion, redundancy and diversity are required to be used in the designs of the particular systems. The requirements are set in regulations Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” and VD-T-001-0-97 “Nuclear Safety Regulations for the Reactor’s of Nuclear Power Plants”. The application of the principles are graded taking into account the safety functions that remaining in actual state of Ignalina NPP Units, that are under decommissioning.

The design principles in accordance with IAEA Specific Safety Requirements No. SSR 2/1 “Safety of Nuclear Power Plants: Design” are regulated by Nuclear Safety Requirements BSR-2.1.6-2018 “Design of Nuclear Power Plant”.

### **Implementation of design measures to prevent beyond design basis accidents or to mitigate their radiological consequences if they occur**

A set of technical and organisational measures concerning management of beyond design basis accidents were implemented at the INPP (see also information in Article 19(4) of this Report). The corresponding procedures for beyond design basis accidents management are developed at the INPP. Due to the final shut down of INPP the extent of measures is reduced. The management of severe accidents at the INPP was comprehensively reviewed during the European “stress test” and recommended additional measures were implemented. Regular drills and training exercises related to beyond design basis accidents management are performed for the INPP staff. The information related to the analysis of beyond design basis accidents of very low probability of occurrence and evaluation of their consequences is provided in Article 14(1) of this Report.

### **Improvements implemented for designs for nuclear power plants as a result of deterministic and probabilistic safety assessments made since the previous National Report; and an overview of main improvements implemented since the commissioning of the nuclear installations**

See Article 6 and Article 14 of this Report.

## **Regulatory review and control activities**

The implementation of the measures linked to “defence-in-depth” principle at the Ignalina NPP is controlled by VATESI in the frame of control of implementation of Safety Improvement Program and other measures such as implementation separate modifications, and by regulatory inspections.

Implementation of “defence-in-depth” principle in the designs of nuclear installations are controlled by VATESI performing review and assessment of licensing documentation.

## **Article 18(2) – Incorporation of proven technologies**

### **Arrangements and regulatory requirements for the use of technologies**

The common requirement for application of proven engineering practices in design and construction of nuclear installation stages are introduced in the amendment to the Law on Nuclear Safety of September 2017 (Paragraph 2 of Article 35).

### **Measures taken by the licence holders to implement proven technologies**

Proven technologies are used by the Ignalina NPP during the main stages of decommissioning.

At the stage of decommissioning preparation, commonly accepted proven practice was used. Contracting parties involved in decommissioning preparation activities were selected by open tenders taking into account the previous experience.

At the stage of reactor defueling, the existing defueling procedures and facilities were used which were used for reactor refuelling during the operation. All defueling works are performed by skilled INPP staff. The refuelling/defueling procedures and facilities were tested many times during the INPP operation and INPP staff has a good practice to perform reactor defueling. So, undoubtedly proven technology is used at the stage of reactor defueling.

The comprehensive safety analysis was carried out before the reactor defueling and spent fuel storage pools defueling stages. Parties involved in safety analysis activities were selected by open tenders taking into account the previous experience in this area.

At the stage of dismantling of the plant equipment, structures and buildings, commonly accepted technologies are used (first of all applied at Unit 1) and then the technological, organisational solutions, types of equipment, gained experience are transferred for application during dismantling activities at Unit 2. Special attention is focused on monitoring and control of the equipment and waste contamination levels since different waste decontamination, treatment technologies are applied for different waste classes in order to minimise waste volumes and to the maximum achievable extent satisfy the free release criteria in.

### **Analysis, testing and experimental methods to qualify new technologies**

See information above in this Article.

## **Regulatory review and control activities**

VATESI is performing review and assessment of licensing and other, such as modifications', documentation. During the review and assessment process aspect of proven engineering practices is verified.

## **Article 18(3) – Design for reliable, stable and easily manageable operation**

### **Overview of arrangements and regulatory requirements for reliable, stable and easily manageable operation, with specific consideration of human factors and the human–machine interface**

The “Nuclear Safety Regulations for the Reactor’s of Nuclear Power Plants” (VD-T-001-0-97) define in detail the requirements for NPP Safety. The regulations require that design of the NPP’s (their systems, structures and components) shall be optimal for operator performance. It is required within this document that:

- the working areas and working environment of the site personnel shall be designed according to ergonomic principles;
- systematic consideration of human factors and the human-machine interface shall be included in the design process at an early stage and shall continue throughout the entire process, to ensure an appropriate and clear distinction of functions between operating personnel and the automatic systems provided;
- the human-machine interface shall be designed to provide the operators with comprehensive but easily manageable information, compatible with the necessary decision and action times;
- verification and validation of aspects of human factors shall be included at appropriate stages to confirm that the design adequately accommodates all necessary operator actions;
- as equipment operator, the operator shall be provided with sufficient information on parameters associated with individual plant systems and equipment to confirm that the necessary safety actions can be initiated safely;
- the design shall be aimed at promoting the success of operator actions with due regard for the time available for action, the physical environment to be expected and the psychological demands to be made on the operator. The need for intervention by the operator on a short time-scale shall be kept to a minimum. It shall be taken in to account in the design that the necessity for such intervention is only acceptable provided that the designer can demonstrate that the operator has sufficient time to make the decision and to act; that the information necessary for the operator is simply and unambiguously presented.

The Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” require that design of a NPP shall be optimal for operator performance as well as provide means to eliminate single personnel errors or mitigate their consequences, including those during the maintenance. The NPP control room shall contain equipment which provides information about the plant operational state and any deviations from normal operation as well as which monitor the state of the plant safety system during operation and their functioning during operational transients and accidents. The information on regulatory requirements related to management of human factor and the corresponding INPP arrangements is presented within Article 12 of this Report. For other design principles see Articles 18(1) and 18(2) of this Report.

## **Implementation measures taken by the licence holder**

Since the final shutdown of both INPP Units the licence holder is in the process of performance of the INPP equipment dismantling and decontamination activities in the scope established in technological designs and safety justification documents following the regulatory requirements and operational licences conditions. The INPP does not intend to restart operation of the Units, as well as to change or modify them for reliable, stable and manageable operation.

## **Regulatory review and control activities**

INPP preparation for decommissioning as well as the related organizational changes important to INPP safety are monitored and assessed by VATESI.

## **Article 19 Operation**

### ***ARTICLE 19. OPERATION***

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

- (i) 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;***
- (ii) 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;***
- (iii) operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;***
- (iv) procedures are established for responding to anticipated operational occurrences and to accidents;***
- (v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;***
- (vi) incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;***
- (vii) 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;***
- (viii) 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.***

## **Article 19(1) – Initial authorization**

### **Overview of arrangements and regulatory requirements for the commissioning of a nuclear installation**

The Law on Nuclear Energy and the Law on Nuclear Safety together with the regulations made under these laws establish the licensing system for activities related to nuclear materials or nuclear cycle materials, as well as for nuclear installations of the following life-stages: site evaluation, design, construction, commissioning, operation, and decommissioning. The Law on Nuclear Safety foresees an issuance of VATESI permissions related to commissioning process – for first transport of nuclear fuel into site of any nuclear reactor, for first loading of fuel into reactor core and for first start-up of a reactor.

The definition of “commissioning of nuclear facility (installation)” is set in the Law on Nuclear Safety: “Commissioning of a nuclear installation – demonstration that the installed structures, systems and components of a nuclear installation are in line with the design and safety requirements, and that the technical standard documentation, organizational structure, number and competences of staff of the licence holder are adequate for safe operation of a nuclear installation.”

Commissioning of nuclear installation may be performed only in line with commissioning programme which shall be approved by VATESI. The reports on commissioning stages is subject for review and assessment by VATESI as well. Detailed requirements for commissioning of the NPPs are presented in Nuclear Safety Requirements BSR-1.8.5-2018 “Commissioning of Nuclear Facility”. The further steps in the licensing process toward operation are going to be made taking into account interim or final results of implementation of commissioning program.

### **Conduct of appropriate safety analyses**

Nuclear Safety Requirements BSR-1.8.5-2018 “Commissioning of Nuclear Facility” requires for compliance of tests performed within commissioning program with safety analysis report.

### **Commissioning programmes**

See information above.

### **Programmes of verification that installations, as constructed, are consistent with the design and in compliance with safety requirements**

Nuclear Safety Requirements BSR-1.8.5-2018 “Commissioning of Nuclear Facility” requires for testing of individual structures, systems and components and requires for reporting on the results.

### **Regulatory review and control activities**

VATESI shall approve commissioning program and interim and final results of implementation of it are used in the licensing process in accordance with Resolution No. 722 of 20 June 2012, of the Government of Republic of Lithuania on the Approval of Regulation on the Issue

of Licences and Permits Necessary to Engage in Nuclear Energy Activities. The implementation of commissioning program is controlled through regulatory inspection's activity.

## **Article 19(2) – Operational limits and conditions**

### **Overview of arrangements and regulatory requirements for the definition of safe boundaries of operation**

It is stated in Paragraph 147 of the Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors”, that the principal document defining safe operation is the technical specification, which lays down the main modes and functions of the safe operation as well as the general sequence the performance of all operations related to the plant safety, and also specifies the limits and conditions of the safe operation. The limits and conditions of the safe operation shall be justified by design and/or other relevant documents.

In accordance with the established procedure Units 1 and 2 Technical Specifications are revised once per three years, but in case of change of the status of equipment of systems important to safety due to performance of works within the scope of the Decommissioning Projects U1DP0, U2DP0, all appropriate changes to the Technical Specifications are made in a timely manner. Each revision of the Technical Specification shall be endorsed by VATESI.

### **Implementation of operational limits and conditions, their documentation, training in them, and their availability to plant personnel engaged in safety related work**

Limits and conditions of the INPP safe operation were set and justified in the Technical Safety Justification prepared by the plant Main Designer NIKIET and Scientific Adviser “Kurchatov Institute” and the General Designer (St-Petersburg, Russia). In the frames of in-depth safety assessments for INPP Unit 1 and Unit 2 – SAR-1 and SAR-2 respectively the limits and conditions of safe operation were reviewed and their correctness was confirmed. As long as there is nuclear fuel in the reactor core or in the storage pools, the INPP Units 1 and 2 are considered to be nuclear installations. At this stage all decommissioning activities are to be carried out in accordance with the design requirements as well as the limits and conditions of safe operation.

During performance of post-Fukushima activities within the scope of “stress tests” (see Article 14), safe operation limits on water temperature and level in the INPP power Units 1 and 2 SFP were established at the INPP leading to all necessary changes were made in the INPP Units 1 and Unit 2 Technical Specifications and appropriate operational and accident-prevention procedures. Safe operation limit on Cs-137 activity in SFP water was established at the INPP as well.

Issues regarding personnel training are described in Article 11 of this Report.

### **Review and revision of operational limits and conditions**

After the final shutdown of the INPP Units many changes were made in accordance with BSR-2.1.2-2010 and DSAR. All main documents associated with operation of safety-related systems (operation and maintenance manuals, accident prevention instructions, setting tables, protection and interlocking tables, lists of elements of systems important to safety) are reviewed as planned, as well as under occurrence of changes to configuration of respective equipment, which are mainly related

to INPP decommissioning projects. The documents requiring agreement with VATESI are independently reviewed by the INPP Audit, Safety and Quality Management Division.

The basis for amendment of operational documents includes the following:

– after complete defueling of Unit 2 reactor, Unit 2 systems and equipment related to the reactor no longer perform any functions related to nuclear safety which were in effect during the stage of Unit 2 reactor defueling, and Unit 2 is currently at the stage of nuclear fuel retrieval from the storage pools.

– as a result of implementation of the modification related to change of Organisational Structure in the Field of Technological Processes, Radioactive Waste Management, Physical Security, MOD-17-00-1490 aiming to achieve:

- reorganization of organisational structures of the Technological Service and Radioactive Waste Management Service of the Decommissioning Department in order to efficiently use current human and material resources in order to ensure safety after completely defueling of Unit 2 reactor and transfer to the spent fuel storage pools, in-line decontamination of Unit 2 MCC, also centralisation of solid radioactive waste (RW) management, organisation of RW logistics, implementation of decommissioning projects in the field of RW management;
- improvement of the organisational structure of the Physical Security Service in order to efficiently use current human and material resources taking into consideration the physical security requirements during the INPP decommissioning stage;
- from 2019 incorporation of the Radioactive Waste Management Agency (RATA) into the organizational structure of the INPP, including full handover of material, human resources and all of its previous functions (including transportation of sources of ionizing radiation within the territory of the Republic of Lithuania, also RW Management functions and decontamination of terrain, buildings and constructions in case of nuclear and radiological emergencies on the territory of the Republic of Lithuania.

### **Regulatory review and control activities**

Technical Specifications of the INPP Units are approved by VATESI as well as any changes to them. Current values of safety related parameters are supervised during VATESI inspections.

## **Article 19(3) – Procedures for operation, maintenance, inspection and testing**

### **Overview of arrangements and regulatory requirements on procedures for operation, maintenance, inspection and testing of a nuclear installation**

All works related to operation, maintenance, inspection and testing of all systems and equipment shall be performed only in accordance with the approved documents. More information is provided in Article 14 of this Report.

### **Establishing of operational procedures, their implementation, periodic review, modification, approval and documentation**

Document preparation, approval of its acceptability and support is performed in accordance with the established procedures. Normal and emergency operating procedures, as well as testing

procedures are developed in the operation-by-operation manner. There are the stops provided to assess results. The most important operations are performed under the direct supervision of another person. All actions of both the executors and their supervisors are recorded and signed in the relevant reports. The application area, limitations, responsibilities and actions of the personnel to detect normal operation failures are determined in each procedure.

Any testing at the INPP not covered by the Technical Specification and operation procedures shall be performed in accordance with the special programmes presenting measurers to provide testing safety. Prior to the document entering into force (including testing programmes) the applicability, usability of the documents shall be confirmed (review, endorsement and approval). Confirmation of applicability shall be based on the critical analysis of adequacy of the measures providing safe and correct operation and shall be performed in compliance with the established procedures. The most important documents shall be agreed with VATESI.

### **Availability of the procedures to the relevant staff**

All documents and records are accounted in a special electronic system ARKI and registered in a special electronic system @vilys. On one hand the specified systems ensure retention of documents soft copies, and on the other hand access of all INPP users to all valid documents. Plant personnel use only the documents passed review, approval and registration. All key personnel have the possibility to use @vilys system to search for any required document.

In accordance with the established requirements, each division of the INPP has its own list of documents that the personnel of specific division must follow and be guided in performing their own tasks.

The originals of the documents and records are stored in within the established storage time. Documents and records, related to safety are stored for the period of operation. Elimination of the documents and records not in action anymore and their archiving shall be performed in accordance with the established procedures. Access to the archive documents and records shall be provided in accordance with the relevant procedures.

### **Involvement of relevant staff in the development of procedures**

Preparation of documentation at INPP is carried out by the competent personnel of the enterprise subdivisions according to the “Procedure of Documents and Data Records Management”, MS-2-002-1, DVSta-0211-1, and other established procedures.

Documentation developers and managers of the relevant subdivisions of the enterprise ensure observance of accuracy, operational authenticity and acceptability of the document being developed.

Confirmation of acceptability of documents is carried out by the competent personnel of the power plant subdivisions, including operational, repair and operating personnel, prior to putting the document into effect and includes revision, approval, coordination, independent review and validation of the document.

Confirmation of acceptability of documents is performed in accordance with the graded approach principle and is based on critical analysis of sufficiency of measures which ensure safe and correct operation of equipment and systems. The results of the performed acceptability conformation are documented and stored together with original of the document. If endorsement of the document by the regulatory authority is required, it shall be obtained prior to putting the document into effect.

## **Incorporation of operational procedures into the management system of the nuclear installation**

See Article 13 of this Report.

### **Regulatory review and control activities**

VATESI in accordance with the established responsibilities and national regulations for the verification of safety of nuclear facilities day-to-day carries out supervision/inspection activities and systematic safety assessment to verify that the Authorized party and license holder is in compliance with the regulatory requirements and with the conditions specified in the authorization/license. VATESI supervises the activities of in-service inspection and testing at Nuclear Facilities:

- review and approval of Standard in-service inspection and testing regulation and programmes of INPP;
- review of annual in-service inspection and testing programmes of INPP;
- review and assessment of annual in-service inspection and testing results of INPP;
- review, development and approval of in-service inspection and testing regulations;
- review and approval of in-service inspection and testing methodologies and procedures;
- review of the results of material investigation of INPP components and pipelines;
- review and consideration of safety justification in case of deviations from in-service inspection and testing acceptance.

## **Article 19(4) – Procedures for responding to operational occurrences and accidents**

### **Overview of arrangements and regulatory requirements on procedures for responding to anticipated operational occurrences and accidents**

The common requirement for capability to prevent and manage design basis and beyond design basis accidents and mitigate consequences of them at nuclear installations is set the amendment to the Law on Nuclear Safety of September 2017 (Paragraphs 3 and 4 of Article 35). In accordance with the law, the specific requirements shall be set by VATESI.

The main regulatory requirements on procedures for responding to anticipated operational occurrences and accidents are established in the Nuclear Safety Requirements BSR-2.1.2-2010 “General Requirements on Assurance of Safety of Nuclear Power Plants with RBMK-1500 Type Reactors” and Nuclear Safety Rules VD-T-001-0-97 “Nuclear Safety Regulations for the Reactor’s of Nuclear Power Plants”.

The Nuclear Safety Requirements BSR-2.1.2-2010 establish safety goals, general safety criteria as well as the basic principles and the nature of the technical and organizational measures, which shall be applied to the nuclear power plants with RBMK-1500 type reactors. The BSR-2.1.2-2010 obligate the licensee to prepare a set of operating procedures, including procedures for responding to anticipated operational occurrences and accidents, including guidelines for management of beyond design basis accidents. The procedures and features shall take into account possibility of simultaneous accidents in a few installations on the site (Paragraphs 155<sup>2</sup> and 194<sup>1</sup>) License holder shall have its own resources for management of design basis accidents (Paragraph

187<sup>1</sup>). License holder may use external support in case of beyond design accidents taking into account the specific conditions (Paragraph 187<sup>1</sup>).

Nuclear Safety Regulations VD-T-001-0-97 establish general requirements for design, characteristics and operational conditions of reactor installation systems and elements, as well as organizational requirements for nuclear safety assurance during the reactor installation design, construction and operation (decommissioning).

### **Event based and symptom based emergency operating procedures**

The event-based accident procedure “Instruction on Elimination of Emergency Situations and Accidents at Ignalina NPP” was developed for Ignalina NPP Units 1 and 2 for the purpose to define INPP personnel actions for elimination of emergency situations and design basis accidents as well as the order of cooperation and responsibility distribution during performance of these actions. After the permanently shutdown of Ignalina NPP Units, the accident response procedure “Instruction on Elimination of Emergency Situations and Accidents at Ignalina NPP” was revised and accommodated for the current state of Ignalina NPP Units.

The Special Symptom Based Oriented Accident Instructions, Emergency Support Instructions, and Support Procedures were developed at Ignalina NPP in addition to the existing event-based accident procedure and introduced at Ignalina NPP in 2001. After the permanently shutdown of INPP Units, the abovementioned procedures lost their relevance.

### **Procedures and guidance to prevent severe accidents and mitigate their consequences if such accidents occur**

Special guidelines for management of beyond the design basis accidents (SAMG/RUZA) were developed and introduced at INPP in 2008. After the permanent shutdown of INPP Units, the guidelines for management of beyond the design basis accidents were revised and adopted for the current state of INPP Units. In accordance with the INPP management system requirements for safety documentation, the guidelines for management of beyond the design basis accidents are included into the documentation package of the INPP Emergency Preparedness Plan (EPP).

As a result of complete defueling of Unit 2 reactor in the beginning of 2018, it is no longer to be used as a device to carry out controlled chain reaction in order to generate thermal power and is not considered to be a source of nuclear danger, therefore the beyond design-basis accidents management guidelines were revised. There are currently three guidelines:

- Manual on use of beyond design-basis accidents management guidelines;
- RUZA-RB “Fission products release mitigation of Unit 1 and Unit 2”;
- RUZA-B “Spent fuel storage pools conditions management of Unit 1 and Unit 2”.

The several safety improvement measures related to management of beyond design-basis accidents at INPP were implemented since it was presented in 7<sup>th</sup> National Report of Convention on Nuclear Safety. All implemented safety improvement measures were introduced in accordance with the Plan of Strengthening Nuclear Safety in Lithuania (National Action Plan). More details on the National Action Plan and INPP “stress tests” results and safety improvements measures associated with post-Fukushima lessons learned are presented in Article 14 of this Report.

## **Regulatory review and control activities**

VATESI reviews and approves accident management procedures and guidelines of Ignalina NPP. Accident management issues are subject of regular VATESI inspections, during which necessary equipment, procedural documents and trainings are inspected.

## **Article 19(5) – Engineering and technical support**

### **General availability of necessary engineering and technical support in all safety related fields for all nuclear installations, under construction, in operation and under decommissioning**

Technical and scientific support is provided by the INPP designers and by the designers of the reactor NIKIET (Russian abbreviation for Research and Development Institute of Power Engineering), VNIPIET (Russian abbreviation for All-Russia Research and Design Institute of Power Engineering Technology), and Research Manager – Russian Scientific Centre Kurchatov Institute, Moscow) and other institutes.

A lot of companies from US and EU countries were involved in safety improvement activities, also local organizations such as Lithuanian Energy Institute, Kaunas University of Technology, EMC, Vilnius Institute of Information Technologies have provided technical support in safety related fields during the INPP decommissioning.

General availability of necessary engineering and technical support under accident conditions realized in the INPP Emergency Preparedness Plan implementation (see Article 16 of this Report).

### **General availability of necessary technical support on the site and also at the licence holder or utility headquarters, and procedures for making central resources available for nuclear installations**

The INPP Technical Support Division is in charge of all issues related to nuclear safety, fuel and the core, ensures support to the power plant subdivisions in solving engineering, ageing, HVAC etc. problems.

The INPP Design Department supports the plant subdivisions in the area of equipment repair technologies development and design works.

The INPP Documentation Management Department provides support to the plant subdivisions in the area of technical documentation management.

To ensure provision of the technical support, management documents, as well as level 3 working procedures (within the scope of QA) are applied at INPP, including but not limited to the following:

- Procedure of Documents and Data Records Management, MS-2-002-1;
- Management Procedure of Operational Experience Application, MS-2-003-1;
- Nuclear Safety Management Procedure Description, MS-2-012-2;
- Procedure of Power Plant Modifications Management, MS-2-016-1;
- Designing Management Procedure, MS-2-018-1;
- Technical Questions, Modification Proposals, Technical Solutions Development Instruction, DVSeD-1612-3;
- Modifications Control Instruction, DVSeD-1612-6;
- Modifications Implementation Instruction, DVSeD-1612-7.

## **General situation with regard to dependence on consultants and contractors for technical support to nuclear installations**

Services related to design, production, delivery of equipment and systems, materials and spare parts, contracted works from the technical support organizations having permission to conduct works and services at the INPP are procured at the INPP in accordance with the Procurement Management Procedure, MS-2-017-1. Independent examination of the most important modifications is carried out by technical support organizations according to the Procedure of Modifications Management, MS-2-016-1.

To solve the particular task that demands technical services and means both from internal and external organizations a special project management group is organized (for example, an implementation of a new system or procedure, fulfilment of the safety improvement program, decommissioning activities, etc.). The personnel of the INPP structural divisions as well as the personnel of external technical support organizations can be involved in such a group. The group manager is responsible for efficient implementation of the project according to the given authority and existing management system. In development of technical support projects INPP cooperates with external technical support organizations, such as Lithuanian Energy Institute, Kaunas University of Technology, EMC, Vilnius Institute of Information Technologies.

### **Regulatory review and control activities**

VATESI performs the inspections of the INPP activities related to audits of the contractors' organizations involved in the INPP's decommissioning projects. The goal of such inspections is to ascertain how the INPP is performing the assessments (audits) of the management systems of the suppliers that are relevant to safety and the capability of these suppliers to meet the requirements of the procurement documents.

### **Article 19(6) – Reporting of incidents significant to safety**

#### **Overview of arrangements and regulatory requirements to report incidents significant to safety to the regulatory body**

The Article 36 of the Law on Nuclear Safety lays down the obligation for the licence holders to notify promptly VATESI about nuclear and radiological accidents, nuclear incidents and other unusual events having occurred at nuclear installations.

Nuclear Safety Requirements BSR-1.8.1-2010 “Notification on Unusual Events at nuclear Power Plants” defines events reporting criteria, reporting processes to ensure that the information will be provided in a timely manner, as well as requirements for the analysis of event and content of the event analysis report.

The VATESI's “Requirements on Operational Experience Feedback in the Field of Nuclear Energy” (P-2009-04) requires from a license holder to prepare detailed procedures for reporting on unusual events, including near-misses, accident precursors and abnormal occurrences at all stages during the life-time of a nuclear installation.

Ignalina NPP has established event reporting and analysis procedures.

In order to report timely reportable events to INES database, the INES national coordinator is nominated at VATESI.

## **Overview of the established reporting criteria and reporting procedures for incidents significant to safety and other events such as near misses and accidents**

The main criteria for reportable events and requirements for notification are established in the Nuclear Safety Requirements BSR-1.8.1-2010 “Notification on Unusual Events at Nuclear Power Plants”. The reporting criteria include, but are not limited to the following:

- violation of limits and conditions of safe operation;
- failure of the barriers important to safety;
- obstacles for personnel to perform work safely;
- unplanned activation of a safety system;
- failure of a system to perform safety important function;
- unplanned discharge of radioactive materials exceeding the permissible levels;
- unplanned radiation dose exceeding the permissible levels;
- any event posing threat to security of a NPP.

In accordance with BSR-1.8.1-2010 VATESI shall be informed verbally about all safety significant events as soon as possible, but not later than within 1 hour with a subsequent written notification by fax within 24 hours. Event investigation report shall be prepared and presented to VATESI within 30 days.

Taking into regulatory requirements Ignalina NPP has developed procedure “Notification on Unusual Events at Ignalina Nuclear Power Plant”, DVSta-0312-8, which defines detailed reporting criteria and notification instruction for personnel of Ignalina NPP. Last review of Ignalina NPP event reporting criteria’s and notification procedures were reviewed by VATESI in the end of 2018. Reporting criteria are consistent with VATESI requirements.

### **Statistics of reported events significant to safety for the past three years**

From 2016 to 2018, nine reportable events occurred at the Ignalina NPP, which in accordance with reporting criteria, established in the Nuclear Safety Requirements BSR-1.8.1-2010 “Notification on Unusual Events at Nuclear Power Plants”, which were in force during the aforementioned period, had to be reported to VATESI. As a consequence of events the occupational exposure of the Ignalina NPP employees and the contamination of the premises with radionuclides did not exceed the permissible limits, and the radionuclides were not released to the environment. On the International Nuclear Events Scale (INES) all 9 events were rated at “level 0 / below the scale”.

### **Documentation and publication of reported events and incidents by both the licence holders and the regulatory body**

Ignalina NPP maintains event database to facilitate the analysis and to inform departments. The Ignalina NPP database supports producing of investigation reports by providing of electronic templates compatible with the ASSET methodology. As soon as the first draft of a report is ready it can be easily retrieved from the system and reviewed by the members of an event investigation team. Necessary changes can be done to the report at this stage by the investigation team. The final version of such a report becomes accessible to all departments after receiving the “approved” status. The system does not provide possibility to change the content of the report after its approval by the leader of the investigation team.

All event analysis reports from Ignalina NPP are collected, handled and stored at the VATESI database of unusual event so that it is possible to carry out a systematic search, selection and evaluation of events. National coordinator of Lithuania at VATESI is responsible for selection, preparation of national reports on safety related events to international databases: IAEA/NEA IRS, FINAS and NEWS databases respectively.

### **Policy for use of the INES scale**

In accordance with the Article 37 of the Law on Nuclear Safety three unusual events at nuclear installations and during activities involving use of nuclear and/or nuclear fuel cycle materials shall be classified by the licence holder on INES scale. Independently from the licence holder the VATESI analyse the unusual events and based on the conducted analysis finalise the approval of their classification. All reportable events for national and international communication are classified according to INES User's Manual edition 2008.

### **Regulatory review and control activities**

The event reporting arrangements at INPP are regularly assessed by VATESI in the frames of supervision of the system of operational experience feedback. The effectiveness of the notification system is evaluated during annual inspection and review of corresponding submittals, including event reports, delivered pursuant to VATESI requirements. The regulatory activities include follow-up of the licensee's corrective actions identified as a result of event investigation.

## **Article 19(7) – Operational experience feedback**

### **Overview of arrangements and regulatory requirements on the licence holders to collect and analyse and share operating experience**

A framework for sharing operating and regulatory experience for the purpose of the prevention of nuclear and radiological accidents and incidents and further safety improvement is established in the Law on Nuclear Safety. The Law on Nuclear Safety requires the licence holder to analyse its own and external operational experience in the nuclear energy field as well as to exchange such operating experience with other interested parties and take necessary preventive and/or corrective measures that would ensure proper performance of nuclear safety requirements in the manner prescribed by the Head of VATESI.

Regulatory requirements in the area of operating experience feedback are established in the VATESI's Nuclear Safety Requirements BSR-1.8.1-2010 "Requirements of notification on unusual events in nuclear power plants" and "Requirements on Operating Experience Feedback in the Field of Nuclear Energy" (P-2009-04). Regulation P-2009-04 defines the main requirements for:

- operating experience feedback system;
- identification, reporting, screening and analysis of information on operating experience;
- analysis of the trends of events;
- collection information on operating experience and dissemination of lessons learned;
- assessment of the effectiveness of the operating experience feedback system.

In accordance with the regulation P-2009-04, operating experience shall be systematically exercised in all stages of the lifecycle of a nuclear installation.

## **Overview of programmes of licence holders for the feedback of information on operating experience from their own nuclear installation and from installations abroad**

The Ignalina NPP has developed operating experience system and special procedures, implementing VATESI Nuclear Safety Requirements BSR-1.8.1-2010 “Requirements of notification on unusual events in nuclear power plants” and “Requirements on Operating Experience Feedback in the Field of Nuclear Field” (P-2009-04).

The purpose of the use of operating experience is to increase the safety and reliability of the Ignalina NPP. A separate process for the activities on the use of internal and external operating experience at Ignalina NPP is developed. This process is documented in the 2<sup>nd</sup> level IMS procedure “Use of operating experience management procedure” (MS-2-003).

The use of operating experience at the Ignalina NPP is ensured by the following means:

- the competent personnel, whose authorities and responsibilities are defined in the power plant documentation;
- availability of the procedures describing and defining various actions: screening information on operating experience, evaluation of applicability, event analysis, planning and documenting of results, development of corrective actions, monitoring of the corrective actions;
- allocation of the resources necessary for realization of activity on the use of own and operating experience;
- safety performance indicator system developed at the Ignalina NPP is a part of the operating experience. Relevant to the decommissioning stage indicators have been renewed since 2010 and is under applications at the Ignalina NPP;
- the categorization (coding by WANO) system for the monitoring of the trends are developed and used at the Ignalina NPP with aim to assess the effectiveness of the use operating experience. The monitoring comprise the faults of equipment, drawbacks in the employees’ operations, descriptions of the procedures, organizational weaknesses as well as the data characterizing the conditions that were present during the events (near-miss events).

In order to assure operating experience use and feedback the Ignalina NPP uses various information sources:

- information of own operating experience: event analysis reports, low level events, the near misses events, the proposals of Ignalina NPP employees, the business trips reports, the reports of the carrying out emergency and fire-fighting exercises;
- an operating experience of the NPPs with RBMK reactors;
- WANO and IAEA (IRS and FINAS) information;
- reports on external evaluations, including VATESI inspections, reports on carrying out of WANO peer review, reports on carrying out of international missions (ASSET, OSART, etc.).

Special attention is paid to safety issues and lessons learned related with decommissioning of other NPPs.

The information on operating experience feedback at Ignalina NPP is collected, handled and stored using a special database allowing to carry out systematic search, selection and evaluation.

### **Procedures to analyse domestic and international events**

To prevent possible events at Lithuanian nuclear facilities and to avoid occurrences and reoccurrences of similar events happened in the worldwide VATESI analyses domestic and international operating experience including information on unusual events. VATESI performs review, screening and analysis of information on events available through IAEA International Reporting System for Operating Experience (IRS), Fuel Incident Notification and Analysis System

(FINAS), information on events gained through Clearinghouse website, NRC website and other available sources. In this regard a separate management system process and corresponding procedure “The procedure on the regulatory and operating experience management” are developed in VATESI.

In accordance with VATESI regulation document “Requirements on Operating Experience Feedback in the Field of Nuclear Field” (P-2009-04), all safety significant events as well as the events that may impact long-term safe operation of the nuclear installation shall be thoroughly investigated, their direct causes and root causes shall be identified, the impact on safety and potential consequences shall be assessed, and the corrective actions shall be established. Based on the results of the investigation, the managers of the nuclear facility shall be provided with specific recommendations regarding the corrective actions that have to be taken immediately.

Ignalina NPP has issued and uses a special procedure “Instruction for event analysis”, DVSta-0312-5, which describes and procedures for event analysis occurred at Ignalina NPP, procedures for root causes analysis, use of ASSET methodology for event investigation, development of corrective measures, event classification by INES, preparation of event analysis and other procedures related with event analysis and event analysis report preparation are included. “Instruction for event analysis”, DVSta-0312-5, includes procedures of analysis of low level events and near-misses events.

In order to identify relevant to the Ignalina NPP safety related issues and adopt the lessons learned at the Ignalina NPP the special “Group of Operating Experience analysis and control” are constitute at Ignalina NPP. This Group performs analysis if information on operating experience - as well as domestic and international events.

### **Procedures to draw conclusions and to implement any necessary modification to the installation and to personnel training programmes**

Use of operating experience at the Ignalina NPP is evaluated in a systematic way with a purpose to reveal eliminate any weaknesses and improve its effectiveness. To determine the effectiveness of the use of operating experience, self-assessments (internal inspections, audits, walk down, surveillances) and external assessments (VATESI inspections, ASSET and OSART missions, WANO peer reviews) are foreseen in the management system procedures. On the basis of the analysis of the operating experience (investigation of the event, evaluation of the trend, analysis of the external operating experience feedback and other) the corrective actions are prepared with a final target to improve the safety of Ignalina NPP.

The use of operating experience is a part of other Ignalina NPP programmes, e.g. equipment maintenance programmes are developed with consideration of analysis of maintenance and operating experience, information submitted by designers and by manufacturers; programmes for optimization of radiation exposure are composed taking in to account the analysis of radiation exposure in the previous years, content and scope of work, VATESI requirements.

The operating experience is used for training of INPP personnel at Ignalina NPP Training Subdivision. The data considered applicable to the plant are analysed and incorporated into training programmes.

### **Mechanisms to share important experience with other operating organizations**

Ignalina NPP has contacts and cooperates with the legal entities which took part in designing the nuclear installation or in manufacturing the safety-important structures, systems or components

which rendered services and carried out works related to safety in order to get consultations in the cases of equipment faults or events.

The mechanisms to share important experience with operating organizations are established in the INPP management procedure “Use of operating experience management procedure” (MS-2-003).

With a purpose to ascertain that all persons supplying goods, rendering services or performing works to INPP are efficiently using the operating experience in their activities the communication with contractors are maintained. INPP exchanges important operating experience with other operating organizations. The important experience is disseminate thought WANO.

### **Use of international information databases on operating experience**

The licensee has defined the procedures for the assessment and usage of the information obtained from other nuclear installations, nuclear safety regulatory institutions and other sources, including IAEA/NEA IRS, FINAS databases and WANO.

### **Regulatory review and control activities for licence holder programmes and procedures**

In order to assure proper operating experience usage VATESI plans and performs inspections at Ignalina NPP. VATESI controls the licence holder’s operating experience feedback arrangements and use of the lessons learned by performing regulatory inspections and reviewing the corresponding submittals delivered to the regulatory body according to regulations.

VATESI performs oversight the activities of licences holders and review events analysis and notification procedures, internal and external operating experience feedback procedures, safety performance indicators system and other procedures related with operating experience feedback.

### **Programmes of the regulatory body for feedback of operating experience and the use of existing mechanisms to share important experience with international organizations and with other regulatory bodies**

A separate VATESI’s management system process and corresponding procedure “The procedure on the regulatory and operating experience management” are established in VATESI. It defines the process for systematic screening, analysis and sharing of information on operating experience. In accordance with VATESI’s management system procedure “The procedure on the regulatory and operating experience management” a permanent Commission of Unusual Events and Operating Experience has been established. It systematically performs review, screening and analysis of information on operating experience. The event analysis reports are assessed and analysed with a purpose to identify safety related issues, adopt the lessons learned in order to avoid the reoccurrences of events and for improve the regulatory requirements. Recommendations developed by Commission are provided to VATESI specialist’s and for license holder. In accordance with regulation “Requirements on Operating Experience Feedback in the Field of Nuclear Power” (P-2009-04) license holder provide VATESI reports on use operating experience and lessons learned, including information on implementation of recommendations of VATESI.

The process of identification of relevant operating experience information includes the review of the international databases, such as:

- IAEA International Reporting System for Operating Experience (IRS);
- Fuel Incident Notification and Analysis System (FINAS);

– European Commission’s Joint Research Centre Technical Reports.

VATESI uses the different ways for information to share own experience. The information on lessons learned and important experience is disseminated through above mentioned international databases and technical meetings. The important information for the public and international organization is published into VATESI own website [www.vatesi.lt](http://www.vatesi.lt).

## **Article 19(8) – Management of spent fuel and radioactive waste on the site**

### **Overview of arrangements and regulatory requirements for the on-site handling of spent fuel and radioactive waste**

In accordance with the Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste Radioactive Waste Management Programme was prepared and approved by the Government of the Republic of Lithuania on 23rd December, 2015, superseding the Radioactive Waste Management Strategy approved in 2002. The strategic goal of the Program is safe management of all radioactive waste and spent nuclear fuel available in Lithuania, protection of people and the environment from harmful effects of ionizing radiation and avoiding to impose undue burdens on future generations. The three basic tasks of the Programme remain the same as in the previous Radioactive Waste Management Strategy: to strive to reduce radioactive waste amount; to achieve a high level of nuclear and radiation safety and environmental protection by management of spent nuclear fuel and radioactive waste; to strive to ensure transparency of spent nuclear fuel and radioactive waste management and information of the public. The additional task is to ensure long-term safety of spent nuclear fuel and long-lived radioactive waste by constructing a deep geological repository within the Lithuanian territory.

Nuclear Safety Requirements BSR-3.1.1-2016 “General Requirements for Spent Nuclear Fuel at Storage Facility of the Dry Type”, issued by VATESI, set out general requirements for spent fuel storage. Nuclear Safety Requirements BSR-3.1.2-2017 “Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities”, issued by VATESI, set requirements for management of radioactive waste at NPP. Nuclear Safety Requirements BSR-3.2.2-2016 “Radioactive Waste Repositories”, issued by VATESI, set requirements for disposal of radioactive waste.

### **On-site storage of spent fuel**

The storage capacity SNFSF-1, which is in operation since 2000, contains 20 CASTOR RBMK casks and 98 CONSTOR RBMK casks. The facility is fully filled-up. The casks contain 6016 dismantled spent nuclear fuel tight assemblies of initial uranium-235 enrichment 2% only. The total activity of spent fuel located at the SNFSF-1 is 3.09E18 Bq.

SNFSF-2 (new spent nuclear storage facility licensed on September 2016 and put into industrial operation on May 2017) is located within a distance of 1 km of the INPP Units and about 1.5 km from SNFSF - 1. The area of SNFSF-2 is 5.93 ha. Total capacity of the facility is 200 CONSTOR®RBMK-1500/M2 casks. SNFSF-2 has enough capacity to store remaining in both Units the spent fuel. As of 2019-01-01, 86 CONSTOR®RBMK-1500/M2 casks with spent fuel are stored in the SNFSF-2. The planned lifetime for interim storage - up to 50 years.

The Technical Design documentation and PSAR for Heavily Damaged Spent Fuel Handling System (DFHS) within the frame of project B1 was approved by VATESI on January 2016.

Currently DFHS is under detailed designing and manufacturing by the contractor with the aim to start installation of appropriate equipment in INPP Unit 1, 2 at the end of 2019.

### **Implementation of on-site treatment, conditioning and storage of radioactive waste**

Solid radioactive waste at INPP is segregated into three groups by the surface dose rate, according to standards that were applied in the former Soviet Union and were applicable at INPP over the period of its operation. The solid waste, produced at INPP during its operation, was dumped into reinforced concrete compartments in storage buildings No. 155, 155/1, 157, 157/1 located on INPP site. All the stored waste is to be retrieved from these facilities in order to be characterized and conditioned according to the current regulatory requirements established by VATESI.

Liquid radioactive waste at the INPP is collected in special tanks, from where it is directed to evaporating facilities. The resulting evaporator concentrates are processed and conditioned at the bitumen solidification facility, being mixed with bitumen into bitumen compound. The bitumen compound then is pumped into a special bituminised waste storage facility (build. 158) located on the INPP site. Presently the decision had been made to refuse bituminization process. The rest of liquid radioactive waste, which was subject to bituminization, will be treated through cementation.

The INPP has initiated B20 project on engineering investigation of possibility to convert bituminised radioactive waste storage facility into a repository. The main purpose of B20 project is to perform all necessary actions (investigation, researches, studies) in order to demonstrate the possibility of the bitumen compound storage facility transformation into the repository and prepare the basic design documents related to transformation or to conclude that the bitumen compound storage facility cannot be transformed into the repository and other actions related to retrieval of bitumen compound, treatment etc. will be evaluated and prepared.

Spent ion-exchange resins, perlite and sediments are stored in special tanks. The cementation facility and storage facility for cemented waste had been authorized and put in operation in 2006. The ion-exchange resins from the INPP water purification and liquid waste treatment systems together with filter aid (perlite) as one waste mixture type and solid particle sediments from evaporator concentrate also with filter aid (perlite) as another waste mixture type is to be solidified in cement by producing stable compound, which is poured into steel drums (200 l drums) and put in storage container (FRAMATOME ANP container for 8 drums) in order to reduce any further risk associated with the liquid waste storage in tanks and to assure safe storage and management of solidified waste. A storage facility for cemented waste is designed for 60 years storage. Conditioned waste will be disposed of in the Near Surface Repository (NSR) (B25 Project).

Modernization of the radioactive waste management includes retrieval from the existing storage facilities, characterization, treatment and conditioning of legacy operational waste taking into account the separate disposal routes. Another aspect of radioactive waste management modernization is enhancement of INPP capabilities towards decommissioning waste management (installing new infrastructure and hardware along with introducing advanced management practices).

In new waste treatment facilities (B2 and B3/4 Projects) operational and decommissioning waste will be handled. Industrial operation of retrieval facilities from old 155 and 155/1 waste storage facilities started in April 2019. It is foreseen that industrial operation of new treatment and storage facility (B3/4 Project) will start up to the end of 2019.

Prior to the final disposal the waste will be stored in new storage facilities according to a certain waste type and radiological characteristics. In order to store very low level radioactive waste prior to transportation to the Landfill Facility, Buffer Storage Facility was erected with the capacity of 4000 m<sup>3</sup>. This facility had been commissioned in 2013. Short-lived low and intermediate level radioactive waste will be stored at the short-lived waste storage module of B4 storage facility prior

to their transportation and to NSR (B25 facility). Long-lived radioactive waste will be stored at the long-lived waste storage module of B4 storage facility (for nearly 50 years) prior to their disposal to deep geological repository.

It is envisaged to construct two short-lived waste disposal facilities – Landfill facility for very low level waste (B19-1 Project) and the NSR for low and intermediate level radioactive waste (B25 Project). According to the plans Landfill facility could be commissioned in 2020-2021 and the NSR for low and intermediate level radioactive waste in 2023-2024.

In accordance with the national Radioactive Waste Management Programme the spent fuel and long lived waste will be disposed in deep geological repository constructed and commissioned on the territory of Lithuania.

### **Activities to keep the amount of waste generated to the minimum practicable for the process concerned, in terms of both activity and volume**

According to the new Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at the Nuclear Facilities” Ignalina NPP shall keep the generation of radioactive waste to the minimum practicable, in terms of both activity and volume, using best available technology without involving excessive costs. Ignalina NPP optimized the processes related to waste generation which allowed reduce the amount of waste.

For the radioactive waste minimization purposes Free Release Facility was introduced to handle operating solid potentially non-radioactive waste. It has been commissioned in 2006 (bld. 159B). After measurements at this installation, part of the waste can be treated as non-radioactive and can be stored in ordinary disposal facilities for non-hazardous waste. In year 2011 radiological characterization of decommissioning waste started at this facility.

Another Free Release Facility (B10 Project) dedicated to handle decommissioning waste, has been commissioned in 2010.

### **Established procedures for clearance of radioactive waste**

Nuclear Safety Requirements BSR-1.9.2-2018 “Derivation and Use of Clearance Levels of Radionuclides for Materials and Waste Generated during Activities in the Field of Nuclear Energy” are established. According to these requirements the INPP performs measurements of the material which could be free released (i.e., released from the regulatory control in terms of nuclear and radiation safety). This is done at the facilities mentioned above in the Article 19, according to respective INPP operating procedures approved by the VATESI.

### **Regulatory review and control activities**

Main steps of regulatory review are related to the steps of development of waste management facility design, construction or reconstruction, operation and decommissioning or closure. In order to receive a licence, operator shall provide application and safety documentation which shall be reviewed by regulatory body. When licence is issued regulatory control is ensured by control of compliance with safety requirements by regular inspections.