



REPUBLIC OF LITHUANIA

State Nuclear Power Safety
Inspectorate (VATESI)

NUCLEAR ENERGY IN LITHUANIA: NUCLEAR SAFETY

ANNUAL REPORT 2008

Vilnius 2009



Nuclear facilities in Lithuania



Nuclear facilities in operation:

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
- Treatment facility
- Repository

Projected 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



About us – the State Nuclear Power Safety Inspectorate	2
Foreword by VATESI Head	3
New organisational structure of VATESI	4
Training and qualification improvement of VATESI specialists	6
Strategic planning and financial activity	7
Quality management	7



Preparatory works for the project of the new nuclear power plant	8
System of nuclear safety regulation and supervision	11
Setting nuclear safety requirements	11
Licensing	11
Inspection	12



Safety of Ignalina Nuclear Power Plant	15
Operational experience feedback	16
Technical and economic indicators	17
Supervision of safety of operation	19
Safety assessment	20
Implementation of safety improvement program (SIP-3)	25
Safety culture	26
Supervision of decommissioning	28
Management of radioactive waste	28

Radiation protection of nuclear installations	30
Emergency preparedness	32



Accounting and control of nuclear materials, application of safeguards	34
Reports on meeting commitments under international conventions	38



International cooperation	40
---------------------------------	----



Contribution of Technical Support Organisations to improvement of nuclear safety	47
Public information	52
International conventions, laws and secondary legislation	53



About us - the State Nuclear Power Safety Inspectorate



A new stage in nuclear safety regulation

The year 2008 has been a period of interesting assignments and big changes to the staff of the State Nuclear Power Safety Inspectorate. The reorganisation of VATESI was completed in August - an organisation complying with the contemporary international practice and the recommendations of the International Atomic Energy Agency (IAEA) was established. In the course of preparatory work for regulatory supervision of a new nuclear power plant project, a number of new employees were hired by VATESI – some of them are young graduates and others have already gained working experience in a nuclear power plant. Preparation for licensing of the new nuclear power plant has been further continued – new projects deemed necessary for the quality improvement of VATESI activities were initiated, specialists were trained, legal framework for safety regulation of nuclear energy was revised and updated along with the newly drafted legal acts which are indispensable for the successful implementation of the project of the new nuclear power plant.

In 2008, Ignalina Nuclear Power Plant was operated in a safe and reliable manner – not a single event higher than level one on the IAEA International Nuclear Events Scale (INES) was recorded at the power plant, not a single employee was exposed to a dose exceeding the set limits, no cases of impermissible effects on the population or environment were reported. Regular meetings attended by VATESI, top managers of Ignalina Nuclear Power Plant and experts were held to discuss the most outstanding safety issues. VATESI was successfully conducting the state regulation and supervision of nuclear and radiation safety at nuclear installations in order to protect the public and environment against hazardous effects of nuclear and radiation events and accidents. In 2008, Ignalina Nuclear Power Plant generated 9893.6 million kWh of electricity, sales to domestic consumers increased by 5 percent as compared to 2007 and totalled 7051.8 million kWh; the capacity factor improved as well and was as high as 86.6%.

Around the globe nuclear power industry experiences challenging times. According to the IAEA, last year 438 nuclear reactors were operating worldwide, their total installed capacity equalled 372 GW (el). The word “renaissance”, formerly used in the context of nuclear energy, was replaced by another term – Vita Nova. More and more often nuclear energy turns out to be a rational choice in pursuance of a solution for problems of the climate change and in ensuring reliable and safe energy supply to consumers. Over 50 countries have already informed the IAEA about their plans to start using nuclear energy. The Nuclear Regulatory Commission (NRC) of the United States, having the highest number of reactors in operation (104 of them) has received 26 applications for the construction of new nuclear reactors, the generating capacity of operating nuclear reactors has increased, the validity of licenses of three reactors

has been extended for another twenty-year period, and their lifetime has been prolonged up to 60 years. In the European Union, the UK Government in 2008 issued the Energy Strategy Report emphasising the importance of nuclear energy in performing obligations assumed by this country to reduce greenhouse gas emissions into the atmosphere and to ensure reliability of energy supply. Italy notified about its plans to restore infrastructure needed for the use of nuclear energy, and the Lower Houses of Parliament of Italy approved the law revoking the moratorium on the construction of nuclear power plants. Romania signed agreements with investors on the construction of Units 3 and 4 at Cernovoda NPP. In Finland an application was submitted to the Government concerning the decision-in-principle on the construction of the fourth nuclear reactor at Olkiluoto Nuclear power Plant, two more applications are currently under preparation. However, the biggest growth in nuclear energy sector at present is observed and in the foreseeable future is expected to occur in the countries of Asia. 28 of 44 reactors which in 2008 were under construction in the world were being constructed in Asia.

The decisions made by Lithuania on the construction of the new nuclear power plant obligate one and all to get properly prepared for the implementation of the project of the new nuclear facility in line with the provisions of legal acts regulating operations in nuclear energy, conventions and international agreements. No uncertainties should arise to the international community regarding Lithuania's capabilities to implement the project of such scope and to ensure proper functioning of the nuclear safety regulation and supervision system. Therefore VATESI, along with the already undertaken supervision of safety of operation and decommissioning of Ignalina NPP, has defined the strategic priorities of VATESI activity, the timely accomplishment of which will be of immense importance for the project of the new nuclear power plant. VATESI has to acquire competencies and recourses which are essential to the regulatory institution, to update the legal framework of nuclear safety with an aim to assess the specifics of nuclear reactors of new generation and experience of other countries. Along with these important tasks, it is necessary to fundamentally modify the system of VATESI financing, to strengthen the competence of the regulatory institution enabling to timely and properly perform the assigned functions. Moreover, to solve the problems related to the project of the new nuclear power plant, it is critically important to ensure effective independence of VATESI as a regulator.

I am confident that VATESI employees, those with many years of regulatory work experience behind and the young ones just starting their professional careers are well aware of the scope and complexity of the assignments related to the implementation of the project of the new nuclear power plant in Lithuania. I am of the opinion that by actively cooperating with the IAEA and countries experienced in the construction and commissioning of new nuclear power plants we will manage to timely and duly finalise preparations for nuclear safety regulation and supervision during the implementation of the project of the new nuclear power plant in Lithuania.

VATESI Head
Gytis Maksimovas

About us - the State Nuclear Power Safety Inspectorate

The State Nuclear Power Safety Inspectorate (VATESI) is the main regulatory and supervision institution of nuclear safety, which sets safety requirements, controls whether they are complied with, issues licences and permits, performs safety assessments and other functions.

VATESI mission is to perform the state regulation and supervision of safety at nuclear installations in order to protect the public and environment against harmful effects of nuclear and radiation events and accidents.

VATESI is a governmental institution, established in 1991, VATESI Head directly reports to the Prime Minister.

VATESI objectives:

- State regulation and supervision of safety at nuclear installations;
- State regulation and supervision of nuclear waste management at nuclear installations;
- Supervision of safe operation and decommissioning of Ignalina NPP;
- Supervision of use of nuclear materials and technologies for peaceful purposes (the IAEA and EURATOM safeguards);
- State regulation and supervision of physical protection of nuclear installations and materials;
- Emergency preparedness, operational duty shifts;
- State regulation and supervision of transportation of nuclear fuel cycle materials.

Other goals:

- To prepare and submit national reports in accordance with international conventions and agreements;
- To take part in the activity of the International Atomic Energy Agency (IAEA), missions, commissions and committees of safety experts - advisors;
- To represent Lithuania in the IAEA Board of Governors in the period of 2007-2009;
- Within VATESI competence, to represent interests of the country in international organisations, associations and forums (European Nuclear Safety Regulators Group (ENSREG) established by the European Commission, Western European Nuclear Regulators' Association (WENRA), EURATOM, etc.);
- Multilateral and bilateral cooperation (with IAEA, Sweden, Finland, Germany, the US, Japan, the UK, etc.);
- To implement the EU support projects in the area of nuclear safety;
- To promote the development of VATESI Technical Support Organisations.

VATESI defines national standards of nuclear safety, controls whether they are complied with at nuclear power installations, other companies and organisations involved in nuclear activity, applies enforcement measures, and is entitled to suspend or discontinue operation of a nuclear installation if flagrant non-compliance with requirements is established.

In accordance with the Law on Nuclear Energy of the Republic of Lithuania, the Convention on Nuclear Safety and recommendations of the International Atomic Energy Agency, the system of regulation of nuclear safety in the country is continuously upgraded.

To address nuclear safety issues, functions are clearly divided between the operating and supervising institutions. In Lithuania the State Company Ignalina Nuclear Power Plant is responsible for safe operation of nuclear reactors and has been granted the status of the operating organisation. The Maišiagalą Radioactive Waste Storage is operated by the State Company Radioactive Waste Management Agency (RATA), and the Public Limited Liability Company Lietuvos Geležinkeliai has got a valid license for the transportation of nuclear materials.

Ignalina Nuclear Power Plant that is operating one of the two RBMK type reactors (designed capacity of 1500 MW), 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 environment while operating Ignalina Nuclear Power Plant and to use nuclear materials for peaceful purposes only.

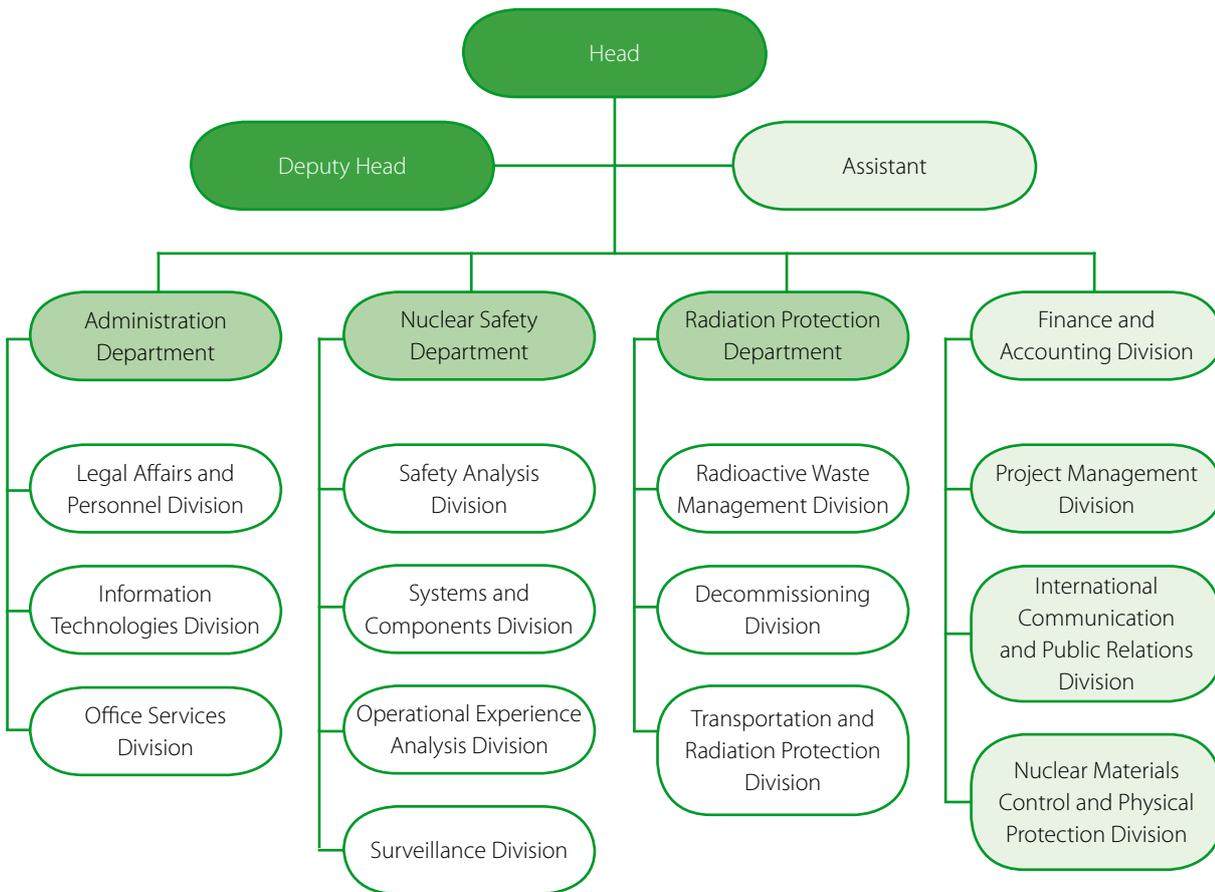
From 1 January 2008, Lithuania has passed on from the implementation of the Bilateral Safeguards Agreement and the Protocol Additional, signed with the IAEA, to the Trilateral Safeguards Agreement (with IAEA and EURATOM) and the Protocol Additional. VATESI, as the organisation performing the functions of accounting and control of nuclear materials in the country, under the Protocol Additional has assumed responsibility for a wider circle of issues.

Abiding by the provisions of the Convention on Early Notification of a Nuclear Accident, the EC 87/600/EURATOM Council Decision on Community Arrangements for the Early Exchange of Information in the Event of a Radiological Emergency and the relevant bilateral agreements, VATESI maintains close contacts with the IAEA, the emergency preparedness divisions of the European Commission and other states by organising operational duty which ensures round-the-clock communication with international and Lithuania's institutions.

VATESI also cooperates with the Technical Support Organisations of Lithuania, which provide expert services in assessing safety of nuclear installations, drafting legal documents, doing other work.

New organisational structure of VATESI

On 29 July 2008, a new structure of VATESI was approved. Three departments – the Administration, Nuclear Safety and Radiation Protection – were established at VATESI. The Administration Department consists of the Legal Affairs and Personnel Division, Information Technologies Division and Office Services Division. The Nuclear Safety Department consists of the Safety Analysis Division, Division of Systems and Components, Operational Experience Analysis Division and Surveillance Division. The structure of the Radiation Protection Department comprises the Radioactive Waste Management, Decommissioning, Transportation and Radiation Protection Divisions. In addition to that, four Divisions are functioning at VATESI which are directly subordinate to the Head of VATESI. They are the Finance and Accounting Division, Project Management Division, International Communication and Public Relations Division and the Division of Nuclear Materials Control and Physical Protection.



VATESI specialists

About us - the State Nuclear Power Safety Inspectorate

Training and qualification improvement of VATESI specialists

Nuclear energy is a complex field of science and technology demanding high competence, special knowledge and experience, which have to be continuously refreshed along with the awareness of ongoing developments in this field. One of the most important goals at VATESI is highly qualified and equipped with special knowledge personnel. In order to strengthen VATESI human recourses, starting from 6 June 2008, the number of VATESI staff has been augmented by 15 full-time positions. In all, 29 new employees were hired during the year, 9 employees were dismissed. Seventy three employees were working at VATESI as of late 2008, 60 of them were civil servants.

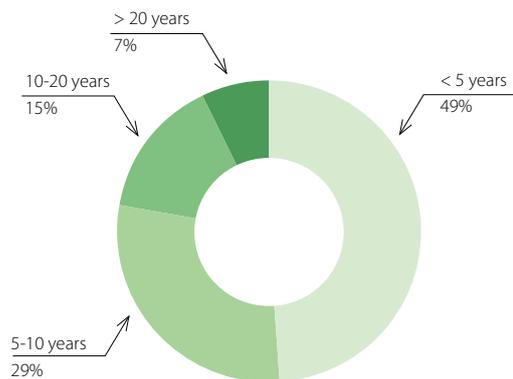
At present six VATESI employees of those working in the field of nuclear energy have got a qualification degree of the Doctor of Science, 8 – the Bachelor's Degree, 26 – the Bachelor and Master's Degrees, 20 – the Master's Degree. In order to retain highly qualified specialists, to continuously improve their skills and to train new employees, VATESI concentrates its attention on the training of employees and their qualification improvement.

In 2008, seventy percent of VATESI employees were improving their skills. Seven of 12 newly employed persons took part in the introductory workshops of civil servants. In all, 74 training events aimed at the development of competences related to the implementation of strategic goals by the state and municipal offices and institutions, and the qualification improvement were attended. Moreover, VATESI focused on the organisation of training in the European Union languages and computer literacy: 2 VATESI specialists were learning French; the courses of the English language were attended by 28, of the German language – by one VATESI specialists, 47 persons participated in the ECDL and other courses in computer literacy.

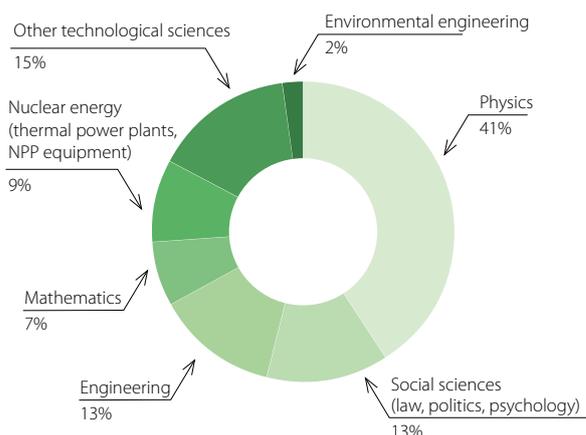
In 2008, VATESI actively participated in the qualification improvement events arranged by the International Atomic Energy Agency (IAEA). In all, forty training events arranged by IEAE were attended by 32 VATESI specialists in 2008.

Knowledge and experience obtained in the training courses will be used to improve the employees' job performance and to increase its efficiency.

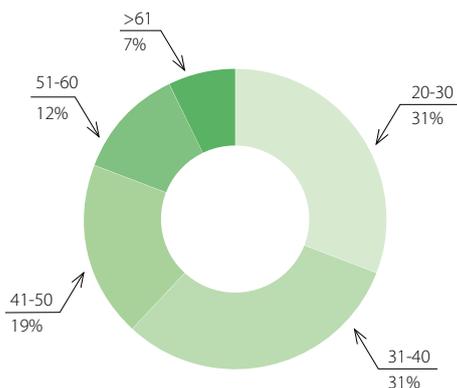
Experience of VATESI employees in nuclear energy



Educational background of VATESI employees working in the field of nuclear energy



VATESI employees by age groups (%)



Strategic planning and financial activity

VATESI activities due to their specifics are long-term and continuous. The program and priorities set by the Government of the Republic of Lithuania, as well as the provisions of the Long-term Development Strategy of the State are taken into consideration when planning the activities.

The sole strategic objective, i. e. assuring a high level of safety of nuclear installations, was set in the 2008-2010 strategic plan of VATESI activities for implementing its mission. To assess whether the strategic objective has been attained, the single criterion of effect has been set, i. e. nuclear safety improvement defined as the absence of level two and upwards unusual events on the INES scale identified.

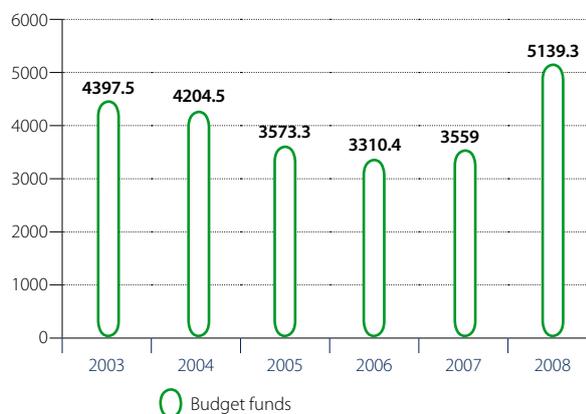
A single program, 01.01 *Public and Internal Administration of Nuclear Safety*, was developed and implemented in 2008 with a view to achieving the strategic objective. Four goals were set for implementing the program:

- To control compliance with nuclear safety standards and licensing conditions at nuclear installations;
- To upgrade the systems of nuclear safety assurance and licensing at nuclear installations with international practice taken into consideration;
- To exercise and augment internal administration;
- To get ready for supervision of design and construction of a new nuclear power plant.

By implementing these objectives, the probability of events and accidents at nuclear facilities will be reduced, the quality of failure and accident prevention measures will improve, the probability of errors or delays in making decisions will go down, and the quality of VATESI internal administration will improve, preparation for supervision of design and construction of the new nuclear power plant will be finalised on time.

The program is being implemented with funds from the state budget. In 2008, VATESI was allocated LTL 8053 thousand from the state budget. LTL 5139.3 thousand, or 63.8%, was spent for implementing the program. The funds from the state budget were used in an economical manner and in accordance with their allocation.

Use of state budget funds in 2003-2008, LTL thou.



Quality management

The decision to develop at VATESI the Quality Management System (QMS) was approved on 5 October 2000 by Order No. 21 of Head of VATESI. The implementation of the Quality Management System at VATESI is aimed at:

- Enhancing the efficiency of the Inspectorate's management.
- Optimizing the planning and use of the Inspectorate's resources.
- Assuring adequate licensing, safety assessment and supervision of nuclear facilities.
- Assuring adequate control of the ongoing EU support projects.
- Assuring adequate qualification improvement of VATESI staff.
- Assuring efficient management and use of information.

In 2008, due to changes in requirements, eight new procedures and instructions of the Quality Management System were approved.

Title	Valid since
Instructions for Implementation of the Plan for Revision of Nuclear Safety Regulatory Documents	26 March 2008
Procedure for Special Inspections	08 April 2008
Procedure for Regular Inspections and Checks at Ignalina NPP	28 April 2008
Procedure for Management of Ingoing and Outgoing Documents	04 June 2008
Rules for Use of Hardware, Software and Other Office Equipment	31 July 2008
Rules of Simplified Procurement Procedure	03 October 2008
Rules for Covering Business Travelling Expenses	10 December 2008
Manual for Maintenance of DB on Extraordinary Events at Nuclear Installations	24 December 2008

In 2008, the organisational structure of VATESI was changed; the job regulations of 17 structural departments and divisions were revised or newly prepared. In 2008, VATESI initiated the project *Implementation of Management*

Systems at the State Nuclear Safety Inspectorate financed from the EU structural funds. The objective of the project – to fundamentally update and upgrade the Quality Management System at VATESI.



Preparatory works for the project
of the new nuclear power plant

Upon having embedded the continuation of nuclear energy in the National Energy Strategy, Lithuania has been actively carrying out the preparatory works deemed necessary for the construction of the new nuclear power plant. These works are performed by Visagino Atominė Elektrinė UAB, the subsidiary of LEO LT, AB, established on 28 August 2008. The goal set for this company – to construct the nuclear power plant in Lithuania by the year 2018.

Program and Report of the Environmental Impact Assessment

The Report of the Environmental Impact Assessment (EIA) was submitted to VATESI in October 2008. The impact on the environment – population, social economic environment, water

systems, air quality, fauna and flora, protected territories, cultural heritage, etc. – to be caused by the construction and operation of the nuclear power plant in Lithuania with the capacity up to 3400 MW was assessed in the Report. In addition to that, the assessment of the project alternatives – two potential construction sites located in the territory of the presently operating Ignalina Nuclear Power Plant; the technological alternatives of nuclear reactors – boiling water, pressurised water and pressurised heavy water; the alternatives of cooling options – were provided in the EIA Report. The environmental impact of the zero alternative – a nuclear power plant is not constructed in Lithuania – was assessed as well.

The Report of the Environmental Impact Assessment was prepared in accordance with the Program of the Environmental Impact Assessment, which had been revised and approved by VATESI specialists in October 2007. While examining the submitted EIA Report, VATESI specialists



Alternative sites for new Visaginas nuclear power plant

Preparatory works for the project of the new nuclear power plant

analysed whether the Report complies with the EIA Program, whether all aspects covered by the Program were examined and the outstanding issues were resolved. During the analysis of the information provided in the EIA Report, nuclear safety specialists focused on the technologies of nuclear power plants, described principles of nuclear safety, management of radioactive waste, characteristics of the alternative construction sites, operational risks and potential radiological effect on population and the environment including the trans-boundary impact. VATESI specialists provided proposals on the elaboration of certain chapters of the Report related to the classification and acceptability of the sites, assessment of radiation exposure of population, selection of the critical group of local population and assessment of direct exposure, management of radioactive waste and accident analysis, decommissioning and emergency preparedness.

In the end of 2008, Visagino Atominė Elektrinė UAB provided the final Report of the Environmental Impact Assessment which had been revised according to comments provided by VATESI and other institutions – the EIA participants. It is being planned that the mentioned document will be approved early in the year 2009, and in the future, prior to the preparation of the Terms of Reference, Visagino Atominė Elektrinė UAB will have to conduct an additional Study on the disposal of radioactive waste. In the Terms of Reference there should be included the specific requirements on mitigation measures and indicated limits for releases of radioactive substances.

In November – December 2008 VATESI specialists participated in the international consultations with the representatives from Austria, Poland and Belarus held at the Ministry of the Environment of the Republic of Lithuania. Moreover, comments and remarks on the EIA Report were provided by international non-governmental organizations for the protection and conservation of the environment *Greenpeace* and *CEE Bankwatch network*. The proposals received from these organisations were evaluated with due argumentation by all institutions – the EIA participants.

VATESI specialists gave answers to the questions of foreign specialists concerning licensing procedure of nuclear installations, strategy for management of radioactive waste, management of spent nuclear fuel, assessment of effects of emergency situations. Early in the year 2009 it is being planned to organise a special mission of the IAEA experts who would revise the procedures of the environmental impact assessment of the planned to be constructed Visaginas Nuclear Power Plant, the EIA Report and would evaluate its compliance with the best international practice and procedures in terms of radiation safety and environmental protection.

Regulatory documents of the new nuclear power plant

In 1991, Lithuania took over the ownership of Ignalina NPP together with the then effective nuclear safety requirements. The main laws and other mandatory documents in this field had been prepared and adopted with regard to the design, construction, and operation requirements of the day for nuclear power plants.

To get ready for the supervision of the construction of the new nuclear power plant, it is necessary to improve the relevant legal framework by using the best experience of other countries and with regard to the requirements set for nuclear reactors of the generation III/III+. There is an essential difference between the regulatory practice of Ignalina Nuclear Power Plant and the new NPP because the safety characteristics of nuclear reactors of generation III are fundamentally different from those of generation II (Ignalina NPP reactors are assigned to generation II as well). Lithuania will have to partially adopt the regulatory practices of the country – supplier of the new NPP technology, and to harmonise the relevant legal acts in line with the presently drafted EU Directive on Nuclear Safety.

In 2007, VATESI initiated the drafting of the Law on Nuclear Safety. The objective of this draft Law – to strengthen and to increase the efficiency of the nuclear energy regulation and supervision system, to clearly define mechanisms for application of supervision and enforcement measures, to adjust the financing system of the regulatory institution, to strengthen the status of the regulatory institution. In 2008, the Concept of the Law on Nuclear Safety was drafted and coordinated with the interested institutions.

After the adoption of the Law on Nuclear Safety, it will be necessary to amend the Law on Nuclear Energy (to work out its new Revision), the Law on Radiation Protection, the Law on Radioactive Waste Management, the Law on Supervision of Potentially Hazardous Equipment, the Law on Civil Protection and other laws.





System of nuclear safety regulation and supervision

The core activity of a nuclear safety regulatory institution consists of the following three main aspects – setting nuclear safety requirements, assessment and licensing of activity related to nuclear safety, and supervision of the licensed activity.

Setting nuclear safety requirements

In compliance with the Law on Nuclear Energy of the Republic of Lithuania and the Regulations of VATESI Activity approved by Resolution No. 1014 by the Lithuanian Government, dated 1 July 2002, as well as other legal documents, VATESI performs public administration in the field of nuclear energy. One of the key areas of public administration is the administrative regulation, i. e. setting nuclear safety requirements through rules, regulations and other legal documents. In accordance with Article 4, part 2 of the Law on Nuclear Energy, safety rules and regulations approved by VATESI are mandatory to all legal and natural persons.

On 18 December 2006, a group for amending the legal framework governing nuclear safety was set up by the Order of the Head of VATESI. The main objective of the group consisted in assessing the currently valid legal and standard technical documents in the field of nuclear safety, and drawing up a plan of perfecting these. After legal and standard technical documents had been reviewed, in particular those related to the construction of a new nuclear power plant, the Plan for Perfecting Legal and Standard Technical Documents in 2008-2011 was revised in 2008. According to the Plan, 43 documents are to be revised with regard to the construction of the new nuclear power plant in Lithuania. In 2008 five legal acts were approved, seven legal acts were drafted.

In 2008, the Concept of the Law on Nuclear Safety was drafted. It is important to note that in 2007 the European Commission initiated preparation of the Directive on Nuclear Safety aimed at regulation of nuclear safety system in the European Union and at establishing legal background for institutional strengthening of nuclear safety regulation and supervision.

Licensing

VATESI exercises regulation and supervision of nuclear energy activities by issuing licenses, and controls

whether the conditions set forth in the license have been complied with. In the course of licensing, the applicant's preparedness to carry out the activity being licensed, the level of nuclear safety assurance of nuclear materials or nuclear installations, organisational structure of the applicant, qualification of personnel and other important aspects of safety assurance are assessed. The process of licensing begins from submission of an application. During the licensing process the submitted application documents are analysed, the applicant's activity is inspected, and a decision regarding granting the license is made. Afterwards the licensed activity is supervised.

Analysis of applications and documents

One of the principal documents evidencing safety of a nuclear power plant or other nuclear facilities is the safety analysis report on the basis of which the decision is made whether the license will be granted or not.

Whereas operations in the area of nuclear energy are potentially hazardous to the environment and the public, it is necessary to assure that the risks caused by a nuclear installation would be manageable and minimized as much as possible.

The assessment of safety is a systematic process of a wide scope, the objective of which is to ascertain that all relevant safety requirements have been satisfied. In general, safety assessment of a nuclear power plant may comprise all safety-related aspects, including selection of a site, design of a nuclear power plant, its construction, operation and decommissioning.

In 2008, VATESI received from the State Company *Ignalina Nuclear Power Plant* three applications for granting licenses – for construction of treatment and storage facilities for solid radioactive waste, construction of storage facilities and repository for very low activity radioactive waste and designing storage facilities and repository for very low activity radioactive waste. Two licenses were issued in 2008 – for designing facilities for retrieval and conditioning of solid radioactive waste and for designing storage facilities and repository for very low activity radioactive waste.

In 2008, VATESI analysed the following applications submitted by the State Company *Ignalina Nuclear Power Plant* for obtaining licenses:

In 2008, VATESI analysed the following applications submitted by the State Company Ignalina Nuclear Power Plant for obtaining licenses

Licensed activity	Date of submission of application
To construct a new storage facility for spent nuclear fuel	September 2007
To construct processing and storage facilities for solid radioactive waste from Ignalina NPP	February 2008
To construct storage facility and disposal facility for low activity radioactive waste	September 2008
To design facilities for retrieval and pre-treatment of solid radioactive waste	September 2007 (License was granted in 2008)
To design storage facility and repository for very low activity radioactive waste	March 2008 (License was granted in 2008)

In the course of supervision of the licensed activity, in the case of flagrant violations of the license conditions, VATESI may suspend the validity of the license or to withdraw the license. In 2008 no flagrant violations of the license conditions were

established. At present VATESI is exercising supervision and control of the activities carried out according to 10 granted licenses.

Licenses granted by VATESI

Date of issuance	Licensee	Licensed activity
12/99(P)	Ignalina Nuclear Power Plant	Operating Ignalina NPP Unit 1
3/2000(P)	Ignalina Nuclear Power Plant	Operating interim spent nuclear fuel storage facility of dry type at Ignalina NPP
1/2004	Lietuvos Geležinkeliai AB	Transporting of nuclear materials
2/2004	Ignalina Nuclear Power Plant	Operating INPP Unit 2
1/2006	Ignalina Nuclear Power Plant	Operating storage facility for cemented liquid radioactive waste at Ignalina NPP
2/2006	Radioactive Waste Management Agency (RATA)	Conducting supervision of the closed Maišiagala storage facility of radioactive waste
1/2007	Ignalina Nuclear Power Plant	Designing SNF storage facility at INPP
2/2007	Ignalina Nuclear Power Plant	Designing facilities for treatment and storage of solid radioactive waste at INPP
1/2008	Ignalina Nuclear Power Plant	Designing facilities for retrieval and conditioning of solid radioactive waste
2/2008	Ignalina Nuclear Power Plant	Designing storage facility and repository for low activity radioactive waste

VATESI specialists were continuously analysing and assessing safety issues assigned to the area of VATESI regulation – upgraded safety requirements, verified whether these requirements were complied with, analysed documents justifying safety, reviewed them, provided conclusions and conducted inspections.

In 2008, Ignalina NPP prepared and submitted to VATESI the Report on the Implementation of the Diversified Reactor Shutdown System in Unit 2. As of late 2008, upon having analysed the Report, VATESI issued a permit to start regular operation of the system.

Like every year, in August – September 2008 the routine maintenance works (RMW) were conducted at INPP Unit 2 – VATESI specialists analysed the submitted RMW documents for routine maintenance works and performed the checks of technical status by testing the repaired systems and components. On 18 September 2008, VATESI issued a permit to Ignalina NPP to launch into operation Unit 2 after the completed RMW scheduled for 2008.

Inspection

While performing inspection activities, it is critically important to adequately assess the current situation in the nuclear power sector, to identify priority areas in terms of radiation hazard so that the safety-related issues would be given proper attention.

Each year VATESI develops a plan of inspections in accordance with the established criteria and with regard to the available human and financial resources. In addition to planned inspections, technical and control room operation inspections as well as unplanned inspections are performed.

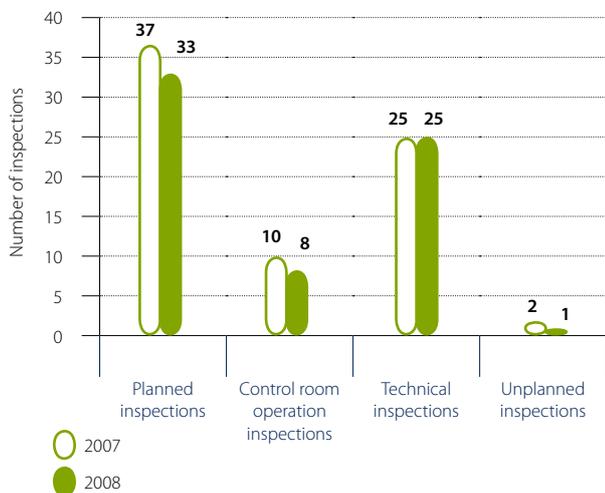
In 2008, VATESI specialists conducted 67 inspections (74 in 2007), including 33 planned inspections, 8 control room operation inspections, 25 technical inspections and 1 unplanned inspection.

Inspections are conducted at all stages of the licensed activity: during the selection of a site for nuclear installation, its



design, construction, operation or decommissioning, during transportation of nuclear materials or when performing their accounting. Moreover, VATESI inspectors are entitled to inspect organisations that provide services to license holders.

Inspections conducted by VATESI in 2007-2008



In 2008, twenty six inspectors participated in VATESI inspection activities, 380 man-days were spent for this assignment (395 in 2007). The scopes of inspections somewhat decreased in 2008 because of the scheduled isolation works of the systems of no longer operating Unit 1 at Ignalina NPP. Upon the assessment of impact of the mentioned systems on safety, the number of inspections was reduced subject to the requirements of the standards and technical regulations on the frequency of verifications of individual systems.

In 2008, 65 out of 67 conducted inspections were performed at Ignalina NPP, 1 – at the Radioactive Waste Management Agency (RATA) and 1 – at Klaipėda University Hospital.

Planned inspections

Every year, in December, upon having assessed the gained experience of inspection activities, having analysed the experience of organisations operating nuclear installations, licensing, the results of the analysis of the safety upgrading programme VATESI specialists project the scope of inspections for the coming year. Thirty three inspections were scheduled according to VATESI inspections plan in 2008. All of them were conducted.

In the course of inspections, the following safety-critical areas were verified:

1. Training of Ignalina NPP personnel;
2. Safety systems and safety-related systems (the emergency core cooling system, the back-up power supply system in the case of emergency, the fire extinguishing systems of Units 1 and 2, reserve control panels, the system of reactor cavity overpressure protection, the reactor's emergency protection system (introduction of new servo drives), the system of protection against overpressure in the main circulation circuit, the system of regular and back-up power supply for the Unit's auxiliary consumption, other systems);
3. Accounting and control of nuclear materials;
4. Management of beyond-design-basis accidents;
5. Management of nuclear fuel;
6. Physical protection of nuclear installations and nuclear materials;
7. Environmental monitoring conducted by Ignalina NPP;
8. Quality management;
9. Management of radioactive waste by Ignalina NPP and RATA;
10. Transportation of nuclear fuel;
11. Compliance with license conditions of Unit 2;
12. Implementation of safety improvement measures;
13. Safety culture;
14. Equipment qualification and ageing management of safety-related systems;
15. The use of imported strategic commodities intended for nuclear purposes;
16. Emergency preparedness;
17. Assessment of operational experience;
18. Expansions (modification) of spent nuclear fuel storage facility at Ignalina NPP.

Technical checks and control room operation inspections

In 2008, the specialists of Surveillance Division of VATESI Nuclear Safety Department performed 25 checks on technical condition of safety-critical systems at Ignalina NPP, including:

- External inspection of pipelines and equipment at operational parameters;
- External inspection of intake manifold of feed water and emergency pumps after maintenance;
- Hydraulic testing of regenerators of filtered water;
- External inspection of the Main Circulation Circuit (MCC) at operational pressure;
- External inspection of accident confinement pumps and heat exchangers at operational pressure;

- External inspection of the Emergency Core Cooling System (ECCS) at operational parameters;
- External inspection of manifolds, cooling water pipelines and steam ducts of the Emergency Core Cooling System (ECCS) and of the Main Circulation Circuit (MCC) of Unit 1 at operational parameters.

The objective of technical checks is to ascertain that the technical condition of individual systems, installations and equipment of nuclear facilities complies with the requirements set in special operation, testing and repair regulations.

In 2008, eight control room operation inspections were conducted. The Operational Manual is the principal document that defines safety of operation of a nuclear power plant. Therefore certain actions of the personnel prescribed by the Operational Manual are examined in the course of control room operation inspections.

Upgrading of inspection activities and training

Upon having analyzed the experience, knowledge and information gained in the course of inspections, workshops or working meetings, VATESI specialists submit proposals regarding improvement of inspection activities and documents governing these. Based on the *General Requirements for VATESI Inspections* approved by the order of the VATESI Head on 19 June 2007, VATESI quality management documents were prepared and approved on 4 April 2008: *The Procedure for Special Inspections by VATESI*, and *The Procedure of Regular Inspections and Checks at Ignalina NPP*.

Measures related to training of inspectors (in-service training, training courses) are envisaged in the IAEA national project for 2008-2010 *Building of VATESI and other Institutions' Capacity in Relation to Licensing of a New Nuclear Power Plant in Lithuania*. The knowledge of VATESI is also to be extended through inspections of structural integrity of safety-critical structures, systems and components within the framework of the institutional strengthening transition facility *Support to VATESI in Assessing Safety of Ignalina NPP*. The main objective of inspection activities envisaged in the above projects is to get acquainted with other countries' practice in inspecting nuclear facilities and to apply the knowledge thus gained when inspecting the operational facilities, as well as to prepare for supervision of implementation of the new nuclear power plant project. It is especially useful to young inspectors who are joining the ranks of nuclear community.





Safety of Ignalina Nuclear Power Plant

Operational experience feedback

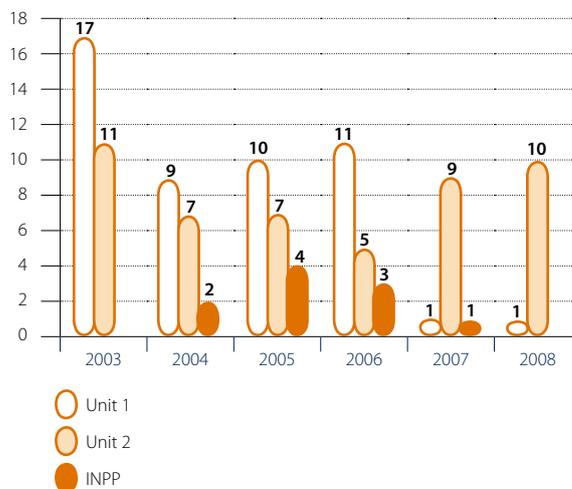
VATESI nuclear safety specialists were continuously assessing the use of operational experience at Ignalina NPP in order to prevent accidents, incidents and non-compliances. In 2008, safety at Ignalina NPP was enhanced and assured by analysing its own experience along with the experience of other institutions and industries operating in the field of nuclear energy.

Operational experience covers human activity, organisational and technological issues: information about events, accidents and their precursors, defects, near miss events, their tendencies, weaknesses and good practise, reports on analysis of safety performance indicators, the NPP self-assessment reports (reports of quality assurance audits, reports of independent experts and missions, documented good practice, etc.).

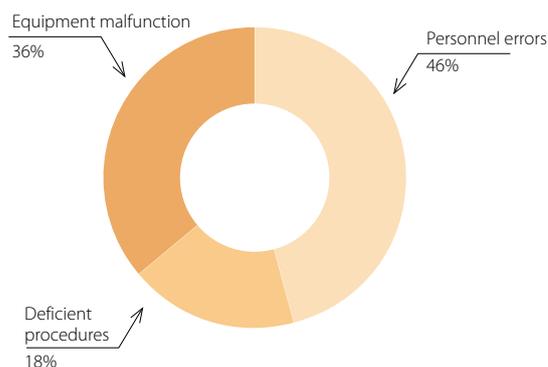
VATESI has a permanent Commission of Unusual Events and Operational Experience, which analyses the reports on unusual events at Ignalina NPP, other nuclear facilities in Lithuania and information about unusual events worldwide.

In 2008, eleven unusual events were recorded at Ignalina NPP. In comparison with 2007, the number of unusual events at Ignalina NPP remained unchanged. During the year, at Ignalina NPP one event was recorded in Unit 1, and 10 events – in Unit 2. VATESI held 10 sittings of the Commission of Unusual Events and Operational Experience where the unusual events at Ignalina NPP were analysed.

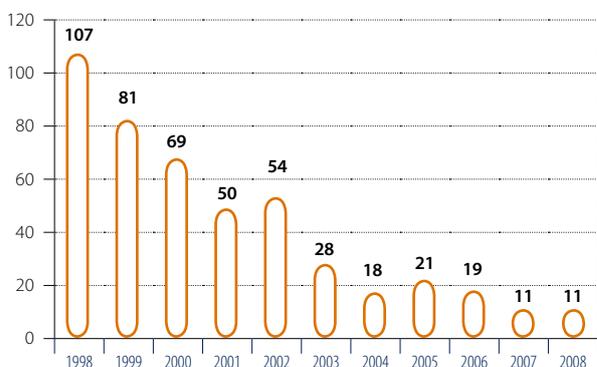
Distribution of unusual events by INPP facilities



Distribution of unusual events by cause, in percent

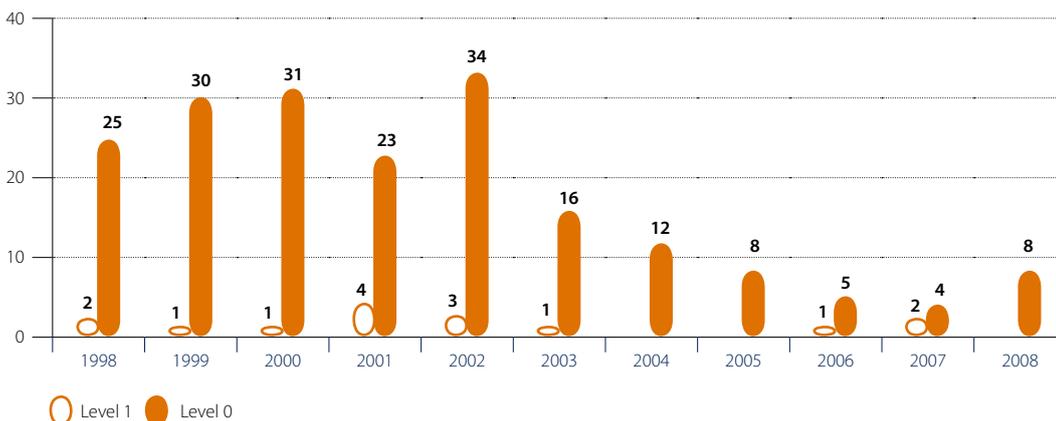


Dynamics of unusual events in 1998-2008



The most frequent causes of unusual events are failures of nuclear power plant equipment, weaknesses, procedures or operations. In 2008, at Ignalina NPP 4 events were caused by the malfunctioning of equipment, 5 – occurred due to personnel error, and 2 – due to weaknesses in applicable procedures were recorded.

Distribution of unusual events on the INES scale



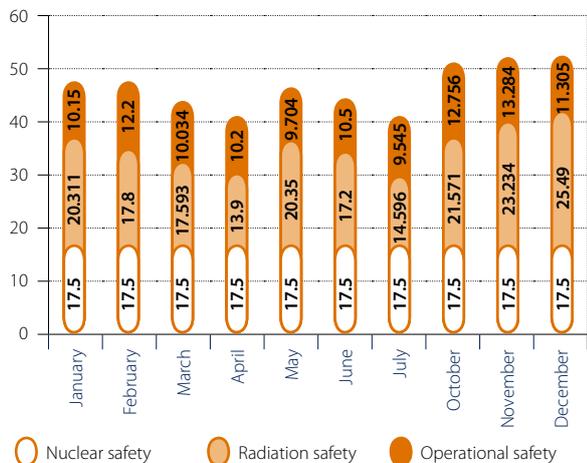
In accordance with the International Nuclear Events Scale, in 2008 eight events were rated as level 0, three were out of the scale; no events were rated as level 1.

For the assessment of Ignalina NPP safety performance, a pre-selected system of safety performance indicators is used. In 2008, a targeted value of safety level at Ignalina NPP was 53. The highest safety level at Ignalina NPP was in December – 54.6, and the lowest – in April – 41.6. Deterioration of the safety level was predetermined by the increased number of damages in leak-proofness of nuclear fuel assemblies, which also resulted in the impairment of special radiation safety performance indicator. In August-September 2008, after the completed routine inspection and maintenance, the overall safety performance at Ignalina NPP significantly increased: in October the value of safety indicator was as high as 41.8, and in November – December months it surpassed 53.

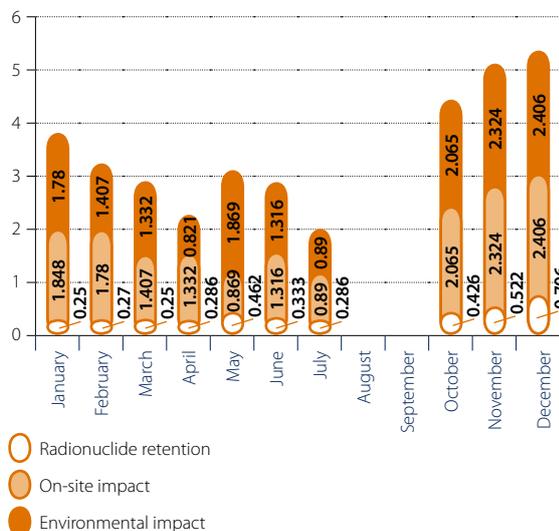
VATESI nuclear safety specialists, upon having completed the analysis of variation tendencies in the safety performance indicators, stated that the safety level at Ignalina NPP Unit 2 was up to standard.

A special inspection was conducted at Ignalina NPP in December 2008, during which the system of the use of operational experience feedback was verified. No non-compliances were found during the inspection.

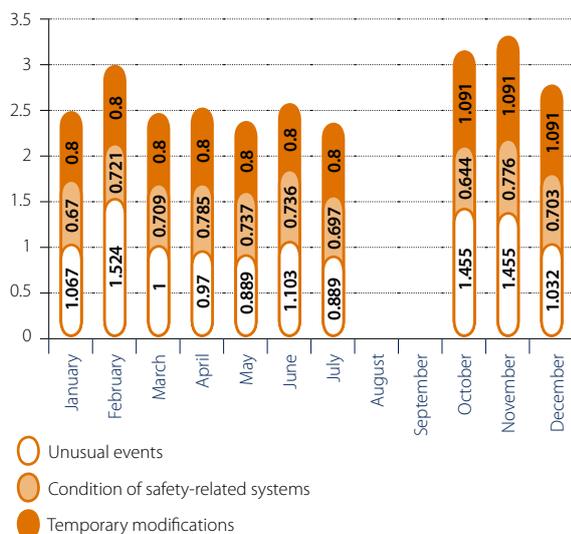
Dynamics of principal safety performance indicators in 2008



Dynamics of special performance indicators of radiation safety



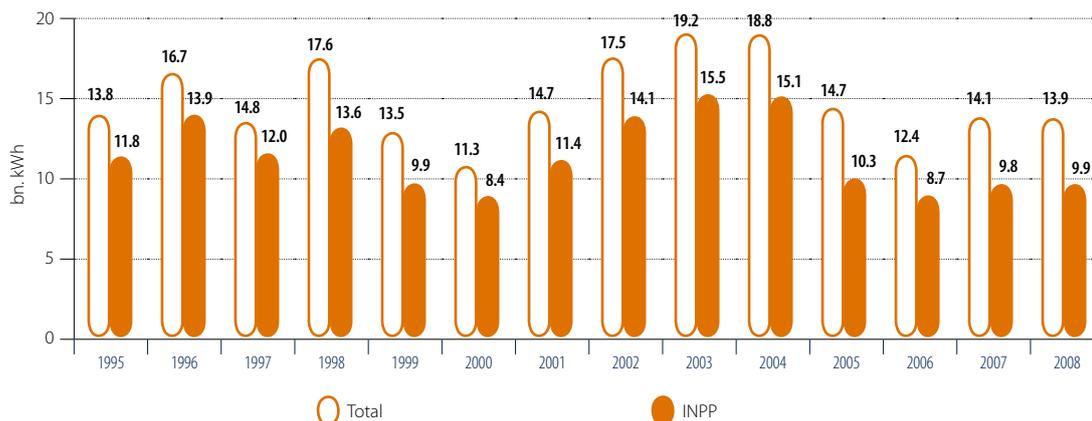
Dynamics of special performance indicators of operational safety



Technical and economic indicators

As of 1 January 2009, since the beginning of the power plant's operation Ignalina NPP has produced 296.3 TWh of electricity: 136.9 TWh in Unit 1 and 159.4 TWh in Unit 2.

Electricity quantity produced by Ignalina NPP in 2008 equalled 71.3% of the total generated output in Lithuania.



Since the date of power plant's commissioning into operation, 269.8 TWh have been supplied to electricity consumers. In 2008, the generated output of INPP totalled 9893.7 million kWh or by 60.9 million kWh more than in 2007.

The amount of electricity not generated due to the extended routine maintenance and malfunctioning of the equipment totalled 84.8 million kWh.

Generation and sales of electricity

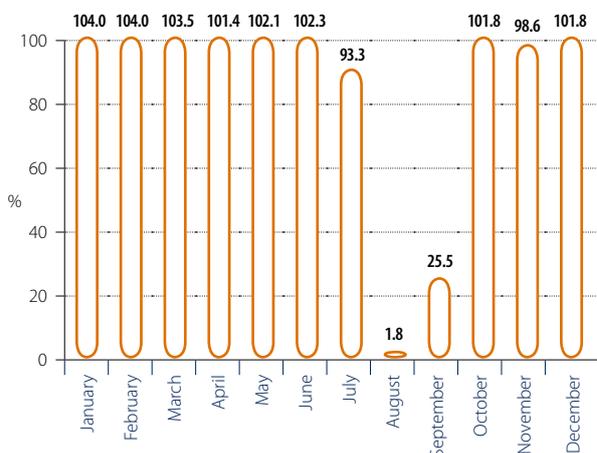
In 2008, 9140 million kWh was sold to the market operator Lietuvos Energija AB, of this quantity 7051.8 million kWh was supplied to the domestic market and 2088.2 million kWh of electricity was exported to other countries. The volume of electricity export dropped by approx. 13% year-on-year.

A high level of loading accounted for the stability of technical and economic indicators at Ignalina NPP in 2008 - there were no dispatch centre's limitations that could have resulted in reduced generation of electricity. In 2008, there was an unplanned automatic scram of Unit 2, and two brief interruptions in operation of the generator TG-4 were undertaken in order to remove the established defects. The duration of the scheduled routine maintenance was shortened; therefore the planned quantity of electricity was generated. The capability factor of Ignalina NPP to use its gross capacity was somewhat higher than the planned one (2.5%); 7.62% of electricity was consumed for heat energy production and electricity generation (7.71% in 2007). The capacity factor in 2008 was as high as 86.6%.

Electricity not generated due to repairs and outages (N unit. inst. = 1300 MW)

Indicator	million kWh
Planned routine maintenance	1689.85
Defects of the Plant	84.77
Total not generated quantity	1774.62

In accordance with the IAEA rules, the capability factor to use the gross capacity and the amount of electricity that was not generated were calculated at the Unit's installed capacity of 1300 MW.

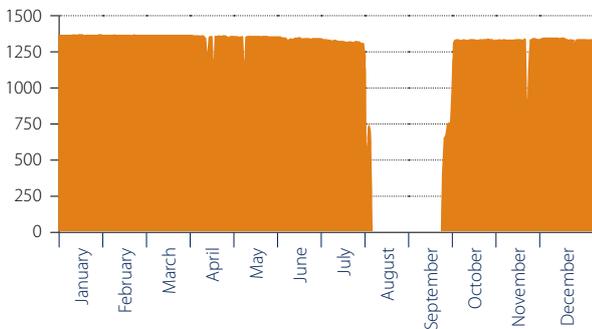


Operation indicators of unit 2

Item	Unit	Reactor	TG-3	TG-4
1. Installed capacity, MW	1500 MW (el.)	4800 MW (heat)	750 MW (el.)	750 MW (el.)
2. Gross licensed capacity, MW	1300 MW (el.)	4200 MW (heat)	750 MW (el.)	750 MW (el.)
3. Gross electricity generation, GWh	9893.7	–	5104.0	4789.7
4. Gross electricity sales, GWh	9140.0	–	–	–
5. INPP own needs, percent	7.62	–	–	–
6. Relative heat consumption per supplied 1 kWh. kcal/kWh	2850	–	–	–
7. Average load, MW	1309 MW (el.)	4033 MW (heat)	693	639
8. On-line hours	7558	7605	7365	7491
9. Time availability factor, percent	86.0	86.6	83.8	85.3
10. Number of outages, including:	2	2	1	5
• Annual routine maintenance	1	1	1	1
• Unplanned	1	1	0	4
• Reserve	0	0	0	0
11. Number of start-ups	2	2	1	5
12. Number of unplanned automatic scrams	–	1	–	–
13. Capability factor, percent	84.5	86.6	83.8	85.3
14. CF Ninst=1500 MW, percent	75.1	72.7	77.5	72.7

CF – capability factor to use the gross capacity.

Electric load of unit 2



Nº	Date	Reasons for emergency outing (capacity reduction)
1	16 April 2008	TG-4 disconnection due to the generator's current drop
2	07 May 2008	TG-4 was stopped for repairs upon having established leakage in a lubricant line of its control system
3	28 July 2008	Scramming of the reactor due to personnel error
4	02 August – 20 September 2008	Planned routine maintenance of Unit 2
5	15 November 2008	TG-4 was stopped for repairs upon having established defect in one of the deaerator's valves

Supervision of safety of operation

In 2008, targeted inspections of Ignalina NPP safety were conducted in accordance with the plan approved in advance. The results of the inspections were recorded in the reports. Moreover, technical inspections of Ignalina NPP pressurised vessels and associated piping, controlled by VATESI, were undertaken, the results were recorded in the reports and in equipment passports. Nuclear safety specialists of Supervision Department took part in the work of the panel that examined the competence of managers and operational staff of Ignalina NPP. In 2008, the competences of 107 high and medium level specialists of Ignalina NPP were examined.

In 2008, INPP Unit 2 was started up twice. Prior to start-ups, a wide-ranging examination of the unit was carried out, with appropriate permits issued for each stage of the start-up. The supervision was exercised through direct participation in the examination of the plant.

In accordance with the requirements of the technical specification, during operation or maintenance of the Units, VATESI nuclear safety specialists controlled execution of operations posing nuclear hazard, including identification of subcriticality of the nuclear reactor after shutting it down and testing the efficiency of fast-acting scram rods. In addition to that, the control of measurements of physical-dynamic parameters of the nuclear reactor at INPP Unit 2 was conducted prior to its shutting for annual routine maintenance and after loading (in line with an approved program) nuclear fuel of a new type containing erbium poison into the core.

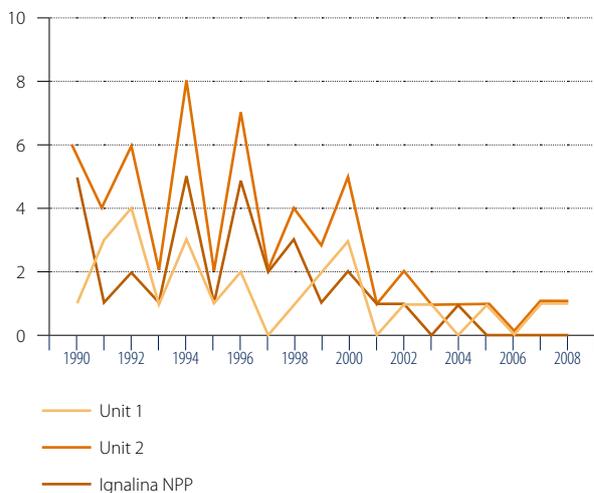
In 2008, VATESI reviewed and analysed 18 technical proposals regarding the modification of safety-related systems of the nuclear power plant. By taking into consideration

the compliance of the modified systems with the design requirements, the results of their testing and commissioning into operation (including preparation of the technical documentation and training of the personnel), VATESI made decisions on the feasibility to put them into service for regular operation.

Regardless of from time to time occurring malfunctioning, the results of Ignalina NPP operation in 2008 in terms of safety were up to standard. No cases of violations of safe operation conditions or marginal parameters, or unacceptable exposure of the personnel were recorded. Flushing of the main circulation circuit in the course of scheduled routine maintenance made a positive impact on the condition of fuel assemblies. The number of leaky fuel caskets identified after launching the Unit into operation did not exceed the quantity in the previous years. Therefore it can be stated that the safety improvement measures which were pre-planned and then implemented during the scheduled maintenance works with an aim to solve the problem of the growing quantities of leaky fuel caskets, were selected and implemented with due diligence.

In 2008, one unplanned outage of the Unit occurred. In 2007, the Unit was also stopped only once. The fact allows concluding that safety improvement measures which had been undertaken at INPP, including the upgrading of safety culture and quality assurance system, were effective and adequate.

Number of unplanned outages



Safety assessment

Safety assessment is a principal function of VATESI which is exercised by conducting supervision of nuclear safety and radiation protection at nuclear installations. VATESI assesses safety throughout all stages of the nuclear facility's lifetime, from selection of a site, through operation, to decommissioning. Safety assessment covers multiple areas – issues related to

physics, mechanics, thermo hydraulics, mathematics, materials science and other fields of science are to be resolved during the assessment.

The main goals of safety assessment performed by VATESI are as follows:

- Ascertaining that the information provided by the organizations operating the nuclear facility in safety analysis reports and other safety justification documents is accurate and sufficient to verify compliance with the set nuclear safety requirements.
- Ascertaining that technical and organizational decisions proposed by the organizations operating the nuclear facility, and new decisions in particular, are based on experience of other countries or tests and ensure the required level of safety.
- Ascertaining that the available information makes it possible to determine the safety of the facility or proposed activity.

Safety assessment involves the analysis of reactors physical properties, assessment of structural integrity of the cooling circuit of Ignalina NPP reactor, qualification and control of safety-related systems, management of ageing of safety-related systems, assurance of functionality of the accident confinement system, fire risk analysis, probabilistic safety assessment and the analysis of design-basis and beyond-design-basis accidents and their management.

Safety assessment often requires comprehensive, specific knowledge, which has to be regularly updated. Therefore considerable assistance in this activity has been provided by the Technical Support Organisations (TSOs) of Lithuania, the European Union and the IAEA by arranging workshops and other events, during which nuclear safety specialists were given a possibility to familiarise themselves with the most recent experience worldwide.

Analysis and upgrading of reactors physical properties

VATESI analyses fuel loading programs submitted by Ignalina NPP together with the safety justification documents, revises and approves them. Safety justification is based on the simulation of the reactor's core performed by special software. To verify the calculations, VATESI organises independent expertise performed by the Technical Support Organisations.

At present fuel is being unloaded from the shut down Unit 1 of Ignalina NPP. Fuel assemblies are unloaded in line with the safety justification documents and programme approved by VATESI. A fuel transportation facility installed in 2006 is used to take the fuel assemblies to Ignalina NPP Unit 2. After appropriate examination they are loaded into the reactor for the final utilization. In 2008, 712 spent fuel assemblies were unloaded from the reactor of Unit 1; 672 of these were transported to Unit 2, and 595 were loaded into the reactor. In the course of unloading, physical properties of Unit 1 reactor are being monitored. The process will continue until all nuclear fuel is completely removed from it.

Progress in modification of INPP reactor core
(data as of the end of the indicated year)

Year	Fuel content in the core (percentage)				ANA	Average burnout, MWd/FA	Control rods of new design, pcs.		
	2	Uranium-erbium					Fuel from INPP Unit 1	sb. 2477	CRR
		2.4	2.6	2.8					
1998	36%	64%	0%	0%	–	17	1148	71	0
1999	12%	88%	0%	0%	–	5	1247	96	0
2000	9%	91%	0%	0%	–	8	1247	96	0
2001	6%	91%	3%	0%	–	4	1229	96	0
2002	7%	69%	24%	0%	–	4	1248	127	0
2003	8%	44%	48%	0%	–	4	1294	127	0
2004	8%	33%	60%	0%	–	4	1308	127	4
2005	6%	8%	79%	7%	–	2	1378	103	28
2006	4%	3%	79%	14%	–	2	1429	82	49
2007	2%	3%	65%	30%	15%	4	1455	82	61
2008	1%	2%	55%	42%	30%	6	1548	82	61

ANA – additional neutron absorber
CRR – cluster regulation rods

Assessment of structural integrity of the cooling circuit of Ignalina NPP reactor

One of the main objectives of VATESI is to exercise the state regulation and supervision in solving the issues of nuclear safety in relation to the safe operation of the reactor's cooling circuit systems and components. The structural integrity of the reactor's cooling circuit has to be maintained both under normal operating conditions and in the case of unusual events along with the compliance with the design requirements throughout the entire operation period of the nuclear power plant by assuring reliable functioning of the systems relevant to its safety and cooling of the reactor. Hence maintenance and in-service inspection of the pipelines and equipment of the cooling circuit is performed on a regular basis.

In order to verify how the structural integrity of the reactor's cooling circuit is maintained by Ignalina NPP, VATESI specialists conduct regular inspections. In 2008, the inspection *Structural integrity of systems and constructions of Units 1 and 2, including spent nuclear fuel storage pools* was carried out; during the inspection no essential deficiencies having impact on the safety were established. Besides, in August 2008 the IAEA experts together with VATESI specialists verified the compliance of the control system exercised by Ignalina NPP and aimed at ensuring the structural integrity of fuel channels with the IAEA standards. The experts provided their conclusions and thereby stated that the operational control system of the fuel channels complies with the IAEA standards and best international practice.

By performing supervision of the assurance of the structural integrity of Ignalina NPP equipment and pipelines,

in 2008 VATESI specialists reviewed and analysed 4 technical decisions worked out and provided by Ignalina NPP and aimed at amending the terms of operational requirements set for welded joints of the reactor's cooling circuit pipelines and equipment.

By improving in-service inspection of equipment and pipelines, Ignalina NPP was continuously modernising and upgrading the equipment and methods of non-destructive testing which are reviewed and approved by VATESI. Ignalina NPP was implementing new technologies with an aim to reduce the probability of defects in welded joints and to increase the possibility to detect them.

Like every year during the routine maintenance in 2008, in order to assess the integrity of the circuit, 25530 welded joints were checked at Unit 2 of Ignalina NPP, and 165 welded joints of this quantity were found to have deviations from the limits set forth by the requirements. To assess the status of the fuel channels, Ignalina NPP performed in-service inspection of the fuel channels at Unit 2 of Ignalina NPP. The results of the performed inspection showed that all controlled parameters remained within the permissible limits.

Number of inspected welded joints at Ignalina NPP

	2003	2004	2005	2006	2007	2008
Unit 1	13000	210	170	150	150	150
Unit 2	15000	13050	180	24650	160	25530

VATESI, upon having assessed the documents submitted by Ignalina NPP on the results of the in-service inspection of pipelines and equipment and having ascertained that all controlled parameters have remained within the permissible limits, in September 2008 issued a permit to operate the reactor at Unit 2 under critical values of safety parameters with an aim to increase the capacity and generate electric power.

Moreover, in 2008 VATESI performed in-service inspection of operational control of the pipelines, equipment and fuel channels at Unit 1 of Ignalina NPP. VATESI specialists examined the documents drawn on the results of operational control, which evidenced that no non-compliance with the permissible limits set forth by the relevant requirements was established.

Qualification of safety-related systems

The qualification of safety-related systems is aimed to justify the capability of the systems and elements to perform the set functions during their entire lifetime under the designed operating conditions, including conditions of normal operation, transient status and design-basis accidents.

Ignalina Nuclear Power Plant, the operating organisation, abiding by the requirements of the *General Regulations for Qualification of Systems of Nuclear Facilities, VD-E- 10-2001* has to perform the qualification of the safety-related systems performing the main three functions:

- Shutting down and maintaining the reactor in sub-critical state;
- Removal of residual heat;
- Limitation of releases of radioactive products into the atmosphere up to the set limits.

In 2008, by implementing the *Plan of Measures for Harmonisation of the Reactor Safety*, Ignalina NPP conducted the qualification of control and measuring equipment at Unit 2 in line with the *Plan-Schedule for Qualification of Reference Measurement Equipment of Safety-Related Systems at Ignalina NPP in 2008*. Besides, the *List of Ignalina NPP Safety-Related Systems and Elements that have to be Qualified at Unit 2* was revised and approved.

In 2008, VATESI specialists, in accordance with the *Lists of Safety-Related Systems and Elements that have to be Qualified at Units 1 and 2* as well as prior to issuing the permit to launch into operation Unit 2 after its routine maintenance (RM), had analysed the results of the reports with a view to assure the compliance of the qualified safety-related systems and elements with the requirements and their capability to perform the pre-set functions during the given operating time.

Year-by-year VATESI has been controlling whether the qualification of safety-critical systems is conducted according to the list of safety-related systems and justified acceptability criteria, also, whether Ignalina NPP duly performs the compilation and evaluation of qualification data, as well as whether preparation and storage of documents is in the form acceptable to demonstrate the status of the safety-critical system. The results of analysis of the qualified safety-related systems and elements revealed that the acceptability criteria have not been breached and the functionality of the safety-related systems has been ensured during the entire operating time both under normal operating conditions and design – basis accidents.

Management of ageing of safety-related systems and elements

In the course of operation of nuclear installations, due to the impacts of various factors, physical-chemical alterations have been continuously occurring in the safety-related systems and elements; this process is characterised as the ageing of constructional and functional properties of the Plant.

Management of ageing of the safety-related systems is conducted to assess degradation of systems and elements of a nuclear installation over time and to project and implement the remedial measures aimed at maintaining the relevant level of safety. Management of ageing of Ignalina NPP safety-related systems and elements comprises the programs of ageing management, methods of ageing management, compilation of documents relevant to ageing management and the assessment of efficiency of ageing management.

To ensure compliance with the effective requirements and to maintain high standards of nuclear safety, VATESI was continuously supervising the implementation of the requirements set forth for the management of ageing. Abiding by the standard documents of Ignalina NPP and the *Requirements for Ageing Management of the Safety-Related Systems at Nuclear Installations*, VATESI specialists were continuously analysing the reports on the completed ageing management measures submitted by Ignalina NPP, assessing the operational factors which are affecting the alterations in the safety-related systems and elements over time and their compliance with the valid requirements.

In 2008 the assessment of the technical status of the elements and their remaining lifetime was further continued at Ignalina NPP according to the plan-schedule drawn for safety-related systems and elements the ageing of which has to be managed and according to the updated list. The methodology for the assessment of the technical status and the remaining lifetime was reviewed and updated as well. According to the list of the safety-related systems and components and with an aim to ensure nuclear safety, monitoring of the parameters of the safety-related systems and elements was conducted along with the operational control and maintenance works. The replacement of the safety-related systems and elements with expired validity by the new ones or the extension of their lifetime was undertaken.

The analysed reports evidenced that the safety-related systems and elements with the obligatory management of ageing satisfy the acceptability criteria, and their required safety functions, operation mode are within the limits of normal operation and the ageing effects have not impaired the safe operation of Ignalina NPP.

Assurance of functionality of the accident confinement system

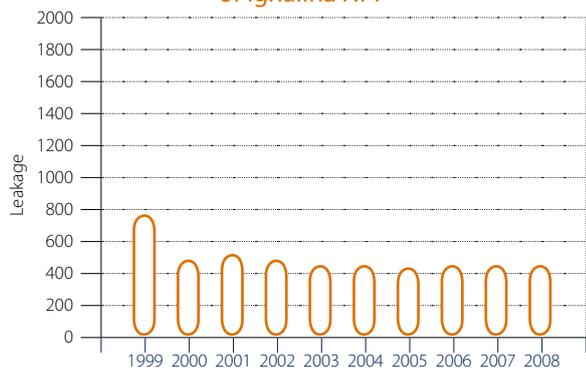
The accident confinement system (ACS) is categorised as a safety-critical system and it performs the following safety functions:

1. During normal operation of the power unit, the ACS performs the containment of radioactive products in sealed compartments with steam supply to the accident confinement system from the system of protection against overpressure in the main circulation circuit, periodical steam release through the main control valves and high-speed reducer to the ACS during testing, and

continuously from the pre-heating drainage of high-pressure circuit pipelines.

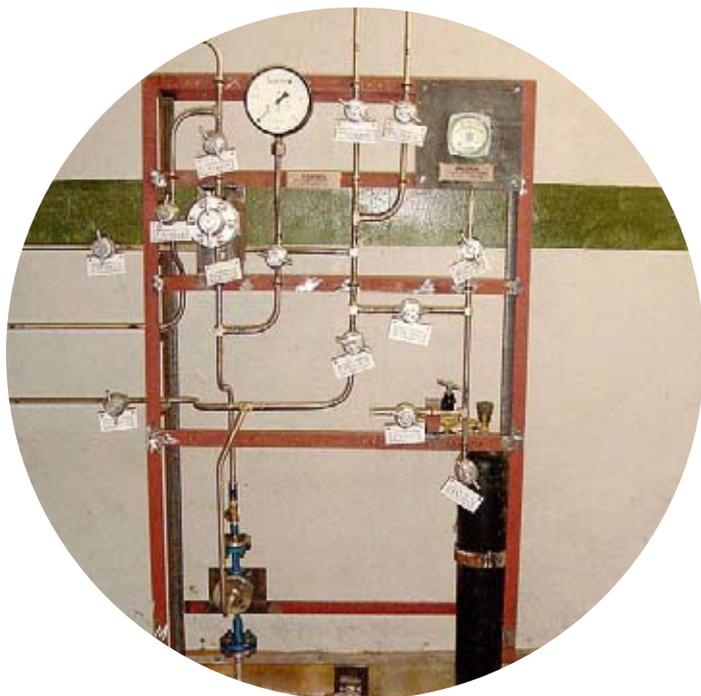
2. During the design-basis accidents, in the case of loss of heat removal, the ACS performs the containment of radioactive products in sealed compartments in the case of occurrence of any precursor indicated in the design and requiring functionality of the ACS.

Results of leakage measurements at Unit 2 of Ignalina NPP



In 2008, during the routine maintenance, Ignalina NPP conducted the ACS leakage test in line with the set requirements that evidenced that the leak-proofness of the system complies with the safety levels set forth in the design. The results of the ACS leakage tests were submitted for the analysis by VATESI, and Ignalina NPP confirmed that the ACS complies with the *Safety Requirements of the Accident Confinement System*.

In 2008, by implementing the requirements of VATESI regulations, Ignalina NPP upgraded the control system of hydrogen concentration in the ACS, worked out the methodology of hydrogen concentration measurement in the upper steam collection chamber. VATESI, with the assistance of TSO LEI specialists, examined the provided reports, and, upon having familiarised themselves with this new system and measurement methodology, stated that the equipment selected by Ignalina NPP for measurement of hydrogen concentrations in the upper steam collection chamber, as shown in Figure 1, as well as the measurement methodology were adequate for accomplishing the set goal of safety assurance.



Measurement equipment of hydrogen concentration in the upper steam collection chamber

Fire risk analysis

In 2008 no fires occurred at Ignalina NPP. The fire safety system at Ignalina NPP is categorised as a safety-related system. The main objective of the system is to protect the systems and elements operating at Ignalina NPP from fire and its consequences with an aim to ensure performance of safety functions assigned to the safety-related systems. Ignalina NPP ensures fire safety at safety-related systems involved in the implementation of the safety concept that has the following goals:

- To prevent the occurrence of fire;
- To expeditiously detect and extinguish breaking fires;
- To restrict distribution of fire and to mitigate its consequences.

In 2002-2004, Ignalina NPP had conducted the fire hazard analysis (FHA) for Unit 2. VATESI, assisted by the Technical Support Organisations of Lithuania and foreign countries, conducted the review of the fire hazard analysis. The results from FHA confirmed the adequacy of fire safety. All fire safety improvement measures set forth in the FHA were implemented by 2008. Equipment of the automated fire alarm system was upgraded according to one of the accomplished safety improvement measures.



Console panel of the automated fire alarm system at INPP Unit 2

In 2008, VATESI specialists analysed and provided their comments on the reports of fire hazard analysis at the interim spent nuclear fuel storage facility (B1), the facility for conditioning and storage of solid radioactive waste (B34 project), the storage facility of radioactive waste of very low activity (B19-1).

The main result of the completed FHA – weak fire safety points in these planned to be constructed facilities were identified and the remedying measures were worked out.

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

The deterministic safety analysis (DSA) is engineering and scientific study in the course of which the analysis of physical – neutronic, thermohydraulic, structural integrity and radiological aspects of safety-critical constructions, systems and components of a nuclear power plant is conducted. Behaviour of a nuclear power plant's safety-critical constructions, systems and components under normal operating conditions and their functioning in the case of deviation from normal operation (also referred to as the "anticipated operational occurrence"), as well as design-basis and beyond-design-basis accidents are analysed by using verified validated computer codes. According to the results of the DSA calculations, the assessment of functioning and integrity of the power plant's physical barriers, efficiency of technical and organizational measures protecting and supporting these

physical barriers, implementation of the concept of defence in depth, accomplishment of the fundamental nuclear safety functions, possible spreading of radiological substances into the premises of the nuclear power plant and their release into the environment, risks to the personnel, local population and the environment is made. The DSA is conducted in the course of preparation of nuclear safety justification documents by Ignalina NPP – nuclear safety justification of modifications in the plant and operation manuals, nuclear safety justification of operation modes, nuclear safety justification of experiments and tests, in-depth and periodical nuclear safety analysis reports and other documents.

In 2008, Ignalina NPP completed the implementation of five analytical measures under the safety improvement program SIP-3/2008 concerning the analysis and management of anticipated operational occurrences and design-basis accidents. In the final reports on the implementation of these measures answers were given to the remaining nuclear safety issues, which had been identified by VATESI in the course of licensing of Ignalina NPP Unit 2, in 2001-2004. The reports submitted by Ignalina NPP revealed that, with regard to the essential uncertainties of neutronic and thermal parameters, nuclear fuel does not melt during reactivity initiated accidents, i. e. the temperature of the fuel remains below its melting point. Upon having assessed the submitted data, calculation methodologies, assumptions, results and conclusions, VATESI established that the nuclear safety requirements were met and the prescribed nuclear safety measures were implemented.

In 2008, Ignalina NPP amended the symptom based emergency operating instructions (SBEOI) and the emergency support instructions (ESI). The symptomatic nuclear accident instructions and the nuclear emergency support instructions had been implemented at Ignalina NPP in 2001, and they were periodically reviewed and elaborated with regard to the configuration of systems and components at Ignalina NPP and other procedures set for the emergency operation of the power unit. The SBEOI and ESI are designated for the use by Ignalina NPP operating personnel to manage the design-basis accidents, and partially, beyond-design-basis accidents. In March VATESI reviewed and approved the amendments of the SBEOI-2, 3, 4 and 5 and of the ESI- 3. In September VATESI reviewed and approved new revision of the SBEOI-1 and 2. In December VATESI reviewed and approved a new revision of the ESI-1.

In 2008, Ignalina NPP completed the implementation of the eight safety improvement measures under SIP-3/2008 related to the management of beyond-design-basis accidents, including the severe accidents. In March Ignalina NPP provided the *Manuals for Management of Beyond-Design-Basis Accidents* and the relevant justification of their safety which had been adjusted in line with the comments from VATESI expertise and the recommendations from the IAEA RAMP mission which had been arranged in January 2007. In April VATESI approved the *Manuals for Management of Beyond-Design-Basis Accidents at Ignalina NPP*. In August Ignalina NPP submitted an additional document – the *Procedure of Shutting down and Cooling of Ignalina NPP Unit 2 in the Case of Total Blackout*. In September, upon having assessed the Procedure, safety justification and supplementary information on the verification and validation of the Procedure, VATESI approved the document. In September



specialists of Ignalina NPP Training Centre arranged training of the operating personnel and staff of the Technical Support Centre on management of beyond-design-basis accidents. Upon having analysed and assessed the submitted information on the implementation of additional tools for management of beyond-design-basis accidents (7 modifications), on the verification and validation of documents (Procedures and Accident Management Manuals, protocols of the personnel training), in October VATESI issued a permit to implement the *Management Procedure of Beyond-Design Basis Accidents at Ignalina NPP Unit 2 and Spent Nuclear Fuel Pools*.

In December 2008, nuclear safety specialists conducted the inspection with a view to verify the performance of nuclear safety requirements in managing beyond-design-basis accidents. The inspection commission and Ignalina NPP specialists discussed the implementation of the Plans of Measures for upgrading the documentation on management of beyond-design-basis accidents, made inquiries about the training of the operating personnel and staff of the Technical Support Centre in the management of beyond-design-basis accidents. In the course of the inspection, some non-compliance was established and the organisation operating the nuclear power plant was obligated to remove them.

Probabilistic safety assessment

The risk posed by nuclear facilities can be assessed quantitatively with the use of probabilistic safety assessment (PSA). While performing this kind of analysis, the effect on the risk of the systems designated to protect facilities against accidents and to mitigate the impacts of accidents that did occur, as well as on the risk of auxiliary safety systems is assessed. Information obtained in the course of the PSA can be used both when designing nuclear facilities and operating them.

In 2007, VATESI initiated the works related to the application of the PSA model of Ignalina NPP in VATESI activity. In 2008, in cooperation with the Technical Support Organisations, special software for the analysis of extraordinary events at nuclear installations was procured. The results of this analysis will complement the results obtained with conventional methods, which will make it possible to assess an event's importance to safety in a more detailed manner. The application of the PSA model will enable to assess potential events that might occur if the circumstances had been somewhat different. The use of the abovementioned software and model makes it possible to assess the impacts of different operation modes of the nuclear facility, changes in technological regulations and non-compliances revealed in the course of inspections on the safe operation of Ignalina NPP.

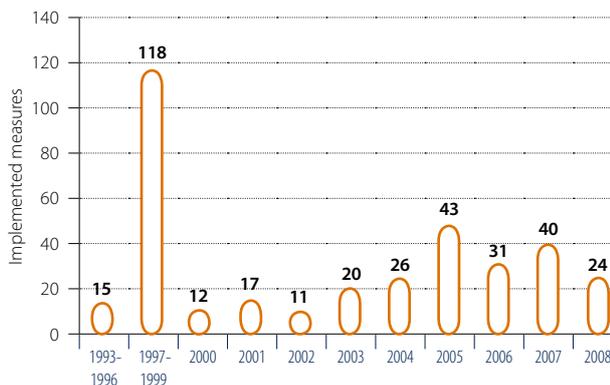
In 2008, Ignalina NPP submitted the report on the *Probabilistic Safety Assessment at Ignalina NPP* drawn in line with the IAEA IPSART repeated mission's recommendations aimed at improving the quality of PSA: updating the probabilistic analysis of personnel errors, supplementing the PSA model and the analysis of primary events, the analysis of the PSA model and uncertainties and application of the PSA methodology in determining the regularity of testing of safety-related systems. VATESI specialists analyzed the report and found no non-compliances with contemporary requirements.

Implementation of safety improvement program (SIP-3)

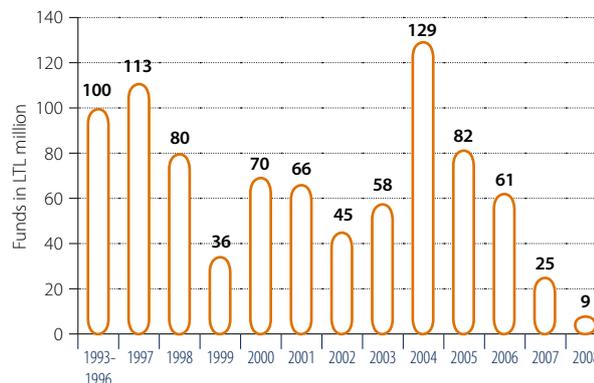
Nuclear energy experts are unanimous that the only way to successfully develop nuclear power lies in unconditional assurance of safety and reliability based on rational application of scientific and technological innovations. Therefore safety at Ignalina NPP has been continuously improved.

In 1993-1996 a special safety improvement program (SIP-1) was carried out, in 1997-2004 SIP-2 and, starting from 2005, work in this area has been continued by implementing the program (SIP-3) coordinated with VATESI that is updated and reviewed on an annual basis. The Ministry of Energy of the Republic of Lithuania approves the program. By implementing the safety improvement measures, more than 350 of them were put into practice in 15 years. Approx. LTL 847 million was spent for the purpose.

Implementation of safety improvement measures at Ignalina NPP in 1993-2008



Funds allocated for safety improvement at Ignalina NPP in 1993-2008



To make sure that safety upgrading measures are implemented in a timely and adequate manner, VATESI is supervising the implementation of the safety improvement program by Ignalina NPP. Ignalina NPP, upon having implemented a SIP measure, informs VATESI about it and submits documents to confirm it (quarterly and final reports on measure implementation, the statements of work handing over

and acceptance, and other relevant documents). In addition to that, VATESI specialists conduct inspections to check the implementation of safety improvement measures. Progress in this work has been repeatedly discussed at the periodically held meetings of Ignalina NPP and VATESI management.

Forty three safety improvement measures were included in SIP-3/2008 program; 37 of these were to be implemented in 2008, one is to be accomplished in 2009, and one in 2010. Four of the measures are being implemented on a permanent basis.

In 2008, Ignalina NPP implemented and coordinated with VATESI 24 measures. The works related to the implementation of 13 measures were not completed in 2008 and were transferred to SIP-3/2009 program. The main reasons of delay indicated by the managers of the nuclear power plant – long-lasting signing of the contracts with suppliers, delayed delivery of equipment, preparation and submission to VATESI of the reporting documents. The continuous measures were also being implemented in 2008, such as the implementation of management program of ageing of safety-related systems, verification of metering equipment of safety-related systems, planned testing in the accident confinement system during the routine maintenance of Unit 2.

In 2008, Ignalina NPP accomplished and coordinated with VATESI the following principal safety improvement measures:

1. Installation of the diversified reactor shut-down system at Unit 2;
2. Design, manufacturing, delivery and installation of servo drives of new design in the diversified reactor shut-down system at Unit 2;
3. Upgrading of the Unit's control room training simulator in relation to the installation of the diversified reactor shut-down system at Unit 2;
4. Analysis of radiation effects of design-basis accidents (update) by determining the impact of the increased average burnout of the reactor's core when using erbium fuel;
5. Preparation of the guiding document for management of beyond-design-basis accidents;

6. Development of the system for the identification and selection for further analysis of near miss events, precursors, low level events;
7. Training of personnel in line with the new requirements set by the IAEA for management systems and other.

Safety upgrading at Ignalina NPP is an important and responsible process, targeted to continuously improve the safety of the INPP Unit 2 and the systems and procedures important to safety with regard to the operational experience of the Ignalina NPP and organizations of foreign countries.

Safety culture

VATESI is responsible for ensuring that enterprises which were granted a license by the inspectorate, including Ignalina NPP, would guarantee the adequate safety culture.

VATESI monitors safety culture at Ignalina NPP. In 2008, specialists analyzed the periodic reports of Ignalina NPP on the safety culture assessment survey among its employees, which was carried out in 2007, and monitored other Ignalina NPP activities to ensure safety culture.

The monitoring of safety culture is performed by analysing quarterly reports of Ignalina NPP based on the system consisting of 11 indicators. This system reflects the trends in ensuring and improving the competence of the employees, identification of established shortcomings drawbacks and their elimination.

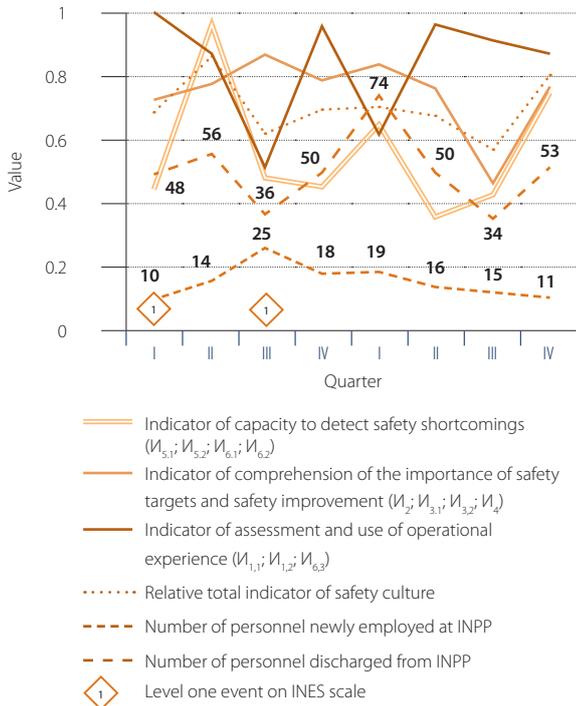
In 2008, Ignalina NPP was implementing its target to maintain the total yearly indicator of safety culture (in the Table - I_{KB}) above 65 %; the average indicator was 68.7%. The following positive trends of safety culture were ascertained for the second consecutive year:

- efficient internal and external training processes ($I_{1,1}$ and $I_{1,2}$, respectively);
- high values of the coefficient of implementation of inspections results ($I_{3,2}$), and the coefficient of implementation of personnel proposals regarding modifications ($I_{6,2}$).

Safety culture indicators at Ignalina NPP in 2008

Indicators of safety culture monitoring at Ignalina NPP		2008			
Code	Short description	Quarter I	Quarter II	Quarter III	Quarter IV
$I_{1,1}$	Coefficient of organisation of internal training at Ignalina NPP	0.92	1	1	1
$I_{1,2}$	Coefficient of organisation of external training outside Ignalina NPP	1	1	1	1
I_2	Coefficient of implementation of Safety Committee's recommendations	1	1	0.67	0.67
$I_{3,1}$	Coefficient of implementation of audit results	0.38	0.18	0.2	0.43
$I_{3,2}$	Coefficient of implementation of inspection's results	0.94	0.94	0.95	0.96
I_4	Coefficient of non-recurrence of events	1	1	0	1
$I_{5,1}$	Coefficient of events due to personnel error	0	0.5	0.5	1
$I_{5,2}$	Coefficient of incentive / punitive measures applied to personnel	1	0.1	0.17	0.2
$I_{6,1}$	Coefficient of implementation of personnel proposals submitted to Ignalina NPP top management	1	0	0	1
$I_{6,2}$	Coefficient of implementation of personnel proposals regarding modifications	0.6	0.83	1	0.8
$I_{6,3}$	Coefficient on work with personnel proposals to use own and operational experience	0	0.87	0.76	0.67
I_{KB}	Total relative indicator of safety culture efficiency	71.20%	67.50%	56.80%	79.40%

Trends of safety culture indicators in 2007-2008



In 2008, at Ignalina NPP there were no events assigned to level one or higher on the INES scale; the number of employees decreased by 150 persons (as of 1 January 2008, the number of INPP employees was 3145, and as of 1 January 2009 – 2995 employees). Since 1998, with an aim to give full-safe assessment of the level of safety culture at Ignalina NPP, special surveys of employees have been conducted every few years by using special safety assessment questionnaires. According to the survey procedure, the employees, by filling in a special questionnaire, evaluate 33 statements corresponding to 11 indicators of safety culture. The surveys were conducted in 1998, 2000, 2004, 2007, and also in 2008 when the management has taken into consideration a complicated period of Ignalina NPP closure.

Results of surveys of Ignalina NPP employees in 2004-2008

Safety culture characteristics at Ignalina NPP	Summarised evaluations given by employees, in percent (percentage from the possible maximum positive evaluation)		
	2004	2007	2008
Role of Heads of Divisions and obligation to assure safety	Excellent 90	Excellent 92	Excellent 92
Responsibility of Heads of Divisions and focus on safety issues	Excellent 86	Excellent 87	Excellent 88
Leadership and assignment of strategic importance in solving safety issues	Excellent 86	Excellent 87	Excellent 87
Organisation of decision-making process in safety issues	Good 84	Excellent 87	Excellent 87
Involvement of personnel in solving safety issues	Good 76	Good 80	Good 81
Examination of own operational experience	Good 82	Excellent 87	Excellent 86
Assessment of nuclear safety	Excellent 90	Excellent 91	Excellent 91
Mutual trust among managers and other employees	Excellent 88	Excellent 90	Excellent 89
Openness in communication	Good 76	Good 80	Good 82
Operation performance without impairment of top priority of nuclear safety	Satisfactory 73	Good 78	Good 80
Attention to employees performing job assignments	Satisfactory 67	Good 76	Good 79
Number of Ignalina NPP employees who responded to questionnaire	305	825	785
Number of employees	3642	3268	3145

Overall results of surveys arranged in 2007 and 2008 revealed that in general most of the respondents evaluated the indicators that are important in the assessment of safety culture either as 'good' or 'excellent'. It should be noted that the 'satisfactory' evaluation of operation performance without impairment of top priority of nuclear safety and the attention to employees performing job assignments were replaced by positive ('good') rating in 2007 and 2008. In 2009 the managers of Ignalina NPP will have to make additional efforts to assure that preparations to fundamentally change the organisational structure of the company in 2010 would not deteriorate high indicators of safety culture.

Supervision of decommissioning

Ignalina Nuclear Power Plant, as the organisation operating this nuclear facility, is responsible for the safe decommissioning, decontamination and dismantling of equipment as well as for the management of radioactive waste.

Every nuclear facility has to undergo the stage of decommissioning. This stage, starting from preparation of decommissioning projects and finalised by specific decommissioning works, must be conducted in a safe manner. The State Nuclear Safety Inspectorate (VATESI) licenses these activities, analyses safety of the projects, and arranges a special expertise of the projects in terms of nuclear safety.

In May 2008, VATESI approved the *Final Plan of Ignalina NPP Decommissioning*. The Plan covers the entire decommissioning process which has been divided into individual decommissioning projects. Every project must be coordinated with appropriate institutions, and its safety must be justified. All decommissioning operations, organisational, technical and radiation protection measures are included in the scope of the project, dismantling and decontamination methods are identified, equipment and tools necessary for the works and the conditions of their use are described, and methods of radioactive waste management are set forth. In the safety analysis report it is verified that individual decommissioning works and the process as a whole will be safe.

In 2008, Ignalina NPP continued the preparatory projects for decommissioning: the construction and installation of spent nuclear fuel storage facility, removal of radioactive waste from its storage facilities, installation of equipment for handling solid radioactive waste and its storage facilities; the installation of measuring equipment of uncontrolled levels of radioactivity in decommissioning debris were approaching their completion; the design works for the construction of radioactive waste repository of very low, low and medium level of activity were started. Without having completed

these projects there will be no possibility to start the works of dismantling and decontamination of the nuclear facility.

In 2007, VATESI specialists analysed and approved the Technical Specification of B9-0 project, examined modifications in the Technical Specification of B9-1 project. Both technical projects comprise the preparatory works for dismantling and decontamination of equipment in the compartments of building 117 at Ignalina NPP Unit 1 (*B9-0 project*) and the turbine hall (*B9-1 project*). In 2008 Ignalina NPP prepared the design documentation for dismantling and decommissioning works, their safety justification as well as the Program and Report of the Environmental Impact Assessment (EIA). The EIA Report for dismantling and decontamination of building 117 was revised and approved by VATESI. It is being planned that Ignalina NPP will submit for revision the documents of the technological projects for dismantling and decontamination of building 117 and turbine hall in 2009.

Ignalina NPP was also getting ready for other dismantling works: in March 2008 the Technical Specification for dismantling and decontamination project of the reactor's gas circuit (*B9-2 project*) was reviewed and approved. Subsequent amendments of the mentioned document were approved as well. In the course of implementation of these projects, technological projects and safety justification documents that are necessary for the licensing of dismantling works, along with the technical specifications needed for procurement of equipment will be worked out.

Ignalina NPP reactors are of unique design and practically not a single reactor of this type has been dismantled anywhere in the world as yet. The gas-cooled reactors with graphite moderators in France and Spain have been conserved and now they are safely waiting till the development of their dismantling and graphite handling technologies is finalised. Although the dismantling of Ignalina NPP reactor will be undertaken in the course of one of the final dismantling and decontamination projects, the *Feasibility Study for Dismantling of a RBMK-type Reactor* has been initiated and the preliminary safety assessment of such works has been carried out. In November 2008 VATESI approved the Technical Specification of this project.

Management of radioactive waste

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

Considerable amounts of solid radioactive waste are generated during operation of Ignalina NPP. The volumes of this type of waste accumulated by 2009 totalled 25342 m³.

Amount of waste (m ³)	Group 1 Combustible	Group 1 Incombustible	Group 2 Combustible	Group 2 Incombustible	Group 3	Total
Accumulated as of 1 January 2009	11424	839	2179	2785	815	25342

Liquid radioactive waste is also generated at Ignalina NPP. It is evaporated in special evaporation facilities, and the evaporation residue is bituminized. The steam that forms following evaporation is filtered through special ion exchange and pearlite filters that retain radionuclides. The filters are then cemented.

In 2008, 456 m³ of bituminized waste was stored in the radioactive waste storage facility (building 158). By 2009, 13 186 m³ of bituminized waste accumulated in this storage facility. In 2008, 134 m³ of ion exchange resins and pearlite was processed in the cementation facility; total processed quantity was 286 m³. In 2008, 1430 cemented waste packages (drums) were produced that are stored in the cemented waste storage facility (building 158/2). By 2009, 3158 cemented waste packages were produced.

In 2008, the Radioactive Waste Management Strategy was reviewed and updated. According to this Strategy, Ignalina NPP has to implement a new classification system of radioactive waste, to install radioactive waste processing and storage facilities, a new storage facility of spent nuclear fuel at Ignalina NPP, to examine the possibility to convert the bituminized waste storage facility into a repository. In addition to that, the repositories for short-lived radioactive waste have to be constructed.

In 2008, VATESI together with experts reviewed the study submitted by Ignalina NPP on conversion of the storage facility of bituminized waste into a repository, which had to prove the possibility of conversion of a storage facility into a repository by constructing additional barriers. VATESI stated in its conclusions that the results of the study were not sufficient to prove the possibility to

construct a repository; therefore it is necessary to make additional assessments.

In 2007, Ignalina NPP prepared the technical design of waste processing and storage facilities as well as a preliminary safety analysis report (project B3/4) and submitted these documents for review by VATESI and other institutions. VATESI, upon having reviewed the submitted documents together with experts, provided their comments and subsequently analysed the explanations given to their comments, and in the end of 2008 approved the project.

As of late 2007, the Ignalina NPP submitted to VATESI and other institutions for review the technical design of a new storage facility for spent nuclear fuel and a preliminary safety analysis report. VATESI, upon having reviewed the submitted documents together with experts, provided their comments and subsequently analysed the explanations given to their comments.

As of late 2008, Ignalina NPP submitted the technical design of a repository for radioactive waste of very low activity and a preliminary safety analysis report; at present VATESI is analysing the report and will provide its comments.

In 2007, the Government made a decision to design a repository to be constructed at Stabatiškės site. VATESI reviewed the Technical Specification for very low and medium activity short-lived radioactive waste repository and approved the document on 16 December 2008.

As of late 2008, the spent fuel from Ignalina NPP spent nuclear fuel ponds loaded into 20 containers of CASTOR RBMK 1500 type and 82 containers of CONSTOR RBMK 1500 type was loaded at the dry interim storage facility for spent nuclear fuel.

Radiation protection of nuclear installations

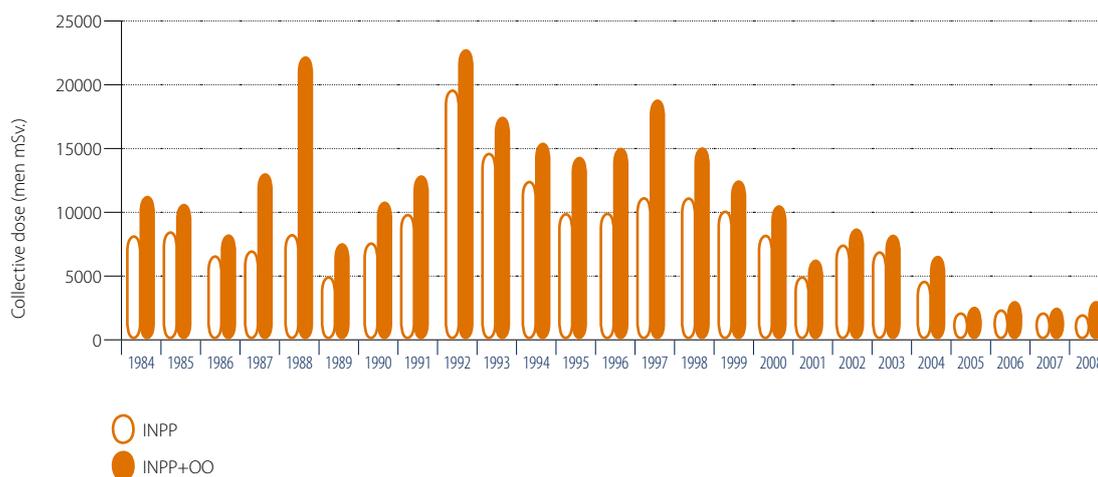
VATESI is the principal state institution that is carrying out the functions of control and supervision of nuclear facilities and performing state regulation of nuclear safety and radiation protection in nuclear energy. Therefore even before a license is issued for designing, constructing and operating 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 protection of the population and environment against hazards that a nuclear installation may pose. The nuclear installation itself must have properties ensuring that the effects of ionizing radiation to the population and environment do not exceed the set limits both during normal operation and in the case of an emergency. Therefore VATESI is controlling compliance with license conditions and requirements set in safety regulations

and standards during operation of such installations. It is compliance with these requirements and the use of relevant technologies and measures that help to protect the population and environment from negative effects of ionizing radiation.

The results from the year 2008 of the occupational exposure control, monitoring of radiological effects to the population and environment showed that Ignalina NPP is being operated safely. The average individual dose of the employees of the power plant and contractors' organizations in 2008 was 0.91 mSv and did not surpass the set limit.

Since the beginning of operation Ignalina NPP has been conducting occupational exposure control of its own personnel and that of contractors' organizations. In 2008, individual dosimetric control was applied to 3599 persons, including 2320 – the INPP personnel. Distribution of external exposure collective doses in 1984-2008 is shown Figure.

Annual collective doses of INPP and other organizations' (OO) personnel



After Unit 1 was shut down, the collective personnel's exposure dose significantly decreased in 2005–2008. The largest collective dose is received during annual maintenance. Therefore the duration of this work is very important. In 2008, the annual collective dose of the INPP and contractor organizations' personnel was 74% of the planned annual dose. In the course of the annual maintenance in Unit 2 the collective dose was 74% of the personnel's overall exposure dose. The average

individual dose of the INPP and contractors' organizations in 2008 was 0.91 mSv. Of all the personnel of the INPP, an employee of the reactor department was subjected to the largest dose (18.09 mSv). The largest individual dose received by an employee of contractors' organizations was 19.98 mSv. These values did not exceed the set limit of 20 mSv.

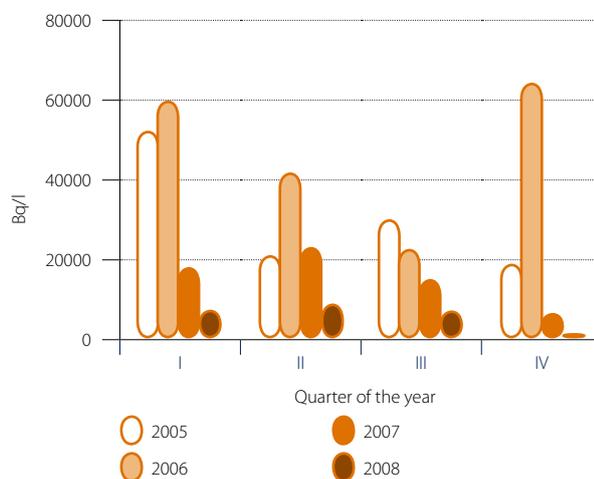
To protect the environment and at the same time all local population, emissions from Ignalina NPP into the atmosphere

and Lake Drūkšiai have been limited. In the course of radiation monitoring conducted at Ignalina NPP the emissions were found to be very much below permissible levels. In 2008, emissions of inert gases into the atmosphere were 0.74%, those of radioactive aerosols 0.23%, and those of ¹³¹I 1.16% of the permissible level. The total emission of radionuclides into Lake Drūkšiai was 13% of the set limit. Evaluation of the dose received by the critical group of population in 2008 showed that the exposure resulting from emissions into the atmosphere and the lake was 150 times lower than the dose set in the standard document LAND 42-2007. The established dose rate in the sanitary protection and monitoring zones was the same as the natural background radiation.

The Maišiagala Radioactive Waste Storage Facility is another nuclear facility of Lithuania. In 2008, VATESI conducted uninterrupted radiological monitoring of the facility, with exposure doses and environmental pollution being observed on a continuous basis. Tritium (³H) is the most important radionuclide at the Maišiagala Radioactive Waste Storage Facility. It accounts for more than 70% of the overall activity. The maximum activity of tritium in observation wells of the Maišiagala Radioactive Waste Storage Facility.

By quarters of 2005-2008 is presented in Figure. The data illustrate that the measured values do not exceed the set limits.

Maximum values of tritium volumic activity in observation wells of the Maišiagala Storage Facility in 2005-2008



Emergency preparedness

International commitments

In 2008, VATESI was closely cooperating with IAEA, the European Commission and organizations of other countries responsible for emergency preparedness.

An extraordinary meeting of authorized EU Member States institutions of the European Community Urgent Radiological Information Exchange (ECURIE) was held in November 2008 in Brussels; the meeting was aimed at evaluating the experience gained during the events at Krško NPP in Slovenia and at the National Radio Elements Institute of Belgium. On 4 May 2008, the Slovenian competent institution issued an alert notification via ECURIE system about an incident at Krško Nuclear Power Plant in Slovenia. As it turned out, the alert had been issued without detailed assessment of the situation, whereas afterwards it was confirmed that there had been no malfunctioning of the primary cooling system of the plant, just a relatively small leakage of the coolant had occurred. The issued radiological alert captured the attention of the media, the European Parliament and the public. During 20 years of the existence of ECURIE system, the alert of such level was issued for the first time.

One more radiological alert was issued on 28 August 2008 via ECURIE system notifying that there had been a release of radioactive Iodine – 131 from the National Radio Elements Institute in Belgium. Later it turned out that this event was assessed inadequately and did not comply with the criteria set for notification about radiological alert.

During the extraordinary meeting of the authorized EU Member States institutions of the European Community Urgent Radiological Information Exchange (ECURIE), the Member States exchanged information about reaction to the mentioned events in their countries and provided proposals on possible ways to avoid interpretation of events of such type as radiological alert in the future. By taking into consideration the proposals of the Member States, the instructions on the use of ECURIE system were adjusted, the criteria for issuing a radiological alert notification were defined in a more strict and detailed manner.

Apart from the aforesaid events, information about 11 events was disseminated via the official IAEA and the European Community Urgent Radiological Information Exchange systems. Most events were related to lost or stolen radioactive sources or withheld goods which were contaminated with radioactive substances. On 31 May 2008 Finland issued a notification about unscheduled automated

shutdown of Unit 1 at Olkiluoto NPP due to malfunctioning of its cooling system. However, the event had no serious effects and after the completion of the repair works in Unit 1, it was successfully launched into operation.

In May 2008 VATESI was visited by the specialists of emergency preparedness from Swedish Radiation Safety Authority (SSM). One of the principal objectives of this visit was to discuss and to draft a final version of the *Bilateral Agreement on Early Notification about a Nuclear or Radiological Accident*. This agreement will obligate both parties to exchange information about nuclear and radiological hazards and other incidents which do not pose direct threat to human beings and the environment. Lithuania has signed similar agreements with Denmark, Norway, Latvia and Poland. Although the parties exchange information about radiological and nuclear accidents via official channels of the European Commission and the IAEA, the agreements of such type enable the parties to directly exchange information thus ensuring its expeditious dissemination.

Emergency preparedness of VATESI

While implementing its commitments under the Convention on Early Notification and ECURIE agreements, VATESI has successfully organised duty that ensures the 24-hour a day communication with international and Lithuanian institutions. As of late 2008, VATESI had 14 duty officers. Last year, in order to maintain and improve the skills of duty officers, 47 VATESI and 4 international communication tests were performed.

Specialists from VATESI Emergency Response Centre had an opportunity to check their readiness in two exercises arranged by the IAEA and one exercise arranged by the European Union.

The IAEA exercise was arranged in May. The objective of the exercise was to examine the competence of specialists in using the ENAC system - the IAEA early notification system of a nuclear or radiological accident.

In July, the IAEA international preparedness exercise was arranged. The exercise scenario and the venue of a supposed accident were known in advance. According to the scenario, a nuclear accident occurred in Mexico, Laguna Verde Nuclear Power Plant, in the result of which radioactive substances were released into the atmosphere. The exercise lasted for 48 hours, therefore duty shifts were organised at VATESI Emergency Response Centre. During the exercise, the main goal of VATESI

was to assure 24-hour communication with the IAEA and to verify the functionality of the Emergency Response Centre in performing the 24-hour a day operation. In September, VATESI specialists took part in the European Union emergency preparedness exercise. The exercise was coordinated by the Fire and Rescue Department under the Ministry of the Interior. One of the scenarios during this exercise – interrupted power supply in the country (blackout) for 72 hours. During the exercise the main goal of VATESI was to prepare information about the nuclear power plant, to provide it to international organisations and state authorities and to assess the institution's capability to perform its functions in the case of interrupted power supply.



In the conclusions drawn after the exercise VATESI stressed that in order to assure the activity and performance of functions of the institution in the case of blackout situation, VATESI has to be equipped with a source of uninterruptible power supply and satellite communication.

Emergency preparedness at nuclear facilities

On 11 June 2008, the Radioactive Waste Management Agency (RATA) submitted an updated emergency preparedness plan of the Maišiagala Radioactive Waste Storage Facility. VATESI specialists examined and approved the plan.

On 24 October, by the Order of VATESI Head, the new Requirements of Emergency Preparedness for the Organisation Operating a Nuclear Facilities were approved. This document replaced the requirements which had been approved in 2003. According to the new requirements, the operating organisation is obligated to develop the infrastructure and to set the functions which would assure prevention of accidents and incidents and, in the case of an accident, would mitigate the accident consequences as much as its is possible. The new requirements were prepared in line with the new requirements of the IAEA.

On 15 December, the inspection of emergency preparedness at Ignalina NPP was conducted with an aim to check how the plan of corrective measures was being implemented, how the training of the INPP personnel and the contractors' organisations and inspection of emergency preparedness is arranged.

The results of the inspections revealed that not all documentation kept at the Ignalina NPP emergency centre is updated on time. Moreover, was noted that not all training courses listed in the Annual Emergency Preparedness Plan were delivered. During an additionally arranged inspection, the members of the Commission checked the supplies of potassium iodide at the emergency centre of the Emergency Preparedness Organisation and their suitability for use, the documents of servicing the alternative power generation source and its supplies of diesel fuel, supplies of personal dosimeters to the personnel of the Emergency Preparedness Organisation. Although some non-compliance was established during the inspection, it can be stated that Ignalina NPP personnel responsible for accomplishment of the inspection was adequately prepared; they provided relevant documents and invited competent specialists who answered the questions which were of importance to the Commission.



Accounting and control of nuclear materials, application of safeguards



From 1 January 2008, Lithuania has moved from the implementation of the Bilateral Safeguards Agreement and the Protocol Additional signed with the IAEA, to the Trilateral Safeguards Agreement (with IAEA and EURATOM) and the Protocol Additional.

After this alteration, VATESI approved the *General Requirements* for the accounting and control of nuclear materials and for notifying about nuclear energy or other nuclear power related activities as well as the *Recommendations for the Implementation of the General Requirements* for the accounting and control of nuclear materials and notifying about nuclear energy or other nuclear power related activities. To achieve smooth transition, reports on nuclear materials' accounting were prepared: the final report to the IAEA and the initial report to the European Commission.

Accounting and control of small quantities of nuclear materials

The main difference after the transition from the Bilateral Safeguards Agreement and the Protocol Additional to the Trilateral Safeguards Agreement and the Protocol Additional was that previously all nuclear materials (with the exception of nuclear fuel) in the territory of Lithuania had been allocated to a single zone in the materials balance area (MBA) – the WLTC. After transition to the Trilateral Safeguards Agreement, the European Commission assigned individual MBA codes to each institution having nuclear materials in its disposition. In the WLTC zone there still remain 9 users of small quantities of nuclear materials. The accounting of nuclear fuel quantities then had been conducted and further remained in two zones of the balance area: the WLTA – for Ignalina NPP and the WLTD – for the spent nuclear fuel storage facility. On 19-22 August 2008, the first joint inspection by VATESI, the European Commission and the IAEA was performed in the six of 10 newly allocated zones.

On 3 March 2008, VATESI, with participation of an expert from the Institute of Physics, performed an inspection at

Klaipėda University Hospital. The goal of the inspection was to verify whether Klaipėda University Hospital has in its disposition any nuclear materials. By applying the gamma spectrum examination during the inspection, it was established that the biological protective shielding container of the gamma therapy apparatus consists of depleted uranium. Klaipėda University Hospital, following the conclusions of the inspection, provided VATESI with a declaration of nuclear materials owned by the hospital.

Accounting and control of nuclear fuel

One planned inspection of physical inventory verification at Ignalina NPP and SNFSF was conducted by the IAEA, the European Commission and VATESI in April 2008. During the inspection the records in the accounting documents were checked, fresh and spent nuclear fuel and the seals chosen using probabilistic statistical method were examined.

Moreover, in February and October 2008, two unannounced inspections were conducted at Ignalina NPP and SNFSF by the IAEA with the presence of inspectors delegated by the European Commission. The results of the inspections indicated that Ignalina NPP properly conducted the accounting of fuel caskets and correctly declared their number.

Inspection activities by the IAEA, the EC and VATESI in 2008 are summarised in the Tables below along with the comparative data of two previous years and the data of nuclear materials accounting.

Summary of the IAEA, EC and VATESI inspection activities in Lithuania in 2006-2008

Summary of the IAEA, EC and VATESI inspection activities in Lithuania in 2006-2008

	2006	2007	2008
Total number of IAEA inspectors and technicians' man days in Lithuania	156	164	206
Number of EC inspectors' man days in Lithuania	8	9	47
Number of man days spent at facilities by VATESI inspectors engaged in the area of safeguards	20	13	15
Number of IAEA inspectors authorised to conduct inspections in Lithuania	332	342	350
Number of EC inspectors authorised to conduct inspections in Lithuania	180	182	184
Number of VATESI inspectors engaged in the area of safeguards	1	2	2



Inspection at the Spent Nuclear Fuel Storage Facility

Data of accounting of nuclear materials in 2006–2008

Year	2006	2007	2008
Amount of depleted uranium (t)	21.1	30.3	31
Amount of enriched uranium (t)	2291	2320	2349
Amount of U235 (t)	28.2	28	27.6
Amount of plutonium (t)	7.7	8	8.3

In the IAEA safeguards implementation report, issued in Quarter II 2008, for a fifth consecutive year it was concluded that all declared nuclear material 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 installations and the overall activity of a country in the use of nuclear energy according to the Agreement on Application of IAEA Safeguards and its Protocol Additional.

The Protocol Additional provides that a country complying with its provisions must submit by 15 May of every year an updated declaration for the previous calendar year. VATESI collected and summarised by 15 May the information about the activities in the field of use of nuclear energy in Lithuania and sent the prepared report to the IAEA via the Permanent Representation of the Republic of Lithuania at the International Organisations in Vienna. Abiding by the Protocol Additional, quarterly reports were also sent on Lithuania's export of equipment and technologies under control.

In September, the IAEA inspectors, in accordance with the Protocol Additional, requested a complementary access to the INPP site to verify whether no undeclared activities related to the use of nuclear materials were taking place at the site.

The Report on the application of safeguards will be issued by the IAEA in the first half of 2009.

Physical protection of nuclear materials and nuclear installations

Physical protection of nuclear materials and nuclear installations has an important role in assuring nuclear safety hence a lot of attention is given to its strengthening. Besides, due to unabated threat of terrorism, Lithuania, as a country developing nuclear energy, may become a potential target of international terrorism. Acts of terrorism may be directed at such sites as Ignalina NPP or the spent nuclear fuel storage facility, the closed Maišiagala Radioactive Waste Storage Facility or any other nuclear facility which is under construction and is of strategic importance to the national security.

In 2008, in line with the schedule of inspections approved by VATESI Head, two inspections of physical protection were conducted at Ignalina NPP and the spent nuclear fuel storage facility during which some non-compliance with the effective requirements of physical protection were established. The



At the training centre of Ignalina NPP security squad

organisation operating the facilities was obligated to rectify the established non-compliance. However, it should be noted that the established non-compliances pose no threat to the safe operation of Ignalina NPP and operation of the spent nuclear fuel storage facility.

In the course of the first inspection, the cooperation of Ignalina NPP physical protection service with external organisations in assuring physical protection of Ignalina NPP laid down in the Ignalina NPP physical protection plan and other documents was verified. In addition to that, the assurance of communication with the security squads, processes of information dissemination on the events related to physical protection to the mass media and the public as well as the plans of training (exercises) and the plans of qualification improvement were inspected.

The goal of the second inspection was to verify the results of the upgrading of the physical protection system at the spent nuclear fuel storage facility. During the inspection, the checks of the upgraded perimeter protection, video surveillance and other systems were conducted. It was ascertained that the upgrading of the systems has significantly improved overall physical protection of the storage facility.

Lithuania, being a member of the Convention on the Physical Protection of Nuclear Materials (hereinafter – the Convention) and being well aware that physical protection of nuclear materials must be strengthened both at the national and international levels, on 20 May 2008 ratified the amendment of this Convention. The amendment of the Convention has expanded the area of application of the Convention by including physical protection of nuclear installations against acts of terrorism and enhancing the scope of regulation of the use, storage and transportation of nuclear materials in the country and by defining liability for legal offence in this area. To make this amendment of the Convention effective, it has to be approved by two thirds of the countries – members of the Convention, and the IAEA

has to be informed about that. According to the data as of 24 December 2008, this was done by 22 member countries of 139, including 6 member-states of the EU: Austria, Bulgaria, Spain, Poland, Rumania and Hungary. Lithuania was not on this list because in 2008 the institutions responsible for the implementation of the Convention had not been appointed yet. When the responsible institutions are appointed by the Government of the Republic Lithuania and upon providing this information to the IAEA, Lithuania will officially become a member country which has ratified the amendments of the Convention.

In December 2008, VATESI together with the German State Nuclear Reactor Safety Consulting Association (GRS) organised in Lithuania an international workshop on the methods of assessment of efficiency of physical protection measures of nuclear materials, including their transportation, and nuclear facilities.

Control of dual-use nuclear goods

Lithuania is a member of the Nuclear Suppliers Group (NSG). The conditions for hand-over of dual-use nuclear materials, equipment and technologies by one country to another are laid down in the Guidelines of the Nuclear Suppliers Group. From 2005 VATESI has been conducting yearly inspections of the use of imported dual-use nuclear goods.

As of late 2008, the inspection was conducted at Ignalina NPP seeking to verify whether dual-use nuclear goods for which the Letter of Guarantee had been issued were delivered to Ignalina NPP and were used according to the obligations under the state guarantee. No non-compliances were established during the inspection. The non-compliances which had been identified during previous inspections were rectified; adequate control of the goods imported with the state guarantee is conducted at Ignalina NPP.



Participants of the workshop visited Ignalina NPP

Reports on meeting commitments under International Conventions

Reporting under the Convention of Nuclear Safety

The Convention on Nuclear Safety (hereinafter – the “CNS”) came into force in Lithuania on 24 October 1996.

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

- To achieve and maintain a high level of nuclear safety worldwide, by consolidating international measures, including international cooperation as well as technical cooperation related to safety assurance;
- To develop and maintain efficient measures of nuclear installations protection against potential radiological hazard, with a view to protect humans and the environment from dangerous effects of ionizing radiation emitted by these installations;
- To prevent accidents with radiological impacts, and to mitigate their effects if they do occur.

Meetings of the contracting parties under the Convention on Nuclear Safety are held every three years. On 14-25 April 2008, the fourth review meeting of the CNS was held in Vienna. The meeting was chaired by Mr. Maurice T. Magugumela, Head of Nuclear Safety Regulatory Institution of the Republic of South Africa.

The member countries submitted their national reports 6 months prior to the meeting. During this six-month period, the reports were reviewed and questions were provided. Lithuania had 90 questions to answer. Lithuania was appointed to a certain group of member countries together with Russia, India, Czech Republic, Argentina, Australia, Croatia, Singapore, Mali and Ireland. According to the drawn schedule for making presentations of the national reports, the report of Lithuania was discussed on 19 April 2008.

At the CNS meeting arranged in 2005, it had been recommended to Lithuania to provide during the fourth review meeting the information about safety assurance after decommissioning of Unit 1, the implementation of the third Ignalina NPP safety improvement program, safety assurance in operating Unit 2 (with regard to motivation of the personnel) and the assurance of high level safety culture and performance of bilateral agreements concluded with neighbouring countries regarding the efficient implementation of emergency preparedness including early dissemination of information to the public. Therefore these aspects were in the focus of attention while preparing the national report and during its presentation. The activities undertaken to elaborate these issues received excellent evaluation and some of them were considered to be an example of good practice. A positive



Delegation of Lithuania in conference on Nuclear safety convention

view was expressed on VATESI activities in solving issues related to the implementation of the National Energy Strategy and on preparation for the construction of the new nuclear power plant. During the repeated visit of the Operational Safety Review Team (OSART) to Ignalina NPP in April 2008 it was stated that the recommendations provided by the OSART mission in 2006 were diligently implemented. This evaluation concerned the issues of safety culture, decommissioning and training of the personnel.

The fifth meeting of the Nuclear Safety Convention will be held in April 2011.

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. The Convention came into force in Lithuania 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 information about fulfilment of obligations under the Convention has to be provided to other contracting parties.

In 2008, VATESI together with other institutions prepared the second national report of Lithuania, mandatory under the Convention. The report was worked out in line with the provisions of Guidelines on the Form and Structure of the National Reports approved by the contracting parties. The contracting parties had to provide their questions and comments on the national reports by 11 February 2009. Later the member countries prepared answers to the received questions on their report, and the reports were discussed at the third review meeting to be held on 11-20 May in Vienna. The review meetings are held every three years.

In the report to be provided under the Convention Lithuania updated the information which had been provided in the first report regarding the legal framework on management of spent nuclear fuel and radioactive waste, the existing facilities, practices of management of spent nuclear fuel and radioactive waste as well as the planned safety improvement measures in this field.



In conference on Nuclear safety convention



International cooperation



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

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 Regulatory Group (ENSREG). Such goals as the assurance and further improvement of safety of nuclear facilities, safety of radioactive waste and spent nuclear fuel, decommissioning, raising finance for management of spent nuclear fuel and radioactive waste were assigned to the competence of this working group.

The objective of the ENSREG activity is to draw up and to recommend uniform EU provisions on nuclear safety, radioactive waste, decommissioning and spent nuclear fuel.

The EU Member States in ENSREG are represented by the Heads and specialists of institutions supervising nuclear safety and safety of nuclear waste. Lithuania in the ENSREG is represented by the Head of VATESI and his Deputy.

Three working groups are functioning at ENSREG

- Group on nuclear safety improvement, chaired by the United Kingdom.
- Group on safety improvement of radioactive waste management, decommissioning and spent nuclear fuel, chaired by France.
- Group on public information and transparency, chaired by Ireland.

VATESI has delegated its specialists to the first two working groups. In 2008, five ENSREG meetings took place where possible solutions regarding nuclear safety regulation practice in the EU were discussed. It should be noted that in 2008 the drafting and discussion of the Draft European Council Directive was actively proceeding. The purpose of this Draft Directive defining the nuclear safety system of the Community is to revive the process of development of the common EU nuclear safety system. VATESI has submitted its comments and proposals regarding the Draft European Council Directive to the ENSREG working group.

ENSREG Working Group on Nuclear Safety Improvement

In 2008, the ENSREG Working Group on Nuclear Safety Improvement (WGNS) was working in several directions: the analysis of relevance of the European Union instruments (e.g. EU Directive) for regulation of nuclear safety; more efficient application of the mechanism defined by the Convention on Nuclear Safety in the EU Member States for improvement of nuclear safety; implementation and evaluation of nuclear safety regulation measures at the national level.

While discussing the expediency of the European Union instruments for regulation of nuclear safety, several scenarios were analysed by considering pro et contra arguments:

1. New instruments should not be developed; the existing international mechanisms and measures applied on a national level should be used instead.
2. Framework Directive should be developed by using the relevant elements from the Convention on Nuclear Safety;

3. Framework Directive should be developed with an obligation to set strict safety standards;
4. Directive setting detailed safety standards should be developed;
5. Development of non-binding instrument (detailed or not detailed).

While analysing the issues of more efficient application of the mechanism defined by the Convention on Nuclear Safety, the WGNS has drawn the program for 2008-2009 the main goal of which is to define a process that would serve as a basis for the EU Member States in evaluating common lessons learned after each cycle set forth by the Convention on Nuclear Safety and, on the grounds of this evaluation, would identify safety improvement measures, which would be implemented by the Member States according to the agreed schedule. Also it is necessary to verify the feasibility of the process by conducting a pilot study where the results of the fourth review meeting of the Convention on Nuclear Safety would be used.

In 2008, the working group analysed and summarised the results of the IAEA missions by the International Regulatory Review Team (IRRT) and the Integrated Regulatory Review Service (IRRS) which have been arranged in the EU since 1998 with an aim to give independent appraisal of the nuclear safety regulation institutions, and provided the ENSREG with its recommendation and the respective plan of measures to be implemented in 2008-2009.

Three meetings of this working group were held in 2008. In principle, the goals set by the working group have been accomplished - the drafted documents were submitted to the ENSREG for approval.

ENSREG Working Group of Radioactive Waste Management

The Working Group on Improving Spent Fuel, Radioactive Waste Management and Decommissioning Arrangements is responsible for safety of radioactive waste and spent nuclear fuel management, decommissioning and management of radioactive waste accumulating in the decommissioning process and spent nuclear fuel, and raising of finance. The goals of this working group are:

- To develop safe management of all types of spent nuclear fuel and radioactive waste;
- To exchange ideas on solving the challenges regarding availability of highly qualified personnel and know-how management during decommissioning process;
- To share information and good practice in the fields of radioactive waste management and decommissioning.

By accomplishing the set goals, it is pursued to identify the relevant constituents of radioactive waste, spent nuclear fuel and decommissioning covering all stages of activity until the final point, such as the radioactive waste management policy, strategy, plans and inventories; to propose general principles of radioactive waste management based on respective standards of WENRA, the IAEA or other international organisations; to share information about good practice in radioactive waste management and decommissioning, to promote the use of the appraisal missions arranged by the

IAEA, OECD or other international organisations, to derive the maximum possible benefits from the review cycle of the reports under the Joint Convention (to improve the quality of the reports, to find common focal points, to discuss joint actions); to encourage joint efforts in assuring management of competence and knowledge in order to meet the challenges related to the highly qualified personnel and know-how.

In 2008, five meetings of this working group were held; at the meetings the drafted documents were reviewed and revised, further perspectives of the working group's activity were discussed. In principle, the goals set by the working group have been accomplished – the drafted documents were submitted to the ENSREG for approval.

VATESI participation in activities of Western European Nuclear Regulators' Association (WENRA)

Heads and specialists of regulating institutions of the countries that use nuclear energy participate in the activities of Western European Nuclear Regulators Association (WENRA).

Nuclear safety regulation 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 in the Association. Representatives of regulating institutions discuss in WENRA events the issues of safety regulation and harmonization of supervision; they exchange information important in terms of safety and experience, and envisage the trends of safety improvement.

Representatives of nuclear safety and radiation protection institutions of the countries that do not have nuclear power plants are also invited to take part at WENRA meetings.

Two working groups are functioning in WENRA – the Reactor Harmonization Working Group (RHWG) and the Working Group on Waste and Decommissioning (WGWD). Lithuania joined both Working Groups in 2004. In 2006, after WENRA approved the reference safety levels for 18 areas of reactor safety prepared by RHWG, all the countries of RHWG produced and presented their harmonization action plans. In accordance with these, the level of nuclear safety in the EU Member States by 2010 will be harmonized with WENRA reference safety levels.

Activity of WENRA Reactor Harmonization Working Group

The objective of WENRA Reactor Harmonization Working Group (RHWG) was to establish the safety reference levels of reactors of WENRA member countries and to harmonize these levels in WENRA member countries.

At present representatives of nuclear safety regulatory institutions of 17 countries – Finland, Italy, Belgium, France, Great Britain, Sweden, Lithuania, Germany, Spain, Slovakia, Switzerland, Czech Republic, Rumania, Bulgaria, Holland, Hungary and Slovenia – are participants of WENRA RHWG activities.

In January 2008, RHWG prepared and issued the safety reference levels of reactors comprising 18 safety areas of nuclear power plants.

Every country participating in the activity of WENRA, including VATESI which is representing Lithuania, in early 2008 conducted in their respective countries the comparative study of their national legal framework regulating nuclear safety with the WENRA safety reference levels, and each country drew up its own national action plan for removal of non-compliances and implementing the safety reference levels in the country by 2010 by transposing them to the national legal acts.

For the implementation of the safety reference levels recommended by WENRA RHWG, in May 2008 a plan of measures for the implementation of the safety reference levels was approved by the Order of VATESI Head. According to the above mentioned action plan, it is envisaged to draft 10 new legal acts and to amend 3 already existing legal acts.

As of late 2008, Ignalina NPP has implemented 38 of 76 WENRA RHWG safety reference levels.

In 2008, at the working meeting in Helsinki, VATESI presented an overview report on the accomplishment of the safety reference levels in Lithuania. VATESI, while preparing the documents regulating nuclear safety, was continuously considering the requirements raised by IAEA, operational experience and international practice, therefore in summarising the mentioned report it can be affirmed that the national legal framework fundamentally complies with the safety reference levels recommended by WENRA RHWG.

In order to assure safety of new nuclear power plants, in 2008 RHWG started working in a new direction. At the plenary meeting held in March 2008, WENRA approved a new mandate of RHWG regarding safety goals for new reactors. In 2008, at the RHWG meeting in Helsinki, an overview of safety goals of new reactors was prepared according to which it is being projected to formulate the new safety reference levels to be applied to the newly constructed nuclear power plants.

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 followed by the WENRA member countries. If necessary, the national requirements will be adjusted. The safety reference levels are worked out with regard to the already existing legal frameworks and international recommendations.

As of late 2005, the WGWD prepared two reports in which the safety reference levels for decommissioning of nuclear facilities and operation of radioactive waste storage facilities were presented. In early 2006 these reports were officially published on the Internet.

The WGWD member countries analyzed the legal framework of their respective countries and its practical implementation, and compared these in terms of compliance with the safety reference levels 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 countries interpret the safety reference levels in the same way.



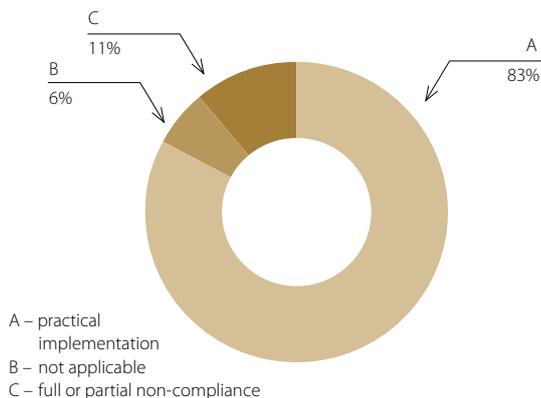
Two meetings of the WGWD were held in 2008, one of them took place in Vilnius on 2-6 June.

A visit to Ignalina NPP was arranged for the participants of the WGWD meeting held in Vilnius, during the visit the participants had a possibility to familiarise themselves with the RBMK-type reactor technologies.

Another meeting was held on 24-28 of November in Sofia, the capital of Bulgaria. At the meetings in Vilnius and Sofia the earlier commenced work on the results from the analyses conducted by the member countries was further continued – the analyses of practical implementation at radioactive waste storage facilities were reviewed and, based on the obtained results, the adjustments in the reference levels were prepared which now are under consideration. Moreover, drafting of the guidelines for setting the reference levels for radioactive waste disposal was started.

Figure illustrates the results of Lithuania after the review of the analysis of practical implementation of the safety reference levels at radioactive waste storage facilities, where A – practical implementation fully complies with the reference safety level, B – not applicable to the country due to certain objective reasons, C – full or partial non-compliance with the reference safety levels.

Results of practical implementation of reference safety levels at radioactive waste storage facilities



VATESI participation in the activities of European Clearinghouse on NPP Operational Experience Feedback

Search for methods assuring continuous and efficient safety improvement of nuclear installations has lead the organisations responsible for the analysis and dissemination of operational feedback to reconsider the efficiency of operational experience feedback mechanisms on the national and international level. One of outstanding events which gave an impulse to take further steps to upgrade the sharing of operational experience feedback was the conference *Improving Nuclear Safety through Operating Experience Feedback* that was held in 2006, in Cologne, Germany. At the Conference the position was voiced that at the Community level the individual EU countries may benefit from pulling together their efforts to enhance the effectiveness of the operational experience feedback process. Recognizing the importance and extent of this safety issue, it was suggested by some EU Member States that the European Clearinghouse

for Operational Experience Feedback could be established on the basis of the European Commission Joint Research Centre (JRC). By providing this proposal, its was assumed that well established JRC working mechanisms and means would enable to improve cooperation among the organisations responsible for the analysis and dissemination of operational feedback, and hence to promote the efficient use of the limited national resources of expertise. At the same time, it would strengthen the EU capabilities in the aforesaid area.

This initiative was further discussed at the meetings of Western European Nuclear Regulators Association (WENRA). After animated discussions, this initiative did not receive unanimous support of WENRA member countries. As a compromise it was proposed that WENRA member countries could take part in the mentioned project without a “WENRA mandate”.

The idea to establish the European Clearinghouse for Operational Experience Feedback was strongly supported by the European Commission. The DG-TREN viewed this initiative as one of the initial steps in harmonising nuclear safety practices in the European Union and certain assistance in the countries’ efforts to improve the operational experience feedback and dissemination process.

In February 2008, at the incorporation meeting of the European Clearinghouse for Operational Experience Feedback held at the Joint Research Centre in Peten (Netherlands) the representatives of nuclear safety regulatory institutions from Finland, Hungary, Netherlands, Lithuania, Rumania, Slovenia and Switzerland declared their intention to cooperate within the framework of this project (Spain participates by the observer rights).

From the date of establishment of the European Clearinghouse for Operational Experience Feedback, negotiations with the Technical Support Organisations from France and Germany (IRSN and GRS) have been proceeding on their participation in the activities of the ECOEF. Until now the negotiations have not brought any tangible results – neither the IRSN nor the GRS are taking part in the activity of the European Clearinghouse for Operational Experience Feedback.

VATESI from the very beginning was supporting the initiative to establish the European Clearinghouse for Operational Experience Feedback. VATESI, being determined to provide support in the development of ECOEF, to strengthen cooperation and to develop tools for information analysis and exchange, in the middle of the year temporarily delegated one of VATESI employees to the ECOEF. On 17-18 December 2008, the meeting of the Technical Committee (consisting of the representatives of the above mentioned countries) was held in the Joint Research Centre in Peten (Netherlands). At the meeting the principles and guidelines for further activity of the European Clearinghouse for Operational Experience Feedback were discussed along with the already completed and planned works in 2008-2009.

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

IAEA regional projects in the area of nuclear safety and nuclear energy

In 2008, VATESI coordinated the participation of Lithuanian specialists in eight IAEA European regional projects for technical cooperation in the area of nuclear safety and nuclear energy:

- RER/0/026 – Support for the Introduction of Nuclear Energy (together with the Ministry of Economy);
- RER/4/027 – Strengthening Capabilities for Nuclear Power Performance and Service Life including Engineering Aspects;
- RER/9/076 – Strengthening Safety and Reliability of Nuclear Fuel and Materials in Nuclear Power Plants;
- RER/9/082 – Improvement of Design Basis and Configuration Management Documentation ;
- RER/9/084 – Effectiveness of Regulatory Authorities and Advanced Training in Nuclear Safety;
- RER/9/085 – Capacity Building for Upgrading Nuclear Security Related National Infrastructure;
- RER/9/087 – Harmonization of Probabilistic Safety Assessment Applications;
- RER/9/088 – Strengthening Safety Assessment Capabilities.
- RER/9/085 – Awareness Raising and Training in Nuclear Security;
- 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.

According to the aforesaid projects, more than 40 international events were planned, including a number of meetings, courses and consultations important to Lithuanian specialists. Two of these – the consultation meeting Safety analysis in the assessment of modifications of power plants within the framework of the project RER/9/095 and The second basic professional training courses within the framework of the project RER/9/099 are planned to be arranged in Lithuania.

In 2008, while engaged in the above projects, Lithuania's representatives participated in 31 events outside the country, including 21 working meetings, 5 training courses, 5 technical consultations. 67 specialists from Ignalina NPP, Lietuvos Energija AB, VATESI and TSOs 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 analysis. In addition to that, they established business contacts with their foreign counterparts.

In 2008, three events arranged by the IAEA were held in Lithuania:

- The workshop *Safety Requirements, Technology Assessment and the Bidding Process for new nuclear power plants*, was held in Vilnius on 19-22 May within the framework of RER/0/026,
- *Basic professional training courses on nuclear safety* were held on 20-31 October at Lietuvos Energija AB's head office in Vilnius and Ignalina NPP Training Centre in Visaginas (under the framework of RER/9/084).

The meetings were attended by the specialists from Lithuania, Albania, Armenia, Austria, Belarus, Bulgaria, Czech Republic, Estonia, Greece, Georgia, Kazakhstan, Croatia, Latvia, Poland, Rumania, Russia, Slovakia, Slovenia, the Ukraine, Hungary, Germany and the IAEA.

In 2009, eleven projects assigned to the cycle of 2009-2011 will be coordinated:

- RER/0/029 – Supporting the Introduction of Nuclear Energy(Phase II) (together with the Ministry of Economy);
- 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;
- RER/4/030 – Strengthening Capabilities for Nuclear Power Plant Performance and Service Life including Engineering Aspects (Phase II);
- RER/4/031 – Improving Quality Management and Quality Assurance in NPP Constructing, Equipment Manufacturing and Maintenance activities;
- RER/4/032 – Enhancement of Sustainability of Research Reactors and their Safe Operation through regional cooperation,, networking and coalitions;

The IAEA national project for Lithuania

In 2008, the implementation of a new national project by the IAEA Enhancing capabilities in VATESI and other institutions in licensing of a new NPP, LIT/9/009 was started. It is planned to complete the measures envisaged within the framework of the project by 2011. As a result of close cooperation between the IAEA and VATESI specialists, in 2008 approx. USD 130 thousand were spent from the budget of the project, the bulk of which are the funds allocated by the IAEA. The budget allocated for full implementation of the project consists of the funds allocated by the IAEA (USD 400 thousand), VATESI (USD 80 thousand), and the Ministry of Economy (USD 50 thousand). VATESI funds allocated for the project in 2008 equalled USD 66.6 thousand.

In 2008, to accomplish LIT/9/009 project, mission by the IAEA experts took place, VATESI specialists engaged in the licensing process of the new nuclear power plant participated in the in-service training in the institutions regulating





nuclear safety and radiation protection in the US, Slovakia and France, took part in the working meetings on the key subjects of licensing of the new nuclear power plant and safety assessment arranged in Austria, Finland, Netherlands and Spain, gained experience necessary for the construction of the new nuclear power plant, enhanced competence and knowledge in the field of nuclear technologies.

VATESI participation in the IAEA Board of Governors

Lithuania was elected to the IAEA Board of Governors for the period of 2007-2009. In 2007, by the Resolution of the Government of Lithuania, VATESI Head Gytis Maksimovas was appointed the Governor representing Lithuania in the IAEA Board of Governors. A working group was established by the Order of the Minister of Foreign Affairs of Lithuania with an assignment to formulate the position of Lithuania on the issues discussed at the IAEA Board of Governors. VATESI specialists, together with other institutions, took part in the activities of the working group.

In 2008, VATESI was actively involved in preparation of the position of Lithuania on the issues discussed at the IAEA Board of Governors. VATESI Head, the Governor of the IAEA Board of Governors represented the interests of Lithuania and spoke at the Board's meetings on the subjects having importance to Lithuania, namely:

- The IAEA technical cooperation activities. Strengthening of international cooperation in the areas of nuclear safety and radiation protection;
- Strengthening of the IAEA activities in the areas of research, technology and application in nuclear energy;
- Nuclear safety – instruments of defence against nuclear terrorism. Assurance of the state control of international commitments in the area of non- proliferation of nuclear weapons and use of nuclear materials and nuclear installations for peaceful purposes only.

Membership in the IAEA Board of Governors enabled Lithuania to strengthen a positive opinion of international community about capability of our country to develop nuclear energy in a safe manner and to fulfil all relevant international commitments with due competence. Participation in the IAEA Board of Governors enhanced the IAEA attention to the issues of critical importance to Lithuania – development of nuclear energy and relevant infrastructure, assurance of nuclear safety and non-proliferation of nuclear materials.

The EU support projects for VATESI

In 2008 VATESI was working on three EU support projects: implementation of one project was ongoing, the implementation of two EU support projects was started in late 2008 and in early 2009.

1. **Project of the Ignalina program Support for Licensing Activities Related to the Decommissioning of the Ignalina Nuclear Power Plant to VATESI (Stage 4) No. PI.05.01.01.**

The implementation of the project was started on 23 April 2007. The scheduled completion date of the project works – 30 April 2009. The value of the project – EUR 999849.

The main objectives of the project:

- To continue support to VATESI in review of documents related to licensing of Ignalina NPP decommissioning activities;
- To obtain relevant consultancy support from West European experts in the assessment of decommissioning of the NPP.

2. **The transition facility project Support to VATESI in Safety Assessment of Ignalina NPP No. 2006/018-183-03-01.**

The implementation of the project was started on 15 December 2008. The scheduled completion date of the project works – 15 December 2009. The value of the project – EUR 450000.

The main objectives of the project:

- To enhance of VATESI and its TSOs specialists in three areas of activities – spent nuclear fuel handling, instrumentation and control, structural integrity of safety-important systems;
- To prepare recommendations for upgrading of the existing regulations for fuel handling and instrumentation and control;
- To prepare recommendations for inspection programs in the field of structural integrity.

3. **Project of the Ignalina Program Technical assistance to VATESI in the field of decommissioning (Stage 5), No. VAT.05.**

The implementation of the project was started on 23 January 2009. The scheduled completion date of the project works – 30 April 2011. The value of the project EUR 1 999 810.

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.

In 2008, VATESI initiated three projects financed under the EU structural assistance for Lithuania, Operational Programme for the Development of Human Resources, Priority 4 *Fostering Administrative Competences and Increasing Efficiency of Public Administration Resources*:

1. Implementation of management systems at the State Nuclear Safety Inspectorate (LTL 850000, 2009-2012). The project is prepared within the framework of the facility VP1-4.3-VRM-01-V *Initiatives on quality of public services*. Activities planned within the scope of the project: documentation of management systems; upgrading of implemented systems, certification of management systems; expansions of server-based hardware resources; implementation and upgrading of a computerised processes management system;
2. Improvement of qualification of specialists of the State Nuclear Safety Inspectorate (LTL 160000, 2009-2011). The project is prepared within the framework of the facility VP1-4.1-VRM-03-V *Qualification improvement of employees of governmental institutions and offices*.



Title	2007	2008	2009	2010	2011
1. Support in licensing activities related to decommissioning of Ignalina Nuclear Power Plant to VATESI (Stage 4)					
2. Support to VATESI in Safety Assessment of Ignalina NPP					
3. Technical assistance to VATESI in the field of decommissioning (Stage 5)					

Activities planned within the scope of the project: analysis of training aids and preparation of the program in the area of examination of non-compliance with nuclear safety requirements and application of sanctions; preparation of lecturers; preparation of training aids, organisation and implementation of the courses.

Activities of international cooperation group of VATESI

The International Cooperation Group on Nuclear Safety (ICG) of VATESI was set up on 18 March 2005, with a view to continuing mutually useful collaboration initiated by the completed Licensing Assistance Project.

The ICG is a working group in whose activities representatives of VATESI, foreign regulatory institutions, TSOs and other organizations take part on a voluntary basis. The Group's main objectives are as follows:

- Coordinating bilateral and multilateral projects of VATESI;
- Advising VATESI on major issues of nuclear safety;

- Exchanging information and experience exchange in the area of nuclear safety and regulation.

Experts from the French Institute of Nuclear Safety and Radiation Protection (IRSN), the Swedish Nuclear Safety Regulatory Authority (SSM), the German State Nuclear Reactor Safety Consulting Association (GRS), the Lawrence Berkeley National Laboratory, the USA, and other institutions participate in the activities of VATESI ICG.

The Head of VATESI, Gytis Maksimovas, was elected the ICG Chairman, and SKI expert, Per Bystedt, was elected his deputy.

Two meetings of the ICG were held in 2008, on 14 March and 26 November. During the meetings the changes in VATESI organisational structure, VATESI preparatory works for the project of construction of the new nuclear power plant were discussed, the safety assessment of Ignalina NPP operation, measures under Ignalina NPP safety improvement program (SIP-3) and Ignalina NPP decommissioning projects performed by VATESI were reviewed. The experience was shared on the reorganisation of regulatory systems and the most important events at nuclear power plants in foreign countries.



Contribution of Technical Support Organisations to improvement of nuclear safety

The objective of the nuclear safety technical support system is to assist VATESI and organisations operating nuclear installations or organisations involved in any other activity related to nuclear materials in performing the assigned functions of nuclear safety assurance, regulation, supervision and control. This support is provided in the form of consultations, design, research, expertise and other works requiring high scientific-technical qualification, competence, special knowledge and skills.

In cooperation with VATESI, the Technical Support Organisations (TSO) of Lithuania provide expertise services in the assessment of safety of nuclear installations, preparation of draft legal acts and in performing other works. To achieve the most efficient use of the scientific-technical potential in solving the problems of nuclear safety, the Coordination Council of VATESI Technical Support Organisations was established, which coordinates the TSO expertise assistance to VATESI, promotes the development of nuclear energy research-industrial infrastructure, upbringing of scientific-technical potential in the country and training of nuclear energy specialists.

In 2008, VATESI continued cooperation with the Institute of Physics (FI); the Laboratory of Nuclear Engineering Problems (LNEP), the Nuclear Installations Safety Laboratory (NISL), the Laboratory of Research and Testing of Materials of the Lithuanian Energy Institute (LEI); the Department of Thermal and Nuclear Energy (DTNE), the Institute of Energy Technologies (IET) of Kaunas University of Technology; the Laboratory of Nuclear Hydrophysics, the Materials Strength Department (MSD), the Laboratory of Numerical Simulation (LNS) and the Research Institute of Welding and Materials Science of Vilnius Gediminas Technical University (VGTU); the State Institute of Information Technologies (VITI); UAB ITECHA, Research Centre of Electromagnetic Compatibility (ESMTC) and other organisations.

The Institute of Physics (FI) in 2008 was implementing the program funded by the State Metrology Service *Developing the metrology system of ionising radiation. I. Creating a state standard of a radionuclide activity unit*, the study funded by the Radiation Protection Centre *Integrated research for the assessment and projection of effects of INPP decommissioning on people in INPP region*, studies funded by the Environmental Protection Agency *Studies of the equivalent dose rate of ionizing radiation with the use of the AGIR system and Radiological studies of air in the zone of direct impact of Ignalina NPP*. Specialists of FI also participated in the implementation of the projects financed by the EU and the Agency for International Science and Development Programs under the EC Seventh Framework Programme for Research and Technological Development (FP7), namely:

Treatment and Disposal of Irradiated Graphite and other Carbonaceous Waste (CARBOWASTE), The redox phenomena controlling system (RECOSY), as well as the EU-financed project *Support to the Radiation Protection Centre related to radiation safety in the course of decommissioning of Ignalina NPP*.

In addition to that, FI took part in the following research works related to nuclear and radiation safety:

- Developing programs of detailed radiological studies of installations in blocks B1, D0, D1 and building 119 of the INPP. The work was performed in cooperation with the LEI.



- Preparation of working design for decontamination and dismantling of equipment of the turbine hall at INPP Unit 1 (ordered by UAB IEEC).
- Additional radiological measurements in ion exchange resins of Unit 1 condensate treatment facilities (ordered by UAB IEEC).
- Software upgrading of radioactive materials accounting system in a protective container of the spent nuclear fuel storage facility (ordered by Ignalina NPP).
- Study of nuclide composition of solid radioactive waste and development of the activity assessment method (ordered by Ignalina NPP).
- In 2008, the following laboratories of the Lithuanian Energy Institute (LEI) took part in the safety upgrading activity: the Laboratory of Nuclear Engineering Problems (LNEP), the Nuclear Installations Safety Laboratory (NISL), and the Laboratory of Research and Testing of Materials (LRTM).

One of the key areas of activity of the Laboratory of Nuclear Engineering Problems (LNEP, LEI) is related to assessment of environmental impact and safety of interim storage facilities for SNF under construction and radioactive waste processing and storage facilities as well as the Landfill type repository for very low activity radioactive waste.

In 2008, LNEP specialists continued the following projects and works:

- *Designing and construction of an interim storage facility of dry type for RBMK spent nuclear fuel assemblies from INPP Units 1 and 2 (B1). New facility for treatment and storage of solid radioactive waste at Ignalina NPP (B234). Converting the bituminized radioactive waste storage facility at Ignalina NPP (building 158) into a repository.*

In 2007, LNEP started the following projects and works:

- *Developing programs of detailed radiological studies of installations in blocks B1, D0, D1 and building 119 of the INPP.* In 2008 the programs of detailed radiological studies were developed, data was gathered and analyzed, the Microsoft Access database was developed and handed over for the use by Ignalina NPP. *Producing a digest of*

general documents pursuant to Article 37 of EURATOM treaty for the projects of a new SNF storage facility and facility for managing and storing solid radioactive waste at the Ignalina NPP. Whilst implementing the project, LNEP specialists drew up the report and provided it for review by respective institutions. *Analysis and optimization of radiation effects in dismantling installations and managing radioactive waste at INPP.*

In 2008, the project *Preparation of the environmental impact assessment report for the construction of the new nuclear power plant* was completed. The environmental impact assessment report for the construction of the new nuclear power plant was prepared together with specialists of the Finnish company Pöyry. In 2008 specialists of the laboratory together with specialists from the UK and Germany further continued the project *Preparing documentation for decontamination and dismantling of INPP building 117/1*. In 2008 the project *Services of preparation of environmental impact assessment documents and safety analysis report* was started. The objective of the project- to prepare the EIA report and ands safety analysis report for the period of nuclear fuel unloading phase. In 2008, within the framework of the EU Seventh Framework Programme for Research and Technological Development (FP7) the project *Treatment and Disposal of Irradiated Graphite and other Carbonaceous Waste* was started. The project is implemented together with other 27 parties of the consortium. The project coordinator is Forschungszentrum Juelich" GmbH, Germany. In 2008 the project *The Landfill type repository for short-lived very low activity radioactive waste* was further continued. The EIA report and the preliminary safety analysis report of the buffer type repository were prepared. The LNEP (LEI) specialists actively continued their work in the research projects coordinated by the IAEA, took part in the IAEA organizational committee developing an international data base of irradiated graphite, and in the activity of the Nuclear Installations Decommissioning group of the European Commission's Joint Research Centre.

Scientists from the Nuclear Installations Safety Laboratory (NISL) of LEI in 2008 carried out works related to the safety of Ignalina NPP operation, took part in the activity related to the construction of the new nuclear power plant and the assessment of energy security.

The primary goals which have to be accomplished in getting ready for the construction of the new nuclear power plant is to uphold competence and to acquire knowledge in nuclear safety that would comply with the most advanced international practice. In pursuing this goal, by VATESI initiative and in cooperation with the IAEA, in October 2008 the regional professional training courses in nuclear safety were arranged in Lithuania. Specialists of the Laboratory further continued the commenced works and were getting ready for new projects of decontamination and dismantling of Ignalina NPP equipment (B9-2). In 2008, the NISL scientists remained active participants of the *SARNET* network of excellence within the framework of the EU BP6, aimed at integrating research on severe accident phenomenology and management in Europe, of the EU 7BP project *SECURE* program, the objective of which is to develop the methodology for the assessment of energy security with regard to various problems of security of energy supply and geopolitical changes, of the *NULIFE* network of excellence, intended for developing the methodology for managing the lifetime of nuclear installations, of one of the biggest international research programs *PFEBUS FP* intended

for safety of water-cooled nuclear reactors and research in severe accidents, of the Ageing Probabilistic Safety Analysis (APSA) study *Use of Probabilistic Safety Assessment (PSA) for Evaluation of Ageing Effects to the Safety of Energy Installations*, coordinated by the Energy Centre of the EC Joint Research Centre, activity of European network for equipment operational control and qualification *ENIQ* as well as of the new promising thermonuclear energy program *FUSION* that is the focus of great interest.

It should be noted that the Laboratory's scientists continued research in the IRIS project for development of a new-generation nuclear reactors that are important in proceeding with the study for the construction of a new reactor in Lithuania. Scientists from NISL also participated in the research program coordinated by the IAEA for the research in new-generation safe, economically effective reactors *The economic benefits of adjustments in the evacuation zone and protection measures around NPPs with innovative low- and medium-capacity reactors in the regions where reactors are used for generating electricity and heat.*

In 2008, work was continued within the framework of LEI agreements with Inspecta Nuclear AB, Sweden, *LEI assistance in review of the documentation of PULS 03 Project*. The objective of the research – to justify the increased capacity of Oskarsham 3 (reactor of BWR type). The input of the LEI scientists was an expertise of thermo-hydraulic and strength calculations. Lithuanian scientists when participating in this work familiarized themselves with specifics of reactors of different types, Sweden's and international requirements for design documentation and safety justification for reactors of different types. Scientists from NISL also participated in the following international projects:

- B 9-0 Preparation of the decontamination and dismantling project for INPP building 117/1 (consortium comprising *BNG Project Services, Nukem Technologies GmbH* and LEI);
 - Numerical and experimental simulation in nuclear reactors, in the field of heat exchange (the Academy of Science of the Ukraine).
- In 2008, the Laboratory's experts assisted in implementation and participated in the following national projects aimed at improving safety at Ignalina NPP and related to VATESI activities:
- The tightness control system during the dismantling of spent heat releasing assemblies of heat releasing element casings in the hot compartments (at the contest arranged by the Confederation of Industrialists of Lithuania this research work was given the award *Product of the Year of Lithuania* and gold medal);
 - Analysis of accident containment system at Ignalina NPP;
 - Analysis of response to seismic impacts on the 101/2 building of INPP A2 unit;
 - Modelling and analysis of interaction of the soil with the 101/2 building of INPP A2 unit;
 - Ignalina NPP probabilistic safety analysis;
 - Probabilistic analysis of external events and events in a shutdown reactor;
 - Optimisation of intervals between testing of safety-important systems;
 - Justification of the procedure *Hot scram following a complete interruption of power supply for NPP's own needs*;

- Justification of amendments to be included in the instruction of Ignalina NPP symptomatically-oriented accidents;
- Justification of amendments to be included in the instruction of Ignalina NPP accident classification; rejection of sensors based on results of the 2008 diagnostics in Unit 2;
- The assessment of probability of graphite-pressure tube gap closure in individual reactor cells in INPP Unit 2 and projections of its alterations by 2010;
- Application of probabilistic safety analysis of Ignalina NPP in VATESI activities;
- Expertise of safety assessment of welded joints of INPP austenitic Du-300 pipelines with fractures left for further operation as well as of the scope of operational control and time periods between the inspections;
- Review of documents submitted to VATESI by Ignalina NPP related to the changes in the configuration, physical properties and control of the reactor core, as well as other issues of reactor physics, storage and management of nuclear fuel;
- Expertise of data on the implementation of the AE SIP-3/2007 measure 41.

Scientists from the Laboratory of Research and Testing of Materials (LRTM) of LEI in 2008 performed the following works and projects:

- *Justification of the remaining lifetime of servo drives of the emergency protection system at Ignalina NPP Unit 1.* To establish the actual remaining life time of servo drives, special complex testing of servo drives of the protection system, necessary calculations and statistical evaluation of reliability were carried out.
- *Slow hydro-fracturing of zirconium-alloy-clad in fuel rods.* The objective of the project coordinated by the IAEA – to examine the effect of hydrogen on occurrence of hydro fractures in the clad of thermal elements. By applying special equipment, the recurring experimental procedures were created enabling to assess the rate of slow hydro-fracturing in zirconium-alloy-clad in fuel rods and to establish conditions under which the disintegration of the clad may occur.

The main works completed in 2008 by the Department of Thermal and Nuclear Energy (DTNE) and the Institute of Energy Technologies (IET) of Kaunas University of Technology (KTU) were as follows:

- *Preparation of the draft Law on Nuclear Safety.* The scope of the work included preparation of the concept of the Law on nuclear safety, justification of the demand for the newly drafted Law on Nuclear Safety of the Republic of Lithuania, the analysis of the national and foreign legal framework regulating social relations in the field of nuclear safety, working out the preliminary structure and content of the Law on Nuclear Safety;
- Review of international standards and national standards of other countries, preparation of the legal act *General Safety Assurance Regulations at Nuclear Power Plants*. While performing this assignment, the relevant legal documents and standards regulating nuclear safety assurance at nuclear power plants of Finland and Germany were analysed. *Requirements for nuclear power plants' systems*, complying with the IAEA nuclear safety and radiation protection principles for nuclear power

plants' systems were drawn. Expert review of the report *Analysis of radiation effects of design-basis accidents by determining the impact of the increase of average burnout of the reactor's core when using erbium fuel*. The expert review was completed, the audit calculations were projected. The work was carried out according to the contract with VATESI Contractor – Vilnius Gediminas Technical University – VGTU;

- Support to VATESI in licensing activities related to decommissioning of Ignalina NPP. KTU was involved as a subcontractor of *Riskaudit* in reviewing the licensing documentation submitted by the Ignalina NPP.

In June 2008, KTU together with the IAEA organised international courses designed for teachers of the English language from European Universities specialising in the field of nuclear energy. This was the first teachers' qualification improvement seminar of this type, it was attended by 32 nuclear energy specialists and English language teachers from 17 European countries. During the seminar proficient English language pedagogues from the World Nuclear University, the United Kingdom, Russia, Germany and other countries shared experience in the English language teaching, communication, methodology.

Specialists from the Laboratory of Numerical Simulation (LNS) and the Department of Strength of Materials (DSM) of Vilnius Gediminas Technical University (VGTU) took part in the following works related to nuclear safety and radiation protection:

- Participated in designing the solid waste management and storage facilities of Ignalina NPP (B3, 4), the short-lived solid waste storage facility and the long-lived solid waste storage facility and performed static and seismic calculations, consulted on the issues of constructions reinforcement;
- Together with LEI, were implementing the project *Analysis and modelling of seismic impacts on the 101/2 building of INPP A2 unit*. The part of the projects assigned to VGTU consists of the analysis of soil - building interaction and calculation of response spectrums.

Scientists from the Department of Welding and Materials Science of Vilnius Gediminas Technical University were implementing the GPD project *Welding Engineers qualification improvement and certification according to the EU requirements*. One VATESI employee and 2 Ignalina NPP employees who participated in the project were qualified as international welding engineers, they got the validated IIW diplomas and Varcet certificates.

Scientists from the Laboratory of Nuclear Hydrophysics and Department of Physics (VGTU) performed expert review of the Ignalina NPP report *Analysis of design-basis accidents in the INPP Unit 2 when the reactor is loaded with uranium-erbium fuel of 2.8% enrichment*.

The activity of the State Institute of Information Technologies (SIIT) was basically related with practical works of safety upgrading at Ignalina NPP. The institute was implementing safety upgrading projects and prepared their safety justification: *Management of ageing of control and instrument tools at nuclear power plants (MAGIC); Assistance to Nuclear Safety Inspectorate of Armenia (ANRA) in safety assessment during licensing and decommissioning of Medzamor 2*. In addition to that, SIIT performed expert review of 3 documents.



In implementing the project *Management of ageing of control and instrument tools at nuclear power plants (MAGIC)*, commenced in 2007, the ageing of cables, connections, electronic components, servo drives and sensors was analysed. In 2008, by completing obligations under the contract, the following works were done:

- Identification of ageing mechanisms and compilation of a database;
 - Selection of compensating measures for each mechanism of ageing;
- Preparation and implementation of the training program.

SIIT was continuing works in line with the contract signed in 2007 with *Roskaudit* (France) in implementing the TACIS project *Assistance to the Nuclear Safety Inspectorate of Armenia (ANRA) in safety assessment during licensing and decommissioning of Medzamor 2*. SIIT conducted assessment of design solutions, and expert review of safety analysis reports in modernisation and refurbishment of the reactor's protection system at Medzamor 2, the reactor's capacity regulation system and reconstruction of the reactor's control room. The works were commenced in 2007, their scheduled completion date is in 2009.

SIIT conducted independent review of the following VATESI documents:

- VD-T-001-0-09 Nuclear safety rules for reactors at nuclear power plants;
- Regulations for application of critical operation parameters and conditions at nuclear power plants;
- Requirements for design, installation and operation of the reactor' cooling system.

In 2008 ITECHA UAB in accordance with the subcontracting agreement with the Lithuanian Energy Institute took part in the expert review of international standards and national standards of other countries in drafting a new revision of the legal act *General Safety Assurance Regulations at Nuclear Power Plants*, performed the review of standard documents of Russia and Bulgaria, regulating nuclear energy production, use and supervision as well as the review of the requirements prepared by European electricity producers. ITECHA specialists took part in drafting a new revision of individual chapters of the legal act *General Safety Assurance Regulations at Nuclear Power Plants*.

According to the subcontracting agreement with the State Institute of Information Technologies (SIIT), ITECHA took part in the expertise review of technical documentation for the Nuclear Safety Inspectorate of Armenia (ANRA) in safety assessment during licensing and decommissioning of Medzamor 2.

Activities of the Scientific Research Centre of Electromagnetic Compatibility in 2008 were related to practical assignments of safety improvement at Ignalina NPP Unit 2. Specialists of the Centre also took part in drafting documents regulating nuclear safety for VATESI.

In 2008, the specialists of the Centre were performing the following works:

- Modernisation of diagnostic control unit of ball flow-meters according to the Technical Specification PTOMod-1633-64 as of 15/02/2008 (Agreement No EMC 08-01).
- Preparation of the draft *Requirements for design, installation and operation of the reactor's cooling system* (Agreement No EMC 08-02).
- Preparation of the new revision of the legal act regulating nuclear safety *Nuclear safety rules for reactors at nuclear power plants* (Agreement No EMC 08-03).
- Review of requirements for application of critical operating parameters and conditions at nuclear power plants; Preparation of the draft legal act *Regulations for application of critical operating parameters and conditions at nuclear power plants* (Agreement No EMC 08-04).

The completion of the works according to the Agreements EMC 08-02, EMC 08-03, and EMC 08-04 is scheduled in 2009.

Public information

In 2008, the most popular and newsworthy subject discussed by the media and the public of Lithuania was the assessment of the effects of the approaching final decommissioning of Ignalina NPP on the power industry as well as on the economic safety and stability of the country. Various discussions on the future of nuclear energy in Lithuania were consistently initiated by the media: many topical articles were published; this was the talking point in discussions broadcasted on the radio and TV wherein VATESI employees were actively involved.

Whereas Lithuania has declared its ambition to remain a nuclear country promoting ecological and sustainable approach towards the development of energy, positive interest of the public to receive as comprehensive information of the issues of nuclear energy as possible has been unceasingly growing. Discussions are especially active on the project of the construction of a new nuclear power plant – presently this is one of the key subjects that interest every consumer of electricity and every citizen alike.

VATESI provides information to the public and media by issuing press releases on topical issues, preparing articles and comments, placing interesting and comprehensive information and documents on the website www.vatesi.lt.

VATESI Annual Report, published in the first half of the year, is sent to the country's governance and supervisory institutions, academic establishments, diplomatic offices, other institutions related to nuclear energy. The Annual Report is issued in the Lithuanian and English languages. Its electronic version is accessible on the website.

We are delighted by the growing interest of the media representatives and the public in the issues of nuclear safety and radiation protection. The condition of the still-operational Unit 2 at Ignalina NPP, the aspects of safe operation, the general status of nuclear safety in the country, all kinds of issues related to radiation protection, the activities of VATESI itself and important issues it was addressing also received considerable attention in 2008. Such topical issues were analyzed as improvement of nuclear safety at INPP whose operation is about to discontinue, and management of the generated radioactive waste. The media also focused on the



environmental protection and safety aspects of nuclear energy, its advantages as compared with other types of energy.

One of VATESI objectives is to supervise the safety of Ignalina NPP and to inform the public hereof. The activity of VATESI managers and specialists are focused on the accomplishment of this objective. Information distributed by the media about supposed events in the nuclear power plants of neighbouring countries was rapidly responded to.

In the future we are planning to more actively cooperate with various groups representing diverse interests of the public, to arrange educational events for young people and other members of the society with an aim to increase their understanding about nuclear facilities and the effects caused by them on the environment and human beings.

International conventions, laws and secondary legislation

International conventions

The key principles and requirements of nuclear safety regulation are set forth in international treaties. Lithuania

has joined the following international agreements and conventions directly related with safe use of nuclear energy:

No.	Title	Legal status
1.	The 1968 Treaty on the Non-Proliferation of Nuclear Weapons.	Lithuania joined it by Resolution No. I-1492 of the Seimas on September 23, 1991.
2.	The 1959 Agreement on the Privileges and Immunities of the IAEA.	Ratified on 14 December 2000, by Law No. IX-78.
3.	The 1963 Vienna Convention on Civil Liability in the Field of Nuclear Energy.	On 30 November 1993, the Seimas declared it having the force of law in Lithuania. (Law No. I-314.)
4.	The 1988 Joint Protocol Relating to the Application of the Vienna Convention and Paris Convention.	On 30 November 1993, the Seimas declared it having the force of law in Lithuania. (Law No. I-314.)
5.	The 1986 Convention on Early Notification of a Nuclear Accident.	The Government of the Republic of Lithuania joined the Convention on 13 October 1994. (Government Resolution No. 972.)
6.	The 1979 Convention on Physical Protection of Nuclear Materials.	Lithuania joined the Convention on 16 November 1993. (Order of Prime Minister of Lithuania No. 778p.)
7.	The 1994 Convention on Nuclear Safety.	Ratified by the Seimas on 17 October 1995. (Resolution No. I-1063.)
8.	The Comprehensive Nuclear Test Ban Treaty.	Ratified by the Seimas on 28 October 1999. (Law No. I-1372.)
9.	The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.	Ratified by the Seimas on 20 July 2000. (Law No. VIII-1882.)
10.	The 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.	Ratified by the Seimas on 18 December 2003. (Law No. IX-1921.)
11.	The 1997 Convention on Supplementary Compensation for Nuclear Damage.	Signed on 30 September 1997.
12.	Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage.	Signed by Law No. I-314 of the Seimas dated 30 September 1997.

13.	Agreement Between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Republic of Italy, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in Implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons.	Ratified by Law No. X-1051 of the Seimas dated 13 March 2007.
14.	Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency on implementation of Article III, (1) and (4) of the Treaty on Non-Proliferation of Nuclear Weapons.	Ratified by Law No. X-1051 of the Seimas dated 13 March 2007.
15.	Amendment of the Convention of Physical Protection of Nuclear Materials.	Ratified by Law No. X-1548 of the Seimas dated 20 May 2008.

Legal acts of the European Union

The European Commission, in response to the growing role of nuclear energy in the European Union's power industry and by envisaging its further development, striving to assure nuclear safety and with regard to the Convention on Nuclear Safety and other international documents, has worked out and brought up for discussion the draft Directive on Nuclear Safety (hereinafter – the Directive). The main objective of the Directive is to reach high level of nuclear safety in the Community, to maintain and to uninterruptedly upgrade this level and also to strengthen the role of the regulatory institutions of the EU Member States in assuring nuclear safety. The self-determination right by any of the EU Member States on the use of nuclear energy is fully acknowledged in the Directive. Several goals are expected to be accomplished by this nuclear safety system of the Community: to strengthen the role of the EU Member States' regulatory institutions, the primary responsibility of a licensee for nuclear safety, to strengthen independence of the regulatory institution, to ensure transparency in the issues related to safety of nuclear installations, regular supervision of safety, accessibility of nuclear safety experts and the priority of nuclear energy.

Laws and secondary legislation in the Republic of Lithuania

The main legal document governing nuclear energy in Lithuania is the Law on Nuclear Energy passed by the

Seimas in 1996. Other laws directly relating to safe use of nuclear energy are as follows: the Law on Radioactive Waste Management, the Law on Radiation Protection, the Law on Control of Import, Export and Transit of Strategic Goods and Technologies, the Law on Civil Protection, the Law on Constructions, etc.

After Lithuania started planning and implementing the preparatory operations of Ignalina NPP decommissioning, the following laws were passed:

- The Law of the Republic of Lithuania on Decommissioning of Unit 1 of the State Enterprise Ignalina Nuclear Power Plant (2000).
- The Law of the Republic of Lithuania on Decommissioning Fund of the State Enterprise Ignalina Nuclear Power Plant (2001).
- The Law of the Republic of Lithuania on Additional Employment and Social Guarantees for the Employees of the State Enterprise Ignalina Nuclear Power Plant (2003).

In 2008 VATESI participated in drafting the Law on the amendment of Articles 1, 2, 3, 6, 7, 8, 9, 10, 25, 26, 27, 29, 30, 32, 33, 35, 36, 38, 43, 44, 45, 46, 50, 51, 52, 53, 54, 55, 56, 65, 70 and 71, the titles of Chapter 8 and Chapter 10 and abolishment of Articles 31 and 68 of the Law on Nuclear energy of the Republic of Lithuania.

The Concept of the Law on Nuclear Safety was drafted in 2008, and was presented for revision by other interested institutions.

NUCLEAR ENERGY IN LITHUANIA: NUCLEAR SAFETY
Annual report 2008

The present Report compiled by VATESI specialists: Gytis Maksimovas, Asta Mensonė, Jolanta Tumasaitė, Ovidijus Šeštokas, Zofija Adomaitienė, Laura Razgutė-Povilavičienė, Lina Vaitkienė, Ugnė Adomaitytė, Vidas Paulikas, Sigitas Šlepavičius, Rolandas Čiučelis, Marius Strazdas, Birutė Purlienė, Dainius Brandišauskas, Michail Demčenko, Evaldas Kimtys, Vytenis Barkauskas, Edgaras Šokurovas, Vilmantas Lašiūnas, Žybartas Patašius, Kęstutis Sabas, Emilius Vanagas, Vladislav Legenis, Nerijus Bucevičius, Viačeslavas Ribakovas, Marius Davainis, Renaldas Sabas, Darius Lukauskas, Emilis Baškys, Kristina Tumosienė, Audrius Pašiškevičius, Rimantas Semėnas, Algirdas Vinskas, Jūratė Prokopovič.

Photos by Nerijus Rakštikas and from VATESI archive.

Translated by Džemilija Stogienė

Signed on July 08, 2009.

Published by UJ „Kriventa“, tel./fax: +370 5 265 0629
E-mail: kriventa@takas.lt
www.kriventa.lt

Designers:
Eglė Lipeikaitė
Simonas Barščiauskas

STATE NUCLEAR POWER SAFETY INSPECTORATE (VATESI)
12 A. Goštauto St., LT-01108 Vilnius, Lithuania
Tel.: +370 5 262 4141, fax: +370 5 261 4487
E-mail: atom@vatesi.lt
www.vatesi.lt

List of abbreviations

AQG	– Atomic Questions Group	LEI	– Lithuanian Energy Institute
CNTBT	– Comprehensive Nuclear Test Ban Treaty	NEF	– Nuclear energy facility
DTI	– Department of Trade and Industry (presently BERR – Department for Business, Enterprise and Regulatory Reform) of the UK	NRWG	– Working group for regulation of Nuclear Safety
DSS	– Diversified Reactor Shutdown System	PSA	– Probabilistic Safety Assessment
FI	– Institute of Physics	RAMG	– Regulatory Assistance Management Group
GRS	– German State Nuclear Reactor Safety Consulting Association	RATA	– Radioactive Waste Management Agency
HLG	– High-Level Group on Nuclear Safety and Waste Management	RSR	– Review of safety analysis report
IAEA	– International Atomic Energy Agency	SAR	– Safety analysis report
INPP	– Ignalina Nuclear Power Plant	SIP	– Safety Improvement Program
INES	– International Nuclear Event Scale	SSM	– Swedish Radiation Safety Authority
IPPAS	– International Physical Protection Advisory Service	SNFS	– Interim Spent Nuclear Fuel Storage of Dry Type
IPSART	– International Probabilistic Safety Assessment Review Team	TSO	– Technical Support Organisation
IRSN	– French Institute of Nuclear Safety	VG TU	– Vilnius Gediminas Technical University
IRRT	– International Regulatory Review Team	VITI	– State Institute of Information technologies
KTU	– Kaunas University of Technology	UMI	– Institute of Ultrasound Science
		WENRA	– Western European Nuclear Regulators' Association
		WGWD	– Working Group on Waste and Decommissioning (WENRA)
		WPNS	– Working Party on Nuclear Safety

Nuclear power plants in Europe





**State Nuclear Power Safety
Inspectorate (VATESI)**

A. Goštauto St. 12, LT-01108 Vilnius, Lithuania

Tel.: +370 5 262 4141, fax: +370 5 261 4487

E-mail: atom@vatesi.lt

www.vatesi.lt