



REPUBLIC OF LITHUANIA

STATE NUCLEAR POWER SAFETY INSPECTORATE

# NUCLEAR POWER SAFETY IN LITHUANIA

ANNUAL REPORT 2011



Vilnius 2012

# Nuclear facilities in Lithuania



## Nuclear facilities in Lithuania

1. Ignalina Nuclear Power Plant – Drūkšiniai, Visaginas m.
2. Closed Maišiagala storage facility of radioactive waste – Bartkuškis forest, Širvintai region.
3. Spent nuclear fuel storage facility – Drūkšiniai, Visaginas m.
4. Cemented radioactive waste storage facility – Drūkšiniai, Visaginas m.

## Pictograms

- Nuclear power plant
- Storage facility

## Projected (under construction) nuclear facilities

1. Visaginas Nuclear Power Plant – 2 sites – Drūkšiniai, Visaginas m.
2. New spent nuclear fuel storage facility – Drūkšiniai, Visaginas m.
3. Facilities for treatment and storage of solid radioactive waste – Drūkšiniai, Visaginas m.
4. Very low level radioactive waste repository – Drūkšiniai, Visaginas m.
5. Low and intermediate radioactive waste repository – Stabatiškės, Visaginas m.

## Pictograms

- Nuclear power plant
- Storage facility
- Treatment facility
- Repository

# Table of Contents

Foreword by VATESI Head.....	5
<b>ABOUT US - THE STATE NUCLEAR POWER SAFETY INSPECTORATE .....</b>	<b>7</b>
The mission and main goals of VATESI .....	8
Key events.....	9
Strategic planning of activities .....	9
Quality management system.....	10
<b>PREPARATORY WORKS FOR LICENSING THE NEW NUCLEAR POWER PLANT .....</b>	<b>11</b>
Regulation and supervision of the project of the new nuclear power plant.....	12
<i>Upgrading of legal framework in Lithuania .....</i>	<i>12</i>
<i>Development of nuclear safety requirements and rules.....</i>	<i>13</i>
The site evaluation of the new nuclear power plant .....	14
Training specialists and improvement of their qualification.....	14
Providing consultations to Visagino Atominė Elektrinė UAB .....	16
Cooperation with nuclear safety regulatory institutions of other countries .....	17
<b>NUCLEAR SAFETY REGULATION AND SUPERVISION .....</b>	<b>18</b>
Preparation of mandatory technical documents on nuclear safety .....	19
<i>Setting nuclear safety requirements .....</i>	<i>19</i>
<i>The Program for Upgrading Nuclear Safety Mandatory Technical Documents in 2010-2014 and the Plan for</i>	
<i>Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011 .....</i>	<i>19</i>
<i>Implementation of the Plan for Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011 ...</i>	<i>19</i>
<i>The list of legal acts regulating VATESI activities and enforcing the requirements for the supervision area</i>	
<i>assigned to VATESI .....</i>	<i>21</i>
Issuing licences and permits .....	21
Inspections conducted by VATESI.....	24
<i>Planned inspections.....</i>	<i>24</i>
<i>Technical checks .....</i>	<i>25</i>
<i>Upgrading of inspection activities .....</i>	<i>26</i>
Optimization of supervisory functions .....	26
<b>SAFETY OF THE FINALLY SHUT-DOWN IGNALINA NUCLEAR POWER PLANT .....</b>	<b>28</b>
Supervision of decommissioning of finally shut-down Unit 1 and Unit 2 .....	29
<i>The main decommissioning works of finally shut-down Unit 1 .....</i>	<i>29</i>
<i>The main decommissioning works of finally shut-down Unit 2 .....</i>	<i>30</i>
Measures for assuring nuclear safety .....	31
<i>Assurance of safety of the Ignalina NPP 2<sup>nd</sup> nuclear reactor and spent nuclear fuel storage pools of</i>	
<i>Ignalina NPP Unit 1 and Unit 2 .....</i>	<i>32</i>
<i>Assurance of the structural integrity of the cooling circuit of the nuclear reactor of Ignalina NPP Unit 2 and</i>	
<i>the fuel storage pools of Ignalina NPP Unit 1 and Unit 2.....</i>	<i>32</i>
Maintenance of safety-related systems, management of their ageing and other safety upgrading and	
assurance measures .....	32
<i>Assurance of functionality of the accident confinement system of Ignalina NPP Unit 2.....</i>	<i>32</i>
<i>Monitoring, control and protection system.....</i>	<i>33</i>
<i>Maintenance of safety-related structures, systems and components.....</i>	<i>33</i>
<i>Ageing management of the safety-related systems and maintaining their qualified condition .....</i>	<i>33</i>
<i>Safety improvement measures .....</i>	<i>34</i>
<i>Stress tests, their process and results.....</i>	<i>34</i>
<i>Analysis of design-basis and beyond-design-basis accidents and their management .....</i>	<i>35</i>
<i>Fire hazard analysis at nuclear facilities.....</i>	<i>37</i>
Operational experience feedback .....	38
Training and qualification assessment of Ignalina NPP employees .....	39
Ignalina NPP management system and its improvement measures .....	39

<b>MANAGEMENT OF RADIOACTIVE FUEL AND RADIOACTIVE WASTE</b> .....	<b>41</b>
Management of nuclear fuel at Ignalina NPP: spent nuclear fuel storage facilities .....	42
Ignalina NPP radioactive waste management facilities .....	43
The closed Maišiagala Radioactive Waste Storage Facility .....	45
<b>RADIATION PROTECTION AT NUCLEAR FACILITIES AND LIMITATION OF RADIONUCLIDE RELEASES TO THE ENVIRONMENT</b> .....	<b>47</b>
<b>EMERGENCY PREPAREDNESS</b> .....	<b>50</b>
Emergency preparedness at VATESI .....	51
Response to the accident at Fukushima Daiichi Nuclear Power Plant .....	52
Emergency preparedness at nuclear facilities .....	53
International cooperation .....	53
<b>TRANSPORTATION OF NUCLEAR FUEL CYCLE MATERIALS</b> .....	<b>55</b>
<b>CONTROL OVER THE USE OF NUCLEAR ENERGY ONLY FOR PEACEFUL PURPOSES</b> .....	<b>57</b>
Accounting of nuclear fuel .....	58
Accounting and control of small quantities of nuclear materials .....	59
Application of international safeguards .....	59
Control over illicit trafficking of nuclear materials .....	60
Control over dual-use nuclear goods .....	60
The Comprehensive Nuclear-Test-Ban Treaty .....	60
<b>PHYSICAL SECURITY OF NUCLEAR MATERIALS AND NUCLEAR FACILITIES</b> .....	<b>61</b>
Inspection activities in the area of physical security .....	62
Identification of Design Basis Threat .....	62
International cooperation in the area of physical security .....	63
<b>MEETING COMMITMENTS UNDER INTERNATIONAL CONVENTIONS</b> .....	<b>64</b>
Reporting under the Convention of Nuclear Safety .....	65
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management ..	67
<b>INTERNATIONAL COOPERATION</b> .....	<b>68</b>
Nuclear safety regulation in the European Union, the role of the European Commission and the Member States –	
ENSREG .....	69
<i>ENSREG Working Group on Nuclear Safety Improvement</i> .....	69
<i>ENSREG Working Group on Radioactive Waste Management</i> .....	70
Participation in the activities of Western European Nuclear Regulators' Association (WENRA) .....	71
<i>Activity of WENRA Working Group on Inspection of Components and Structures</i> .....	71
<i>Activity of WENRA Reactor Harmonization Working Group (RHWG)</i> .....	72
<i>WENRA program for harmonization of safety requirements / Activity of Working Group on Waste and Decommissioning (WGWD)</i> .....	72
Activities in implementing the provisions of the Espoo Convention .....	73
Participation in the activities of the European Clearinghouse for Operational Experience Feedback .....	74
Technical cooperation projects of the International Atomic Energy Agency (IAEA) .....	75
<i>The IAEA regional projects in the area of nuclear safety and nuclear energy</i> .....	75
<i>The IAEA national projects for Lithuania</i> .....	76
The EU support projects for VATESI .....	76
<b>Do you know that</b> .....	<b>77</b>
<b>List of abbreviations</b> .....	<b>78</b>



## Foreword by VATESI Head

All around the world nuclear energy is experiencing the times of dynamic changes. According to the data of the International Atomic Energy Agency (hereinafter – the “IAEA”), at the beginning of 2012, 435 nuclear power plants were operating worldwide with the installed capacity totaling 368 GW(e). Regardless of the accident at Fukushima Nuclear Power Plant and the decision made by Germany to discontinue the operation of its nuclear power plants, nuclear energy has remained the choice of many countries for solving the problems of the climate change, energy security, as well as for assuring the reliable and safe energy supply to customers. Presently 63 new nuclear reactors are under construction in the world. Irrespective of the decision made by an individual country regarding the future of its nuclear energy, the safety of all already existing and newly constructed energy facilities as well as any other operations with nuclear and nuclear fuel cycle materials have to meet the highest international standards.

The State Nuclear Power Safety Inspectorate (hereinafter – the “VATESI”) has over twenty years of experience of successful work in the area of the state regulation and supervision of nuclear safety. However, it should be noted that this activity has been mostly related to the state regulation of Ignalina Nuclear Power Plant (hereinafter – the “Ignalina NPP”), where the reactors of the RBMK-1500 type were operated. By planning to perform the state regulation and supervision of safety in the design, construction and operation stages of a different type new nuclear power plant, VATESI has to prepare in advance the qualified specialists in specific technical fields and to develop the relevant legal framework.

Last year VATESI was supervising the nuclear safety and radiation protection at the finally shut-down Ignalina NPP Units in performing operations in the nuclear energy sector with sources of ionizing radiation (hereinafter – the “Radiation protection”), safety of decommissioning of this power plant, management of radioactive waste, including the construction and operation of new nuclear facilities, as well as the nuclear safety and radiation protection.

Unit 1 of Ignalina NPP was finally shut down in 2004, Unit 2 – in 2009. VATESI has reorganized its activities with regard to the demand for assessing various Ignalina NPP’s closure and decommissioning projects and licensing new nuclear facilities related to spent nuclear fuel and radioactive waste management. Supervision of such projects is always related to big challenges because then it is necessary to move from one stage of the lifetime of a nuclear facility to the other, from the use of the energy facility for performing its primary function, i.e. generation of electricity, to isolation, decontamination and dismantling of its individual systems.

In 2011, upon having reviewed and assessed the safety justification documents that had been submitted by Ignalina NPP, one more licence relevant to Ignalina NPP decommissioning was issued – to construct a solid radioactive waste retrieval and conditioning facility.

In 2011, the Law on Nuclear Energy, the Law on Radiation Protection and the Law on Radioactive Waste Management were amended along with other legal acts regulating the use of nuclear energy, and a new Law on Nuclear Safety was passed whereby the regulation principles

of nuclear safety, physical security and radiation protection of nuclear facilities and nuclear and nuclear fuel cycle materials were set in a more detailed and explicit way and the basis for implementing the principles of the safeguards of the IAEA and the European Atomic Energy Community (hereinafter – the “EURATOM”) was established, the competence of VATESI to issue licences in the nuclear energy sector and to develop the system of requirements on nuclear safety, physical security, radiation protection, accounting and control of nuclear materials was elaborated. This was the essential incentive to update the legal framework of the nuclear safety regulation in Lithuania enabling VATESI to further upgrade the nuclear safety requirements.

Side by side with the ongoing supervision of the safety of decommissioning and termination of operation of Ignalina NPP, VATESI has defined the strategic priorities in its activities the implementation thereof will be of primary importance in striving to successfully develop the project of the new nuclear power plant. VATESI has to timely acquire the competencies and resources indispensable for a regulatory institution, to upgrade the legal framework on nuclear safety, to evaluate the specifics of the new generation nuclear reactors, the experience of other countries, the IAEA recommendations and international practices. In addition to that, it is very important to assure the efficient independence of VATESI as a regulatory authority in solving the problems relevant to the project of the new nuclear power plant.

The decisions made by Lithuania regarding the construction of the new nuclear power plant have committed one and all to get properly prepared for the implementation of the project in accordance with the requirements of legal acts, conventions and international agreements regulating nuclear energy operations. The construction of the new nuclear

power plant is an important assignment to the entire state regulatory system, and in particular to VATESI as the main institution regulating nuclear safety – during a relatively short period of time the existing requirements on nuclear safety, physical security of nuclear facilities, nuclear and nuclear fuel cycle materials (hereinafter – the “Physical Security”), radiation protection while performing operations in the nuclear energy sector, accounting and control of nuclear materials will have to be reviewed and upgraded, the relevant new legal framework will have to be developed, qualified specialists for supervision of the design and construction of the new nuclear power plant, and at a later stage – for supervision of its operation as well, will have to be recruited and trained.

One of the priorities set by the Government of the Republic of Lithuania (hereinafter – the “LR”) in the energy sector – to continue the implementation of the project of the new nuclear power plant. In 2012, the fundamental nuclear safety and radiation protection requirements for the new power plant will have to be set because at that time the preparation of the Technical Specification of the new nuclear power plant will be in progress. VATESI will have to finish the review of the Site Evaluation Report and to make a decision regarding the approval of this document.

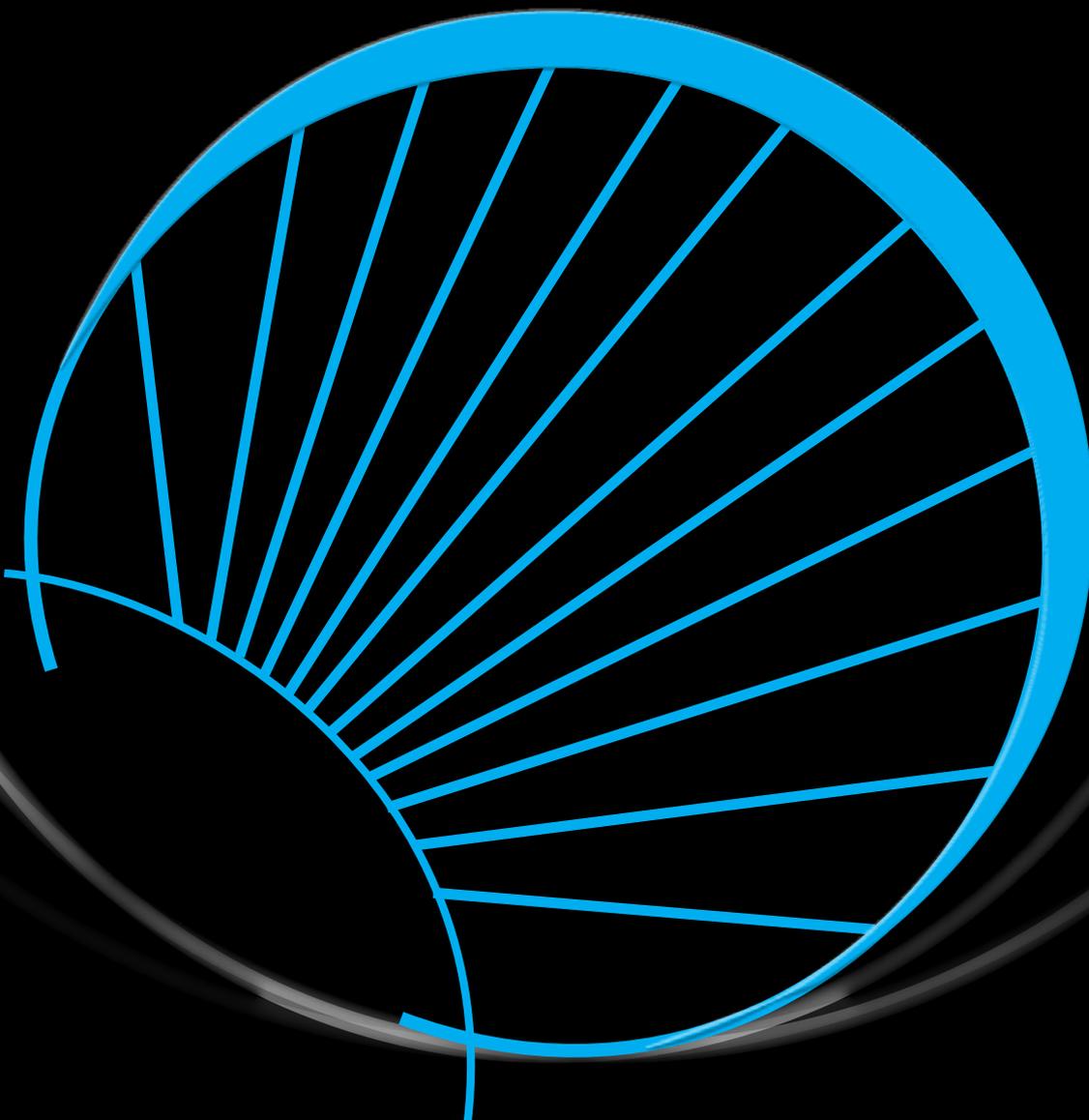
The year 2011 was full of interesting and important assignments to VATESI staff. I am confident that VATESI specialists are duly prepared to accomplish all goals raised to them and to successfully implement the VATESI mission. I think that by actively collaborating with the IAEA and other countries having appropriate experience and with the assistance of the organizations operating nuclear facilities as well as of our technical support organizations we will succeed in assuring a safe nuclear energy industry in Lithuania.

Head



Michailas Demčenko

# ABOUT US - THE STATE NUCLEAR POWER SAFETY INSPECTORATE



# The mission and main goals of VATESI

**VATESI is the main regulatory and supervisory institution of nuclear safety, which sets safety requirements, controls whether they are complied with, issues licences and permits, performs safety assessments of nuclear facilities, conducts inspections, and carries out other functions.**

The VATESI mission is to perform the state regulation and supervision of safety at nuclear facilities and operations related to nuclear and nuclear fuel cycle materials in order to protect the public and the environment against harmful effects of ionizing radiation.

VATESI is an independent state institution. The owner of VATESI is the state, the rights and duties of the Inspectorate are exercised by the Government.

VATESI Head for a six-year tenure is appointed by President by nomination of the Prime Minister. Deputy Heads of the Inspectorate for a six-year tenure are appointed by the Prime Minister by nomination of VATESI Head.

The main goals of VATESI:

- State regulation and supervision of safety at Ignalina NPP and other nuclear facilities;
- State regulation and supervision of safety of radioactive waste management at nuclear facilities;
- Supervision of use of nuclear materials and technologies for peaceful purposes (application of safeguards set by the IAEA and the European Atomic Energy Community (hereinafter – the “EURATOM”));
- State regulation and supervision of physical security of nuclear facilities and nuclear materials;
- State regulation and supervision of transportation of nuclear fuel cycle materials;
- Emergency preparedness.

Ignalina NPP that was operating two reactors of the RBMK type (with the designed capacity of 1500 MW each) came under the jurisdiction of Lithuania in 1991, when Lithuania regained its independence. Lithuania thus became the world’s 31st country to use nuclear energy for generation of electricity. Lithuania assumed obligations not to cause nuclear threat to mankind or environ-

ment while operating Ignalina Nuclear Power Plant and to use nuclear materials and technologies for peaceful purposes only. **The operation of Ignalina NPP Unit 1 was terminated in 2004, and Unit 2 – in 2009.**

Decommissioning of Ignalina NPP is a long-lasting process. VATESI assesses and supervises whether the activity undertaken during this process complies with the nuclear safety requirements by analyzing safety justification documents, approving modifications, conducting inspections. It should be noted that the RBMK-1500 reactors at Ignalina NPP are the graphite moderated, channel-type reactors, and there is not a single case of practice of dismantling the reactor of this type in the world. In 2000, VATESI issued a licence for operation of the spent nuclear fuel facility at Ignalina NPP, where the spent nuclear fuel is stored in special containers. By now this storage facility has been fully stocked, and a new spent fuel facility is under construction in order to accommodate the nuclear fuel that is being kept in the finally shut-down Ignalina NPP units. This activity is also assessed and supervised by VATESI. **Since 1999 VATESI has issued to Ignalina NPP ten licences that have remained in effect up till now.**

In 2011, upon having reviewed and assessed the safety justification documents submitted by Ignalina NPP, one licence that is relevant to decommissioning was issued for the construction of the solid radioactive waste retrieval and conditioning facility.

VATESI was concentrating its efforts on getting ready for the implementation of the project of the new nuclear power plant by drawing up nuclear safety regulations, training employees to properly conduct the tasks of the new nuclear facility’s safety regulation and supervision. **In getting ready for the construction of the new nuclear power plant, each stage of the process has to be strictly regulated and the preparations for this purpose have to be made in advance because the construction of the new nuclear power plant is a long, complicated and responsible process.**

The primary responsibility for the safety assurance of nuclear installations and operations

where nuclear materials are involved is borne by the organizations operating these installations or performing operations with nuclear materials. **In Lithuania, the State Company Ignalina Nuclear Power Plant is responsible for the safe condition of the finally shut-down nuclear reactors, the State Company Radioactive Waste Management Agency (RATA) supervises the closed Maišiagala Radioactive Waste Storage Facility, and the Public Limited Liability Company Lietuvos Geležinkeliai has got a valid licence for transportation of nuclear materials.**

To assure round-the-clock communication with the emergency preparedness authorities both in Lithuania and in international organizations, VATESI has appointed early notification officers who

at any time of the day and night are ready to receive or to furnish information about any nuclear or radiological emergency that has occurred in Lithuania or other countries. At any time, upon the receipt of a notification about a nuclear accident in Lithuania or any other country, if the accident is likely to cause a threat to the people of Lithuania, the VATESI Emergency Centre will be ready to start its operations in an hour.

The Inspectorate sets the requirements and rules on nuclear safety, controls whether they are complied with at nuclear facilities or in performing any other activity related to nuclear and/or nuclear fuel cycle materials. In the case of established non-compliances, VATESI has the authority to apply the respective enforcement measures.

## Key events

**25 March.** In response to the events at Fukushima Daiichi Nuclear Power Plant, the European Council of Ministers made a decision to revise the safety of all nuclear power plants located in the European Union (hereinafter – the “EU”) and to perform the stress tests.

**21 April.** VATESI issued a licence to the Ignalina NPP whereby the latter was authorized to construct the solid radioactive waste retrieval and conditioning facilities.

**June.** The IAEA issued the Safeguards Implementation Report whereby it was stated that all declared nuclear materials and nuclear installations in Lithuania were used for peaceful purposes only and no undeclared operations in the use of nuclear energy were discovered.

**19 July.** The European Council passed the Direc-

tive on Management of Radioactive Waste and Spent Nuclear Fuel.

**16 August.** VATESI authorized Ignalina NPP to continue the operation of the bitumized radioactive waste storage facility till 30 May 2012.

**18 October.** This day 20 years ago VATESI was established by the Resolution of the LR Government.

**19 October.** VATESI authorized Ignalina NPP to start two decommissioning projects. Both projects are related to Ignalina NPP Unit 1 and dismantling and decontamination of the auxiliary equipment of this Unit.

**22 December.** The emergency preparedness exercise was arranged at VATESI.

**29 December.** VATESI submitted to the European Commission the final National Stress Test Report.

## Strategic planning of activities

VATESI activities due to their specifics are long-term and continuous. The Program and the priorities set by the LR Government for a respective year, as well as the provisions of the National Long-Term Development Strategy are taken into consideration when planning the activities.

For the accomplishment of the VATESI mission, the sole strategic objective – assuring a high level of safety at nuclear facilities – was set in the

Strategic Plan of VATESI activities for the period of 2011-2013. To assess whether the strategic objective has been met, the single criterion of effect has been set – the absence of level two and upwards unusual events on the International Nuclear and Radiological Event SCALE (hereinafter – the “INES”).

To accomplish the strategic objective, the only program – *Public and Internal Administration of*

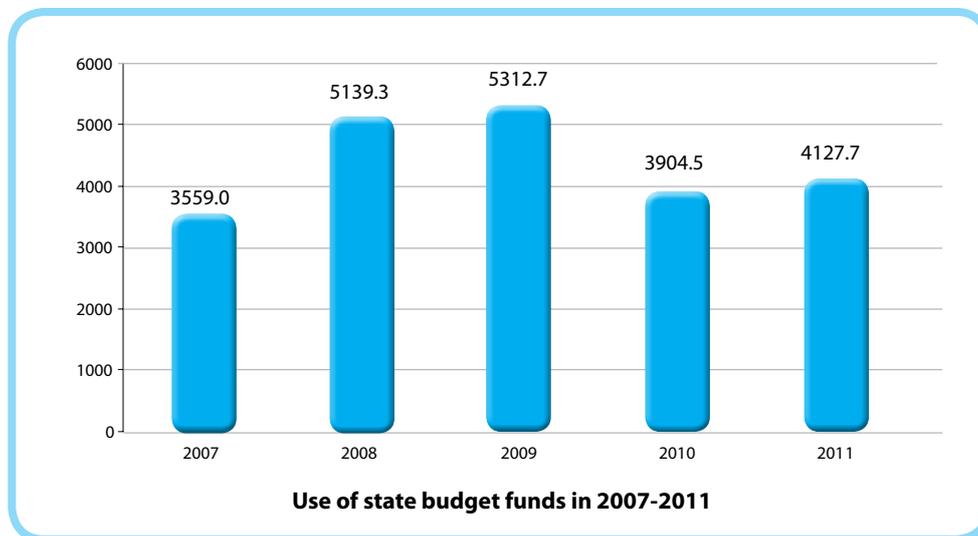
*Nuclear Safety* – was developed in 2010 and has been implemented since then. Two goals were set for implementing the program:

- To assure efficient regulation and supervision of nuclear safety;
- To get ready for and to perform the safety assessment, licensing and supervision of Visaginas Nuclear Power Plant.

To reach these goals, the activities were aimed at further reducing the probability of events and accidents at nuclear facilities, upgrading the quality of failure and accident prevention measures, improving VATESI internal administration and the quality

of decision-making process. Moreover, they were aimed at timely preparation for the regulation and supervision of design and construction of the new nuclear power plant. The program was financed with the funds from the state budget.

In 2011, the amount of LTL 4315 thousand from the state budget was approved for the implementation of the VATESI program; budget allocations and actual disbursements (expenses) equaled LTL 4127.7 thousand, or 95.7 %. The funds from the state budget were used in accordance with their allocation, i.e. in line with the items of economical classification approved in the cost estimates.



## Quality management system

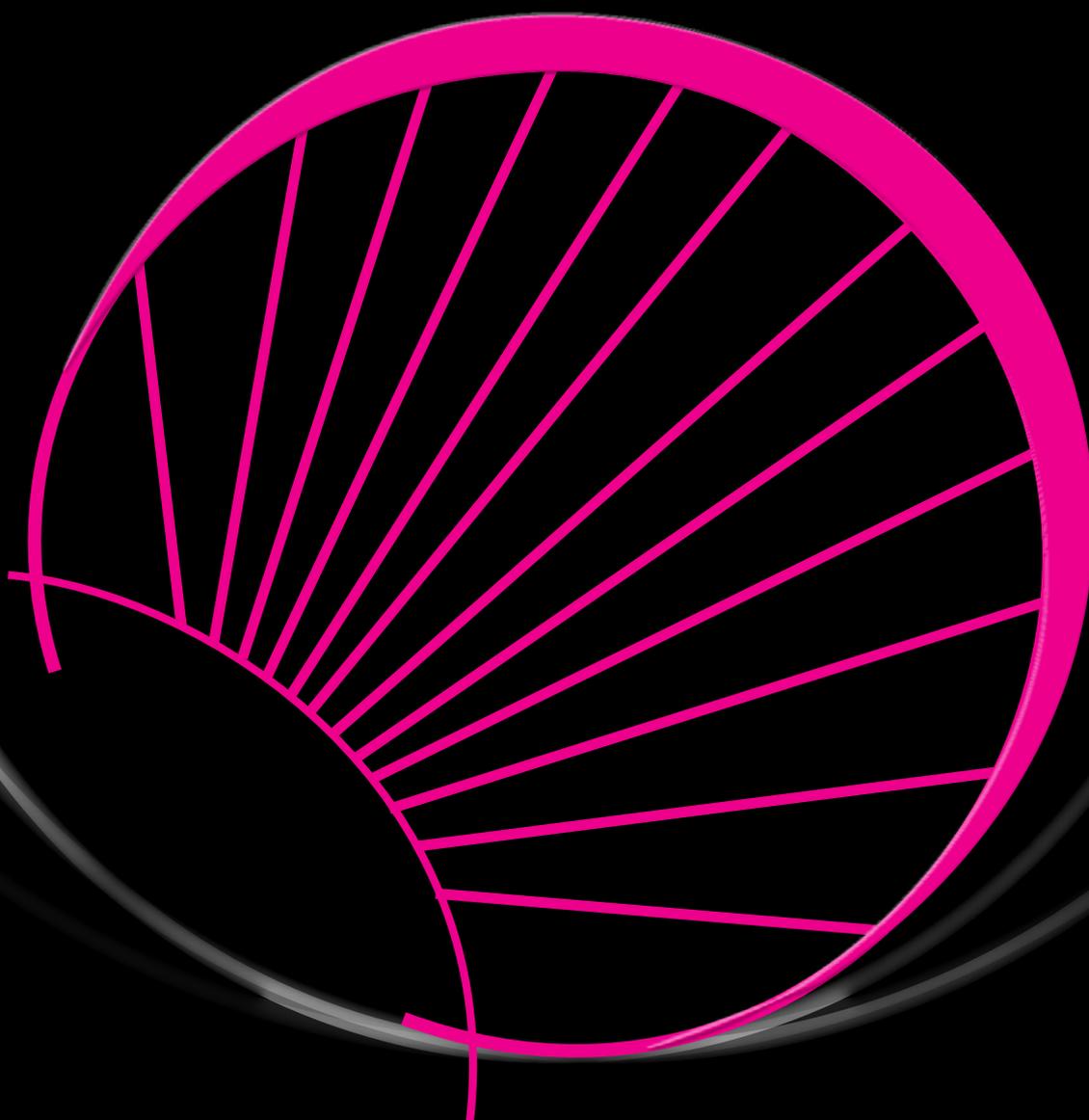
The decision to develop the Quality Management System at VATESI was made on 5 October 2000, when it was approved by Order No. 21 of VATESI Head. The implementation of the Quality Management System at VATESI is aimed at:

- Enhancing the efficiency of the institution's management;
- Optimizing the planning and use of the institution's resources;
- Assuring adequate licensing, safety assessment and supervision of nuclear facilities;

- Assuring sufficient supervision over the on-going EU support projects;
- Assuring adequate qualification improvement of the VATESI staff;
- Assuring efficient management and use of information.

With regard to the changing requirements and by continuously improving the quality assurance documents, in 2011 four new quality management procedure regulations and instructions were approved and eight of such documents were updated at VATESI.

PREPARATORY WORKS FOR  
LICENSING THE NEW NUCLEAR  
POWER PLANT



# Regulation and supervision of the project of the new nuclear power plant

## ***Upgrading of legal framework in Lithuania***

The Program of the LR Government approved by Resolution No. XI-52 of the Seimas of the Republic of Lithuania as of 9 December 2008 (Official Gazette, 2008, No.146-5870) provided that the implementation of the project of the new nuclear power plant will have to be further continued. The Plan for Implementing the National Energy Strategy in 2008-2012 approved by Resolution No. 1442 as of 27 December 2007 of the LR Government (Official Gazette, 2008, No. 4-131) envisages the following measures relevant to the development of the legal framework on nuclear safety:

- To draft the legal acts regulating nuclear safety in of design, construction and operation the new nuclear power plant;
- To draft the Law on Nuclear Safety;
- To draft the Law Amending the Law on Nuclear Energy.

With an aim to strengthen nuclear safety, to prepare the regulatory environment for the planned development of the nuclear power infrastructure, to lay down in detail the functions of the state regulation and supervision in the area of nuclear safety including licensing, issuing permits and safety assessment procedures, twelve Laws of the Republic of Lithuania were drafted with VATESI participation and were submitted to the Seimas. The most important among them are – the Law on Nuclear Energy (Official Gazette, 1996, No. 119-2771; 2011, No. 91-4314), the Law on Nuclear Safety (Official Gazette, 2011, No. 91-4316), the Law on Radioactive Waste Management (Official Gazette, 1999, No. 50-1600; 2011, No. 91-4318), the Law Amending Articles 1, 2, 4, 5, 6, 7, 8, 8<sup>1</sup>, 8<sup>2</sup>, 8<sup>3</sup>, 8<sup>4</sup>, 10, 11, 12, 20, 21, 22, Amending and Supplementing the Title of Chapter 8, Supplementing with Articles 7<sup>1</sup>, 10<sup>1</sup> and Revoking the Validity of Articles 9, 25, 26, 27 of the Law on Radiation Protection (Official Gazette, 2011, No. 91-4317), the Law Amending Articles 6 and 21 of the Law on Environmental Protection (Official Gazette, 2011, No. 91-4315), the Law Amending Article 3 of the Law on Implementing the Law on the State Language (Official Gazette, 2011, No. 91-4324), the Law Amending Articles 94, 94<sup>1</sup>, 235, 239<sup>2</sup> and 259<sup>1</sup> of the Code of Administra-

tive Infringements of Lithuania (Official Gazette, 2011, No. 91-4313). These Laws were passed by the Seimas on 28 June 2011 and came into effect on 1 October 2011. It should be noted that the Law on Nuclear Safety and the Law on Nuclear Energy transposed the provisions of the Council Directive 2009/71/EURATOM as of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear facilities into the national legislation of the Republic of Lithuania. After the Laws were passed, in the third and fourth quarters of 2011, VATESI focused its attention on drafting the secondary legislation for their enforcement. The most important among them (drafted and submitted for approval by interested institutions) were:

- The draft Resolution of the LR Government Regarding the Approval of the Procedure Regulations for Preparation and Review of the Nuclear Power Plant's Construction Site Evaluation Report;
- The draft Resolution of the LR Government Regarding the Approval of the Regulations for Issuing Licences and Permits for Operations in the Nuclear Energy Sector and Revoking Resolution No. 103 of the LR Government as of 27 January 1998 on the Approval of Regulations for Licensing of Operations in the Nuclear Energy Sector along with the Amending Resolution;
- The draft Resolution of the LR Government Regarding the Amendment of Resolution No. 1458 of the LR Government as of 15 December 2000 on the Approval of the State Levy Amounts as well as the Procedure for its Payment and Refunding;
- The draft Resolution of the LR Government Regarding the Approval of the Regulations of the State Nuclear Power Safety Inspectorate and Revoking Resolution No. 1014 of the LR Government as of 1 July 2002 on the Approval of the Regulations of the State Nuclear Power Safety Inspectorate and the Approval of the Regulations of its Council and Revoking the Amending Resolution of the Government of the Republic of Lithuania;

- The draft Resolution of the LR Government Regarding the Approval of the Procedure Regulations for Identifying and Reassessing the Potential Hazards and Providing Information to the State Nuclear Power Safety Inspectorate.



Alternatives sites for new Visaginas Nuclear Power Plant

### Development of nuclear safety requirements and rules

**To assure that the nuclear power plant which is planned to be constructed in Lithuania would be safely operated and would comply with the highest possible safety level, it is necessary to develop the legal framework enabling to accomplish these goals.**

As early as in 2008, VATESI resolved to draw up the nuclear safety requirements and rules for the implementation of the project of the new nuclear power plant in line with the IAEA safety requirements and guides, the WENRA safety reference levels and the best practice of other countries and international organizations. **The set target was to develop the system of nuclear safety requirements for the successful licensing of the new nuclear power plant in 2011-2012.**

In 2011, the efforts were concentrated on drafting the legal act *The Design of the Nuclear Power Plant*, in view of the fact that this document will define the main principles of nuclear safety – defense in depth, fail-safe operation, redundancy and others, which will have to be observed in the course of design the nuclear power plant as well

as during its construction and operation in order to assure the highest possible level of safety of the new nuclear facility. In drafting this legal act, the requirements of the IAEA Safety Standard No. SSR 2/1 *Safety of Nuclear Power Plants: Design* were taken into consideration along with the WENRA safety reference levels for new nuclear reactors and the best practice of other countries.

In 2011, the following nuclear safety requirements and regulations for the implementation of the project of the new nuclear power plant were approved:

- Nuclear Safety Requirements BSR-2.1.4-2011 *Preparation and Use of the Nuclear Power Plant's Safety Analysis Report*, approved by Order No. 22.3-117 of VATESI Head as of 25 November 2011 (Official Gazette, 2011, No. 148-6981).

In 2011, the following existing nuclear safety requirements, which will also be applied in implementing the project of the new nuclear power plant, were reviewed and revised:

- Order No. 22.3-91 of VATESI Head as of 27 September 2011 *Regarding Amendment of Order No. 22.3-58 of VATESI Head as of 20 July 2010 on Approval of Nuclear Safety Requirements BSR-2.1.3-2010 – General Requirements for the Site Evaluation of a Nuclear Power Plant* (Official Gazette, 2011, No. 118-5600);
- Nuclear Safety Requirements BSR-1.8.2-2011 *Categories of Modifications at Nuclear Facilities and Procedure Regulations for Making these Modifications* approved by Order No. 22.3-99 of VATESI Head as of 7 October 2011 (Official Gazette, 2011, No. 123-5856).

Moreover, in 2011 VATESI specialists were drafting the following new nuclear safety requirements and rules:

- Construction of a Nuclear Facility;
- Operation of the Nuclear Power Plant;
- Commissioning of the Nuclear Power Plant;
- Deterministic Safety Analysis;
- Probabilistic Safety Assessment;
- Safety Assessment of Nuclear Facilities and Activities in the Nuclear Energy Sector;
- Preparation of Safety Justification Documents and their Approval by the Regulatory Institution;
- Qualification Assessment of the Nuclear Power Plant's Managers;
- Design, Installation and Operation of the Reactor's Core Systems at the Nuclear Power Plant;

- Design, Installation and Operation of the Reactor's Cooling Systems at the Nuclear Power Plant;
- Design, Installation and Operation of the Nuclear Power Plant's Instrumentation and

- Control Systems;
- Design, Installation and Operation of the Nuclear Power Plant's Containment.

It is planned that these legal acts will be validated in 2012.

## The site evaluation of the new nuclear power plant

**With regard to the global practice of construction of nuclear power plants, the first stage of the lifetime of a nuclear power plant is the selection of the construction site (site) and its evaluation in terms of safety.**

In accordance with the Law on Nuclear Safety of the Republic of Lithuania, prior to starting the preparation of the NPP 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. In the course of the safety analysis and its justification, all factors related to the site or its environment that could impact the NPP's safety, including physical security and planning of emergency preparedness, have to be identified, and remedying measures for the identified shortcomings of the site, if any, have to be proposed.

Whereas the nuclear power plant's site evaluation covers many areas – nuclear safety, physical security, metrology, hydrology, geology, aviation, the Law on Nuclear Safety provides that apart from VATESI, the LR Ministry of Health, Civil Aviation Au-

thority, Lithuanian Geological Survey, Lithuanian Hydro Meteorological Service, Fire Safety and Rescue Department have to take part in reviewing the NPP Site Evaluation Report. To enforce the provisions of the Law, VATESI prepared draft Resolution of the Government setting the procedure for reviewing the NPP Site Evaluation Report.

With regard to the provisions of the Law on Nuclear Safety of the Republic of Lithuania, recommendations from the IAEA mission *Review of the New Nuclear Power Plant's Site Evaluation Report in Terms of Seismic, Geotechnical and Caused by Human Activity Hazards* that took place on 8-12 November 2010 in Vilnius, and the new experience in the NPP site evaluation gained by VATESI, in 2011 VATESI revised the legal act Nuclear Safety Requirements BSR-2.1.3-2010 *General Requirements for the Site Evaluation of a Nuclear Power Plant* (Official Gazette, 2011, No. 118-5600).

In 2011, *Visagino Atominė Elektrinė UAB* submitted the NPP Site Evaluation Report to VATESI for its first review. VATESI specialists, upon having examined the submitted Reports, provided their initial comments that were discussed with VAE UAB specialists during the arranged consultations.

## Training specialists and improvement of their qualification

Nuclear energy is a complicated field of research and technology demanding high competence, special knowledge and experience that have to be continuously updated and where all developments have to be closely followed, hence one of the priority goals of VATESI – to have highly qualified and equipped with special knowledge employees. This issue has become of outstanding importance for Lithuania in continuing the implementation of the new nuclear power plant project.

To perform fluent and high quality safety review and assessment during the licensing process of

the new nuclear power plant, it is necessary to properly prepare the legal framework regulating nuclear safety that will be followed by VATESI specialists in evaluating the nuclear safety justification documents in the course of the site evaluation of the new nuclear power plant, as well as in the processes of design, construction and operation of the power plant and when conducting inspections. **To draw up this legal framework, experts in various fields, who should have knowledge in reactor physics, thermo hydraulics, instrumentation and control, elec-**

**tric power systems, strength of materials, construction engineering, accident analysis, probabilistic safety analysis, fire safety, physical security, chemistry, welding technologies and methods of non-destructive inspection, technologies of radioactive waste management, principles of decommissioning and other relevant fields are required.**

In 2011, with regard to the economic situation in Lithuania, the number of the VATESI job positions was not increased, and in 2011 there were seventy job positions at the Inspectorate. Sixty seven employees were working at VATESI as of late 2011. In 2011, 2 persons were newly employed by VATESI, and the employment contracts were terminated with 3 employees. Five VATESI employees of those working in the field of nuclear energy have got a qualification degree of the Doctor of Science, 35 – Master’s Degree, and 4 – Bachelor’s Degree.

With regard to the already being implemented and planned to be implemented VATESI goals and the related demand to maintain the highly qualified staff, VATESI gives major attention to the training and qualification improvement of its employees. In 2011, fifty four employees (81 percent of all VATESI job positions) were improving their qualification – 1 of them participated in the introductory workshops of civil servants, 53 employees took part in the training events aimed at the development of competences related to the implementation of the VATESI program for the accomplishment of its strategic goal – *Public and Internal Administration of Nuclear Safety*.

In 2011, VATESI started implementing the project *Improvement of Qualification of Specialists of the State Nuclear Power Safety Inspectorate* (No.VP1-4.1-VRM-03-V-01-049). The project is financed under the Operational Program for the Development of Human Resources 2007-2013, Priority 4 *Development of Administrative Competence and Improvement of Efficiency of Public Administration, facility Qualification Improvement of Employees of Governmental Institutions and Offices*. The objective of the project – to improve the qualification of VATESI specialists in the area of imposing the administrative enforcement measures. VATESI specialists, after having improved their qualification in the training courses arranged within the scope of the training programs developed under the project, will enhance their knowledge in proper

investigation of violations and imposing the administrative enforcement measures, therefore the implementation of the project will strengthen VATESI administrative competencies in performing safety regulation and supervision and will make an input to enhancing the efficiency of public administration in Lithuania.

One of provisions laid down in the IAEA Statute is to support training of researchers and experts in the field of use of nuclear energy for peaceful purposes. This international organization has accrued immense experience in organizing various training events. It also provides financial support that gives VATESI specialists an opportunity to improve their knowledge and to gain experience in such organizations as the US Nuclear Regulatory Commission (NRC), Radiation and Nuclear Safety Authority of Finland (STUK) and in other offices and organizations.

VATESI specialists upgraded their knowledge in various fields by independently studying the relevant information and by taking part in various seminars and training courses:

- On 21-25 March 2011 – in the IAEA Regional Workshop Advances in Deterministic Safety Analyses Including the Application of Computational Fluids Dynamics (Slovenia);
- On 23-27 May 2011 – in the IAEA Regional Meeting Combining Insights from Deterministic and Probabilistic Safety Analyses (Croatia);
- On 24-30 August 2011 – in the Training Courses Methods of Thermo Hydraulic Design (the US);
- On 12-16 September 2011 – in the international seminar Fire Safety Assurance during Construction and Operation of Nuclear Power Plants (Germany);
- On 26-29 September 2011 – in the joint IAEA and WANO (the World Association of Nuclear Operators) Regional Workshop Self-assessment in Operational Experience Feedback and Review of its Efficiency (the Ukraine);
- On 13-20 November 2011 – in the training courses Survey of Nuclear Power Plants with Boiling Water Reactors (the US).

VATESI specialists have disseminated the acquired knowledge at the arranged in-service seminars. This information is very beneficial in developing the legal framework on nuclear safety.

## Providing consultations to Visagino Atominė Elektrinė UAB

At the end of 2008, *Visagino Atominė Elektrinė* performing the preparatory works for the project of the new nuclear power plant had addressed VATESI with a request to be provided with consultations in the field of nuclear safety. In the beginning of 2009, at the joint meeting of VATESI and *Visagino Atominė Elektrinė* an agreement was reached on the form of providing consultations and their content.

In 2011, fourteen consultation meetings were held to discuss various safety-related issues in implementing the project of the new nuclear power plant. The most important of these are presented below.

**Evaluation of the site for construction of the new nuclear power plant.** In 2011, this was one of the most outstanding issues. The Law on Nuclear Safety provides that the safety analysis of the construction site of a nuclear facility and its justification have to be performed prior to starting the design of the nuclear facility adapted to a specific construction site. The results of this analysis and its justification have to be presented in the Site Evaluation Report which has to be agreed with VATESI. Therefore during the arranged consultations the structure and content of this Report were discussed along with the comments provided by VATESI on certain chapters of the Report, namely the *Assessment of the Characteristics of the Ultimate Heat Sink* and the *Description of Response Options to Emergency Preparedness*.

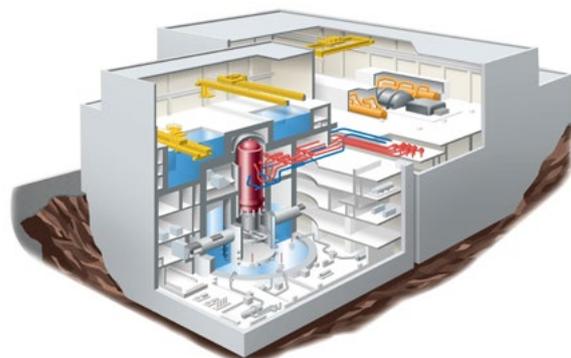
**Technical Specification of the new nuclear power plant.** The other important step in implementing the project of the new nuclear power plant – the approval of the Technical Specification by VATESI as prescribed by the Law on Nuclear Energy. During the consultations it was stated that the Technical Specification has to contain a comprehensive list of the technical requirements to be applied in the course of design (including adaptation of the design of the nuclear power plant to the specific construction site, construction (including manufacturing and installation of structures, systems and components), commissioning, as well as in the course of its operation along with the information related to the construction site of the nuclear power plant.

### **Preparation of the design of the new nuclear power plant and the Safety Analysis Report.**

The other important aspect – preparation of the design of the new nuclear power plant. In September 2011, VATESI drafted the Nuclear Safety Requirements *Design of the Nuclear Power Plant*. During the consultations, the main design principles set forth in the draft requirements as well as such aspects as the analysis of external explosions; impacts of large aircraft crash, fire risk analysis, probabilistic safety analysis were discussed. In addition to that, the subject of preparation of the Safety Analysis Report and its updating in implementing the project of the new nuclear power plant was discussed. The agreement was reached on the scope of the updated Safety Analysis Report to be provided prior to delivering nuclear fuel to the site and launching the Unit of the nuclear power plant into operation. Besides, the requirements for the management system, including independent appraisals and safety culture, were talked over.

### **Preparatory works on the site of the new nuclear power plant.**

During the consultations, the preparatory works on the site of the new nuclear power plant were discussed. These works would cover the earthworks, erection of structures to be used for further construction works, assembling and others.



**Advanced Boiling Water Reactor, ABWR**

### **Assurance of physical security in implementing the project of the new nuclear power plant.**

During the consultations, the main aspects which have to be considered by *Visagino Atominė Elektrinė*

(afterwards - by the project implementation company, the licence holder) in organizing the physical security of the construction site of the new nuclear power plant and the nuclear facility itself were discussed. The structure and content of the Site Evaluation Report, Chapter *Application of Physical Protec-*

*tion Measures, Description of Possibilities* were discussed. In addition to that, the draft requirements for physical security of nuclear installations, nuclear and nuclear cycle materials, and their potential application in implementing the project of the new nuclear power plant were talked over.

## Cooperation with nuclear safety regulatory institutions of other countries

From the very beginning of its establishment VATESI was giving significant attention to international cooperation the importance thereof has been emphasized in the Convention of Nuclear Safety. The main objective of this cooperation is to share the gathered experience and knowledge with other countries in order to achieve and maintain a high level of nuclear safety all over the world. The international community should not feel any uncertainties about Lithuania's capability to assure proper functioning of the nuclear safety regulation and supervision systems.

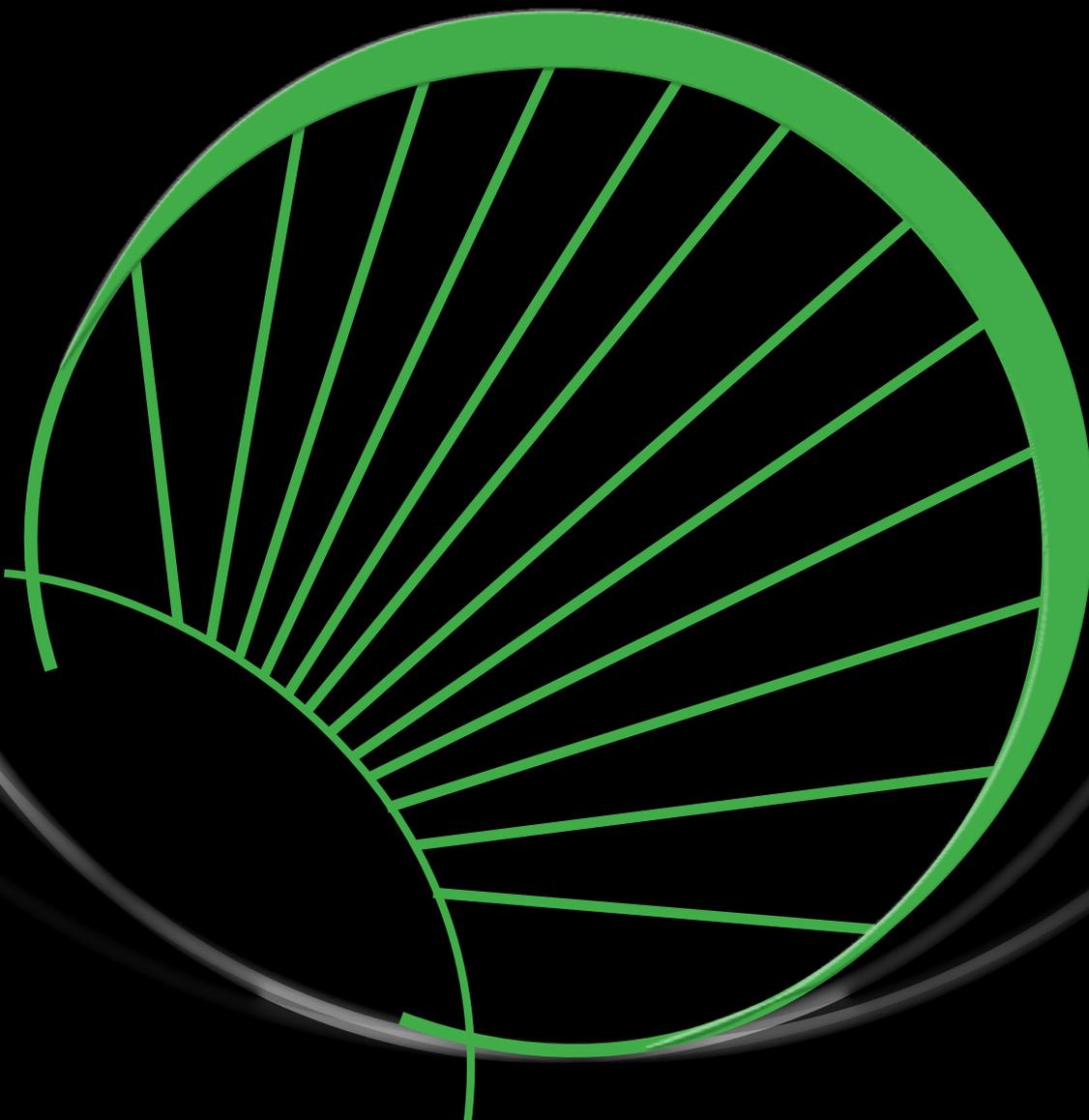
**When in July 2011 it was decided that an advanced boiling water reactor (ABWR) is planned to be constructed in Lithuania, VATESI started preparing for the review and assessment of this reactor.** Currently 4 reactors of ABWR type are operated in Japan, and 5 are under construction – 3 in Japan and 2 in Taiwan. It should be noted that in 1997 the design of the ABWR was certified by the US Nuclear Regulatory Commission (NRC). In this context, on 11

November 2011, on VATESI initiative the meeting was arranged which was attended by the representatives of the Nuclear and Industrial Safety Agency (NISA) of Japan, the US NRC and VATESI. At the meeting it was emphasized that the knowledge and experience gained by the NISA and NRC experts would be helpful for VATESI specialists in getting better understanding of the features of the ABWR design, design modifications made with regard to the operational experience including lessons learned after the Fukushima Daiichi accident, adjusted nuclear safety requirements as well as in assimilating this knowledge. At the meeting it was decided that in 2012 the program for cooperation between NCR and VATESI will be drawn up, and the cooperation in the field of nuclear safety between NISA and VATESI will be further developed. It was also agreed to organize a workshop, which subsequently took place in the beginning of 2012, where the NRC experts shared their experience in assessing safety of nuclear power plants.



**NRC workshop at VATESI**

# NUCLEAR SAFETY REGULATION AND SUPERVISION



# Preparation of mandatory technical documents on nuclear safety

## **Setting nuclear safety requirements**

Nuclear safety requirements are set forth by the Laws of the Republic of Lithuania, Resolutions of the LR Government and other secondary legislation. The legal acts defining nuclear safety requirements are listed in the List of Legal Acts, which was approved by Order No. 22.3-98 of VATESI Head as of 30 November 2010, regulating VATESI activities and embedding the requirements for the area the supervision thereof is assigned to VATESI (uploaded on the VATESI website).

In 2011, the new wording of the Law on Nuclear Energy of the Republic of Lithuania (Official Gazette, 1996, No. 119-2771; 2011, No. 91-4314) and the new wording of the Law on Radioactive Waste Management (Official Gazette, 1999, No. 50-1600; 2011, No. 91-4318) were approved, the Law Amending Articles 1, 2, 4, 5, 6, 7, 8, 8<sup>1</sup>, 8<sup>2</sup>, 8<sup>3</sup>, 8<sup>4</sup>, 10, 11, 12, 20, 21, 22, Amending and Supplementing the Title of Chapter 8, Supplementing the Law with Articles 7<sup>1</sup>, 10<sup>1</sup> and Revoking Articles 9, 25, 26, 27 of the Law on Radiation Protection of the Republic of Lithuania (Official Gazette, 2011, No. 91-4317) and the new Law on Nuclear Safety of the Republic of Lithuania (Official Gazette, 2011, No. 91-4316) were passed, which have laid down the principles of nuclear safety, physical security of nuclear facilities, nuclear and nuclear cycle materials and radiation protection in performing operations in the nuclear energy sector with sources of ionizing radiation, of regulation and supervision of accounting and control of nuclear materials in nuclear energy sector, which have laid the fundamentals for implementing the safeguards system of the IAEA and the EURATOM in Lithuania, and which have more specifically defined VATESI competence in issuing licences and permits for operations in the nuclear energy sector and in developing the system of requirements for nuclear safety, physical security, radiation protection and accounting and control of nuclear materials. This was the main incentive to update the legal framework regulating nuclear safety in Lithuania, enabling VATESI to further upgrade secondary legislation on nuclear safety.

In accordance with Article 5 of the Law on Nuclear Safety, the system of mandatory technical documents on nuclear safety consists of:

- Nuclear safety requirements;
- Nuclear safety rules;
- Standards;
- Mandatory technical documents of a licensee or a permit holder;
- Mandatory technical documents of entities performing the evaluation of a construction site (site).

The Procedure Regulations for preparing nuclear safety requirements and nuclear safety rules as well as the prepared nuclear safety requirements and nuclear safety rules are approved by VATESI Head.

## ***The Program for Upgrading Nuclear Safety Mandatory Technical Documents in 2010-2014 and the Plan for Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011***

A working group coordinating preparation of VATESI legal acts has been functioning at VATESI since 26 August 2009. Based on the proposal of the Working Group, a five-year VATESI *Program for Upgrading Nuclear Safety Mandatory Technical Documents (2010-2014)*, which is updated year by year, was approved by Order No. 22.3-136 of VATESI Head as of 31 December 2009. In line with this Program, the *Plan for Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011* was approved. Both documents and their subsequent amendments are uploaded on the VATESI website.

## ***Implementation of the Plan for Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011***

*The Plan for Preparation and Review of Nuclear Safety Mandatory Technical Documents in 2011* (hereinafter – the “Plan”) comprised 41 legal acts that were planned to be reviewed, and if necessary, had to be amended or their wording had to

be revised, as well as those that were planned to be newly drawn-up. In addition, 6 legal acts, that had not been originally included in the Plan, were approved.

In all, 98 legal acts were approved, revised or reviewed or postponed to a later date. Seventy one legal acts were approved, revised or reviewed, but it was decided that their amendment was not expedient (there was no necessity to do so). It should be noted, that 57 of the mentioned 71 legal acts originally had not been included in the Plan. Among them 6 legal acts were additionally revised and then approved, one was reviewed but there was no necessity to amend it, and 50 legal acts were revised (they were reviewed and conclusions were submitted to the respective institutions on the legal acts drafted by them). Twenty seven legal acts, which in 2011 were submitted for their reconciliation with other institutions, still are under preparation, have been submitted for

revision by the respective VATESI divisions or their drafting has not been started, have been transferred to the Plan for the year 2012 or postponed to a later date.

In all, in 2011 at VATESI:

- 14 legal acts were approved (including the newly drawn, updated existing legal acts and withdrawn as no longer valid or irrelevant);
- 52 legal acts were received for revision;
- 5 legal acts were reviewed but not amended (it was not necessary to do so);
- Legal acts that were transferred to the Plan for 2012 (or postponed to a later date):
  - 13 legal acts that were submitted for revision by other institutions;
  - 8 were submitted for revision by VATESI divisions, 6 – are under preparation, their drafting was not started and other legal acts.



### ***The list of legal acts regulating VATESI activities and enforcing the requirements for the supervision area assigned to VATESI***

In accordance with Item 1, paragraph 2 of Article 36<sup>5</sup> of the Law on Public Administration of the Republic of Lithuania, the list of the legal acts regulating VATESI activities and enforcing the requirements for the supervision area assigned to VATESI was approved by Order No. 22.3-98 of VATESI Head as of 30 November 2010. This list is considered to be the public domain information (in the meaning prescribed by paragraph 2 of Article 36<sup>3</sup> of the Law on Public Administration) and is freely accessible on the VATESI website. The list is immediately updated when the effective legal acts are revoked as no longer valid or the new ones are passed. It

should be noted that due to the plans to construct the new nuclear power plant, i.e. a completely new facility falling under VATESI regulation and supervision as well as new regulated and supervised operations, in preparing the legal acts regulating nuclear safety VATESI will not be able to fully implement the “one in – one out” principle the purpose thereof is to optimize supervision of economic entities. Nevertheless, in the mentioned list from the date of its approval till the end of 2011:

- 1 legal act was withdrawn as no longer valid,
- 7 were amended,
- 6 legal acts regulating nuclear safety were newly drafted and approved (in all – 13.04 percent of the revoked, amended or newly approved legal acts).

## Issuing licences and permits

The use of nuclear energy, as well as the use, storage and transportation of nuclear and other radioactive materials are strictly regulated by the legal acts of the Republic of Lithuania to assure that the risks posed to the public and the environment would be minimized as much as possible. These risks have to be fully assessed in the course of selecting the site for a nuclear facility, design, construction a nuclear facility, performing modifications of the existing facility, during its operation or decommissioning, during storage or transportation of nuclear or other radioactive materials, and the relevant measures have to be set to reduce these risks to the minimum. It is not allowed to carry out risky operations, if the risks have not been properly assessed, appropriate safety measures have not been projected and assured.

Another important reason for regulating the use of nuclear energy – possible use of nuclear energy for terror purposes. In this case, regulation is aimed at preventing means for possible acts of terror and illicit trafficking of nuclear and radioactive materials.

Licensing is one of the main parts of the regulation, supervision and control system for operations in nuclear energy or other activity related to nuclear materials. During the licensing process, preparedness of an applicant (and after granting the licence – of the licensee) to carry out the activity licensed by VATESI in accordance with the

Law on Nuclear Safety (Official Gazette, 2011, No. 91-4316) is assessed. **In the process of licensing, the nuclear safety and physical security of nuclear facilities, the nuclear safety, radiation and physical security of nuclear and radioactive materials, the organizational structure of the applicant, the qualification of the personnel, and the compliance of the quality of operations with the set requirements are assessed.**

The process of licensing consists of the following main stages:

- Submission of an application;
- Review and assessment of application documents;
- Inspection of an applicant;
- Decision making regarding granting the licence or permit;
- Issuance of the licence or permit (provided that an affirmative decision has been made);
- Supervision of compliance with the conditions of the licence or permit;
- Termination or suspension of validity of the licence or permit.

When an application is submitted, the documents deemed necessary for the assessment of safety of the activity for which it is requested to issue the licence or permit are identified.

During the review and assessment of the application documents and the inspection of the appli-

cant, the safety of operations is assessed in terms of the following aspects:

- Whether the nuclear facility complies with the safety requirements set for this facility. These requirements, depending on the type of the licensed activity, cover the principal requirements of nuclear safety and physical security (e.g. the sufficiency of implementation of the defense in depth principle), the requirements for the plant (e.g. the equipment qualification and ageing management), the specific requirements for the systems of the facility (e.g. for the reactor core, cooling system, accident confinement systems, the peculiarities of safety engineering), etc.

- Whether the activity related to the nuclear facility or nuclear materials complies with the safety requirements set for this activity: whether the applicant has established an organizational structure, implemented an efficient quality management system and has sufficient resources to implement this system, whether the applicant can bear full responsibility for nuclear safety;

- Whether the applicant has obtained permits from other institutions prescribed by the Laws of the Republic of Lithuania evidencing that he has implemented their requirements for the safe use of nuclear facilities and nuclear materials.

**In 2011, four applications for issuing licence and permits were examined.**

Date of submission of the application	Applicant	Type of the licensed activity	Comments
July 2010	State company Ignalina NPP	To construct a solid radioactive waste retrieval and conditioning facility (B2)	Licence No. 1/2011 was issued in April 2011
September 2010	State company Ignalina NPP	To operate a very low level short-lived radioactive waste storage facility (B19-1)	Submission and review of the application documents will be continued in 2012
December 2010	State company Ignalina NPP	To operate an interim spent nuclear fuel storage facility (B1)	Submission and review of the application documents will be continued in 2012.
December 2011	State company Ignalina NPP	To conduct tests with radioactive materials at a very low level short-lived radioactive waste storage facility (B19-1)	Submission and review of the application documents will be continued in 2012

**Application for issuing licences and permits examined by VATESI in 2011**

The decision on issuing the licence or permit is made on the basis of the results of the review and assessment of the documents and the inspection of the applicant. VATESI decisions on issuing the licence or permit are executed by the Orders of VATESI Head.

In 2011, one licence No.1/2011 was issued.

Item No.	Licence No.	Licensee	Type of licensed activity
1.	12/99(P)	State company Ignalina NPP	To operate Ignalina NPP Unit 1
2.	3/2000(P)	State company Ignalina NPP	To operate an interim spent nuclear fuel storage facility of dry type at Ignalina NPP
3.	1/2004	Lietuvos Geležinkeliai AB	To transport nuclear materials
4.	2/2004	State company Ignalina NPP	To operate Ignalina NPP Unit 2
5.	1/2006	State company Ignalina NPP	To operate a storage facility of cemented liquid radioactive waste at Ignalina NPP
6.	2/2006	Radioactive Waste Management Agency (RATA)	To perform supervision of the closed Maišiagala Storage Facility of Radioactive Waste

Item No.	Licence No.	Licensee	Type of licensed activity
7.	2/2008	State company Ignalina NPP	To design a very low level short-lived radioactive waste storage facility and a repository
8.	1/2009	State company Ignalina NPP	To construct solid radioactive waste management facilities
9.	2/2009	State company Ignalina NPP	To construct an interim spent nuclear fuel storage facility
10.	1/2010	State company Ignalina NPP	To construct a very low level short-lived radioactive waste storage facility
11.	1/2011	State company Ignalina NPP	To construct a solid radioactive waste retrieval and conditioning facility (B2)

#### Licences issued by VATESI whereby VATESI was supervising the licensed activities in 2011

Abiding by the provisions of the Law on Nuclear Energy and the Law on Nuclear Safety, VATESI sets forth the conditions for the validity of the licences and permits. In the course of the licensed activity, the conditions of the validity of the licence or permit may be adjusted in order to meet the amended safety requirements or changed parameters of a nuclear facility.

Licence No.	Date of adjustment	Type of the licensed activity	Essence of adjustments
All licences were issued by VATESI to Ignalina NPP	23 February 2011		The condition to provide annual reports on licensed activities was introduced
12/99(P)	16 August 2011	To operate Ignalina NPP Unit 1	Further operation of the solid and bituminized radioactive waste storage facilities till 30/05/2012 was authorized.  The condition was set to draw up and to implement the plan of corrective measures regarding non-compliance of radioactive waste management activities with the amended nuclear safety requirements
12/99(P)	19 October 2011	To operate Ignalina NPP Unit 1	The implementation of decommissioning, dismantling and decontamination projects (B9-1, B9-5) was authorized

#### Licences amended by VATESI in 2011

In 2011, by executing the assigned functions and with an aim to evaluate the compliance of performed operations with the set requirements, VATESI specialists examined safety justification documents and conducted inspection (see more in the Chapter Inspections). The decisions on the compliance of nuclear facilities with the safety requirements, acceptability of the proposed modifications of the safety systems were made and the requirements for upgrading the licensed activity were provided on the basis of conducted safety assessments and inspections.

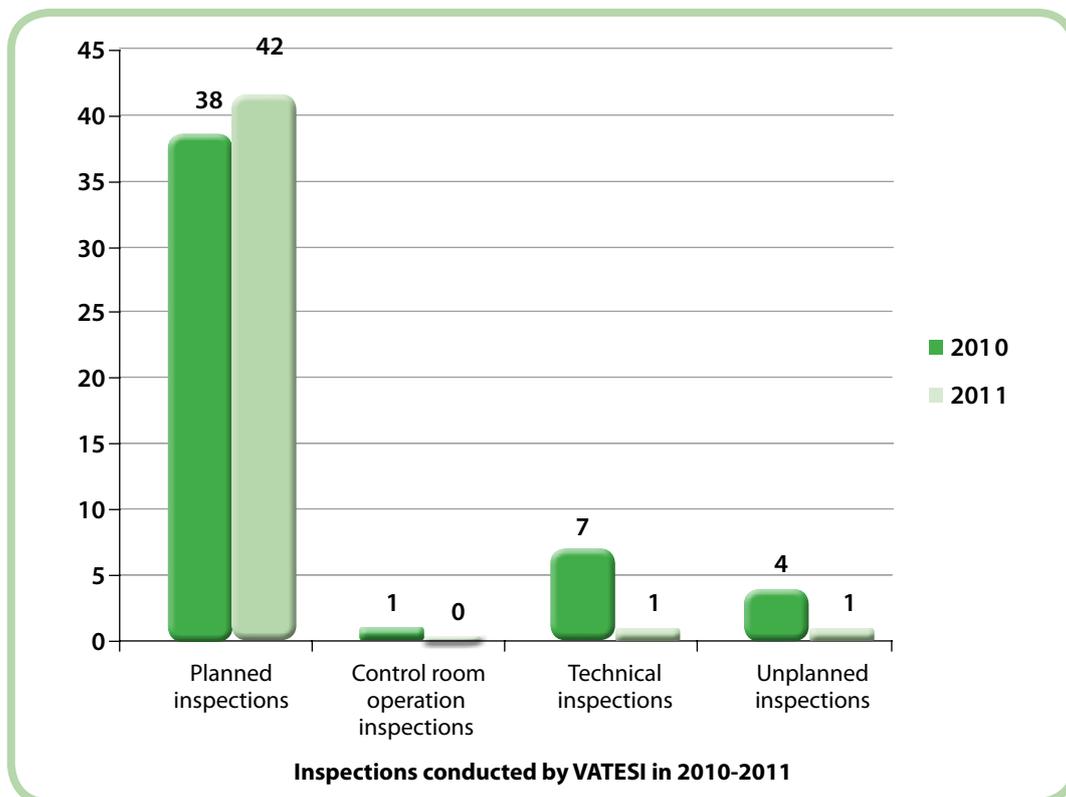
In the course of supervising the licensed activity, in the case of flagrant violations of the licence conditions, VATESI may suspend the validity of the licence or permit or to withdraw the licence or permit. In 2011, no flagrant violations of the licence conditions were established.

The licence is withdrawn when a nuclear facility proceeds to another stage of its lifetime (when the type of the licensed activity becomes different) or when the licensee terminates the licensed activity. In 2011, one licence issued by VATESI was withdrawn – Licence No. 1/2008 for designing a solid radioactive waste retrieval and conditioning facility.

## Inspections conducted by VATESI

VATESI inspects those operations of an economic entity that are related to nuclear safety, radiation protection and physical security, control over dual use nuclear commodities and accounting of and control over nuclear materials. Every year VATESI develops a plan of inspections in accordance with the established criteria. In addition to the planned inspections, the technical checks and control room operation inspections as well as unplanned inspections are undertaken. In 2011, VATESI specialists conducted 44 inspections (50 in 2010), including 26 planned special inspections, 16 planned regular inspections, 1 regular unplanned inspection and 1 technical check.

VATESI inspections are conducted at all stages of the lifetime of a nuclear facility: during the evaluation of a construction site (site) for a 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 dual use nuclear commodities. VATESI inspects applicants for obtaining licences and permits, licensees and permit holders, suppliers of goods or contractors performing works and other companies performing operations related to nuclear or nuclear fuel cycle materials.



In 2011, 42 of 44 conducted inspections were conducted at Ignalina NPP, 1 – at the State Company Radioactive Waste Management Agency (RATA) and 1 – at Kaunas Hospital of Oncology.

### ***Planned inspections***

Every year, in December, after having assessed the gathered experience of inspection activi-

ties, the experience of organizations operating nuclear facilities, the results of licensing, analysis of the safety upgrading program as well as other safety-related documents, VATESI specialists schedule the inspections to be conducted in the coming year. In 2011, forty one inspections were scheduled in the VATESI plan of inspections. All of them were conducted, excluding one which was rescheduled for 2012, because the works planned

to be inspected have not been undertaken. In the course of inspections, the following safety-related areas were examined:

- Safety systems and safety-related systems (the emergency cooling system of the reactor core, back-up power supply system, control of safety-important characteristics of the reactor, system of regular and back-up power supply for the Unit's auxiliary consumption, regulation and control systems, etc.);
- Accounting of and control over nuclear materials;
- Management of design-basis and beyond-design-basis accidents;
- Management of spent nuclear fuel;
- Physical security of nuclear facilities and nuclear materials;
- Planning of Ignalina NPP decommissioning projects;
- Implementation of dismantling and decontamination projects;
- Training of Ignalina NPP personnel;
- Implementation of the radiation protection program;
- Radioactive waste management at Ignalina NPP;
- Equipment qualification and ageing management of the safety-related systems;
- Use of imported strategic commodities assigned for nuclear purposes;
- Emergency preparedness;
- Operational experience feedback.

If some violations are found during the inspection, the enforcement measures are applied in accordance with the procedure set forth by the laws. The inspection protocol together with the resolution of VATESI Head providing binding measures is sent to the economic entity. The latter, after having analyzed the resolution of VATESI Head regarding application of the enforcement measures, has to draw up a plan aimed at implementing the resolution of VATESI Head. VATESI performs supervision of the implementation of the plan.

### **Technical checks**

Technical checks are the verifications conducted by VATESI experts of the technical condition of individual systems, facilities and equipment of a

nuclear facility set forth in the special (operation, testing, maintenance, etc.) regulations.

The objective of the checks of the technical condition is to ascertain that the safety-related pressurized components at Ignalina NPP (equipment and pipelines) have been manufactured, mounted, installed, maintained and operated in accordance with the requirements of the effective legal acts (regulations) and operation manuals, as well as that they are in good condition and it is possible to use them in the course of the start-up – commissioning works and to operate the facility at the specified operational parameters (e.g. pressure and temperature). The check of the technical condition comprises the internal and/or external visual inspections of equipment and pipelines, the tests, the verification of technical parameters confirming that the pressurized components meet the safety requirements along with other actions to be taken to ascertain their safety compliance.

The main goal of the VATESI specialists who take part in the checks of the safety-related pressurized components is to supervise the checks of the technical condition of the safety-related pressurized components and pipelines at Ignalina NPP and to personally evaluate the technical conditions of the NPP components being checked.

Regardless of the fact that the only operated Unit 2 of Ignalina NPP was finally shut down on 31 De-



**VATESI inspectors at storage facility of spent nuclear fuel**

ember 2009, part of the safety-related technological systems have remained in operation.

In 2011, the VATESI specialists conducted one technical check related to hydraulic testing of equipment used for evaporation of radioactive materials after maintenance. The results of the technical check were recorded in accordance with the established procedure by authorizing to operate this equipment at the established parameters.

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### **Upgrading of inspection activities**

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VATESI nuclear safety specialists regularly analyze the experience, knowledge and information obtained during inspections, workshops or working

meetings, provide proposals on the upgrading of the conducted inspection activities and documents regulating these activities. Measures for training the inspectors and improving their qualification are envisaged in the IAEA national project for 2008–2011 *Capacity Building of VATESI and Other Institutions in Licensing a New NPP in Lithuania*. During the in-service trainings and training courses the specialists can familiarize themselves with the practice of other countries in inspecting nuclear facilities and to apply the knowledge thus gained when inspecting the operating facilities, as well as in getting ready for supervising the implementation of the project of the new nuclear power plant. This is especially useful to the newly employed inspectors who are joining the ranks of nuclear safety specialists.

## Optimization of supervisory functions

The improvement of the activities performed by VATESI, including the optimization of the supervisory functions, is an integral part of the VATESI quality management system. This is also closely related to the qualification improvement of the personnel, upgrading of legal acts regulating nuclear safety and other fields of activity. **In supervising the activities performed by economic entities, VATESI is following the principles of the minimum and prorated burden of supervision, indiscrimination, planning, publicity and methodological assistance.**

VATESI has been systematically and continuously improving its activities, but the direct work for optimizing the functions performed by the Inspectorate was started in 2010, when Order No. 22.3-77 of VATESI Head as of 27 October 2010 Regarding the Improvement of Supervision of Economic Entities Activities and Optimization of the Supervisory Functions Performed by the State Nuclear Power Safety Inspectorate was approved. The Order laid down the specific measures for implementing the provisions of the Law on Public Administration of the Republic of Lithuania, Chapter IV Supervision of Activities of Economic Entities (Official Gazette, 1999, No. 60-1945; 2006, No. 77-2975) and of Resolution No. 511 of the LR Government as of 4 May 2010 Regarding Optimization of Supervisory Functions Performed by

Institutions. The procedure set by this Order was valid at VATESI till 25 October 2011.

The previously set procedure was adjusted by Order No. 22.3-108 of VATESI Head as of 25 October 2011 Regarding Optimization of Supervisory Functions with regard to the new wording of the Guidelines for Optimization of Supervisory Functions Performed by Institutions approved by the provisions on the improvement of activities of the supervisory institutions of economic entities and optimization of supervisory functions, which were laid down by the Minutes No. 30 of the meeting of the LR Government as of 13 July 2011.

Abiding by the set procedure, VATESI employees in their activities and especially in preparing the legal acts regulating nuclear safety and the internal administration of VATESI, in setting specific requirements or applying other enforcement measures for the economic entities supervised by them as well as in planning and conducting inspections are striving to:

- Decrease an administrative burden for economic entities and institutions imposed by performing the supervisory functions;
- Efficiently use the limited financial and human resources for risk management and business control;
- Decrease conditions for corruption;

- Ensure that the requirements of supervision would be comprehensible, easily and freely accessible for supervised economic entities;
- Ensure that the adjustment of supervisory regulation or introduction of new regulation would be foreseeable, public, horizontally coordinated and coming into validity on the set deadlines;
- Change the approach to the mission of supervising institutions by emphasizing the function of providing methodological assistance to economic entities so that they would be able to abide by the requirements of the relevant legal acts;
- Develop inter-institutional cooperation among supervisory institutions.

To optimize the performance of the supervisory functions, VATESI:

- By Order No 22.3-80 as of 23 August 2011 approved a new wording of the Procedure Regulations for Preparing Nuclear Safety Mandatory Technical Documents;
- By Order No 22.3-82 as of 25 August 2011 approved the new Nuclear Safety Requirements BSR-1.1.3-2011 Inspections Conducted by the State Nuclear Power Safety Inspectorate. By the mentioned Order the General Requirements for VATESI Inspections, which had been in effect since 2007, were revoked as no longer valid;
- By Order No 22.3-106 as of 24 October 2011 approved the Procedure Regulations for Applying the Enforcement Measures Set by the State Nuclear Power Safety Inspectorate.

It should be noted that the norms of the newly approved legal acts have been reconciled with the latest provisions of the Law on Public Administration and the Guidelines for Optimization of Supervisory Functions Performed by Institutions.

In preparing new nuclear safety requirements, VATESI is following the rule that the dates of their coming into force have to be set as occurring twice per year – either on 1 May or on 1 November. In line with the recommendations of the LR Ministry of Justice, the IAEA practice and international experience, side by side with the imperative regulation VATESI also applies the principles of the dispositive regulation to give more freedom to the regulated economic entities in choosing safety assurance measures for implementing the set safety goals and achieving the required level of safety.

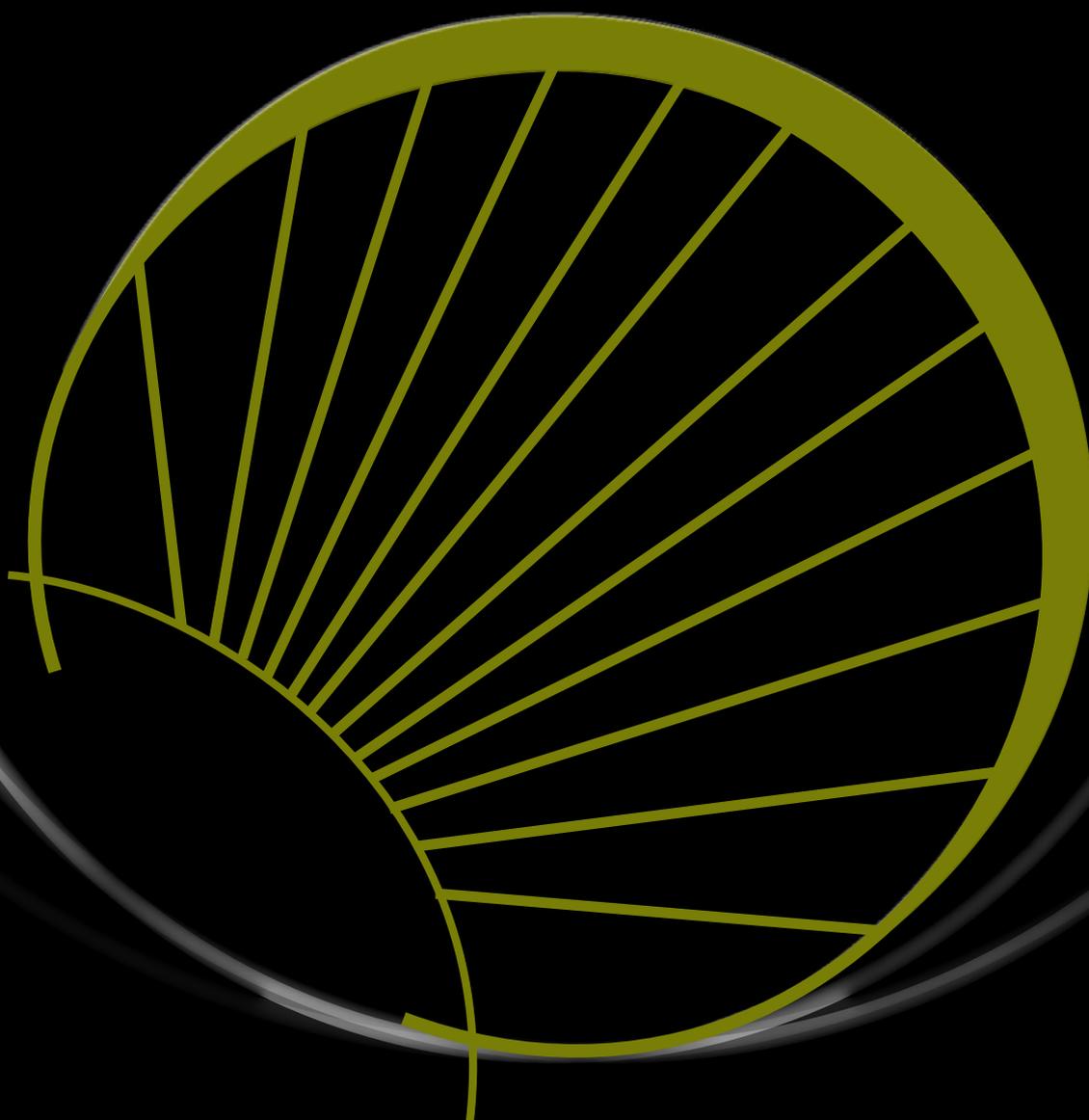
It has become an established tradition, which has already justified itself, to regularly arrange joint meetings among the top managers of VATESI and regulated economic entities in order to discuss the most important issues, to reconcile positions and to plan binding measures. In 2011, the meetings among the top managers of VATESI and the State Company Ignalina NPP, VATESI and VAE UAB and VATESI and the State Company RATA were arranged. In addition to that, numerous meetings were arranged among the specialists of the mentioned companies. At the meetings with the specialists of VAE UAB, the safety requirements which have been planned to be implemented in relation to the specific aspects of construction of the new nuclear power plant were discussed in more detail, and the agreed provisions were laid down in the consultation protocols. At the working meetings with Ignalina NPP specialists, the outstanding issues of the radioactive waste and spent nuclear fuel management, implementation of the decommissioning projects, safety assessment and licensing were discussed. The working meetings ensure a more fluent process of the assessment of documents and licensing.

The following information, which is relevant to economic entities, is uploaded on the VATESI website:

- Licences and permits that are issued by VATESI, the procedure for their issuance, the procedure for submitting applications for getting a licence;
- A list of legal acts regulating VATESI activities and enforcing the requirements for the area the supervision thereof is assigned to VATESI;
- Legal acts regulating nuclear safety and draft legal acts which are under preparation;
- Public consultations;
- VATESI plan of inspections to be conducted in 2012 and other important information.

VATESI follows and supports the initiatives raised by the Ministry of Economy and the Ministry of Justice for improving supervision of economic entities. On 22 September 2011, VATESI became a party of the Declaration on the First Business Year. VATESI also follows the principles of the Guidelines on supervising operations of economic entities on the basis of risk assessment provided in the orders of the Minister of Justice and the Minister of Economy as of 20 November 2011.

SAFETY OF THE FINALLY  
SHUT-DOWN IGNALINA  
NUCLEAR POWER PLANT



# Supervision of decommissioning of finally shut-down Unit 1 and Unit 2

## ***The main decommissioning works of finally shut-down Unit 1***

In much the same way as in Unit 2, Ignalina NPP was further operating the finally shut-down Unit 1 – performed control over the parameters of technological processes, maintenance of safety-important equipment and other works deemed necessary to fulfill the main three functions of safety assurance:

- ensuring sub-criticality of the spent nuclear fuel stored in the fuel pools (spent nuclear fuel from the reactor of Unit 1 was retrieved at the end of 2009);
- heat removal from the spent nuclear fuel pools;
- confinement of radionuclides, installation of barriers suppressing ionizing radiation and control over radionuclide releases.

The reports submitted by Ignalina NPP in 2011 along with other safety justification documents, the reviews and analyses of these documents by VATESI specialists as well as the results of the conducted inspections confirmed that in 2011 all safety functions were carried out in compliance with the requirements of the mandatory technical documents on nuclear safety.

In 2011, Ignalina NPP continued the works related to decontamination and dismantling of the equipment of Unit 1, which does not perform any safety-important functions.

In 2011, VATESI examined and approved the technical design for decontamination and dismantling of the turbine hall equipment (turbine generators with their auxiliary systems, turbine oil systems, condensate treatment equipment, condensers, separators – reheaters and evaporators, water supply circulation pumps, condensate pumps and heat reduction equipment) at Ignalina NPP Unit 1 (B9-1 project) and the technical design for decontamination and dismantling of Ignalina NPP heating equipment (Building 119), which was used for steam supply from the operating Unit of the power plant to heat water for district heating demands of Ignalina NPP and Visaginas

city (B9-5 project) as well as the safety justification of both projects. It should be mentioned that the contamination with radionuclides of Building 119 and the equipment installed therein is rather low, and after decontamination and, if necessary, after radiological tests it will be possible to unrestrictedly use the major part of this equipment in other industries. Some insignificant part of the equipment contaminated with radionuclides will be processed in the grinding and decontamination plant for very low level radioactive waste.

In 2011, other safety assessment works were continued – VATESI provided comments on the technical design and safety justification report for decontamination and dismantling of the equipment at Ignalina NPP Building V1 (the gas-cooling circuit of the reactor, the flue gas treatment system, the back-up system of tanks of the main cooling circuit (MCC), the components of the ventilation system, the components of the emergency cooling system of the reactor core, and other related auxiliary equipment) (B9-2 project), revised and approved the specification of engineering works for dismantling the structures of the reactor shafts in Unit 1 and Unit 2 and provided comments on the scope of the technical design (UP 01 project) for dismantling R1 zone (an upper part of the reactor's metal structure) and R2 zone (a lower part of the reactor's metal structure).

At the end of 2009, after the retrieval of the last fuel assembly from Ignalina NPP Unit 1, preparations for decontamination of the main cooling circuit (MCC), purification and cooling systems (PCS), bypass treatment systems (BTS), internal surfaces of the headers and parts of the steam supply pipes of the emergency cooling system of the reactor core were started (B12 project). This equipment is contaminated with radionuclides most of all. The main objective of this project is to retrieve the major part of contaminants from the internal surfaces of the equipment in order to reduce the employees' exposure to radiation during the dismantling works in the reactor unit (Building A1) and in the MCC low mineralization water treatment equipment (Building B1). However, in

2010, due to the unusual event related to decontamination of the main cooling circuit of the reactor of Unit 1, all works had been suspended till the reasons of the occurrence are fully clarified, assessed and the relevant rectifying measures are implemented so that in the future similar malfunctioning would not occur in neither of the Units. In 2011, VATESI revised and approved the report of the unusual event and the plans of rectifying measures submitted by Ignalina NPP, but the inspectorate found some shortcomings in the safety justification and did not issue a permit to continue the works. In 2011, VATESI conducted 4 inspections during which compliance of the decontamination and dismantling works performed by Ignalina NPP with the approved safety justification documents was inspected – no non-compliances with nuclear safety requirements were found.



**Ignalina NPP**

### ***The main decommissioning works of finally shut-down Unit 2***

**The highest possible level of safety has to be assured throughout all stages of the lifetime of a nuclear power plant – starting from the assessment of the construction site (site) and preparation of the design and through to its decommissioning.**

In 2011, like in the previous year, Ignalina NPP was further continuing the operation of the finally shut-down Unit 2 – performed control over parameters of technological processes, maintenance of safety-important equipment and other works deemed necessary to fulfill the main three functions of safety assurance:

- control of the reactor's reactivity and ensuring the subcriticality of the spent nuclear fuel;
- heat removal from the reactor's core and spent nuclear fuel pools;
- and confinement of radionuclides, installation of barriers suppressing ionizing radiation and control over radionuclide releases.

The reports submitted by Ignalina NPP along with other safety justification documents, the reviews and analyses of these documents by VATESI as well as the results of the conducted inspections confirmed that in 2011 all safety functions were carried out in compliance with the requirements of the mandatory technical documents on nuclear safety. It is worth mentioning that in the beginning of 2011 VATESI analyzed the safety justification for retrieval of 500 spent nuclear fuel assemblies from the reactor's core of Unit 2 and approved the relevant program whereby 365 spent nuclear fuel assemblies were retrieved from the reactor. This work at Ignalina NPP will be further continued in 2012.

In addition to that, in 2011 Ignalina NPP was preparing and reconciling with VATESI the documents deemed necessary to get ready for decontamination and dismantling works at Unit 2 the beginning thereof is scheduled at the end of 2012. The procedure regulations for preparation of the safety assessment reports of the decontamination and dismantling projects were submitted for VATESI review. VATESI specialists analyzed the procedure regulations and provided proposals how the document could be improved. Ignalina NPP took into consideration these proposals and the procedure regulations were approved.

In 2011, the updated Final Plan of Ignalina NPP Decommissioning was provided by Ignalina NPP for review by VATESI. VATESI specialists reviewed and assessed the Plan and provided their comments. Ignalina NPP is planning to revise the plant and to resubmit it to VATESI for review in the middle of 2012.

## Measures for assuring nuclear safety

### ***Assurance of safety of the Ignalina NPP 2<sup>nd</sup> nuclear reactor and spent nuclear fuel storage pools of Ignalina NPP Unit 1 and Unit 2***

In the beginning of 2011, VATESI approved the program of works and the safety justification for removing 500 spent nuclear fuel assemblies from Ignalina NPP Unit 2 and their loading into the spent nuclear fuel storage pools, which had been prepared and submitted by Ignalina NPP. In 2011, 356 assemblies were removed in line with the mentioned program. According to the data provided by Ignalina NPP, at the end of 2011, 1278 spent nuclear fuel assemblies were still stored in the reactor's core. The calculations show that the reactor in this condition can not be launched into operation even if all of the control rods are removed. The last spent nuclear fuel assemblies from the reactor of Ignalina NPP Unit 1 were removed in 2009. The removed assemblies are stored in the spent nuclear fuel storage pools, it is being planned that later they will be delivered for storage in the storage facility of dry type.

### **The safety of the spent nuclear fuel assemblies loaded into the spent nuclear fuel stor-**

**age pools is assured by storing them in accordance with the methods set forth in the NPP design, by maintaining the required cooling and chemical regime.** In 2011, the plan for reinforcement of the part of the bottoms of the SNF pools was submitted to VATESI. This reinforcement is necessary to assure that the accidental dropping of a fuel assembly or a barrel with assemblies would not cause serious damage.

In 2011, VATESI specialists inspected measures for control over the safety-related characteristics of the reactor installations and for management of the spent nuclear fuel. It was established that the characteristics of Ignalina NPP Unit 2 were registered in accordance with the valid Ignalina NPP regulations and the requirements of the normative documents. No deviations in the characteristics from the set limits were found. After Ignalina NPP had completed the safety justification and it was reviewed and approved by VATESI, the lifetime of the control and protection rods that presently are in the reactor's core, was extended. Currently the reactor's subcriticality is above 16%.



**Ignalina NPP**

### ***Assurance of the structural integrity of the cooling circuit of the nuclear reactor of Ignalina NPP Unit 2 and the fuel storage pools of Ignalina NPP Unit 1 and Unit 2***

Ignalina NPP is controlling the structural integrity of the pipelines, equipment and technological channels by using the existing preventive measures (by monitoring the level of water in the drum-type separators, conducting visual inspections, etc.).

In addition to these measures, Ignalina NPP has to undertake additional measures in order to identify in advance the potential defects that might result in the leakage of the coolant. **Early prevention of possible failures is the primary principle of safety assurance.** Due to the fact that Ignalina NPP Unit 2 has been finally shut down since the beginning of 2010, the current operating conditions of the pipelines, technological channels and equipment (at present the water temperature in the circuit is ~37°C, as compared with 285°C during operation of the power unit, pressure ~0,3MPa, during operation of the power unit it was ~8,6MPa) and the environment, in which they are operated, has become rather moderate.

Ignalina NPP prepared and submitted for review and approval by VATESI the programs for control over the condition of metal parts of the technological channels, safety-related systems and pipelines of Unit 2, to be implemented during the decommissioning project. In 2011, the works of

operational control over the condition of metal parts of the technological channels, safety-related systems and pipelines of Unit 2 have been started and they will be further continued in 2012.

To verify how the structural integrity of the reactor's cooling circuit and the SNF storage pools is maintained by Ignalina NPP, VATESI specialists conduct regular inspections. In 2011, three inspections were conducted, during the inspections it was verified how Ignalina NPP:

- Performed maintenance of the finally shut-down Units 1 and 2, and assured management of the equipment ageing;
- Operated and performed maintenance of the cooling systems of the SNF storage pools;
- Performed the works of operational control over the condition of the metal parts of the equipment and pipelines of the safety-important systems.

During these inspections, no non-compliances with the nuclear safety requirements, regulations or other legal acts that could result in the infringement of the safe operation limits and/or conditions and/or hazardous effects on the population and the environment were found. For the elimination of other shortcomings, the State Company *Ignalina Nuclear Power Plant* has projected the relevant rectifying measures the implementation thereof will be supervised by analyzing the submitted documents and by performing inspections and technical checks.

## Maintenance of safety-related systems, management of their ageing and other safety upgrading and assurance measures

### ***Assurance of functionality of the accident confinement system of Ignalina NPP Unit 2***

The accident confinement system (ACS) is assigned to the safety-important systems and performs the safety function in the case of design-basis accidents with the loss of coolant – the confinement of radioactive products in the leak proof chambers if any initiating event assumed in the design basis and demanding to launch the ACS has occurred.

On 31 December 2009, Ignalina NPP Unit 2 was finally shut down, since 2010 the ACS has been kept in reserve and its leakage tests have not been performed. In 2011, Ignalina NPP specialists carried out maintenance of the ACS in line with the requirements for the decommissioning project and its safety justification. The specialists of Ignalina NPP conducted monitoring of the water level in the condensation plates and hot condensate chambers and of the water temperature; the ACS also controlled the concentration of hydro-

gen. This assured the operability of the system. The ACS of Ignalina NPP Unit 2 has to perform the prescribed functions till the spent nuclear fuel is removed from the reactor of Unit 2.

### **Monitoring, control and protection system**

The control and protection system of Ignalina NPP Units was operated for the time period when nuclear fuel was being removed from the nuclear reactors, as it is prescribed by the Technological Regulations. For operation in this regime, in 2011 the lists of the safety-related equipment and components in the respective divisions of Ignalina NPP and their Operation Manuals were further examined and revised. In October 2011, a special inspection to verify the operation of Ignalina NPP control and security equipment was conducted. During the inspection no violations or non-compliances in their operation were found.

### **Maintenance of safety-related structures, systems and components**

Due to the changed condition of Ignalina NPP after its final shut-down, in the recent years the configuration of its systems and components has been significantly altered, and this predetermined variations in the scopes of maintenance. In 2011, the main activities were targeted at the analysis and implementation of the modifications of the safety-important systems, related to their isolation. Last year VATESI revised and approved the technical solutions for 26 modifications which were basically related to isolation of the systems and their preparation for further dismantling. Whereas the agreement between Ignalina NPP and the contractor providing the services of inspection and testing of metal parts was not concluded on time, the technical verification of the equipment and pipelines of the main cooling circuit (MCC), the emergency cooling system of the reactor's core (ECSRS) and of the blasting and cooling system (BCS) was not performed.

The completion of the works of operational control and the technical checks of equipment and pipelines of the Nuclear Fuel Handling Department were rescheduled for 2012.

In 2011, the technical checks of the equipment and pipelines of the Ignalina NPP Liquid Radioactive Waste Management Division and Chemical

Technologies Division were completed in line with the schedules.

### **Ageing management of the safety-related systems and maintaining their qualified condition**

#### **• Ageing management of the safety-related structures, systems and components**

Although presently Ignalina NPP is not operating, but prior to its decommissioning the operational maintenance and the testing program have to be carried out in order to identify the effects of ageing.

In 2011, in accordance with the *Plan of Measures for the Ageing Management of Components and Systems after the Final Shut-down of Ignalina NPP*, the instructions and procedure regulations to be followed in the ageing management were reviewed and updated. The List of safety-related systems and components the ageing management thereof is mandatory was supplemented by including the equipment of the radioactive waste storage facility.

In August 2011, the inspection to verify the maintenance and the ageing management of the finally shut-down Ignalina NPP Units 1 and 2 was conducted. During the inspection it was verified how Ignalina NPP, acting in line with the set requirements, was performing the process of the ageing management of the safety-related structures, systems and components of the shut-down power units. No violations or non-compliances that could impact nuclear safety were found during the inspection. It was stated that the instructions and procedures had been updated with regard to the changed organizational structure of Ignalina NPP and had been adjusted to make them applicable in the shut-down units.

#### **• Maintaining the qualified condition of the safety-related systems**

The qualification of the safety-related systems (SRS) is aimed to justify the capability of the systems and elements to perform the given functions during their lifetime under the designed operating conditions. Although Ignalina NPP is no longer operated, the qualification of the SRS and components has to be performed as before the shut-down, and the qualified condition of the equipment has to be maintained to assure performance of the relevant functions of the equipment.

In August 2011, VATESI conducted an inspection at the shut-down Units 1 and 2 of Ignalina NPP to verify how Ignalina NPP, by following *the List of the Systems and System Components that are Important to Safety of Ignalina NPP Unit 2* and maintaining the qualified conditions thereof is mandatory, was performing the maintenance, as well as the input and storage of its results in the centralized computer database Fobos. No violations or non-compliances that could impact nuclear safety were found during the inspection. Both the condition of the systems and the examined reports enabled to draw the conclusion that the works for maintaining the qualified condition of the systems were duly planned and carried out.

### **Safety improvement measures**

#### **Safety upgrading of Ignalina NPP is the main task and an uninterrupted process, therefore the safety improvement works at Ignalina NPP are carried out on a permanent basis.**

These works are aimed at continuously improving the safety of Units 1 and 2 by upgrading the safety-related systems and procedures with regard to the operational experience of Ignalina NPP and organizations of foreign countries. Works in this area have been performed in accordance with a special Ignalina NPP Safety Improvement Program (SIP) coordinated with VATESI.

Regardless of the fact that Ignalina NPP Unit 1 was finally shut down on 31 December 2004, and Unit 2 was finally shut down on 31 December 2009, Ignalina NPP has been further implementing the SIP measures. Six safety improvement measures were included in the Safety Improvement Program SIP-3/2011 – 3 of them were to be implemented in 2011, and 3 measures are being implemented on a permanent basis.

In 2011, VATESI specialists supervised the works undertaken for implementing the following measures: conservation of the fully loaded compartments of the solid radioactive waste storage facility (building 157/1), safety assessment in converting the existing bitumized radioactive waste storage facility (building 158) to the radioactive waste repository, defining the seismic category of buildings 151, 155, 155/1, 157 and 157/1. In addition to that, in 2011, VATESI specialists supervised the works undertaken under the measures implemented on a permanent basis: the measures for

reducing the frequency of an individual exposure dose (the implementation of the ALARA principle), managing the ageing of the safety-related systems and maintaining the qualified condition of safety-related systems.

All works of the safety improvement measures are being performed, VATESI specialists have no comments on their implementation. Based on the assessment of the results of the Ignalina NPP safety improvement program, the safety level of Ignalina NPP in 2011 was evaluated as being acceptable. The safety improvement works will be also continued in 2012.

### **Stress tests, their process and results**

On 25 March 2011, in response to the events at Japan's Fukushima Daiichi Nuclear Power Plant, the European Council of Ministers made a decision to revise the safety of all nuclear power plants located in the EU by conducting the so-called stress tests during which the comprehensive and transparent reassessment of risks and safety of the nuclear power plants would be made. The draft Declaration on Stress Tests was prepared by the Western European Nuclear Regulators' Association (WENRA), and on 13 May it was finally agreed with and approved by the European Nuclear Safety Regulators Group (ENSREG).

On 25 May 2011, the Declaration on Stress Tests and its Annexes prescribing the conditions for conducting the stress tests were presented to the European Commission. The Declaration obligated all EU Member States to reassess the safety and security of their nuclear power plants in line with the provisions of the Annexes. The assessments of the nuclear safety and the security had to be conducted separately.

The Declaration on Stress Tests contains the Specification of Nuclear Safety Assessment (the "Specification") providing that the stress tests have to be conducted by the licence holders responsible for the safety of the nuclear power plants and other nuclear installations. VATESI by its official letter as of 27 May in writing obligated Ignalina NPP to conduct the reassessment of the safety in line with the requirements set forth in the Specification and to submit the respective reports to VATESI for review and evaluation. In accordance with the Specification, during the stress tests the nuclear safety of the finally shut-down Units of Ig-

Ignalina NPP, the operated spent nuclear fuel storage facilities of dry type and the storage facilities that are under construction within the scope of Ignalina NPP decommissioning project (B1 project) had to be verified. On 11 August Ignalina NPP submitted the Progress Stress Tests Report, and on 25 October – the Final Stress Tests Report for their review and evaluation by VATESI.

**The scope of the stress tests covered the reassessment of the Ignalina NPP safety. Besides, with regard to the accident at Fukushima Dai-ichi Nuclear Power Plant, during the tests it was newly assessed if the safety assurance measures at the nuclear plant are adequate to withstand extreme natural phenomena, e.g. earthquakes, severe weather conditions and other impacts, and to effectively control the consequences of such accidents.** To assess how the nuclear power plant would respond to any events which might disturb the performance of the main safety functions, the total loss of power supply for the power plant's auxiliary consumption, loss of the ultimate heat sink at the power plant and the combinations of these accidents were examined.

The results of the Ignalina NPP Final Stress Tests Report revealed that the company has implemented the relevant technical and organizational measures which would be adequate to control the emerging situation in order to protect at the maximum people and the environment from the hazardous effects of ionizing radiation even in the most adverse conditions, such as earthquake, flood, long-lasting blackout, long-lasting failure of the nuclear fuel cooling systems.

Ignalina NPP, as the organization responsible for safety of the nuclear installations that are in its disposition, in the Report provided recommendations the implementation thereof would enhance the safety level of these installations. In the recommendations it was proposed to develop the measures for mitigation and elimination of the effects which would occur if a container transported from Ignalina NPP Units to the spent nuclear fuel storage facilities was overturned during the earthquake, to examine a possibility to set additional criteria for issuing an emergency alert by using the information of the seismic emergency alert and monitoring systems, to provide for a possibility of additional fuel supplies for back-up diesel generators in order to ensure their longer operation and to provide for

additional measuring devices to measure the level of water and its temperature in the spent nuclear fuel storage pools and to ensure autonomous operation of these devices.

VATESI, after having examined and assessed the Final Stress Tests Report submitted by Ignalina NPP, approved the safety assessment results presented therein and by its letter as of 2 December in writing obligated Ignalina NPP to work out the plan for implementing the recommendations provided in the Ignalina NPP Final Stress Tests Report, and to reconcile the plan with VATESI.

Based on the information provided in the Ignalina NPP Progress Stress Tests Report and Final Stress Tests Report, VATESI drew up the National Progress Report of Stress Tests, which on 15 September was in writing submitted to ENSREG, and the National Final Report of Stress Tests, which was also submitted to ENSREG.

Lithuania is also involved in the peer review of the stress tests results which has been scheduled for the first half of 2012.

To conduct the safety assessment stress tests, in July 2011 the Ad Hoc Group on Nuclear Security (AHGNS) was established. VATESI specialists take part in the activities of this Ad Hoc Group as well. The Ad Hoc Group, with regard to the experience gathered by the EU Member States in the field of physical security, prepared the Interim Report and identified 32 best practice examples. The activity of the AHGNS will be continued in 2012 as well.

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### ***Analysis of design-basis and beyond-design-basis accidents and their management***

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In accordance with the nuclear safety requirements, the safety assessment (safety analysis and safety justification) of the nuclear facility has to be carried out to justify its safety. One of the fundamental constituent parts of the safety assessment is the deterministic safety analysis. **The deterministic safety analysis (DSA) is an engineering and research study whereby the analyses of neutronic, thermal hydraulic, structural integrity, fire hazard and radiological characteristics of a nuclear installation are conducted by applying verified and validated computer codes.** According to the results of the calculations of the deterministic safety analysis, the efficiency of pre-

vention of design-basis and beyond-design-basis accidents and technical and organizational measures for mitigation of their effects are assessed. In the case of breach of the physical barriers of the nuclear facility and possible emission of radionuclides into the atmosphere, the method of deterministic calculations is used to determine whether the risks posed to the environment and people do not exceed the permissible limits.

In 2011, VATESI specialists were analyzing the safety justifications submitted by the Ignalina NPP that had been prepared within the scope of various decommissioning projects, assessed the results of the analysis of the design-basis and beyond-design-basis accidents and the procedures for management of these accidents, supervised compliance with the set requirements, and the timely preparation and implementation of the corrective measures. The safety justification documents of decontamination and dismantling of the turbine hall equipment of Ignalina NPP Unit 1 (B9-1 project), the solid radioactive waste storage and management facility (B2 project) were reviewed, the reports on typical for these nuclear installations design-basis and beyond-design-basis accidents and the procedure regulations for management of such accidents were assessed. Ignalina NPP corrected the found non-compliances in the safety analysis reports of the mentioned projects in line with the comments provided by VATESI.

In 2011, Ignalina NPP corrected the violation and non-compliance that had been established during the inspection conducted by VATESI in 2009, and modified the manuals for managing beyond-design-basis accidents. The modified guidelines for managing beyond-design-basis accidents defined the accident management strategy C19, which will be implemented in managing very unlikely beyond-design-basis accidents related to the formation of self-criticality in the spent nuclear fuel pools of Ignalina NPP Unit 1 (e.g. in the case of dropping heavy-weight equipment into the pool or the earthquake) and mitigating the effects of these accidents. VATESI specialists reviewed and assessed the Ignalina NPP modified guidelines for managing beyond-design-basis accidents and the safety justification. To verify the feasibility of implementing the accident management strategy C19, the inspection *Verification of Accident Management Processes at the State Com-*

*pany Ignalina Nuclear Power Plant* was conducted on 30 November 2011.

To get ready for the construction of the new nuclear power plant in Lithuania, VATESI specialists were drafting a new legal act the *Requirements for the Deterministic Safety Analysis of Nuclear Power Plants*. The requirements were prepared in line with the regulatory documents on nuclear safety and radiation protection valid in Lithuania, the recommendations of the IAEA and the Western European Nuclear Regulators Association (WENRA) as well as the best practices of other countries (e.g. with regard to the requirements set by the US Nuclear Regulatory Commission (NRC) for new nuclear power plants, the results of Generic Design Assessment process of new nuclear power plants conducted by the UK Health and Safety Executive (HSE), the experience gained by Radiation and Nuclear Safety Authority of Finland (STUK) in licensing a new nuclear power plant). These requirements set forth the goals and objectives of the deterministic safety analysis, postulated initiating events and their classification, technical acceptance criteria, requirements for the methods, data and assumptions of the analysis, the requirements for computer codes and numerical evaluation models, documenting the results, quality assurance, independent review and updating documents.

In addition to that, to get ready for the construction of the new nuclear power plant in Lithuania, VATESI specialists were drafting the *Requirements for Safety Assessment of Nuclear Installations and Operations*. The requirements were prepared in line with the regulatory documents on nuclear safety and radiation protection valid in Lithuania, the IAEA recommendations. These requirements set forth the principles of safety assessment of nuclear installations and operations related to nuclear and/or nuclear fuel cycle materials, safety assessment (safety analysis and justification), as well as the methods, procedures for their execution and application. When these nuclear safety requirements are agreed and approved, they will become binding to the applicant or the licensee in preparing the nuclear safety and radiation protection justification documents in the design, construction, operation, decommissioning stages of the new nuclear power plant in accordance with the procedure set forth by the laws or other legal acts. These requirements together with oth-

er mandatory technical documents will set the system of the state safety regulation and supervision of nuclear facilities in Lithuania.

### ***Fire hazard analysis at nuclear facilities***

Fires occurring at nuclear facilities, especially at nuclear power plants, can impact the availability of the safety-related systems and cause immense unpredictable losses. Therefore the fire hazard analysis (FHA) at these facilities is in the focus of attention in all countries of the world. The main objective of this analysis is to demonstrate that the locations of the safety-related systems and the existing fire safety measures are assuring nuclear safety and complying with the requirements of the national legal framework, the IAEA recommendations and the best practice of other countries.

The *Requirements on Fire Safety in Safety-Related Systems at Nuclear Facilities* approved by Order No. 42 of VATESI Head as of 11 October 2002 prescribe that the fire hazard analysis has to cover the following stages:

- Identification and classification of fire risks zones;
- Identification of safety-related systems in fire risks zones;
- Defining potential fire sources and level of fire risks, assessment of potential fire distribution and expected impact on the operation capability of the safety-related systems;
- Defining the mandatory flame resistance of fire walls in fire risk zones;
- Setting necessary measures for fire detection and extinction, verification of operation capability of fire detection and extinction systems;
- Analysis of radiation effects caused by fire.

In 2011, VATESI analyzed and provided comments on the fire hazard analyses (FHA) reports for the buffer-type storage facility of very low level radioactive waste (B19-1) and disposal facility (B-19-2), waste retrieval from buildings 155-155/1, 157-157/1, and the segregation and storage facility of very low level radioactive waste (B2 project, parts 1, 2), decontamination and dismantling of Ignalina NPP building V1 (B9-2). Based on the FHA results, the shortcomings in the fire safety of these planned to be constructed nuclear facilities were identified and the remedying measures were worked out.

Fire safety at Ignalina NPP Unit 1 and Unit 2 is implemented either by automated and/or manual means. One of the most effective means of fire safety is an automated fire safety system designed to detect, liquidate fires and to mitigate their effects. The automated fire safety systems are completely autonomous in each of the Units and consist of:

- Automated fire extinction system;
- Automated system of fire alarms,
- Fire confinement, smoke removal and air overpressure generating systems.

In 2011, VATESI specialists conducted the inspection at Ignalina NPP where the maintenance and preparedness of the automated fire extinction systems (AFES) to perform their functions, performance of these works and documentation of their results were inspected (the records of the full-scope tests of the automated fire extinction system in Unit 1 performed by Ignalina NPP employees were examined), as well as whether Ignalina NPP conducted fire hazard analysis in accordance with the fire safety requirements for the safety-related systems (P-2002-01); the visual inspection of the equipment and premises was conducted, the maintenance and operation documents were examined. It was also inspected whether the meetings of the Technical Fire Safety Commission were convened at Ignalina NPP. During the inspection the issues discussed at the Commission's meeting arranged on 20 June 2010 were examined. VATESI prepared the inspection report with conclusions and proposals for upgrading this activity, and submitted it to the inspected organization.

In 2011, at the TUV headquarters in Munich, Germany, the 12<sup>th</sup> international seminar *Fire Safety Assurance during NPP Construction and Operation* was arranged, which was also attended by the FHA specialists from VATESI, LEI and VAE. During the seminar the specialists working in the field of the NPP FHA shared their experience in the use of FHA in different countries in making decision related to safety. The Gundremmingen Nuclear Power Plant was visited to get acquainted with the fire safety assurance in this nuclear facility. The knowledge gained at the seminar will be useful to the specialists of our country in supervising the safety of Ignalina NPP decommissioning works as well as in getting ready for designing and constructing the new nuclear power plant.

## Operational experience feedback

**To prevent possible accidents and safety-important events, to avoid their reoccurrence, and to ensure high level of nuclear safety it is necessary to systematically analyze the power plant's own operational experience along with the experience of other organizations operating in the nuclear energy sector.** The high-level safety of Ignalina NPP has been continuously assured and upgraded by analyzing its own operational experience as well as the operational experience of other organizations operating in the nuclear energy sector.

Operational experience covers information about events, accidents and their precursors, defects, near miss events, low level events, their tendencies, weaknesses and good practice, reports on analysis of safety performance indicators, self-assessment reports (reports of quality assurance audits, reports of independent experts and missions, documented good practice, etc.) along with other information which when used can improve the safety of the nuclear facility. It includes human activity, organizational and technological issues.

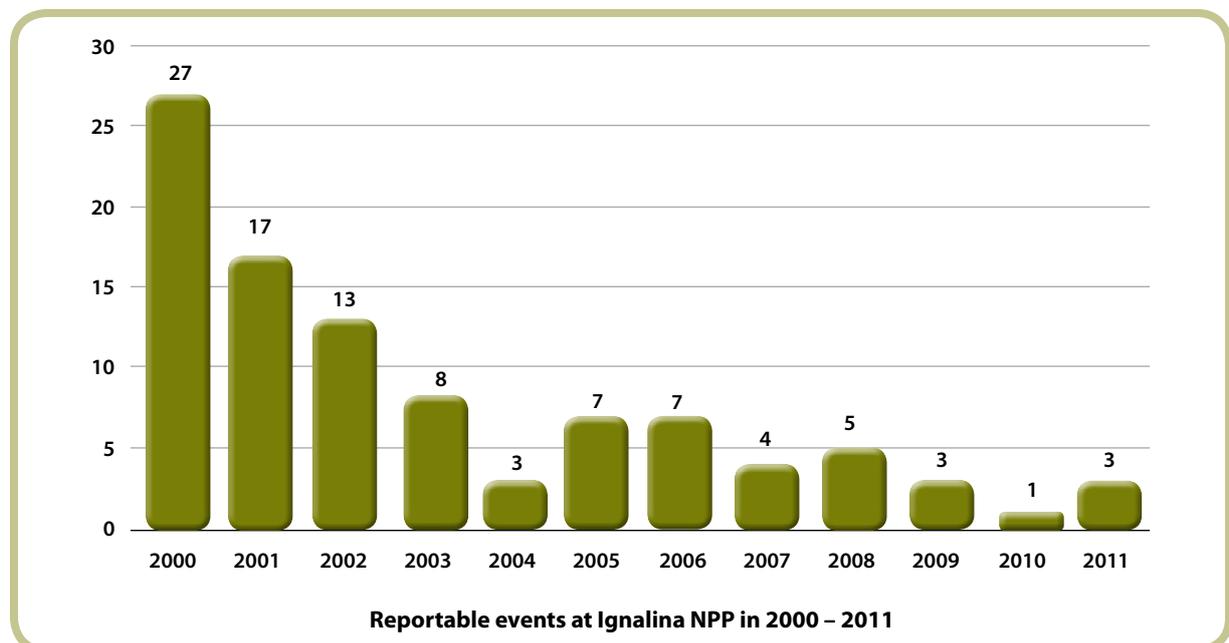
VATESI has established a permanent Commission of Unusual Events and Operational Experience (hereinafter – the “Commission”), which analyses the reports on unusual events at Ignalina NPP, other nuclear facilities (NF) in Lithuania and the information about unusual events at nuclear power plants worldwide.

In 2011, nine meetings of the Commission were arranged where the reports of unusual events at Ignalina NPP were analyzed along with the unusual events that occurred at nuclear power plants of other countries and at other NF. The results of the analysis performed by the Commission members, conclusions and/or recommendations related to the upgrading of safety and lessons learned in other NF were handed over to Ignalina NPP and were used for improvement of VATESI regulations.

Abnormal occurrences are most often caused by the shortcomings in the nuclear power plants' design, procedures or operations. In 2011, three unusual events occurred at Ignalina NPP which in accordance with the set criteria for providing information had to be reported to VATESI:

- 23/06/2011: the pipelines' thermal insulation caught fire in performing welding works;
- 28/07/2011: start-up the 11<sup>th</sup> back-up diesel generator by using the input signal from the automated emergency power supply source failed;
- 28/11/2011: a fault in the system for pumping trap water from the trap water tank of the first turbo generator to the collection reservoirs at the liquid waste processing plant occurred.

These unusual events were rated as level 0 on the INES, i.e. below the INES scale limits.



With an aim to assess how the operational experience is used by Ignalina NPP, on 14 July 2011 VATESI conducted an inspection at Ignalina NPP, during which it was inspected how the system of Ignalina NPP operational experience feedback was being used and what is the status of eliminating the violations identified during the previ-

ously conducted inspections. The attention was focused on the implementation of the new safety performance indicators system. The new safety performance indicators system will be used for safety assessment during decommissioning of Ignalina NPP. No violations or non-compliances were identified during the inspection.

## Training and qualification assessment of Ignalina NPP employees

The qualification of the employees of the nuclear energy sector is one of the most important elements in assuring nuclear safety, therefore VATESI specialists were continuously giving special attention to the supervision of this area.

In supervising the training and qualification improvement system at Ignalina NPP, VATESI follows the provisions of the *General Requirements for Personnel Management in the Organizations Operating Nuclear Facilities and Enterprises Rendering Services to Them* (VD-E-11-2001), the IAEA safety standards, recommendations and the good operation practice of other countries. Even after the final shut-down of both Units of Ignalina NPP, VATESI has not altered the commonly recognized approach that a nuclear facility has to be operated by a sufficient number of appropriately qualified employees. In 2011, like every year, VATESI specialists were coordinating the training programs, exam papers, took part in 28 exams for verifying

the competencies of Ignalina NPP specialists responsible for safety.

In 2011, VATESI specialists conducted two special inspections during which particular attention was paid to Ignalina NPP personnel. During one of these inspections they examined the capacity building and training of the personnel, as well as the qualification assessment related to new works and technologies in implementing Ignalina NPP decommissioning projects, and during another inspection the entire system of training, maintaining and improving the qualification was inspected.

In the future VATESI is planning to upgrade the requirements for human resources management at the nuclear power plants, to give due attention to the supervision of the system for maintaining the employees' qualification and measures applied by Ignalina NPP to preserve the sustained knowledge in design, construction and operation the power plant which is vital in its decommissioning stage.

## Ignalina NPP management system and its improvement measures

Since 13 December 2009, when Ignalina NPP stopped generating electricity and operating Unit 2, decommissioning of the nuclear power plant has become a core activity of Ignalina NPP. Due to this reason Ignalina NPP has to fundamentally change the principles of its activity, management of the personnel and the company, to adjust itself to the altered financing and at the same time to assure nuclear safety. One of the most important changes at Ignalina NPP is the move to the inte-

grated management system and to the process management.

VATESI, in line with the provisions of the Law on Nuclear Safety, passed by the Seimas, has been assessing how Ignalina NPP is implementing the processes of transfer to the new management system.

To meet the requirements of the IAEA standards and the Western European Nuclear Regulators Association (WENRA) reference levels for the ad-

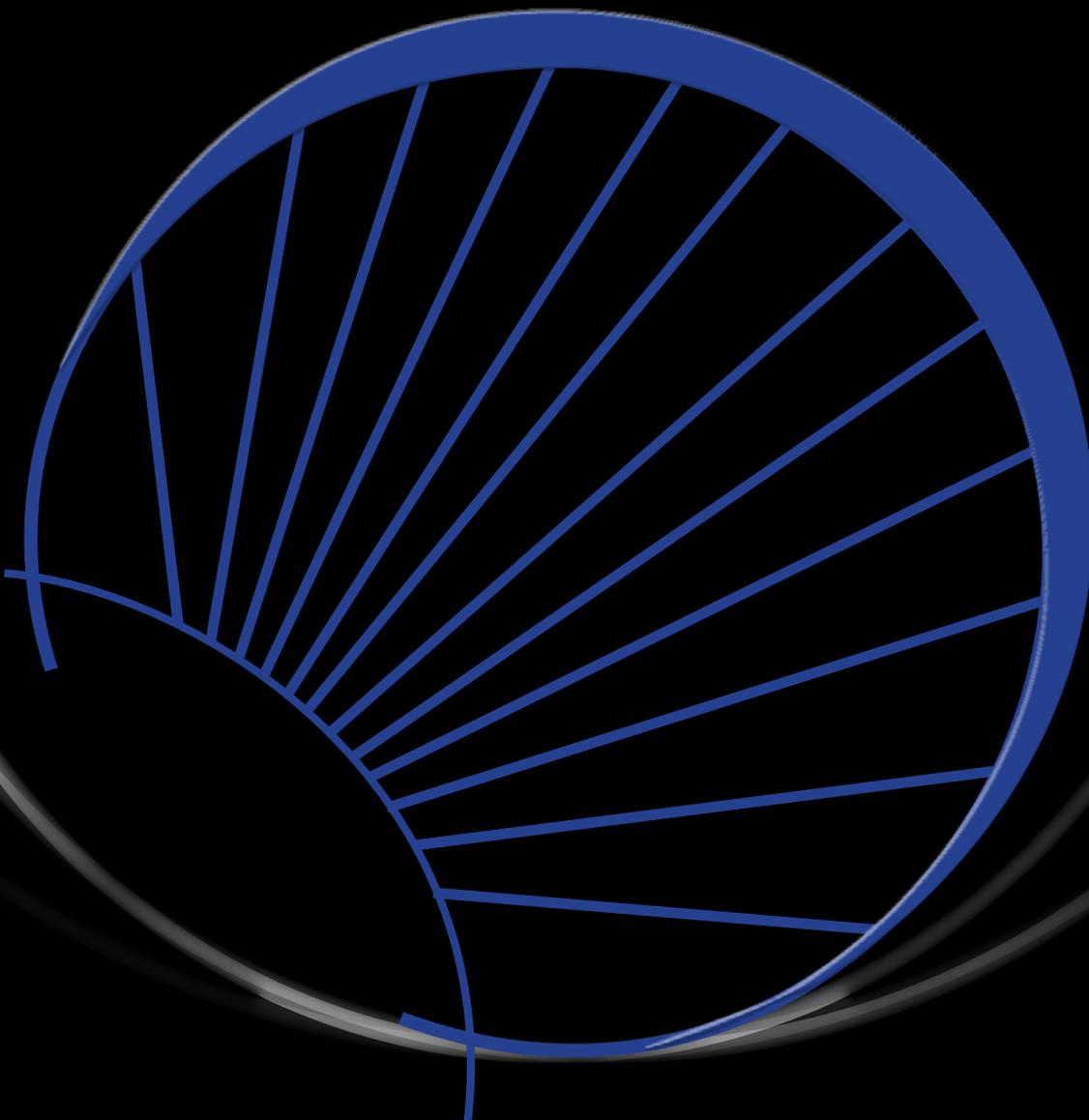
vanced management systems of a nuclear facility, as well as to implement the provisions of the nuclear safety requirements BSR-1.4.1-2010 *Requirements for the Management System* approved by Order No. 22.3-56 as of 21 June 2010 of VATESI Head and with regard to the contemporary best practices, Ignalina NPP has been implementing the integrated management system. Ignalina NPP prepared the Management System Manual and part of the management procedure regulations that are planned to be issued in changing the previously used management system, and submitted them for review by VATESI.

In 17-18 October 2011, VATESI inspected the activities of Ignalina NPP related to conducting external audits at the contractors' organizations which are taking part in the Ignalina NPP decommissioning projects, with an aim to verify how Ignalina NPP is performing the assessments (audits) of the management systems of the suppliers that are relevant to safety and the capacity of these suppliers to meet the requirements of the pro-

curement documents. No violations were found during the inspection.

Safety culture is an integral part of the management system of the licence holder. In accordance with the VATESI requirements, the safety culture of the organization has to be systematically assessed and sustainably developed. For the quantitative assessment of the safety culture at Ignalina NPP, the system of the safety culture indicators is used. The data of the safety culture indicators enable to evaluate the tendencies in implementing the findings of audits and inspections, the employees' qualification and other tendencies. In 2011, VATESI was assessing the tendencies in the results of the safety culture indicators thus monitoring the level of the safety culture in the company. In addition to that, VATESI revised and approved the updated procedure regulations for the safety culture management at Ignalina NPP as well as the new Ignalina NPP plan of measures for the development of the safety culture in the year 2011, and supervised the implementation of the measures provided in this plan.

# MANAGEMENT OF RADIOACTIVE FUEL AND RADIOACTIVE WASTE



# Management of nuclear fuel at Ignalina NPP: spent nuclear fuel storage facilities

In the interim dry type storage facility of spent nuclear fuel (SNFF) operated in the territory of Ignalina NPP 118 containers with spent nuclear fuel (20 CASTOR RBMK-type containers and 98 CONSTOR RBMK-1500 type containers) were placed for storage, and the storage facility was loaded to the full. Fifty one spent nuclear fuel assemblies releasing heat were placed in each container. In all, 6018 spent nuclear fuel assemblies are stored in this storage facility. **The initial enrichment of all spent nuclear fuel stored in this facility is 2%  $^{235}\text{U}$ .**



**Storage facility of spent nuclear fuel**

At the operated spent nuclear fuel facility the stored containers are supervised and their periodic checks are performed in accordance with the procedures approved by Ignalina NPP. Ignalina NPP, in line with the nuclear safety requirements BSR3.1.1-2010 *General Requirements for the Spent Nuclear Fuel Storage Facility of Dry Type* approved by Order No. 22.3-59 of VATESI Head as of 21 July 2010, has regularly submitted the reports to VATESI about the ongoing supervision of the storage facility, the results thereof and has been solving the related issues.

During one of the previously conducted inspections it was pointed out that Ignalina NPP, when submitting to VATESI the yearly report of geode-

sic survey of the settlement and deviation of the bed-plate and the walls of the storage facility, had not performed the analysis of the settlement and deviation of the bed-plate and the walls in line with the requirements of the approved mandatory technical documents of Ignalina NPP. Ignalina NPP evaluated the available data and in October 2011 submitted the report to VATESI. On the basis of the analysis performed by Ignalina NPP it can be stated that the settlement and deviation of the bed-plate and the walls of the SNFF do not exceed the permissible limits.

In 2011, the implementation of the project for the new spent nuclear fuel storage facility (hereinafter – the SNF SF) has been further continued. In accordance with the Agreement concluded by Ignalina NPP with the Contractor – the German consortium GNS-NUKEM GMBH, the construction works are performed by the Lithuanian subcontractor Vetrūna UAB. Another member of the consortium – GNS Gmbh is organizing the manufacturing of the spent nuclear management equipment for the SNF SF and of the new containers of the CONSTOR RBMK1500/M2-type for both Units of Ignalina NPP. Till the end of 2011, as per order placed by the German company GNS Gmbh, 150 containers of the CONSTOR RBMK1500/M2-type were manufactured. In the beginning of 2010, VATESI approved the modification of the handling equipment of the spent nuclear fuel containers of the CONSTOR RBMK1500/M2-type in the Ignalina NPP Units and has been supervising its implementation. In accordance with the schedule for implementing the above mentioned modification, the following equipment had to be installed in both Units of Ignalina NPP till the first quarter of 2011: three new shock-absorbers accommodating the CONSTOR RBMK1500/M2-type containers, a new platform for servicing the containers, equipment for handling the spent nuclear fuel rods.

In 2011, by supervising the project implementation, VATESI conducted three inspections: of the factory tests of the welding platform, of the storehouse for the safety-related works, and the implementation of the modification of the handling

equipment of the spent nuclear fuel. However, findings from the inspections revealed that the methods and technology for welding the hoods of the CONSTOR RBMK1500/M2-type containers will have to be improved, and in supervising the construction works the Ignalina NPP specialists will have to more strictly control the performance of the constructions works, installation of the equipment and the adjustments in the construction design.

It was expected that the construction of the storage facility will be completed in March 2011, and after that in a few months the modification of the equipment and the relevant systems in the units will be finished, and the licence for operation of the storage facility and handling of the spent nuclear fuel will be issued in July 2011. Unfortunately, the project completion works were postponed. The implementation of the project is behind schedule by more than three years.

## Ignalina NPP radioactive waste management facilities

**The key principle of radioactive waste management is to manage the radioactive waste in such a manner that poses no danger to the public and the environment, and to avoid imposing undue burdens on future generations.**

Management of solid radioactive waste in Lithuania is carried out in accordance with this principle.

As prescribed by the Radioactive Waste Management Strategy approved by the Government in 2008, Ignalina NPP is responsible for implementing a new classification system of radioactive

waste, and has to install the equipment for conditioning the radioactive waste, to construct the radioactive waste storage facilities and repositories of short-lived radioactive waste.

Considerable amounts of solid radioactive waste have been generated during operation of Ignalina NPP. The waste is stored in buildings 155, 155/1, 157 and 157/1 located in the territory of Ignalina NPP. The volumes of solid radioactive waste accumulated till 2012 are presented in the below Table:

Quantities of waste	Group 1 Combustible	Group 1 Incombustible	Group 2 Combustible	Group 2 Incombustible	Group 3	Total
Accumulated till 1 January 2012	11 623	8488	2222	2953	881	26 167

Liquid radioactive waste has been also generated at Ignalina NPP. It is evaporated in the special evaporation facilities, and the evaporation residue is bituminized (solidified). The steam that is generated following the evaporation is filtered through special ion exchange and perlite filters that retain radionuclides. The filters are then cemented and stored in building 158/2.

In 2011, 192 m<sup>3</sup> of bituminized waste was loaded into the radioactive waste storage facility (building 158). Till 2012, 14055 m<sup>3</sup> of bituminized waste was accumulated in this storage facility. In 2011, 57.85 m<sup>3</sup> of ion exchange resins and perlite were processed in the cementation facility; the total

processed quantity is 681.22 m<sup>3</sup>. In 2011, 649 cemented waste packages (drums) were produced that are stored in the cemented waste storage facility (building 158/2). In all, 7332 cemented waste packages were produced till 2012.

To manage the solid radioactive waste located at Ignalina NPP in line with the most recent requirements, it is necessary to retrieve the waste from the storage facilities, to condition and to prepare the waste for disposal. In November 2009, Ignalina NPP submitted to VATESI for its review the technical design for solid waste retrieval from buildings 155 and 155/1 and for a segregation facility of the retrieved waste (B2 project, part 1). VATESI, upon

having reviewed and approved the submitted documents, in April 2011 issued a licence to Ignalina NPP whereby the construction of equipment for solid waste retrieval from buildings 155 and 155/1 and for segregation of the retrieved waste was authorized.

In July 2010, Ignalina NPP submitted to VATESI for its review the technical design for retrieval of the solid radioactive waste from buildings 157 and 157/1 (B2 project, part 2). These documents were reviewed and comments on them were provided. In March 2011, a meeting was arranged to discuss the comments and responses to them.



**Solid waste retrieval from buildings 157 and 157/1 and for a segregation facility of the retrieved waste**

On 27 August 2009, the licence was issued to Ignalina NPP for the construction of the solid radioactive waste management facilities. In the solid radioactive waste management facilities all solid radioactive waste that was generated during operation and decommissioning of Ignalina NPP will be managed and stored for a fifty-year period in line with all up-to-date international requirements. Presently the construction works are in progress.

In accordance with the new radioactive waste classification, the waste assigned to class A (with the surface dose rate which is less or equal 0.5 mSv/h, but exceeding the clearance levels prescribed by BSR-1.9.2-2011) have to be disposed to a very low level radioactive waste repository. Prior to disposal, this waste will be stored in a very low level radioactive waste storage facility and from here no less than once in two years it will be delivered to the repository. On 5 March 2010, upon having assessed all documents required for issuing a licence, VATESI issued to Ignalina NPP the licence whereby the construction of a very low level radioactive waste storage facility was authorized. The capacity of the storage facility will be approx. 4 000 m<sup>3</sup> of radioactive waste. In August 2010, Ignalina NPP submitted an application requesting to issue a licence to operate this facility. During 2011, VATESI was reviewing the documents submitted together with the mentioned application. The beginning of operation of this facility has been scheduled for 2012.

In October 2009, Ignalina NPP submitted the technical design and the preliminary safety report for the repository of very low level radioactive waste (project B19-2). These documents were reviewed by VATESI, and in December 2010 the inspectorate informed Ignalina NPP that they do not have any other comments on the documents. The repository will accommodate approx. 60 000 m<sup>3</sup> of radioactive waste.

Low and intermediate activity short lived radioactive waste has to be handled and placed in the repository for low and intermediate activity short lived radioactive waste. In December 2008, VATESI approved the technical specification of the repository for low and intermediate activity short lived radioactive waste (project B25). The capacity of the repository will be some 100 000 m<sup>3</sup> of radioactive waste. Presently the repository is being designed.

## The closed Maišiagala Radioactive Waste Storage Facility

Maišiagala Radioactive Waste Storage Facility was constructed in 1963 in Širvintai District, Bartkuškis forest, at a distance of approx. 9 km from Maišiagala town and 40 km from Vilnius. The waste was collected in the storage facility till 1989. Maišiagala Radioactive Waste Storage Facility is a vault with the storage capacity of 200 m<sup>3</sup> where approx. 120 m<sup>3</sup> of radioactive waste generated in industry, medicine, scientific research is stored. Waste to the storage facility was delivered from Lithuania, Grodno and Kaliningrad Regions. After its closure in 1989 and till 2002, the storage facility was supervised by the Institute of Physics. In 2002, the storage facility was taken over by the Radioactive Waste Management Agency (RATA), which since then has been supervising the facility and monitoring the environment. **The main objective of monitoring is to ascertain that the Maišiagala storage facility does not pose hazard to people and the environment. During the monitoring it is observed whether radionuclides from the storage facility have not penetrated into the environment.**

To improve the physical security of Maišiagala Radioactive Waste Storage Facility, a permanent video surveillance system was installed in 2004. When the system is operated, it is possible to monitor the storage facility either from the RATA head office or from Vilnius Chief Police Commissariat, thus in the case of some assault or imminent threat it is possible to immediately act in response and to take counteractions.

With an aim to evaluate the safety of the storage facility and to license the facility in accordance with the current requirements, its safety assessment and upgrading were undertaken in 2004-2006. On 26 May 2006, VATESI issued to the RATA a licence for supervising the closed Maišiagala Radioactive Waste Storage Facility. In the same year the safety upgrading works were carried out – new safety barriers of the storage facility (a system of soil and two water-resistant membranes) were constructed. These barriers protect the radioactive waste stored in the storage facility from

water which could leach radionuclides from the storage facility.

Ten wells were bored for monitoring the environment of the storage facility, from which the samples of the ground water are systematically taken. In performing the monitoring of Maišiagala Radioactive Waste Storage Facility it is verified whether the radionuclides from the storage facility have not penetrated into the ground water. One of the main indicators of the efficiency of the safety barriers of the storage facility is the volumic activity of tritium – the most mobile radionuclide – in the water of the monitoring wells. According to the Maišiagala Radioactive Waste Storage Facility safety monitoring reports, the maximum volumic activity of tritium was reduced after the safety upgrading works were completed in 2006. Prior to the safety upgrading works, in two wells where the highest volumic activity had been observed, it decreased 3 and 9 times respectively, and in some other wells – even more. Depending on the season when the samples are taken, similar decreased volumic activities of tritium are being observed even now. Such results evidence the efficiency of the new barriers.

**In accordance with one of the conditions of the licence issued in 2006, RATA worked out and in I Quarter 2011 agreed with VATESI the preliminary plan for decommissioning of the closed Maišiagala Radioactive Waste Storage Facility.** In preparing this preliminary decommissioning plan, the provision was embedded in the Radioactive Waste Strategy approved by Resolution No. 860 of the LR Government as of 3 September 2008, stipulating that after the completion of construction of the new radioactive waste storage facilities at Ignalina NPP, the radioactive waste stored in Maišiagala Radioactive Waste Storage Facility will have to be retrieved, segregated, packed in special packages and disposed to the radioactive waste repository, and the territory will have to be handed over to the Municipality of Širvintai District for uncontrolled usage.

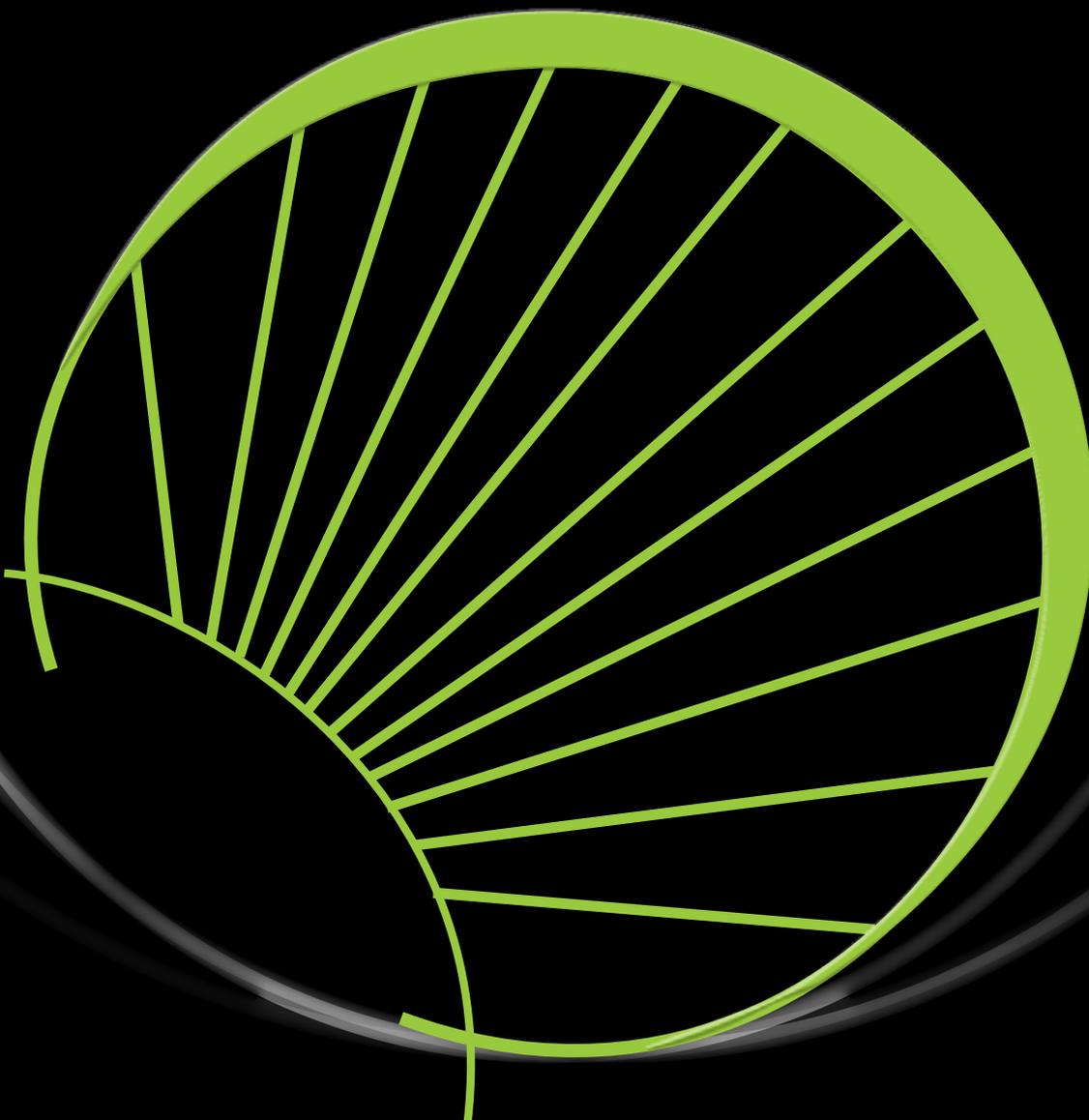
Taking into consideration that presently the radioactive waste storage facilities at Ignalina NPP have not been constructed yet, a method of postponed dismantling was chosen in the preliminary plan for decommissioning of Maišiagala Radioactive Waste Storage Facility, i.e. the radioactive waste and equipment contaminated with radionuclides will be stored until the new radioactive waste storage facilities are constructed at Ignalina NPP and it is possible to rearrange Maišiagala storage facility so that the site (territory) could be used without limitations. Moreover, in the preliminary decommissioning plan the main stages for decommissioning of Maišiagala Radioactive Waste Storage Facility were defined, the volumes of the accumulating hazardous waste were estimated by the categories of their hazardousness and the equipment and means for radioactive waste retrieval facilitating the primary handling of radioactive waste were selected for retrieval from the pile, segregation depending on the dose ca-

capacity and loading into delivery containers. It will be possible to start the decommissioning works of Maišiagala Radioactive Waste Storage Facility when the LR Government makes a decision on decommissioning of Maišiagala Radioactive Waste Storage Facility and upon having obtained a relevant licence from VATESI.



**Maišiagala storage facility**

RADIATION PROTECTION AT  
NUCLEAR FACILITIES AND  
LIMITATION OF RADIONUCLIDE  
RELEASES TO THE ENVIRONMENT



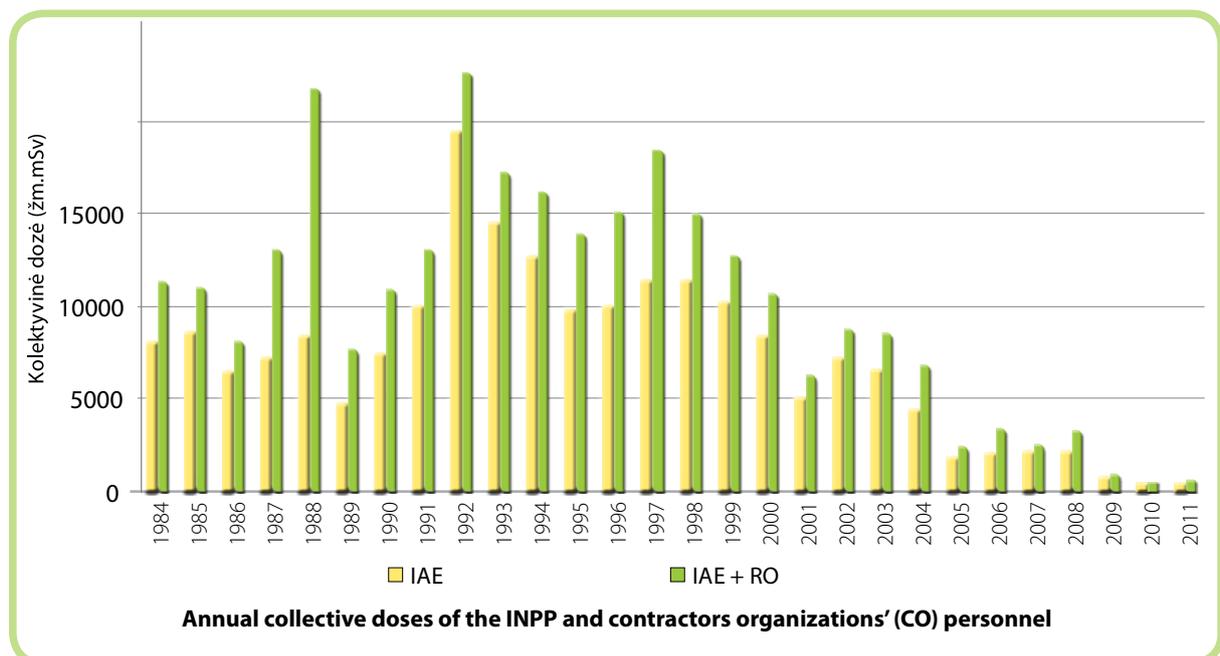
**VATESI is the principal state institution that performs the state regulation of nuclear safety and radiation protection in the nuclear energy sector.** Therefore even before a licence is issued for constructing, operating and decommissioning a nuclear facility (a nuclear power plant, a facility for managing or storing radioactive waste), it is necessary to ascertain that the facility will be operated in a safe manner. The main objective of radiation protection is to ensure the protection of the population and the environment against hazards that a nuclear facility may pose. The nuclear facility itself must have properties ensuring that the effects of ionizing radiation on the population and the environment do not exceed the set limits both during normal operation and in the case of an accident. Therefore VATESI exercises control over compliance with the licence conditions and the requirements set forth in the legal framework on nuclear safety. It is the compliance with these requirements and the use of relevant technologies and measures that help to protect the population and the environment from negative effects of ionizing radiation.

When on 1 October 2011 the new Law on Nuclear Safety came into force, VATESI started performing the state supervision of radionuclide releases from nuclear facilities into the environment, and when the amendments of the Law on Radiation Protection came into force – the state regulation and supervision of radiation protection at nuclear facilities as well. To execute these func-

tions, VATESI prepared the radiation protection requirements for employees or their individual risk groups who are permanently or temporary working at nuclear facilities as well as for other persons temporary performing activities at nuclear installations, the requirements for the radiation protection program as well as the requirements regulating limitations of radionuclide releases from nuclear facilities into the environment, the norms for radionuclide releases from nuclear facilities into the environment, and the requirements for the plan of radionuclide releases from nuclear facilities into the environment and for control over radionuclide releases from nuclear facilities into the environment.

Ignalina NPP is the biggest nuclear facility in Lithuania. The results of occupational exposure control as well as the results of radiological monitoring of the environment and the population show that decommissioning of Ignalina NPP is performed in a safe manner.

Since the very beginning of its operation, Ignalina NPP has been conducting occupational exposure control of its own and contractors organizations' personnel. In 2011, individual dosimetric control was applied to 2 313 persons, among them 1 530 were Ignalina NPP employees. Employees of the contractors' organizations, persons on business trips and visitors of Ignalina NPP accounted for the remaining part. Dynamics of external exposure collective doses in 1984-2011 is shown in Figure.



After the final shut down of Unit 1 in 2004 and Unit 2 in 2009, in the period of 2005–2011 the collective dose of the occupational exposure significantly decreased. The average individual dose of the Ignalina NPP and contractors organizations' personnel in 2011 was 0.27 mSv. The highest individual dose received by an employee of Ignalina NPP was 13.78 mSv, whereas the highest individual dose received by an employee of contractors' organizations was 8.56 mSv. Neither of these values exceeded the set limit (20 mSv).

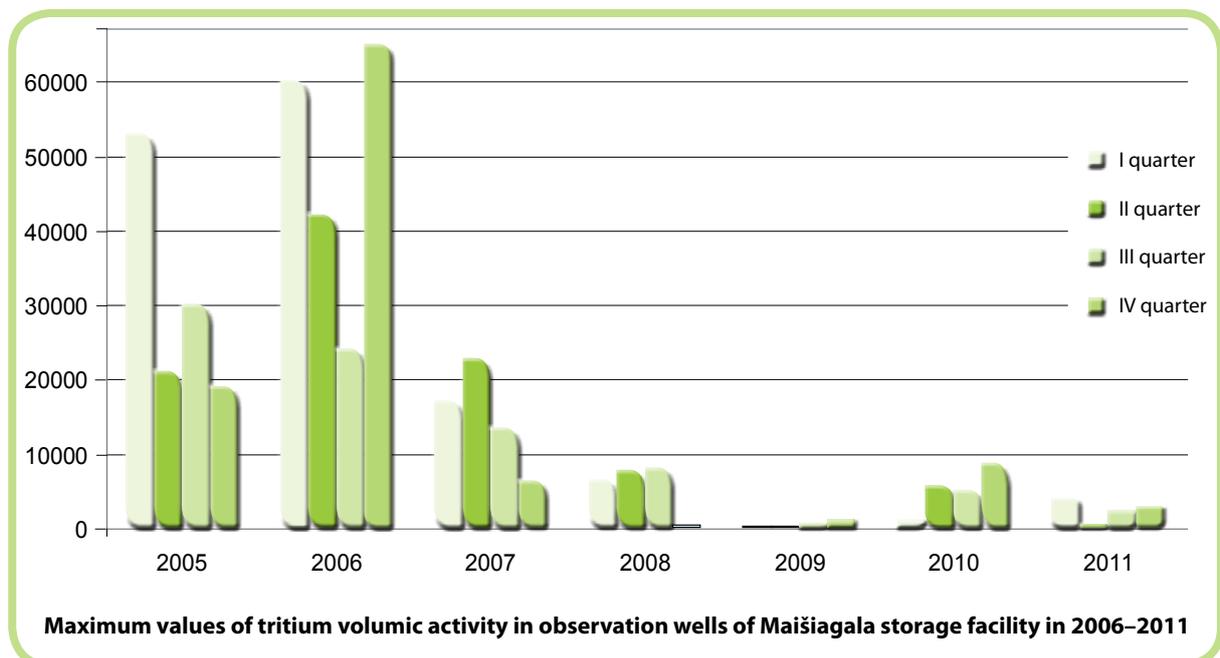
To protect the environment and the population, the activity of emitted radionuclides from Ignalina NPP into the atmosphere and the lake Drūkšiai has been restricted. In the course of radiological monitoring conducted at Ignalina NPP it was established that not only the activity of emitted radionuclides was below the permissible levels, but that they constituted a very small part of these levels as well. In 2011, there were no releases of radioactive inert gases and  $^{131}\text{I}$  into the atmosphere, and the releases of radioactive aerosols constituted 0,0019 % of marginal levels. The total emission of radionuclides into the lake Drūkšiai was 0.0025% of the marginal levels. The evaluation of the dose received by the reference group of the residents in 2011 showed that the exposure resulting from releases into the atmosphere and the water pool was 3 thousand times below the marginal value permissible by the mandatory document BSR-1.9.1-2011. The established dose rate in the sanitary protection and monitoring

zones was the same as the natural background radiation.

In 2011, two inspections were conducted to verify the assurance of radiation protection at Ignalina NPP in the course of decontamination works and control over releases of radionuclides into the atmosphere. During the inspections the measures aimed at assuring radiation protection, planning and accounting of exposure doses at Ignalina NPP and control over releases of radionuclides into the atmosphere during decontamination and dismantling works were examined. Certain non-compliances were found during the inspections which were removed till the end of 2011.

Maišiagala Radioactive Waste Storage Facility is another nuclear facility of Lithuania where radioactive waste that had been collected from industrial enterprises, medical and research institutions till 1989 is stored. In the mentioned storage facility, like in all other nuclear facilities, it is necessary to assure the lowest possible impact of radioactive waste on the environment and on people as well.

The radiological monitoring of this nuclear facility has been conducted since 1994, with exposure doses and environmental pollution being observed on a continuous basis. Tritium ( $^3\text{H}$ ) is the most important radionuclide at Maišiagala storage facility. It accounts for more than 70% of the overall activity. The maximum activity of tritium in the observation wells of Maišiagala storage facility in 2006–2010 is presented in Figure 2. The data illustrate that the measured values do not exceed the set limits.



# EMERGENCY PREPAREDNESS



## Emergency preparedness at VATESI

The specialists of the VATESI Emergency Response Centre are regularly trained and take part in exercises and communication tests of various levels to assure their preparedness to respond to nuclear and radiological emergencies. In 2011, the specialists of the VATESI Emergency Response Centre took part in five international communication tests and forty seven VATESI communication tests. In addition to that, they were improving their qualification in four workshops and training courses arranged by the IAEA.

Every year the VATESI Emergency Response Centre specialists take part in the international exercises arranged by the European Commission, IAEA and other organizations. Due to the fact that in 2011 the international exercise was not arranged because of the accident at Fukushima Daiichi Nuclear Power Plant, VATESI specialists drew up the scenario and organized the exercise themselves wherein the Environmental Protection Agency, Radiation Protection Centre, Fire Safety and Rescue Department under the Ministry of the Interior and the Lithuanian Hydro Meteorological Service were involved as well.

According to the scenario of the exercise, an accident occurred at one of the nuclear power plants in Europe as a result of the fault in the reactor's

cooling system. VATESI specialists had a possibility to analyze the development of the accident and the expected consequences, to project what types and quantities of radionuclides would have been released into the environment as well as the possible routes of their dispersion. They also updated their capabilities and skills in interpreting, summarizing and disseminating information to other organizations and the mass media and answering the questions of journalists. With regard to the shortcomings, which were identified during the exercise, the plan of rectifying measures was worked out order to improve the work of the VATESI Emergency Response Centre.

In 2011, by implementing its international commitments, VATESI has been further successfully performing the early notification function. To fulfill this function, the round-the-clock communication with international and Lithuanian institutions has been established. The function of early notification is one of the most important constituent parts in responding to nuclear and radiological emergencies that initiates the emergency response mechanisms. At VATESI this function is performed by 14 qualified early notification officers who are working according to the drawn schedule. These specialists are continuously trained and regularly take part in communication tests.



**Exercise of the VATESI Emergency Response Centre**

## Response to the accident at Fukushima Daiichi Nuclear Power Plant

The accident at Fukushima Daiichi Nuclear Power Plant is one of the most important events in the operational practice of nuclear reactors which confirmed that emergency preparedness is an integral and very significant part in assuring nuclear safety. Preparedness to respond to nuclear and radiological emergencies by the operator, municipalities and the relevant institutions is indispensable for assuring protection of the population from hazardous effects of ionizing radiation.

By responding to the accident at Fukushima Daiichi Nuclear Power Plant, on 12 March by the Order of VATESI Head, the limited emergency preparedness was announced at VATESI. At the

Emergency Response Centre the specialists were working day and night shifts in order to assure monitoring of the situation, collection of information from the international organizations and other countries, its analysis and provision to the LR authorities and the people. On the basis of the information forwarded by the IAEA and other countries, specialists on duty were regularly providing information notices to the authorities. In addition to that, the summarized information was uploaded on the VATESI website and disseminated to the mass media. During regular working hours meetings with representatives of the mass media were arranged.



**Responding to the accident at Fukushima Daiichi Nuclear Power Plant**

In their own turn, VATESI nuclear energy specialists followed the process of development of the nuclear accident, analyzed the received technical information and used the information to support the modeling of possible scenarios of the development of the accident. The summarized information was regularly presented to the VATESI employees during the seminars.

An announcement of limited emergency preparedness at Fukushima Daiichi Nuclear Power Plant was the first time when the emergency alert was called at VATESI for different reasons than the exercise. The VATESI Emergency Response Centre effectively managed the collection of information and its provision to the relevant institutions, to the public and the mass media.

## Emergency preparedness at nuclear facilities

On 1 February the General Manager of Ignalina NPP approved the Ignalina NPP Emergency Preparedness Plan (hereinafter – the “Emergency Preparedness Plan”) which had been agreed with VATESI, the Ministry of Energy, the Fire Safety and Rescue Department under the Ministry of the Interior, the Radiation Protection Centre and Visaginas Municipality. In accordance with the provisions of VATESI requirements to the organization operating the nuclear facility, the Emergency Preparedness Plan has to be revised and resubmitted for approval by VATESI, other governmental and supervisory institutions no less than once in three years as well as in the case of significant changes in the operation and activities of the NF. The Ignalina NPP decommissioning processes and construction of new facilities on its site already have been taken into account in the revised Emergency Preparedness Plan.

The preparedness of Ignalina NPP to respond to an accident at the nuclear power plant and to liquidate its consequences is inspected year by year. In 2011, two emergency preparedness inspections were conducted by VATESI specialists at Ignalina NPP.

On 24 February, the full-scale exercise was arranged at Ignalina NPP to verify the efficiency of the newly approved Ignalina NPP Emergency Preparedness Plan. During the exercise VATESI specialists conducted the unplanned announced in-

spection whereby they were observing how the employees of the Emergency Preparedness Organization performed their functions and given assignments, how the provisions of the Emergency Preparedness Plan were complied with, the forms were filled in, the information exchange in the organization and with external organizations was arranged. No non-compliances were found during the inspection. The comments and proposals were provided to Ignalina NPP in the inspection report.

On 30 June VATESI specialists conducted a special announced inspection of the emergency preparedness at Ignalina NPP. During the inspection the documentation stored at the Accident Control Centre of the Emergency Preparedness Organization was examined along with implementation of the corrective measures from the previously conducted inspections. No violations were found during the inspection, and the identified non-compliances were related to as yet unimplemented measures of the plan of corrective measures and to the technical equipment of the protected Ignalina NPP Accident Control Centre. In the conclusions of the inspection report it was stated that Ignalina NPP has been implementing the provisions of the new Emergency Preparedness Plan, has prepared the relevant documentation and has planned the appropriate procedures for the assurance of the emergency preparedness measures.

## International cooperation

International cooperation and early exchange of information facilitates proper preparedness and quick response of the concerned countries to the situation emerging after an accident in a nuclear facility which could have hazardous effect on people's health. Taking into consideration the construction of new nuclear power plants in close proximity to the Lithuanian border – in Belarus and the Kaliningrad Region, it is vitally important to assure the exchange of information about nuclear accidents and incidents between

Russia and Lithuania, as well as between Belarus and Lithuania. Both neighboring countries have ratified the Convention on Early Notification of a Nuclear Accident which committed both countries to exchange information about radiological and nuclear accidents. However, this method of information exchange among neighboring countries is not efficient because the respective country can face the consequences of an accident earlier than the IAEA mechanisms of early notification would come into action. Hence, to assure

quick information exchange in the case of an accident, it is necessary to enter into Bilateral Agreements which would commit the parties of these agreements to exchange information directly and immediately after the occurrence of the accident, so that the information about the accident would be provided more expediently and would allow to initiate protective actions without delay. Such Agreement with Belarus has been already drafted and is being conciliated among the authorities. It is expected that the Bilateral Agreements with Russia and Belarus will be signed before the start-up of operation of the nuclear power plants in the neighboring countries. Lithuania has already signed such Agreements with Denmark, Latvia, Poland, Norway and Sweden.

In 2011, upon having evaluated the experience gained during the accident at Fukushima Daiichi Nuclear Power Plant, the IAEA prepared a new draft of the IECOMM document *Instructions for Communication during Incidents and Accidents* which will replace the currently valid EPR-ENATOM Instructions. The document is aimed at implementing in practice the Convention on Early Notification of a Nuclear Accident and it sets forth and describes the mechanisms of information exchange after the occurrence of a nuclear and radiological emergency. The IECOMM document is binding to all countries that have ratified the Convention.

The IAEA has also initiated drafting the amendments of the Requirements GS-R-2 *Preparedness and Response to a Nuclear or Radiological Emergency*. This document sets forth general requirements for infrastructure and functions deemed necessary to assure preparedness for nuclear and radiological emergencies. The emergency preparedness plans at the national, institutional and nuclear facility levels are prepared abiding by its provisions. The completion of drafting the amendments of the Requirements GS-R-2 and their submission for revision by the member countries has been scheduled for 2012.

In June the IAEA presented a new website USIE for information exchange about nuclear and radiological incidents and accidents, which replaced the Early Notification and Assistance Conventions Website (ENAC) and the nuclear events web-based system NEWS that had been used for a long time. This website is designated to the competent authorities responsible for implementing the provisions of the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. From the beginning of June, the IAEA disseminated information about 20 events from all over the world. Most of them were related to detection of illegal sources of ionizing radiation and occupational exposure due to breach of work regulations and equipment failure. Among the disseminated notices, a few events can be distinguished.

On 14 June, in one of Bulgarian companies, operating a Gamma irradiation facility, which is owned by Gitava Ltd., Sofia, and is licensed to work with sources of ionizing radiation for purposes to irradiate industrial production to achieve microbial decontamination, 5 employees were exposed to strong radiation due to violations in the labour quality assurance procedures. The preliminary estimated absorbed dose per affected person was over 1 Sv. The absorbed dose of one employee was up to 5.63 Gy, for other four employees it varied from 1.23 Gy to 3.44 Gy. The employees showed the symptoms of radiation sickness. The accident has been ranked at level 4 on the INES.

On 12 September, in one of the radiology schools in Port Lavaca city, Texas, the US, a trainee who was working with a radiography camera, irradiated the fingers of his hand. The preliminary estimated dose of the fingers varied from 20 up to 30 mSv. The measured effective dose of the body was as high as 14 mSv. The event has been ranked at level 3 on the INES.

# TRANSPORTATION OF NUCLEAR FUEL CYCLE MATERIALS



**Transportation of nuclear fuel cycle and other radioactive materials, in the same manner as their use, has to be carried out in line with the safety requirements laid down in the international legal acts and the legal framework of the Republic of Lithuania.** The ionizing radiation released by these materials can affect persons who are involved in transportation, and in the case of an accident, damage can be caused to other people and the environment as well. Due to these reasons transportation of nuclear fuel cycle and other radioactive materials has to be organized and carried out so that the impact caused by them on people, their property and the natural environment would be minimized, and all measures which could protect human beings and the environment from hazardous effects of ionizing radiation have to be taken.

One of the VATESI goals in the field of nuclear safety assurance is to ensure safe transportation of nuclear fuel cycle, nuclear and fission materials. To accomplish this goal, VATESI is performing the state regulation and supervision of transportation of these materials. For nuclear fuel cycle materials and if the quantities of the nuclear and fission materials exceed the quantities set forth in the Law on Nuclear Energy, the shipping company is authorized to transport these materials only after it has obtained the licence issued by VATESI in accordance with the procedure set in the relevant legal acts. In accordance with the provisions of the Regulations on Import, Export, Delivery by Transit of Radioactive Materials, Radioactive Waste and Spent Nuclear Fuel approved by Order No. V-1271/22.3-139 of the LR Minister of Health and Head of the State Nuclear Energy Safety Inspectorate as of 24 December 2008 (Official Gazette., 2009, No. 3-64), a permit issued by VATESI is required for transportation of the specific quantity of fission materials in the absence of the conditions set forth in Annex 1, radioactive waste generated in the course of nuclear fuel cycle and spent nuclear fuel. Thus the preparedness both of the permit holder and the shipping company to safely transport these materials in all stages of delivery is evaluated. Moreover, applications for transportation of radioactive materials and radioactive waste generated otherwise than in the course of a nuclear fuel cycle but categorized as nuclear materials, the permits for transportation

thereof are issued by the Radiation Protection Centre, have to be reconciled with VATESI.

In 2011, four economic entities from Lithuania addressed VATESI and submitted applications for obtaining a permit for transportation of radioactive materials and radioactive waste assigned to nuclear materials. VATESI specialists revised and approved all 11 applications and the documents submitted with them. Like in the previous year, the permits were requested to import or export the sources of ionizing radiation to be used in industrial radiography and calibration of equipment. The mentioned sources of ionizing radiation were transported in the containers the structures whereof contained the nuclear material – depleted uranium. In addition to that, applications for issuing permits to export radioactive waste containing plutonium isotopes from unused equipment of dosimetric control and smoke detectors were approved.

VATESI specialists are upgrading their knowledge in the field of safe transportation of nuclear fuel cycle materials by analyzing international requirements and the IAEA recommendations, and are striving to take over the best practice of other countries. In 2011, VATESI specialists visited the United Kingdom, where the institution regulating transportation of radioactive materials shared their experience in exercising control over transportation of nuclear fuel cycle and radioactive materials. Besides, in May – June 2011, one VATESI expert took part in drafting the safety manual *Planning and Preparedness to Respond to Emergency Situations in Delivering Radioactive Materials*. The document was drafted remotely, by using the options of the modern information technologies.

Radioactive waste generated during decommissioning of Ignalina NPP and in the course of decommissioning works will be delivered to the newly constructed radioactive waste management facilities, thus the gathered experience and knowledge will be very beneficial in assessing whether this material is delivered in the appropriate packaging, whether radiation protection requirements are complied with, measures for liquidation of an accident are in place, etc. The main objective of this assessment is to assure protection of people and the environment from the effects of ionizing radiation of the transported nuclear fuel cycle materials.

CONTROL OVER THE USE OF  
NUCLEAR ENERGY ONLY FOR  
PEACEFUL PURPOSES



# Accounting of nuclear fuel

In May 2011, a planned inspection of physical inventory verification at Ignalina NPP and the spent nuclear fuel storage facility (SNF SF) of dry type was conducted by the IAEA, the European Commission (hereinafter – the “EC”) and VATESI. During the inspection the records in the accounting documents were checked, verification of fresh and spent nuclear fuel was carried out and seals selected by using the probabilistic statistical method were replaced. Such inspection of physical inventory verification is conducted every year. In addition to that, in 2011 unannounced inspections were conducted by the IAEA and the EC experts: in September – at Ignalina NPP and in November – at the SNF SF.

After the integrated safeguards came into effect in Lithuania, on 1 July 2007, the pre-planned quarterly inspections were replaced by the inspections that are not announced in advance. This factor, as well as the remote transmission of data important to implementing the safeguards from Ignalina NPP to Vienna and Luxemburg re-

duced the number of man days of international experts in Lithuania. Moreover, after the final shut down of both Ignalina NPP Units and full loading of the SNF SF, there was no transshipment of nuclear fuel assemblies, and that even more decreased the volume of inspection activities at the power plant.

After the completion of the construction of the spent nuclear fuel storage facility (B1 project) the activity for implementing the safeguards, which is directly related to exercising control over the nuclear fuel assemblies, will become more intense again. In 2011, two meetings among the representatives of Ignalina NPP, its contractors, the IAEA, the EC and VATESI were convened to discuss the safeguard implementation measures within the scope of B1 project.

Data on the inspection activities by the IAEA, the EC and VATESI as well as on the quantities of nuclear materials in Lithuania at the end of 2011 are summarized in the Tables below along with the comparative data from the two preceding years.

Year	2009	2010	2011
Total number of man days of the IAEA inspectors and technicians in Lithuania	156	85	39
Number of man days of the EC experts in Lithuania	86	78	22
Number of man days spent on site by VATESI inspectors engaged in the area of safeguards	18	22	8
Number of the IAEA inspectors authorized to conduct inspections in Lithuania	335	315	347
Number of the EC inspectors authorized to conduct inspections in Lithuania	188	183	183
Number of VATESI inspectors engaged in the area of safeguards	2	2	2

### Summary of the IAEA, EC and VATESI inspection activities in Lithuania in 2008-2011

Year	2011
Amount of depleted uranium (t)	32.3
Amount of enriched uranium (t)	2368
Amount of U <sup>235</sup> uranium (t)	27
Amount of plutonium (t)	8.6

### Data on nuclear materials in Lithuania at the end of 2011

## Accounting and control of small quantities of nuclear materials

Starting from 1 January 2008, after Lithuania's transition from the Bilateral Agreement with the IAEA and its Additional Protocol to the Trilateral Safeguards Agreement (with the IAEA and EURATOM) and the implementation of its Additional Protocol, instead of a previously used single material balance area (MBA) – WLTC thereto all nuclear materials in the territory of Lithuania (excluding nuclear fuel) had been assigned, the European Commission has to assign individual MBA codes to each institution having nuclear materials in its disposition. In 2008-2010 fourteen new MBAs, and in 2011 two new MBAs were established in Lithuania.

In the beginning of 2011, two users of small quantities of nuclear materials remained in the WLTC area: the Clinics of Kaunas University of Medicine,

and Vilnius University Hospital Santariškių Klinikos. Their reports on accounting nuclear materials to the European Commission, which subsequently prepares and forwards these reports to the IAEA, were submitted by VATESI. In May a separate MBA code – WLTY was assigned for accounting of small quantities of nuclear materials at the Clinics of Kaunas University of Medicine. It is being planned that in the future in the WLTC area there will be no users, permanently keeping small quantities of nuclear materials in their disposition.

On 14 April 2011, VATESI conducted an inspection at the Oncology Hospital, a branch of Kaunas Clinics. During the inspection for verification of physical inventory and assessment of the accounting system of nuclear materials, no violations or non-compliances were found.

## Application of international safeguards

Application of safeguards covers a wide range of issues from the technical ones related to measurement of nuclear materials, inspections of nuclear installations to the legal and political issues related to the implementation of international commitments.

In the IAEA Safeguards Implementation Report for 2010 issued in the second quarter of 2011, for an eighth consecutive year it was concluded that all declared nuclear material in Lithuania had been used for peaceful purposes only and no undeclared nuclear activities had been discovered. The IAEA is able to draw such conclusion by inspecting nuclear materials, nuclear facilities and the overall activity of a country in using nuclear energy according to the Agreement on Application of IAEA Safeguards and its Additional Protocol.

The Additional Protocol provides that every year an updated declaration for the previous calendar year must be submitted to the IAEA. Accord-

ing to the Additional Protocol to the Trilateral Safeguards Agreement (among the EU Member States, EURATOM and the IAEA) applicable in the EU for non-nuclear weapons states, which has been valid in Lithuania since 1 January 2008, the respective Member State and the European Commission bear individual responsibility for submission of certain information, but a certain part of the information is under the shared responsibility. VATESI, in accordance with the competence of the state, collected and summarized the information about the activities in the field of use of nuclear energy in Lithuania and submitted the information to the IAEA and the European Commission. Abiding by the requirements of the Additional Protocol, quarterly reports were also sent on Lithuania's export of nuclear equipment and technologies under control.

The conclusions on the application of safeguards in the year 2011 will be issued by the IAEA in the first half of 2012.

## Control over illicit trafficking of nuclear materials

VATESI is a contact institution in the IAEA Illicit Trafficking Database of Nuclear and Radioactive Materials. In 2011, 127 notifications were received from the database about the illicit trafficking of nuclear and other radioactive materials worldwide, fourteen of them were related to nuclear materials.

In 2011, VATESI submitted two notifications about the events recorded in Lithuania, one among these was about the found smoke detectors containing plutonium, another – about the shipment contaminated with radioactive materials.

## Control over dual-use nuclear goods

When Lithuania became a member of the European Union, it was integrated into the EU and international System of Nonproliferation Export Control Regimes. Lithuania became a member of the Nuclear Suppliers Group (hereinafter – the “NSG”) in 2004. The conditions for handing over the dual-use nuclear materials, equipment and technologies by one country to another are laid down in the NSG Guidelines. By implementing these conditions, VATESI together with the Ministry of Economy issue to the country – supplier of the imported dual-use nuclear goods the state assurance for the use of these goods for peaceful

purposes. Since 2005, VATESI has been conducting yearly inspections on the use of imported dual-use nuclear goods.

At the end of 2011, an inspection was conducted at Ignalina NPP to ascertain that the imported dual-use nuclear goods, for the use of which the state assurances were issued, are used in compliance with the assurance obligations and are duly controlled. Besides, the implementation of additional measures in the power plant aimed at preventing the threat of proliferation of nuclear strategic goods during decommissioning and dismantling of Ignalina NPP was assessed.

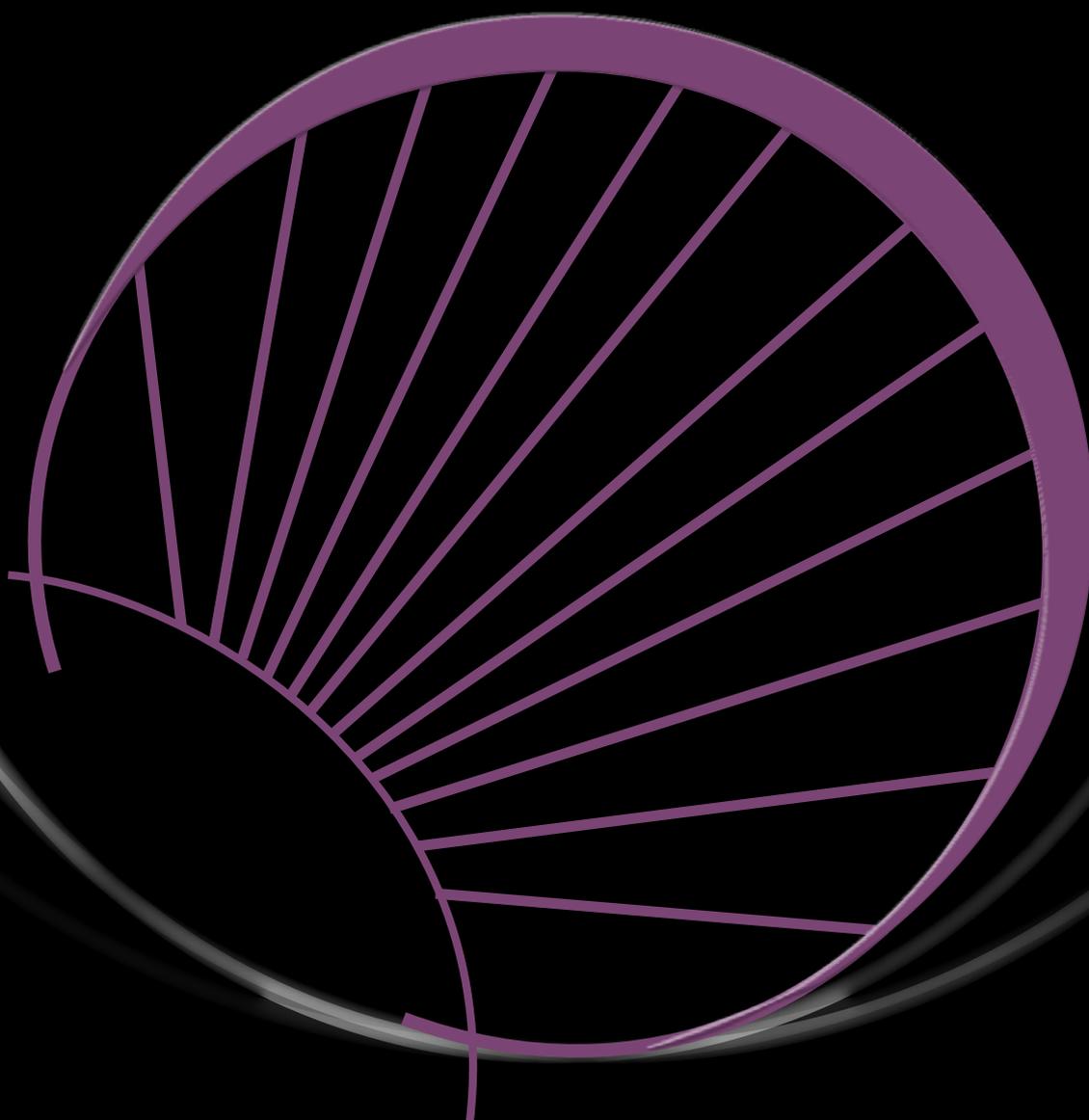
## The Comprehensive Nuclear-Test-Ban Treaty

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) was declared in 1996. It was ratified by 156 State Parties, among these 36 State Parties are on the List of the Protocol to the CTBT that is necessary for the Treaty to come into force. In 2012, Indonesia was the State Party from the Protocol that ratified the Treaty. The countries which have not yet signed and ratified the Treaty are the Democratic People’s Republic of Korea, India and Pakistan, and the countries which have not ratified the Treaty are China, Egypt, Iran, Israel and the US.

The Provisional Technical Secretariat of the CTBT Organization will be working in Vienna till the Treaty comes into force. In 2011, the representatives of Lithuania took part in the working meeting of the working group for the analysis the technical CTBT aspects.

In the autumn of 2011, the representatives of VATESI and the Ministry of Foreign Affairs were invited to attend a meeting the *Role of the Comprehensive Nuclear-Test-Ban Treaty in Regional and Global Safety*, arranged in Istanbul, Turkey.

PHYSICAL SECURITY OF  
NUCLEAR MATERIALS AND  
NUCLEAR FACILITIES



## Inspection activities in the area of physical security

In 2011, three inspections in the field of physical security were conducted at the nuclear facilities of Lithuania: the inspection of organizational and technical measures at Ignalina NPP for detecting an attempted delivery of prohibited items (guns, explosives, etc.) into the protected, inner and vital zones; the inspection of operation of the detection and assessment elements of the physical protection system of the closed Maišiagala Radioactive Waste Storage Facility during a warm season; the inspection of devices of the physical protection system in Ignalina NPP buildings 150, 151, 154, 158 and 158/2.

With regard to the increased threat of using explosives for terror purposes in Europe and other countries of the world in 2010 (e.g. the explosives detected onboard or the events in Greece when explosives were sent to the embassies of various countries or to the leaders of some of them) and with an aim to evaluate whether the organizational and technical measures set at Ignalina NPP for detecting an attempted delivery of prohibited items (guns, explosives, etc.) into protected, inner and vital zones are sufficient to prevent the delivery such items into mentioned security zones, in the beginning of 2011 VATESI conducted an inspection of these measures.

VATESI conducted an inspection of operation of the physical protection measures for detecting and assessing violations of unauthorized access to the territory of the closed Maišiagala Radioactive Waste Storage Facility. During the inspection two objectives were pursued – to evaluate whether the settings of the technical equipment of the physical protection measures are suitable for operation during a warm season and to inspect whether the installations for lighting the perimeter of the facility produce suffi-

cient light necessary for operation of the installed video camera beyond the daylight hours.

Regardless of the fact that both Ignalina NPP Units have been finally shut down, a number of important and vital equipment remained on the site the protection whereof has to be assured. Therefore it was decided to include into the Plan of Inspections for the year 2011 the inspection of the physical protection measures of buildings 150, 151, 154, 158 and 158/2 that are not attributable to the INPP Units but from the point of view of physical security belong to inner zones. After each inspection, the inspection protocols were provided to each inspected economic entity (a licensee) defining the identified violations and non-compliances. The inspected organizations were obligated to rectify certain identified shortcomings.



**Control of coming and leaving people at Ignalina NPP**

## Identification of Design Basis Threat

In the beginning of 2011, the State Security Department submitted the draft documents on the Design Basis Threats (hereinafter – DBT) to Ignalina NPP facilities that are under construction or are planned to be constructed (interim spent nuclear fuel storage facility – site B1; facility for retrieval of solid radioactive waste – site B2; handling and

storage facility of solid radioactive waste – sites B3, 4; short lived very low level radioactive waste buffer-type storage facility – site B19-1; short lived very low level radioactive waste repository – site B19-2; low and medium level radioactive waste surface dumping facility – site B25) for revision by VATESI. The specialists of the Inspectorate ex-

amined the submitted documents and approved them.

Starting from 1 October 2011, when the new wording of the Law on Nuclear Energy came into force, VATESI took over the function of development and maintenance of the DBT from the State Security Department. In order to involve other responsible institutions into the process of development and maintenance of the DBT, VATESI specialists prepared the draft Resolution of the LR Government *Regarding Approval of Procedure Regulations for*

*Development and Maintenance of the Design Basis Threat and Providing Information to the State Nuclear Power Safety Inspectorate.* When the Government approves the Procedure Regulations, a permanent working group will be established which will examine, summarize and provide the collected information to VATESI Head for drawing up the document on the DBT to a nuclear facility. Thus an efficient mechanism for the threat assessment, complying with the best international practice and the IAEA recommendations, will be developed.

## International cooperation in the area of physical security

After the accident at Fukushima Nuclear Power Plant, the European Council made a decision to revise the safety of all nuclear power plants operated in the European Union by performing the stress tests. It was also decided that side by side with the stress tests, the nuclear security has to be assessed as well. For that purpose the Ad Hoc Group on Nuclear Security (hereinafter – the “AHGNS”) was established, and the VATESI expert was appointed a member of the AHGNS. The main objective of the Ad Hoc Group is to provide proposals on strengthening nuclear security not only in the EU but in the neighboring countries as well. In 2011, the AHGNS, with the assistance of presiding Poland, prepared an Interim Report containing 32 examples of the best practice in strengthening nuclear security. In 2012, by continuing the AHGNS activities, decisions for strengthening the security of nuclear power plants and involving countries neighboring with the European Union will be further investigated.

In 2011, the IAEA issued several documents of the Nuclear Security Series. One of these is the updated recommendations for physical security of nuclear materials and nuclear facilities. This is the fifth revision of the document that among nuclear security specialists in all countries of the world is known as the INFCIRC/225. In 2011, the works for preparing other documents of the Nuclear Security Series were undertaken. VATESI

specialists were taking an active part in upgrading these documents by providing their remarks and comments and participating in the meetings arranged for reviewing the documents.

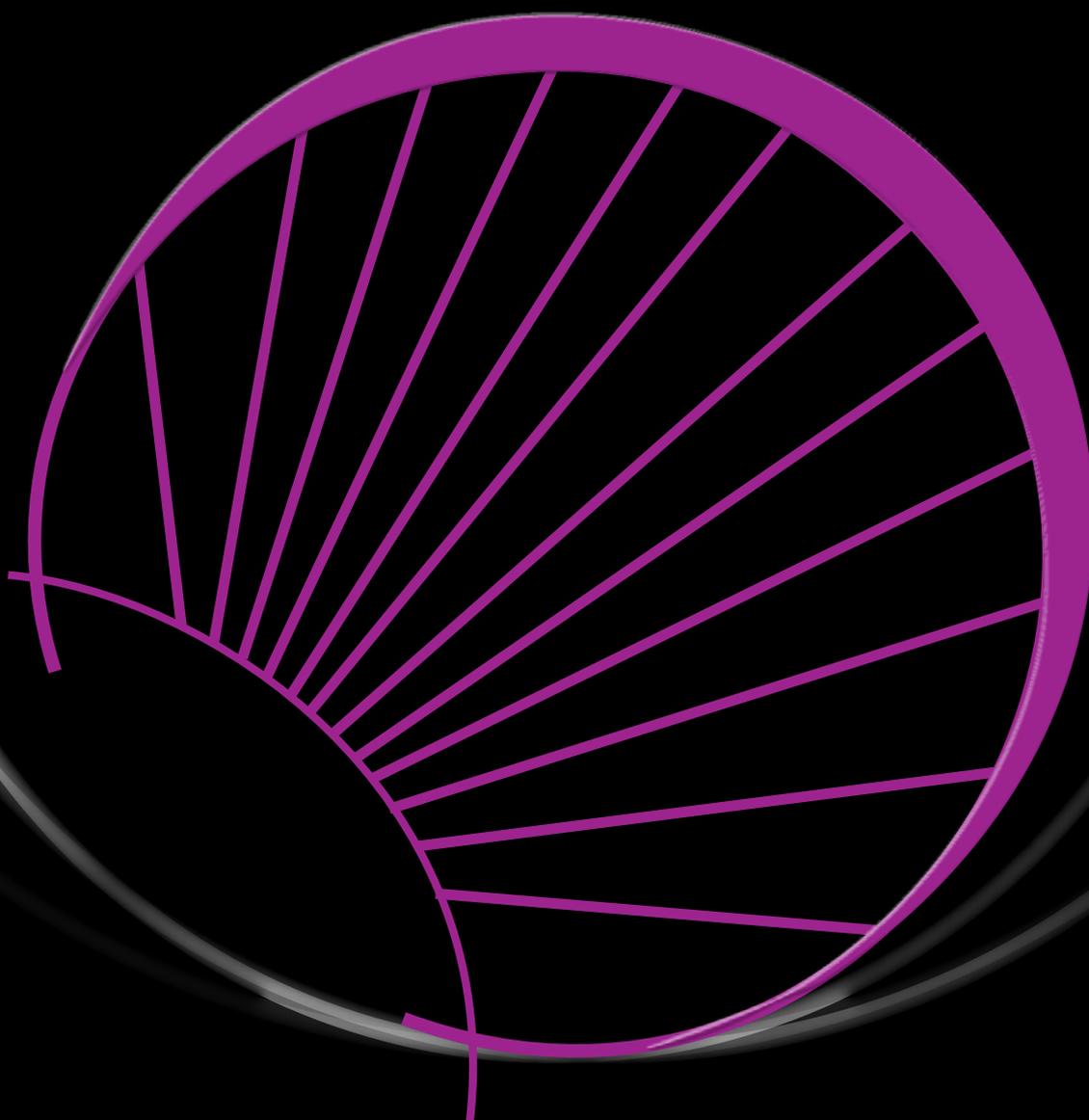
The competence of VATESI specialists has been also acknowledged by the IAEA, when a VATESI expert was invited to act as a trainer in the regional training courses on physical security in Kiev. In the two-week training courses the trainers delivered lectures about physical security of nuclear materials and nuclear facilities and practical training exercises.

In 2011, the VATESI physical security specialists took part in the seminar the *Assessment of Efficiency of the Physical Security System* arranged by the US Energy Department and in the physical security workshop arranged by the IAEA.



**Practical exercises during training in Kiev**

MEETING COMMITMENTS  
UNDER INTERNATIONAL  
CONVENTIONS



# Reporting under the Convention of Nuclear Safety

After the accident at Chernobyl NPP in 1986, the international community started actively discussing the problems of nuclear safety assurance which had caused this accident. The discussions were especially active at the IAEA. The IAEA member states drafted the Convention of Nuclear Safety (CNS), which was adopted in 1994. The contracting parties of the Convention committed themselves to assure a high level of nuclear safety that would be accepted on the international scale. Lithuania signed the Convention of Nuclear Safety in 1995, and ratified in 1996. The EU Member States and EURATOM Community are the contracting parties of the CNS, therefore they have to follow the principles of nuclear safety assurance laid down therein.

The main goals of the Convention on Nuclear Safety are as follows:

- To accomplish and maintain a high level of nuclear safety worldwide, by consolidating international measures, including international cooperation, and where applicable,

technical cooperation related to safety assurance;

- To develop and maintain efficient measures for protection of nuclear facilities against potential radiological hazard, with a view to protect humans and the environment from dangerous effects of ionizing radiation emitted by these facilities;
- To prevent accidents with radiological impacts, and to mitigate their effects if they do occur.

The CNS Article 5 provides that each contracting party shall submit for review a report on the measures it has taken to implement each commitment under this Convention. The submitted reports are reviewed at the review meetings convened no less than every three years.

The Fifth Review Meeting under the Convention of Nuclear Safety was held on 4-14 April 2011 at the IAEA headquarters in Vienna. This meeting was the first important international forum on the nuclear safety issues after the accident at Fuku-



**The delegation of Lithuania in the 5th Review Meeting under the Convention of Nuclear Safety**

shima Daiichi Nuclear Power Plant caused by the earthquake and tsunami. These events and their consequences were extensively and in detail discussed at the meeting. The contracting parties expressed their deep condolences to and solidarity with Japan's nation and the people remedying the damages caused by the accident.

By acknowledging the significance of this nuclear accident, the international community proposed to examine its causes and to set milestones for enhancing the level of safety. The contracting parties confirmed their commitment to properly assess and to project the relevant measures for avoiding such accidents and their consequences.

With regard to the recent events in Japan, the contracting parties expressed the request to discuss the following issues in the country groups:

- Capability of the nuclear power plant design to withstand external events;
- Availability of nuclear power plants safety measures in the cases of total blackout;
- Emergency preparedness and management of severe accidents;
- Safety considerations in operating multi-unit nuclear power plants;
- Storage of spent nuclear fuel in severe accident conditions;
- Training of NPP personnel for operation in severe accident conditions;
- Protection of people in the case of an accident.



**The report on meeting the Lithuania's commitments under the Convention is delivered by M. Demčenko, VATESI Deputy Head acting in the capacity of VATESI Head**

To the countries, which have already been operating nuclear power plants, as well as to those, which are only planning to develop nuclear energy programs, the issue of developing and maintaining the nuclear safety infrastructure, including financial resources and competence of employees, is of outstanding importance. It was emphasized, that the nuclear safety infrastructure, including independent nuclear safety supervisory authorities, has to be continuously strengthened. The issues of cooperation and information exchange among the contracting parties about the operating nuclear power plants, planned to be constructed nuclear power plants as well as those which are being constructed in the proximity to the border with neighboring countries were discussed. Dissemination of this information to the neighboring countries and the international community is above all necessary for assuring the emergency preparedness measures as well as for the purposes of evaluating potential hazards in their territory.

The countries which are planning to construct new nuclear power plants should select their site in line with the relevant IAEA safety standards. Special attention should be given to the events caused by natural phenomena. At the same time a potential impact of the nuclear power plant on people and the environment should be assessed.

At the Fifth Review Meeting under the Convention of Nuclear Safety, with regard to the consequences of the accident at Fukushima Daiichi Nuclear Power Plant and for avoiding similar emergency situations in the future, the contracting parties agreed to arrange an extraordinary meeting on 27-31 August 2012. The contracting parties will have to submit their national reports about the planned and already implemented safety assurance measures with regard to the accident at Fukushima Nuclear Power Plant till 25 May 2012. Such report about the finally shut-down Ignalina NPP, including the spent nuclear fuel storage facilities, the planned and already implemented safety assurance measures will be also drawn up and presented at the extraordinary meeting by the responsible authorities of Lithuania.

To analyze and evaluate the experience from the accident at Fukushima Daiichi Nuclear Power Plant and to find solutions for further strengthening of nuclear safety, on June 20-24 2011, a Ministerial Conference was organized by the IAEA.

In his opening address the IAEA Director General Yukiya Amano emphasized that nuclear accidents do not recognize state borders, therefore joint actions of the international community are necessary, and urged to ensure transparency and efficiency of the processes undertaken to assess safety of nuclear power plants. He said that the IAEA standards have to become a cornerstone of national legal frameworks regulating nuclear energy in all countries developing nuclear energy and delegated a task to the IAEA Safety Standards Commission within a twelve-month period to provide the assessment of the existing IAEA safety standards and proposals for their updating or drafting the new ones.

At the conference the delegation of Lithuania raised the issues of nuclear safety of nuclear power plants, international commitments and meeting commitments under the respective Conventions. Attention was brought to the actions of Russia and Belarus in implementing the projects for construction of new

nuclear power plants. It was also emphasized that although the IAEA safety standards formally are not binding, they should be transposed into the respective national legal frameworks.

At the conference the Ministerial Declaration was approved whereby the approach of international community towards the status of nuclear safety after the accident at Fukushima Daiichi Nuclear Power Plant was affirmed along with the milestones which have to be accomplished in upgrading nuclear safety. The Declaration stated that the countries planning to develop nuclear energy programs should establish an appropriate nuclear safety infrastructure based on the IAEA safety standards. It was proposed to regularly revise, improve and continuously implement the IAEA safety standards. The IAEA missions should be regularly arranged in every country for the assessment of their national legal framework, emergency preparedness and operation of the nuclear power plants.

## Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Lithuania signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management on 30 September 1997, and the Convention was ratified on 18 December 2003. In Lithuania the Convention came into force on 14 June 2004.

According to the provisions of Article 32 of the Convention, Lithuania, like other contracting parties, is obligated to prepare the report in which the information about the performance of commitments under the Convention has to be provided to other contracting parties.

In 2011, VATESI participated in the organizational meeting for the review meeting of the reports to be submitted under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, where the president and vice presidents of the review meeting were elected, review groups were set and their chair persons and their deputies, rapporteurs and coordinators were elected. Lithuania was assigned to the second review group together

with France, Slovakia, Sweden, the Republic of South Africa, Tajikistan, Uruguay, Greece, EURATOM and Ghana.

In 2011, VATESI together with other institutions prepared the third national report of Lithuania, mandatory under the Convention. The report was worked out in line with the provisions of the *Guidelines on the Form and Structure of the National Reports* approved by the contracting parties. In this report Lithuania updated the information of the second report on the legal framework on the spent nuclear fuel and radioactive waste management, existing facilities, practice of spent nuclear fuel and radioactive waste management and the planned safety improvement measures in this area. The contracting parties have to provide their questions and comments on the national reports by 14 February 2012. Later the contracting parties will prepare answers to the questions on their national reports, and then the reports will be discussed at the fourth review meeting scheduled on 14 – 23 May 2012 in Vienna. The review meetings are arranged as often as every three years.

# INTERNATIONAL COOPERATION



# Nuclear safety regulation in the European Union, the role of the European Commission and the Member States – ENSREG

All Member States of the European Union that are operating nuclear facilities follow the main internationally acknowledged principles of nuclear safety, spent nuclear fuel and radioactive waste management. These principles are laid down by the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The High Level Group (HLG) on Nuclear Safety and Waste Management was established by the resolution of the European Commission in 2007. Later the HLG was renamed the European Nuclear Safety Regulators Group (ENSREG) that was delegated the mission to establish the conditions for continuous improvement and to reach a common understanding among the EU Member States in the above mentioned areas. By following the principle of continuous improvement of nuclear safety, ENSREG is seeking to accomplish the following goals: to assure and further improve the safety of nuclear facilities, the safety of radioactive waste and spent nuclear fuel, to assure and further improve the funding of decommissioning activities as well as management of radioactive waste and spent nuclear fuel. The EU Member States are represented at ENSREG by senior officials and experts from their national regulatory institutions supervising nuclear safety and nuclear waste safety. In 2011, Lithuania at the ENSREG group was represented by VATESI Deputy Head, acting in the capacity of VATESI Head. In 2011, three ENSREG meetings were held where the issues of implementing the ENSREG working program were discussed.

On 28-29 June 2011, ENSREG organized the first European Nuclear Safety Conference where the issues of nuclear safety harmonization, implementation of Nuclear Safety Directive, drafting the Radioactive Waste and Spent Nuclear Fuel Management Directive were discussed along with the aspects of safety assurance (the so called “stress tests”) the decision on the implementation thereof was made after the accident at Fukushima Daiichi Nuclear Power Plant.

To accomplish the objectives of the ENSREG program, the following working groups have been established:

- Group on nuclear safety improvement;
- Group on safety improvement in radioactive waste management, decommissioning and spent nuclear fuel;
- Group on public information and transparency.

VATESI has delegated its experts to the first two working groups.

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## ***ENSREG Working Group on Nuclear Safety Improvement***

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On 25 June 2009, the Council Directive 2009/71/EURATOM establishing a Community framework for safety of nuclear facilities (hereinafter – the “Directive”) was passed. The main objective of the Directive is to secure the continuous improvement of nuclear safety and its regulation and to ensure that the Member States provide for appropriate national arrangements for the assurance of high level nuclear safety to protect workers and the general public against the dangers arising from ionizing radiation caused by nuclear installations. The Directive requires the Member States to transpose the provisions of the Directive into their respective national legal frameworks by 22 July 2011. ENSREG resolved that for the fluent implementation of the Directive it is necessary to provide the methodological assistance to the Member States in drawing up the national reports in accordance with paragraph 9(1) of the Directive and to define the format and structure of these reports; to draw the guidelines for the self-assessments to be conducted by the Member States in accordance with paragraph 9(3) of the Directive and its peer review, the schedules thereof and to plan the resources deemed necessary for these purposes.

These provisions were included into the Working Program of the Working Group on Nuclear Safety (WGNS). By consistently implementing

the Program, in 2011 WGNS drafted to the EU Member States a package of the Guidelines on the principles and format for drawing up the national reports to be submitted in accordance with paragraph 9(1) of the Directive. In accordance with the draft Guidelines, in 2012 the volunteer Member States will prepare their national reports which will be submitted for consideration by WGNS. The work will be continued in 2012 in order to improve the draft Guidelines in line with the comments received from the Member States.

WGNS, upon having assessed the provisions of the Directive on sharing the lessons learned from the review of the Convention of Nuclear Safety and the results of the Integrated Regulatory Review Service (IRRS) missions, drew up the Guidelines for the identification of common problems among the EU Member States and the respective model of the learning process which were approved by ENSREG in 2011. In practice the model for the identification of common problems was proved at the Fifth Review Meeting of the Convention of Nuclear Safety of the contracting parties where the Member States presented their reports on meeting the commitments under the Convention. Four problematic issues were selected for further analysis and possible corrective actions in line with the Guidelines drafted by WGNS, namely: integrated planning of emergency preparedness, conditions for extending the lifetime of nuclear power plants, peer review of nuclear power plants' designs, adequacy of resources (for the development of the nuclear energy program). On the basis of the information provided by the Member States, WGNS drew up a preliminary ten-year schedule for self-assessment of nuclear safety regulatory institutions and its peer-review. For this purpose the draft Memorandum of Understanding was discussed and signed with the IAEA defining the practical aspects of the IAEA IRRS missions for independent appraisals at the nuclear safety regulatory institutions. To carry out the missions, additional human resources will be needed; therefore an expert pool from the EU Member States was formed.

In 2011, four meetings of this working group were held. Basically, the goals set by the working group were accomplished.

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### **ENSREG Working Group on Radioactive Waste Management**

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In 2011, with regard to the available financial resources, VATESI involvement in the activities of the ENSREG Working Group on Radioactive Waste Management (hereinafter – the “WG2”) was rather constrained: the information was received and analyzed, but the meetings were not attended.

In the first half of 2011, WG2 continued the discussion on the provisions of the Directive of Radioactive Waste Management proposed by the European Council. At the meetings the Draft Directive was analyzed and the summarized position paper of the WG 2 was provided.

As expected, the Council Directive 2011/70/EURATOM was approved on 19 July 2011 establishing a Community framework for responsible and safe management of spent nuclear fuel and radioactive waste. The provisions of the Directive will have to be transposed into the respective legal frameworks within two years after publication of the Directive in the Official Journal of the European Union, and the first national reports on the implementation of the national radioactive waste management program will have to be submitted in 2015.

Other meetings were dedicated to organizing the seminar *A Better Use of Joint Convention in the EU* which took place on 2-4 November in Vienna, as well as for discussing other outstanding issues: the draft Guidelines to the EU Member States for their national reports in accordance with Article 14 of the Directive, and planning and organizing the regular self-assessments in accordance with Item 14.3 of the Directive. To develop the integrated national systems of radioactive waste and spent nuclear fuel, it was decided to exchange information in the WG2 about the practice of radioactive waste management. The planned works will be continued in 2012 as well.

# Participation in the activities of Western European Nuclear Regulators' Association (WENRA)

Western European Nuclear Regulators Association (WENRA) was established in 1999 on the initiative of the EU Member States and Switzerland. The main goal of the organization is to develop the common approach of the participating countries towards nuclear safety. At present the nuclear safety regulatory institutions of Belgium, Bulgaria, the Czech Republic, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the UK are represented at the Association, and the observer rights are held by the representatives of Armenia, Austria, Ireland, Luxemburg, Norway, Poland, Russia and the Ukraine. During WENRA meetings, the representatives of the regulatory institutions discuss the issues of nuclear safety regulation and supervision; they exchange information important in terms of safety, share experience, and envisage the trends of safety improvement. Three working groups are functioning in WENRA – the Reactor Harmonization Working Group (RHWG), the Working Group on Waste and Decommissioning (WGWD) which both were joined by Lithuania in 2004, and the WENRA Working Group on Inspection of Components and Structures (WIG) established in 2010.

## **Activity of WENRA Working Group on Inspection of Components and Structures**

WENRA Working Group on Inspection of Components and Structures (WIG) was established in March 2010 with an aim to analyze the practices in design, quality assurance and regulation of new and already operated NPP structures and components, to identify the best practice examples and to prepare proposals for the harmonization actions.

Twelve WENRA member countries – Spain, Belgium, Switzerland, Bulgaria, France, Lithuania, Finland, the United Kingdom, Slovakia, Sweden, and Poland (with the rights of an observer) are represented in WIG by the representatives of their respective regulatory institutions.

The main objectives of the WIG activity are:

- To survey the European regulatory practices in verifying the design and quality of a nuclear power plant's steel and concrete structures and mechanical components, especially pressurized vessels;
- To use the lessons learned from the practices of other countries in improving the regulatory practice of one's own country;
- To discuss the efficiency and benefits of various regulation methods, required resources and the potential burden for a regulator or a licensee;
- To assure adequate involvement of nuclear industries in supervising the design and quality of a nuclear power plant's steel and concrete structures, mechanical components and pressurized vessels;
- To harmonize the requirements effective in different countries by providing the Inspecting Organizations (hereinafter - the "IO") with the possibility to conduct inspections and audits of the management systems in other countries in line with the harmonized requirements; to review the issues of the IO competitiveness and accreditation.

To accomplish these objectives, WIG was given an assignment to prepare the study and the report on findings from the study.

At the WIG meetings held in 2010-2011 the key principles of safety regulation applied by the member countries in supervising the design and quality of nuclear power plants' structures and components covering the stages of design, manufacturing/installation of structures and components, construction and acceptance as fit for use were discussed and benchmarked. During the discussions, on the basis of the national reports on the regulatory practices, it was attempted to set the guidelines of the best regulatory practice, from which in the future the uniform harmonized European practice could evolve. The content of the WENRA WIG study report was discussed and then the member countries, by cooperating among themselves, prepared the report of the

WIG study. The report of the WIG study was presented at the meeting of WENRA member countries in November 2011. It is being planned to implement the best regulatory practice set forth in the WENRA WIG report in pre-design stages of new nuclear power plants' construction projects and in updating the nuclear safety requirements.

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### **Activity of WENRA Reactor Harmonization Working Group (RHWG)**

The primary objective of WENRA Reactor Harmonization Working Group (RHWG) was to establish the key requirements (safety reference levels) for the presently operating nuclear power plants and to harmonize these levels in WENRA member countries.

Currently the representatives of nuclear safety regulatory institutions or delegated by them from 18 countries are active participants of WENRA RHWG activities. Every country participating in the activity of WENRA, including VATESI which is representing Lithuania, in 2006-2008 were conducting in their respective countries the comparative study of their national legal framework regulating nuclear safety with the WENRA safety reference levels. The comparison of its mandatory technical documents with these reference levels was also conducted by Ignalina NPP. Each country, by taking into consideration the results of the comparative study and WENRA RHWG recommendations, drew up its own national action plan for eliminating non-compliances in the respective country by the year 2010 by transposing them to the national legal acts and /or by including them into mandatory technical documents of a licensee. In all, the safety reference levels cover 18 safety areas of nuclear reactors. With regard to the final version of the safety reference levels, prepared by WENRA RHWG in January 2008, where 295 safety reference levels were included, the national action plan of Lithuania for the year 2008 was adjusted. The plan stipulated that the remaining 120 WENRA RHWG safety reference levels would be transposed to the legal framework regulating nuclear safety, and 76 safety reference levels – to the mandatory technical documents of Ignalina NPP. As of late 2011, 73 safety reference levels were transposed to the legal acts regulating nuclear safety, and 48 – to the Ignalina NPP mandatory technical documents. It was decided

that the remaining 28 WENRA RHWG safety reference levels will not be implemented due to the final shut-down of Ignalina NPP.

The safety reference levels have been developed for the presently operated nuclear power plants. With an aim to harmonize these requirements for new nuclear power plants, in 2008-2009, WENRA RHWG discussed the targeted qualitative and quantitative safety objectives that should be accomplished in designing new nuclear power plants, and in 2010 issued the WENRA Position Paper Regarding Safety Objectives in New Nuclear Power Plants. As yet it has not been planned to establish the specific safety reference levels for new nuclear reactors. Presently RHWG is actively working on preparation of the common position on the individual safety problems – the operation of nuclear power plants after the expiration of their designed lifetime (this concerns only operating nuclear power plants), the main requirements for the assessment of the impact of the aircraft crash, application of the "defense in depth" principle in designing new nuclear power plants, assessment of severe accidents, etc. VATESI, by drawing up the legal acts for nuclear safety regulation in licensing the new nuclear power plant, has taken into consideration both the qualitative and the quantitative safety objectives.

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### **WENRA program for harmonization of safety requirements Activity of Working Group on Waste and Decommissioning (WGWD)**

As of late 2001, the Working Group on Waste and Decommissioning (WGWD) started the project for harmonization of the requirements in force in the WENRA member countries in the areas of decommissioning of nuclear facilities and operation of radioactive waste storage facilities. The goal of this assignment is to develop the safety reference levels which have to be met by the WENRA member countries. If necessary, the national requirements will be amended. The safety reference levels are being worked out with regard to the already existing legal frameworks and international recommendations.

As of late 2005, WGWD prepared two reports where the safety reference levels for decommissioning of nuclear facilities and operation of ra-

radioactive waste storage facilities were presented. In early 2006 these reports were officially published on the Internet.

The WGWD member countries analyzed the legal frameworks of their respective countries and their practical implementation, and compared these in terms of compliance with the safety reference levels set for operation of storage facilities and decommissioning of nuclear facilities. The results of these analyses were reviewed by specialists of other WGWD member countries to ascertain that all the member countries interpret the safety reference levels in the same way.

The new revisions of the safety reference levels for operation of the storage facilities and decommissioning of nuclear facilities, which were made upon having reviewed the national legal frameworks of the member countries and the analysis of results of the mentioned review, were announced in 2010 and 2011. No essential adjustments in the

safety reference levels were made – the definitions of some levels were adjusted, some close definitions were merged into one, etc. The legal frameworks of all member countries will have to comply with new safety reference levels, and these requirements will have to be respectively implemented in practice.

In 2011, two meetings of WGWD were arranged. One of them was held in Helsinki on 23-27 May, another – on 25-28 October in Ljubljana. At the meetings in Helsinki and Ljubljana, the completed document on the decommissioning safety reference levels was discussed and the amendments of the document were proposed. Moreover, special attention was given to the being drafted new safety reference levels for radioactive waste disposal – the reference levels were drawn and revised with regard to the practice from the previously prepared documents and the specifics of radioactive waste disposal.

## Activities in implementing the provisions of the Espoo Convention

The design, construction and operation of new nuclear power plants have to be carried out abiding by all international requirements on nuclear safety, radiation protection and environmental protection, and during the assessment of their impact on other countries – by the Convention on Environmental Impact Assessment in a Transboundary Context (hereinafter - the "Espoo Convention"). VATESI is involved in the environmental impact assessment of the new nuclear power plants which are planned to be constructed in the neighboring countries and gives special attention to this assignment. **In 2011, VATESI along with other institutions was taking part in the environmental impact assessment of the Baltic Nuclear Power Plant in the Kaliningrad Region as well as of the nuclear power plant planned to be constructed in the Astravets site in Belarus in line with the Espoo Convention, and was further analyzing the responses provided by Belarus and Russia to the questions raised by VATESI.**

The process of the environmental impact assessment in Lithuania of both – the Belarus new nu-

clear power plant to be constructed in the Astravets site and the Russian Baltic Nuclear Power Plant in the Kaliningrad Region – was started at the end of 2009 when these countries submitted the environmental impact assessment documents. VATESI specialists analyzed the submitted documents and raised questions; however the responses provided by both countries did not clarify the issues related to the selection and evaluation of the sites. The site of the nuclear power plant in the Astravets (Grodno District) is remote at 23 km distance from the border of Lithuania and only some 50 km from the capital of Lithuania Vilnius with the population exceeding half a million people. The Neman site in the Kaliningrad Region is at some 10–12 km to the South from Lithuanian – Russian border, and the criteria on the grounds of which these sites were given the priority have not been clarified yet. Neither country provided the information related to the evaluation of the sites in accordance with the IAEA requirements, the information about the assessment of the impact of the nuclear power plants on the people of Lithuania in the course of their normal operation, in the

cases of design-basis and severe accidents, or the information about the radioactive waste management and disposal to the repositories. VATESI proposed to further demand the assessment of the impact of a large aircraft crash in the designs of both power plants as well as the compliance of the designs with the contemporary nuclear safety requirements, including the requirements for the stress tests. In addition to that, it was requested to submit the documents included by reference in the responses of the specialists of Russia and Belarus, where, according to them, the requested information had been already provided.

The operation of the nuclear power plants may have a transboundary impact; therefore it is mandatory that their environmental impact as-

essment would be performed in line with all international commitments. The conciliation of the environmental impact assessment of the nuclear power plants planned to be constructed by both countries has not been completed yet. We will further demand that Belarus in implementing the nuclear power plant project would take into account the reasoned arguments of Lithuanian and its disapproval on the construction of this facility in the selected site, and that Russia would commence the works in the Nemman site only after having presented the project of the Baltic Nuclear Power Plant to the public of Lithuania and having completed the consultations with the relevant state institutions on all outstanding issues.

## Participation in the activities of the European Clearinghouse for Operational Experience Feedback

In 2008, nuclear safety regulatory institutions from seven European countries signed a Declaration of Intention of Multi-partner Collaboration Arrangements for the European Clearinghouse on NPP OEF (hereinafter – the “EU Clearinghouse”). The implementing organization of the project and the operating agent is the Institute of Energy and Transport established in Peten (the Netherlands), one of the seven institutes of the Joint Research Centre (JRC) of the European Commission.

The objectives of the European Clearinghouse are as follows:

- Improving the existing and newly constructed NPPs safety through strengthening co-operation between licensees, regulatory authorities and their Technical Support Organizations;
- Making input to the use of operational experience feedback by strengthening and sharing competencies, enhancing mutual relations within the European Clearinghouse and with international community using nuclear power;
- Collecting, summarizing and disseminating information on NPP operational events along with the continuous and systematic application of knowledge gained from European countries participating in the project;

- Establishing the best practice for assessment of NPP operational events through the use of state-of-the-art methods, computer aided assessment tools and information gathered from different national and international sources;
- Providing support in defining the long-term EU policy needs on the operational experience feedback.

The supervisory body of the European Clearinghouse on NPP OEF is the Steering Committee. In the activities of the Steering Committee the representatives of Finland, Hungary, Lithuania, the Netherlands, Rumania, Slovenia, and Switzerland as well as of the JRC are involved along with the representatives of nine other countries that are participating by the observer rights. At the meetings of the Steering Committee, Lithuania is represented by VATESI Deputy Head acting in the capacity of VATESI Head. In 2011, by participating in the activities of the Steering Committee VATESI submitted its proposals on the activities of the European Clearinghouse for Operational Experience Feedback.

The Technical Board was established in the European Clearinghouse on NPP OEF to support the activities of the Steering Committee. The representatives of nuclear safety regulatory institutions, technical support organizations, industries

and international organizations from sixteen countries are taking part in the activities of the Technical Board.

In 2011, the activity of the EU Clearinghouse was focused on the relevant operational experience studies on the following issues: the external events, events related to the NPP ageing, modifications, supply of components, decommissioning, failures of back-up diesel generators, digital control and protection equipment and the reactor's pressure boundary.

In 2011, the EU Clearinghouse issued four on-line info sheets, where the summarized expedient information about the incidents related to nuclear power that occurred in the world during the previous quarter was presented. The experts of the EU Clearinghouse provided assistance to the regulatory institutions of the project counterparts by performing independent surveys of the assessment reports on unusual events at NPPs. Afterwards these reports were uploaded on the IAEA/NEA IRS database.

After the accident caused by the earthquake occurred at Japan's Fukushima Daiichi and Fukushima Daini NPP, the EU Clearing House has issued information surveys about the status of nuclear safety at Fukushima Daiichi and Fukushima Daini NPP, the methods for investigating the accidents and their results, along with the measures taken to liquidate the consequences of the accident and the results of the radiation monitoring.

On 30 September 2011, VATESI, in cooperation with the EU Clearinghouse, arranged in Vilnius the seminar *International Operational Experience Feedback in Nuclear Safety Assurance and Upgrading in Lithuania*. At the seminar the reports were delivered on the subjects of the impact of quality of nuclear power plant's components on nuclear safety, the use of research methods and measures in the case of unusual events at nuclear power plants, actions taken by different countries in responding to the accident at Fukushima Daiichi and Fukushima Daini Nuclear Power Plants.

## Technical cooperation projects of the International Atomic Energy Agency (IAEA)

### **The IAEA regional projects in the area of nuclear safety and nuclear energy**

In 2011, VATESI coordinated the participation of Lithuanian specialists in eleven IAEA European regional projects for technical cooperation in the area of nuclear safety and nuclear energy:

- RER/0/029 – Supporting the Introduction of Nuclear Energy (jointly with the Ministry of Energy);
- RER/3/006– Supporting the Repatriation, Management and Disposal of Fresh and/or Spent Nuclear Fuel from Research Reactors;
- RER/3/008 – Strengthening Safety and Reliability of Nuclear Fuel and Nuclear Materials in Nuclear Power Plants, Including Water-Cooled Water-Moderated Power Reactor Components and Piping;
- RER/4/030 – Strengthening Capabilities for Nuclear Power Plant Performance and Service Life including Engineering Aspects;
- RER/4/031 – Improving Quality Manage-

ment and Quality Assurance in Nuclear Power Plant Constructing, Equipment Manufacturing and Maintenance Activities;

- RER/4/032 – Enhancing the Sustainability of Research Reactors and Their Safe Operation through Regional Cooperation, Networking and Coalitions;
- RER/9/085 – Capacity Building for Upgrading Nuclear Security Related National Infrastructure;
- RER/9/095 – Strengthening Safety Assessment Capabilities;
- RER/9/098 – Improving Safety Management Systems and Operation Feedback;
- RER/9/099 – Strengthening the Effectiveness of Regulatory Authorities and Advanced Training in Nuclear Safety;
- RER/9/102 – Developing Human Resources in Nuclear Security.

In 2011, Lithuania's representatives participated in 43 events within the scope of the IAEA region-

al projects, including 21 working meetings, 14 training courses, and 8 technical meetings. Forty four specialists from Ignalina NPP, VATESI and the Technical Support Organizations took part in the events. They familiarized themselves with state-of-the-art practice and requirements set in different areas of nuclear safety assurance and assessment, established business contacts with their foreign counterparts.

In 2011, VATESI participated in the working meetings held for planning the IAEA regional projects in Europe in 2012-2013. VATESI, together with other interested Lithuanian institutions, made every effort to achieve that the IAEA would schedule as many regional projects important to Lithuania as possible.

### **The IAEA national projects for Lithuania**

In 2011, the implementation of the national project by the IAEA LIT/9/009 *Enhancing Capabilities of VATESI and Other Institutions in Licensing a New NPP* was further continued. This was a four-year project the implementation thereof was started in 2008 and was finished at the end of 2011.

In 2011, under the framework of LIT/9/009 project, the specialists of VATESI, the Radiation Pro-

tection centre, *Visagino Atominė Elektrinė* and the Lithuanian Energy Institute had a possibility to participate in in-service trainings, working meetings, conferences, seminars and training courses on the outstanding issues of licensing and safety assessment of the new NPP, gained experience deemed necessary in preparing for the construction of the new nuclear power plant, improved qualification and enhanced their knowledge in the field of nuclear technologies.

In 2011, the description of the new IAEA national project LIT/9/010 *Strengthening Capabilities of Nuclear Safety Regulatory Institution and Other Institutions in Licensing a New Nuclear Power Plant* was drafted and the relevant measures were planned. VATESI reconciled the drafted project description with the IAEA and allocated the budget of approx. EUR 170 thousand for accomplishment of the planned goals of the project.

It should be noted that the IAEA support provided through national projects provides nuclear safety specialists of Lithuania with invaluable opportunities to familiarize themselves with the most outstanding international requirements of nuclear safety and the best practice of other countries in meeting these requirements.

## The EU support projects for VATESI

In 2011, VATESI was working on two EU support projects:

1. *Technical Assistance to VATESI in the Field of Decommissioning (Stage 5)*, No. VAT.05 financed by the funds from Ignalina Program. The implementation of the project was started on 23 January 2009. The completion of the projected activities was scheduled for 30 April 2011, however because of the delayed submission of documents by Ignalina NPP the project completion was postponed till 9 November 2011. The value of services rendered during the project implementation totaled EUR 1 435 162.30.

The main objectives of the project:

- To provide support to VATESI in reviewing the documents related to decommissioning of Ignalina NPP;
- To consult VATESI on the issues related to decommissioning projects.

2. *Improvement of Qualification of Specialists of the State Nuclear Power Safety Inspectorate* (No. VP1-4.1-VRM-03-V-01-049). The project is financed under the framework of the Operational Program for Human Resources Development for 2007–2013, priority 4 *Strengthening the Administrative Capabilities and Enhancing the Efficiency of Public Administration, facility Qualification Improvement of Employees of Governmental Institutions and Offices*. The objective of the project is to improve the qualification of VATESI specialists in the field of applying the administrative enforcement measures. Under the framework of the project, the preparation of the training programs was started in 2011. It has been planned to start training VATESI specialists in the beginning of 2012. It is expected that VATESI specialists will acquire deepen their knowledge in due investigation of violations

and application of the administrative enforcement measures; therefore the implementation of the project will strengthen VATESI administrative capabilities in regulating and supervising safety and will make a direct input in increasing the efficiency of public administration in Lithuania.

In 2011, VATESI signed the Agreement with RISKAUDIT IRSN/GRS International and took part in implementing the European Union support project No BE/RA/06 *Transfer of the West European Regulation Methods and Practice to the Nuclear Safety Institutions of Belarus – Institutional and Technical Cooperation and GOSTAMNADZOR Capacity Building by Transferring West European Safety Principles and Practice*. VATESI together with experts from other foreign countries participated in implementing the following assignments:

- Drafting the national strategic plan, the action plan and the plan of cooperation including the review of the existing situation and capacity building of the nuclear safety regulatory institution;
- Developing the legal framework on nuclear safety;
- Support in establishing the licensing process in the field of nuclear safety and radiation protection of a nuclear power plant.

Although the project implementation period is from 29/03/2011 till 28/09/2013, a significant part of the works was completed in 2011.

In 2011, VATESI was preparing the description and procurement documents of the project No. VAT.06 *Technical Assistance to VATESI in the Field of Decommissioning (Stage 5)*. It is projected that the project implementation will start in 2012.

## Do you know that

... Lithuania has been a member of the IAEA since 1993.

... presently 435 nuclear power plants are operated worldwide.

...the first nuclear power plant in the World that generated electricity for commercial use was constructed in 1954 in Obninsk (Russia, the former USSR).

... Antoine Henri Becquerel accidentally discovered the phenomenon of natural radioactivity in 1896.

... radioisotopes are used to test jet aircraft engine turbines for structural integrity.

... radioisotopes are used for sterilization of medical instruments, diagnosis and treatment of diseases, including malignant tumours.

... heat is released during fission of uranium U-235 atoms in nuclear power plants. Heat is used for steam production which rotates powerful turbines and they generate electricity.

... Australia has the biggest resources of uranium in the World. Whereas this country has joined the Treaty on the Non-Proliferation of Nuclear Weapons, the uranium mined in Australia is sold exclusively for the purposes of electricity production.

... the quantity of uranium U-235 necessary to support the chain reaction in natural uranium is quite small therefore the uranium has to be enriched.

# List of abbreviations

- A1** – a nuclear reactor with the main circulation circuit and the main auxiliary systems for the reactor is located in the building A
- ABWR** – Advanced Boiling Water Reactor
- ACS** – accident confinement system
- AFES** – automated fire extinction system
- ANA** – additional neutron absorbers
- B1** – a primary water treatment system of the cooling system and demineralized water treatment equipment are located in the building B
- B19-1** – project for very low activity radioactive waste storage facilities
- B234** – project for SNF retrieval from NPP old storage facilities (project B2) and a new facility for treatment and storage of solid radioactive waste at Ignalina NPP
- B34** – project for solid radioactive waste treatment and storage facilities
- B9-2** – nuclear reactor's gas circuit dismantling and decontamination project
- BCS** – a blasting and cooling system
- BDBA MM** – Manual for Management of Beyond-Design-Basis Accidents
- CF UGC** – capability factor to use gross capacity
- CNS** – Convention of Nuclear Safety
- DSA** – deterministic safety analysis
- EC** – European Commission
- ECCS** – emergency core cooling system
- ECOEF** – European Clearinghouse for Operational Experience Feedback
- ECURIE** –European Community Urgent Radiological Information Exchange
- EIA** – environmental impact assessment
- ENAC** – Emergency Notification and Assistance Convention of the IAEA
- ENSREG** – European Nuclear Safety Regulatory Group
- ESMTC** – Research Centre of Electromagnetic Compatibility
- EU** – European Union
- EURATOM** – European Atomic Energy Community
- FASR** – fast-acting scram rods
- FI** – Institute of Physics
- FRA** – fire risk analysis
- GRS** – German State Nuclear Reactor Safety Consulting Association (Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH)
- GWh** – gigawatt hour
- HLG** – high level group
- IAEA** – International Atomic Energy Agency
- ICG** – International Cooperation Group on Nuclear Safety of VATESI
- Ignalina NPP** – Ignalina Nuclear Power Plant
- ISNF SF** – interim spent nuclear fuel storage facility
- INES** – International Nuclear and Radiological Event Scale
- IRRS** – Integrated Regulatory Review Service
- IRRT** – International Regulatory Review Team
- IRSN** – French Institute for Radiological Protection and Nuclear Safety
- JRC** – Joint Research Centre
- Kcal** – kilo calorie

**KTU** – Kaunas University of Technology  
**KWh** – kilowatt hour  
**LEI** – Lithuanian Energy Institute  
**LR** – the Republic of Lithuania  
**LRTM (LE)** – LEI Laboratory of Research and Testing of Materials  
**MBZ** – material balance zone  
**MPa** – megapascal  
**mSv** – millisievert (unit of dose equivalent) millisievert (exposure measurement unit)  
**MW** – megawatt  
**MWd/HRE** – megawatt per day/heat releasing element  
**NF MD** – a nuclear fuel management division  
**NI** – nuclear installation  
**NISL (LEI)** – LEI Nuclear Installations Safety Laboratory  
**NF MD** – nuclear fuel management department  
**NPP** – nuclear power plant  
**NRC** – the US Nuclear Regulatory Commission  
**NSG** – Nuclear Suppliers' Group  
**NFHD** – Nuclear Fuel Handling Department  
**OECD** – Organization for Economic Cooperation and Development  
**OO** – operating organization  
**OSART** – Operational Safety Review Team under the International Atomic Energy Agency  
**PSA** – probabilistic safety analysis  
**QAS** – quality assurance system  
**RATA** – Radioactive Waste Management Agency  
**RBMK** – high power channel-type reactor  
**RHWG** – WENRA Reactor Harmonization Working Group  
**SBEOI** – Symptom-Based Emergency Operating Instructions  
**SIIT** – the State Institute of Information Technologies  
**SPNFA** – spent nuclear fuel assembly releasing heat  
**SNFSF** – dry type storage facility for spent nuclear fuel  
**SAM** – scheduled annual maintenance  
**SRS** – safety-related systems  
**SSM** – Swedish Radiation Safety Authority  
**STD** – standard technical documents  
**SIP** – safety improvement program  
**TSO** – technical support organizations  
**VAE** – Visagino Atominė Elektrinė UAB  
**VATESI** – State Nuclear Power Safety Inspectorate  
**VG TU** – Vilnius Gediminas Technical University  
**WENRA** – Western European Nuclear Regulators' Association  
**WGNS** – Working Group on Nuclear Safety  
**WGWD** – Working Group on Waste and Decommissioning



## **NUCLEAR POWER SAFETY IN LITHUANIA**

### **Annual report 2011**

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## Operating units of nuclear power plants in Europe



Source: European Nuclear Society, [www.euronuclear.org](http://www.euronuclear.org) (March 2012)