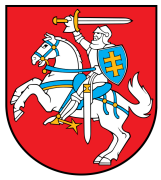

**Republic of Lithuania**

# CONVENTION ON NUCLEAR SAFETY

## FIFTH NATIONAL REPORT

**Vilnius 2010**

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## TABLE OF CONTENTS

## ACRONYMS AND ABBREVIATIONS USED IN THIS REPORT

| | |
|---|---|
| ALARA | As Low As Reasonable Achievable |
| ALS | Accident Localization System |
| ATWS | Anticipated Transient Without Scram |
| BWR | Boiling Water Reactor |
| CPS | Control and Protection System |
| DSAR | Decommissioning Safety Analysis Report |
| DSS | Diverse Shutdown System |
| EIA | Environmental Impact Assessment |
| ENSREG | European Nuclear Safety Regulators Group |
| EML | Environmental Monitoring Laboratory |
| EOP | Emergency Operating Procedure |
| EPO | Emergency Preparedness Organization |
| EPP | Emergency Preparedness Plan |
| EU | European Union |
| FA | Fuel Assemblies |
| FC | Fuel Channel |
| FRD | Fire and Rescue Department |
| FSP | Fuel Storage Pool |
| IAEA | International Atomic Energy Agency |
| INES | International Nuclear Event Scale |
| INPP | Ignalina Nuclear Power Plant |
| ISI | In-Service Inspection |
| LBB | Leak Before Break |
| MCP | Main Circulating Pump |
| NI | Nuclear Installation |
| NIKIET | Research and Development Institute of Power Engineering |
| OIL | Operating Intervention Level |
| OSART | Operational Safety Review Team |
| PSA | Probabilistic Safety Assessment |
| QM | Quality Management |
| RATA | Lithuanian State Company “Radioactive Waste Management Agency” |
| RAMP | Review of Accident Management Programs |
| RBMK | Channel-type Large Power Reactor |
| RPC | Radiation Protection Centre |
| RSR | Review of Safety Report |
| RUZA | Guidelines on the management of the beyond design accidents |
| SAR | Safety Analysis Report |
| SDW | Service and Drinking Water |

| | |
|---|---|
| SIP | Safety Improvement Program |
| SFSP | Spent Fuel Storage Pool |
| TG | Turbine generator |
| TSO | Technical Support Organisation |
| VAE | Joint stock company “Visagino atominė elektrinė” |
| VATESI | Lithuanian State Nuclear Power Safety Inspectorate |
| VNIPIET | All-Union Research and Development Institute for Energy Technology |
| VNPP | Visaginas Nuclear Power Plant |
| WANO | World Association of Nuclear Operators |
| WENRA | Western European Nuclear Regulators’ Association |

# INTRODUCTION

This report provides updated information as compared to the Lithuanian National Report issued in 2007.

During operation of the INPP, safety requirements to nuclear facilities were continuously increasing. These requirements covered reliability of all normal operation systems and safety systems, procedures and instructions of all levels, administrative management of the plant, personnel qualification improvement, emergency planning. Quality Assurance made integral part of all safety related activities.

On 26 December 2008 the first Unit, which was shut down on 31 December 2004, was designated as a finally shut down one. Defueling of Unit 1 reactor was begun in 2006 and completed in December 2009. Currently Unit 1 is maintained in post-operation state, based on VATESI license and in accordance with the requirements of Technical specification.

The safety of INPP Unit 2 operation was grounded by Safety Analysis Report – SAR-2. From 2006 to 2008 INPP has updated the Safety Analysis Report for Unit 2. The update was implemented taking into account the results of modifications, analytical work and changes to INPP safety management system, carried out during the period of 2001-2007. 127 modifications of Unit 2 main equipment and 50 analytical works have been carried out based on SAR-2 review report, VATESI recommendations, as well as based on INPP's own initiative as part of the process of updating SAR-2. After shut-down on 31 of December 2009 Unit 2 is maintained in post-operation state based on VATESI license and in accordance with the requirements of Technical specifications for operation of Unit 2.

The legal framework for the construction of the new nuclear power plant was set forth by the Law on Nuclear Power Plant adopted in 2007 as well as in the National Energy Strategy approved by the Resolution No. X-1046 of the Seimas of the Republic of Lithuania on 18 January 2007. The Government of the Republic of Lithuania by its Resolution No. 300 of 22 April 2009 approved the strategic directions and indicative plan for the development and implementation of the project.

The implementation of the new Visaginas Nuclear Power Plant project in Lithuania is supervised by the New NPP Project Implementation Supervision Committee chaired by the Minister of Energy. Joint stock company "Visagino atominė elektrinė" (VAE) was established in August 2008 and took over the preparatory works, which were carried out by the Nuclear Energy Department of Company "Lietuvos energija" established at the end of 2006.

In January 2009, the Report of the Environmental Impact Assessment for the construction of the New Nuclear Power Plant in Lithuania was approved

With a view to implementing the construction Project of the new nuclear power plant, it is necessary to adjust the legal framework in line with international legal acts, Acquis Communautaire of the European Union and by using the best practice of other countries. Lithuania is obligated to harmonize the national legal acts with the Council Directive 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear facilities.

Information presented in this report demonstrates how Republic of Lithuania is fulfilling its obligation under the Convention on Nuclear Safety.

## Article 6 EXISTING NUCLEAR INSTALLATIONS

*Each Contracting Party shall undertake appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.*

### 6.1. List of existing Nuclear Installations as defined in Article 2 of the Convention

INPP is the only nuclear installation in Lithuania. It contains two RBMK-1500 reactors, which have their own design peculiarities comparing with eleven RBMK-1000 units what are currently in operation in Russian Federation. INPP is located in the north-eastern part of Lithuania, near the borders with the Republic of Latvia and the Republic of Belarus. The power plant was built as part of the Soviet Union's North-West Unified Power System. The first Unit of INPP was connected to grid at the end of 1983, and the second Unit - in August 1987. Design lifetime of the Units was projected out to 2014-2017 accordingly. Totally four Units were originally planned to be built on INPP site. Construction of the third Unit was suspended in 1988 due to political pressure, and construction of the forth one had never been started. INPP finally shut down Unit 1 on 31 December 2004 and Unit 2 on 31 December 2009 in compliance with the protocol of Lithuania's EU accession.

The development of the INPP design was implemented by VNIPIET, Russian Federation, which was the principal designer. INPP contains RBMK-1500 reactors, designed and constructed by former Ministry of mid-scale industry of USSR. The turbine hall and the open switch-yard were developed by the Kiev branch of the Atomic Energy Design Institute (Russian abbreviation - "Atomenergoproekt"), Kiev, Ukraine. It had been proposed, that INPP would be the pilot nuclear power plant with the RBMK-1500 type reactors. The scientific supervisor of the RBMK-1500 project was the Kurchatov Atomic Energy Institute (often referred to as the Russian Research Centre "Kurchatov Institute"), Moscow, Russia. The principal designer of the nuclear steam supply system was the Research and Development Institute of Power Engineering -NIKIET, Russia.

Both INPP reactors have one circuit, two cooling loops; fuel assemblies are loaded into individual channels. The neutron spectrum is thermalized by a massive graphite moderator block. The plant uses slightly enriched nuclear fuel with or without burnable poison. Refueling is performed during reactor operation.

INPP belongs to the category of "boiling water" channel-type reactors. The reactor cooling water, as it passes through the core, is subjected to boiling and is partially evaporated. The steam-water mixture then continues to the drum-separators, the elevation of which is greater than that of the reactor. Here the water settles, while the steam proceeds to the turbines. The remaining steam beyond the turbines is condensed in the condenser, and the condensate is returned via the deaerator by the feedwater pumps to the water of the same drum-separators. The coolant is returned by main circulation pumps to the core, where part of it is again converted to steam.

This fundamental heat cycle is identical to the BWR cycle widely used throughout the world, and is similar to the thermal cycle of the power plant using the carbon-hydrogen fuel. However, compared to BWRs used in Western power plants, INPP and other plants with the RBMK-type reactors have a number of unique features. In the Table 6.1. listed the most important plant parameters.

Table 6.1.

| | |
|---|---|
| Coolant | water (steam-water mixture) |
| Heat cycle configuration | single circuit |
| Power, MW: | |
| • Thermal (design) | 4800 |
| • Thermal (actual) | 4200 |
| • Electrical (design) | 1500 |
| • Electrical (actual) | 1300 |
| Core dimensions, m: | |
| • height | 7 |
| • diameter | 12 |
| Thickness of reactor's graphite reflector, m: | |
| • end | 0.5 |
| • side | 0.88 |
| Lattice pitch, m | 0.25 x 0.25 |
| Number of channels: | |
| • fuel | 1661 |
| • control and protect system | 235 |
| • reflector-cooling | 156 |
| Fuel | uranium dioxide, uranium dioxide with erbium oxide |
| Initial fuel enrichment for $^{235}U$, % | 2.0 |
| Enrichment for $^{235}U$, % with 0.41% of erbium used since 1995 | 2.4 |
| Fuel enrichment for $^{235}U$, % with 0.5% of erbium, used since 2001 | 2.6 |
| Fuel enrichment for $^{235}U$, % with 0.6% of erbium, used since 2005 | 2.8 |
| Nuclear fuel burn up, MWday/kg | 22.5 |
| Uranium-erbium fuel with 0.41% of erbium addition burn-up, MWday/kg | 25.2 |
| Nuclear fuel with 0.5% of erbium addition burn up, MWday/kg | 25.2 |
| Nuclear fuel with 0.6% of erbium addition burn up, MWday/kg | 27.0 |
| Temperatures, $^{o}C$: | |
| • maximum temperature in centre of fuel pellet | 2100 |
| • maximum graphite stack temperature | 760 |
| • maximum fuel channel temperature | 360 |
| • coolant temperature at fuel channel inlet | 260-266 |
| • coolant temperature at fuel channel outlet | 284 |
| • feedwater temperature | 177-190 |
| Excessive pressure, Mpa: | |
| • steam pressure at separators | 6.38-6.87 |
| • pressure in MCP pressure header | 8.6 (8.54) |
| Coolant flow rate through reactor at normal power, kg/s | 8700 - 10550<br>11111-13333 (at 4800 MW) |
| Steam produced in reactor at normal power, kg/s | 2361-2444 |
| Void fraction at reactor outlet, % | 23-29 |
| Maximum fuel channel parameters: | |
| • fuel channel power, kW | 4250 |
| • coolant flow rate through fuel channel, kg/s | 8.7 (11,1) |

| | |
|---|---|
| • void fraction at fuel channel outlet, % | 36.1 |
| Number of main circulation pumps | 8 |
| Capacity of main circulation pumps, kg/s | 1944-3056 |

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

During operation of the INPP, safety requirements to nuclear facilities were continuously increasing. These requirements covered reliability of all normal operation systems and safety systems, procedures and instructions of all levels, administrative management of the plant, personnel qualification improvement, emergency planning. Quality Assurance shall make integral part of any safety related activity. Given these requirements the safety improvement activities are always in progress at INPP.

On 26 December 2008 the first Unit, which was shut down on 31 December 2004, was designated as a finally shut down one.

Defueling of Unit 1 reactor was begun in 2006. It was performed according working program which was based on approved by VATESI safety justification. The safety justification confirmed monotonic increase of subcriticality during refueling as well as demonstrated acceptability of consequences of possible accidents. During refueling relevant parameters were monitored by equipment. Till the end of defueling process reactor was monitored by control room personnel all the time. A part of removed spent fuel assemblies was transported to Unit 2 for after-burning. In December 2009 defueling was completed. 978 FAs have been transported to Unit 2 for after-burning and the remaining assemblies were put into spent fuel storage pools. At this time Unit 1 is maintained in post-operation state, based on VATESI license and in accordance with the requirements of Technical conditions for operation of Unit 1 for defuelling phase. Decommissioning of various Unit 1 facilities is underway. These activities are performed in accordance with the "INPP Final Decommissioning Plan", approved by the Government of Republic of Lithuanian in May 2005 and in line with Unit 1 decommissioning project for defuelling phase.

The safety of INPP Unit 2 operation was grounded by Safety Analysis Report – SAR-2. SAR-2 was prepared in 2000 and after review by VATESI in September 2004, INPP received a indefinite validity license for Unit 2 operation.

According to VATESI requirements, in order to continue Unit 2 operation after the final shutdown of Unit 1, INPP has prepared a Safety Justification for the only operating Unit 2. The Safety Justification for the only operating Unit 2 was developed on the basis of Unit 2 condition at the end of December 2004, i.e. when the Unit 1 final shutdown was scheduled. The Safety Justification is based on SAR-2 and RSR-2, it covers the safety issues related to changes of operation conditions for Unit 2 process systems and common plant process systems and changes of administrative structure of INPP following the Unit 1 final shutdown. The Safety Justification also considers planned modifications of Unit 2 systems, which are affected by the Unit 1 final shutdown, configurations of Unit 1 process systems during the decommissioning of Unit 1. The Safety Justification for the only operating INPP Unit 2 has determined the high level of INPP safety and demonstrated that operation of the Unit 2 will be safe enough after end of operation of Unit 1.

From 2006 to 2008 INPP has updated the Safety Analysis Report for Unit 2. The update was implemented taking into account the results of modifications, analytical work and changes to INPP safety management system, carried out during the period of 2001-2007.

127 modifications of Unit 2 main equipment and 50 analytical works have been carried out based on review report of SAR-2 (RSR-2), VATESI recommendations, as well as based on INPP's own initiative as part of the process of updating SAR-2.

The results of analytical work were used as a basis for implementation of a number of modifications at Unit 2, such as use of uranium-erbium fuel with 2.8% enrichment, commissioning of a diverse shut down system, use of cluster control rods. Implementation of these modifications allowed for a significant increase of nuclear safety of INPP Unit 2.

Ageing analysis of thermal and mechanical equipment components of safety related systems did not identify any components, ageing of which would be a limiting factor for Unit 2 life. Analysis of fuel channels corrosion revealed that considering the current speed of wall thickness reduction corrosion is not a life limiting factor for the channels. Operational statistics showed that power and signal cables of all types are operating within the normal operation range. The existing ageing control and management programmes are efficient enough to allow detect the moment when normal operation range ends and intensive aging range starts.

Assessment of all areas of operation performed in the update of SAR-2, the actual condition of systems and equipment, completed modifications and results of analytical work have shown that the existing level of INPP Unit 2 safety is in compliance with established safety criteria and that the second Unit can safely continue operation.

One of the main modification which was done at INPP unit 2 was installation of DSS. In October 2004 DSS has been put into trial-industrial operation. The requirement of the Regulations on the availability of two independent Shutdown Systems has been implemented. Each system is aimed at ensuring the transfer of the reactor core into sub-critical condition as well as maintaining the reactor core in sub-critical condition taking into account the principle of single failure or the failure caused by personnel actions.

Following VATESI requirements and in order to ensure diversity of types of equipment comprising the two diverse reactor shutdown systems, 49 servo-actuators of a new type AZ/BSM-274/20 have been designed and installed on the CPS as part of unit 2 DSS implementation activities. DSS implementation was fully completed in 2008, including training of the operating and maintenance staff.

Within the frame of the DSS design the safety justification of the DSS has been implemented with the application of full-scope PSA model. Unit 2 PSA model has been adjusted taking into account the DSS PSA full-scope model.

In order to prevent the evolution of the design accidents into the beyond design accidents and to mitigate the consequences of the beyond design accidents the following Guidelines on the management of the beyond design accidents (RUZA) have been developed at INPP for Unit 2:

- RUZA -R1. Assurance of the heat removal from the reactor.
- RUZA -R2. Pressure reduction in the reactor space.
- RUZA -R3. The ALS condition management.
- RUZA -RB. Reduction of the Fission Products' release.
- RUZA -B. The Storage Pools' condition management.

For all indicated Guidelines the appropriate justifications are available. In order to implement RUZA strategies, during period 2007-2008 INPP existing equipment were modified and INPP personnel involved in emergency response activities has been trained.

LBB concept has been implemented at INPP in 2007. This assured the fulfillment of the existing nuclear requirements. The following Coolant Leakage Detection Systems have been introduced at INPP:

- Leakage detection in the premises of the lower water communication lines.
- Leakage detection in the premises of the ALS leek-tight confinements.
- Coolant leakage detection in the steam pipelines of the TG-3 and TG-4 vaults.

The implementation of these systems helped to increase the safety of the Unit since it allowed detecting small coolant leakages at the early stage of the equipment leak-tightness loss.

After shut-down on 31 of December 2009 Unit 2 is maintained in post-operation state based on VATESI license and in accordance with the requirements of Technical specifications for operation of Unit 2. The validity of the Technical specifications has been extended until 31 December 2010. Technical specifications for operation of Unit 2 covering defuelling phase have now been developed and are undergoing agreement by various stakeholders.

Unit 2 Decommissioning Project covering final shutdown, defuelling phases and including the Safety Analysis Report has been developed. In December 2009 the Decommissioning Project and the SAR have been submitted for VATESI review.

From the organizational point of view, activities for INPP safety assurance are implemented within the framework of SIP-3.

### 6.3. Overview of programmes and measures for the safety upgrading of those nuclear installations which will be upgraded; and identification of installations for which decisions on shutdown have been made

INPP activities for safety improvement is based upon priorities to meet the modern requirements of national and international safety standards, upon results of the analysis, carried out in SAR of Unit 1, SAR-2 and RSR scope, also it includes additional calculations, implementation of VATESI guidelines, modifications, which improve the system reliability, thus providing the INPP safety. Managerially this activity is fulfilled within the framework of SIP-1 (1993-1996), SIP-2 (1997-2004) and SIP-3 (2005 – 2009). SAR-2, RSR-2 and safety justification of single operating Unit 2 report recommendations became the basis for the new SIP-3 for the period of 2005-2009.

#### *6.3.1. SIP-3/2007*

INPP SIP-3/2007 included 88 measures which were planned to be carried out in the period 2007 - 2009. In 2007 35 measures have been implemented, the most significant of which are listed below:

- Development and implementation of cluster regulators to reduce reactivity change caused by draining of CPS channels.
- Introduction of SNF spillage collection equipment at Units 1 and 2.
- Replacement of automatic isolating switches “Elektron-16V” on 0.4kV sections of the Switchgear for House Loads of Unit 2.
- Power supply to control circuits of pumps TW16D01-03 and of the valves installed on the outlets of these pumps has been divided and installed on different panels.
- Modification of INPP accident warning system.

#### *6.3.2. SIP-3/2008*

INPP SIP-3 programme in 2008 included 43 measures which were planned to be carried out in the period 2008 - 2009. In 2008 26 measures have been implemented, the most significant of which are listed below:

- Installation of the diverse shutdown system on Unit 2 reactor.
- Development and installation of new type of servo-actuators at Unit 2.
- Modernisation of the full-scale Main Control Room simulator as a result of installation of the diverse shutdown system.

- Introduction of the LBB concept at INPP.
- Installation of an additional system supplying nitrogen gas (pressure 6 kgf/cm$^2$) to the ALS.
- Development of PSA model in line with the IPSART mission recommendations.
- Development of Guidelines covering management of beyond design basis accidents.
- Introduction of water supply lines to FSP and to room 125 from the SDW system to reactor fuel channels in the event of beyond design basis accidents.
- Development and manufacturing of thermocouples to ensure monitoring of reactor temperature in the event of beyond design basis accidents.
- Measurements of gaps between fuel pellets and fuel element cladding. Gas pressure measurements and identification of composition of fission products for the entire fuel burnup range.
- Justification of operational limits and safe operation limits for operative reactivity margin.
- Analysis of radiological consequences of design basis accidents and identification of effect of average core burnup increase in case erbium fuel is used.
- Additional research of effect of disturbed linear load criterion on fuel elements. Conducted to assess possible consequences of this event during transients in the core.
- Development of in-service metal inspection regulations, which cover equipment and pipelines of systems relevant for Unit 1 safety.
- Implementation of a system for registration and collection of near miss events, precursors and low level events.
- Training of staff in new IAEA requirements related to control systems.

### *6.3.3. INPP SIP-3/2009*

INPP SIP-3 in 2009 included 20 measures, planned to be carried out in the period 2009 2012. In 2009 12 measures have been implemented, the most significant of which are listed below:

- Assessment of systems monitoring hydrogen in the ALS.
- Improvements to system controlling hydrogen in the upper steam reception chamber of the ALS.
- Improvements to hydrogen concentration measurements. Acquisition of complete data on cracks when conducting post-reactor analysis of Unit 2 fuel channels.
- Design, supply and installation of a system for monitoring leak-tightness of fuel elements in Spent Fuel Assemblies at Unit 1.
- Modification of seismic alert and monitoring system.
- Analysis of building's 101/2 Unit A-2 reaction to earthquake action.

### *6.3.4. Funding of SIP-3*

SIP is funded by different sources (see Table 6.3.4).

Table 6.3.4

| **Total expenses (million LTL)** | **Including:** | | |
|---|---|---|---|
| | **Own funds (million LTL)** | **Public interests (million LTL)** | **Unit 1 decommissioning fund (million LTL)** |
| **Year 2007** | | | |
| 25.659 | 16.051 | 9.148 | 0.460 |
| **Year 2008** | | | |
| 8.863 | 8.863 | 0 | 0 |
| **Year 2009** | | | |
| 1.204 | 1.204 | 0 | 0 |

## 6.4. Identification of installations for which decisions on shutdown have been made

Following the resolution No.1491 of 25 November 2004 by the Government of the Republic of Lithuania based on 4th protocol of Treaty Between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, the Hellenic Republic, the Kingdom of Spain, the French Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Republic of Austria, the Portuguese Republic, the Republic of Finland, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland (Member States of the European Union) And the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia, the Slovak Republic, Concerning the Accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia And the Slovak Republic to the European Union resolution No.1491 of 25 November 2004 by the Government of the Republic of Lithuania the first Unit of INPP was shut down on 31 December 2004.

Following the Resolution No.1448 of 4 November 2009 by the Government of the Republic of Lithuania based on 4th protocol of Treaty Between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, the Hellenic Republic, the Kingdom of Spain, the French Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Republic of Austria, the Portuguese Republic, the Republic of Finland, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland (Member States of the European Union) And the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia, the Slovak Republic, Concerning the Accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia And the Slovak Republic to the European Union the second Unit of INPP was shut down on 31 December 2009.

### *6.4.1. The key events related to the decommissioning of the INPP*

On 5 October 1999 the Parliament of the Republic of Lithuania (Seimas) approved the National Energy Strategy in accordance with which Unit 1 at INPP is to be shut down by 2005, given the long-term substantial financial support conditions of the European Union, G-7 and other countries and international financial institutions. On 31 December 2004 Unit 1 was shut down and Unit 2 is to be operated until the end of 2009.

On 19 February 2001 the Government of the Republic of Lithuania approved the Decommissioning Program of INPP Unit 1 envisaging the measures for 2001-2004. On 2 February 2005 the Government of the Republic of Lithuania approved the new Decommissioning Programme for both Units of INPP. The main objectives of the Programme are:

- To ensure safe operation of INPP during preparatory decommissioning phase and during actual decommissioning activities.
- Develop, modify and add to the legal acts related to INPP decommissioning.
- Ensure the work of INPP Decommissioning Service and Unit 1 Surveillance Service.
- In the order defined by the legal acts, evaluate both the preparatory decommissioning projects and the decommissioning projects in respect to nuclear and radiation safety as well as license them.

- To mitigate negative social and economic effects.

It also specifies necessary organizational, technical, economical and social measures to achieve the above mentioned objectives.

Furthermore, on 25 February 2005 the plan was approved by the order of the Minister of Economy on implementation of measures of the decommissioning program of INPP Units 1 and 2 envisaging the measures for addressing environmental, social and economic problems, as well as the consequences of premature decommissioning. The document is reissued once a year.

Following the Resolution No.1448 of 4 November 2009 by the Government of the Republic of Lithuania the second unit of INPP was shut down on 31 December 2009.

### *6.4.2. Decommissioning projects and Documents*

**The Final Decommissioning Plan**

Preparing for decommissioning and implementing the General requirements for decommissioning the INPP, approved by the Head of VATESI in 1999 and supplemented in 2003, INPP prepared the Final Decommissioning Plan (FDP). In 2005 this plan was approved by the Ministry of Economy. In 2009 the FDP was updated.

The plan includes the whole period of INPP decommissioning (both Units, auxiliary equipment and interim storage facilities for spent fuel and waste). On basis of proposed strategy decommissioning activities and projects are being planned. FDP describes principles, methods and technologies, as well as general schedule, which will be necessary for ensuring safe, in respect to radiation, ecological and efficient decommissioning process. The following information is presented in INPP FDP:

- Applied base of normative documents;
- Accepted dismantling strategy;
- Decommissioning plan and schedule;
- Description of radioactive and hazardous materials;
- Decommissioning activities;
- Decontamination activities;
- Dismantling methods and technologies;
- INPP waste management strategy;
- Safety and environmental impact evaluation;
- Radiation safety program;
- Organizational chart of INPP decommissioning;
- Decommissioning expenses and financing;
- Quality assurance;
- Final radiological exploration and territory recultivation.

In respect to nuclear safety the activities connected with possible risk will be carried out for the first ten years after final shutdown of the reactors (spent fuel treatment, decontamination, modification and isolation of systems). The works will be prepared and performed by INPP qualified staff.

FDP describes the volumes of waste which are not finally treated and which shall be taken into account while decommissioning preparation and realization. In order to summarize it can be affirmed that as a result of INPP operation and decommissioning about 5900 $m^3$ of spent resins, perlite and sediments, as well as 130000 $m^3$ of solid radioactive waste will be generated. This waste shall be treated in the new cementation facility and in the future Solid Waste Management and Storage Facility. After that waste, depending on the category, can be sent for free release (if contamination levels are less than controlled), disposed in the near surface repository for very low active short-lived waste or temporarily stored on the power plant site until the appropriate repositories will be constructed (near surface or deep geological). Taking into account the envisaged

volumes of waste it is recommended to construct near surface repository for very low active short-lived waste with capacity 60000 $m^3$ and near surface repository with capacity 100000 $m^3$. The volume of bituminized waste will be more than 24000 $m^3$. After INPP empty buildings dismantling and disassembling of their constructions 965000 $m^3$ of concrete and 190000 tons of steel will be generated additionally, and their level of contamination by radionuclides will be less than controlled.

Since INPP decommissioning is such economical activity for which the process of EIA is obligatory, in parallel with FDP the Program of Assessment of the Planned Economical Activity Impact on the Environment was developed and approved. It is specified in EIA programme what issues will be reviewed in EIA reports, as well as INPP environment is described, since according to it the impact of decommissioning on the environment will be evaluated later.

**Decommissioning Project for INPP Unit 1 Final Shutdown and Defuelling Phase**

Decommissioning Project for INPP Unit 1 Final Shutdown and Defuelling Phase including SAR and EIA Report was prepared in August 2004. Project and its SAR and EIA were accepted by State competent authorities.

In June 2006 VATESI approved the Decommissioning Project for INPP Unit 1 Final Shutdown and Defuelling Phase and its safety analysis report. VATESI also arranged nuclear safety review of the project and review's conclusion submitted to the Ministry of Environment that arranged the State Complex Expertise of the project. The conclusions of State Complex Expertise were issued in October 2006.

Decommissioning Project covers works which will be performed within the frames of prolonged operational license for INPP Unit 1. It is one of the documents substantiating the permission for reactor final shutdown. The project has double purpose:

A) Process regulations, in which:
- The systems (their parts) which are not needed any more are indicated, their further isolation/modification is described, that allow reducing costs for the shutdown Unit maintenance;
- In-line decontamination of MCC and refuelling machine is described (with the aim to reduce personnel irradiation during further dismantling works performance).

B) Guide on planning in which all expenses of the described period are estimated (related not only to process activities, but to operation of remained systems, treatment of fuel and radioactive waste, as well as other preparatory works), need in man power, personnel irradiation, discharges into environment and radiation impact on the population.

The Project does not cover dismantling works, since they will be performed within the frames of other dismantling and decontamination projects.

In 2004 VATESI and the INPP agreed as to what documents would have to be analyzed in order to grant Unit 1 the status of a finally shutdown facility. In late 2006 having analyzed the last of the submitted documents, VATESI granted this status to the INPP unit 1 and gave permission to carry out operations envisaged in Decommissioning Project for INPP Unit 1 Final Shutdown and Defuelling Phase.

In June 2007 VATESI and the INPP agreed as to what documents would have to be analyzed in order to grant Unit 2 the status of a finally shutdown facility.

Environmental impact is analyzed in EIA report, on basis of which Ministry of Environment has accepted affirmative solution regarding final shutdown of INPP and possibilities of nuclear defuelling in respect to environmental impact. In accordance with Espoo Convention EIA report is a subject of consultations (see 17.1.3).

**Decommissioning Project for INPP Unit 2 Final Shutdown and Defuelling Phase**

Unit 2 Decommissioning Project covering final shutdown, defuelling phases and including the Safety Analysis Report was developed in November 2009. In December 2009 the Decommissioning Project and the SAR have been submitted for VATESI review.

Unit 2 decommissioning EIA covering the final shutdown and defuelling phase was developed in June 2009. Following review by state authorities the EIA together with the authorities' conclusions was sent in the beginning of 2010 to the Ministry of Environment.

In accordance with the Requirements for decommissioning of nuclear facilities (P-2009-02), INPP must obtain VATESI permission for final shutdown of Unit 2 reactor. Such permission may be granted following provision to VATESI and review by the regulator of relevant documentation, including:

- Ministry of Environment conclusions on Unit 2 EIA covering the final shutdown and defuelling phase.
- Conclusions of the State expertise panel on Unit 2 Decommissioning Project covering the final shutdown and defuelling phase.
- Technical specifications for operation of Unit 2 for the reactor defuelling phase.

**Project B1 "Interim Spent Fuel Storage Facility for INPP"**

The project envisages construction and delivery of equipment for management of fuel assemblies whose integrity has been damaged, removal of spent nuclear fuel (about 18000 fuel assemblies) from INPP power Units 1 and 2, its transportation to a new storage facility and its temporary storage for the period not less than 50 years.

The Contract was signed on 12 January 2005 with NUKEM-GNS Consortium, Germany.

Following comprehensive review of the Design by State expertise panel and approval by Lithuanian state institutions, on 2 September 2009 INPP obtained VATESI license for construction of Interim Spent Fuel Storage Facility (ISFSF). On 15 September 2009 the State Inspection on Territory Planning and Construction under the Ministry of Environment issued permission for construction of the ISFSF.

Construction works on the site started in October 2009 following positive conclusions by expert company "Expertika" on the structural part of the Detailed Design. Completion of construction and commissioning of ISFSF are scheduled for October 2011.

German company GRIMMA is manufacturing a new type of CONSTOR RBMK-1500/M2 cask, which will be used to store spent nuclear fuel in the ISFSF. At the moment, approximately 40 casks have already been manufactured and are currently stored at a temporary site in Germany.

**Project B2, 3, 4 "Solid Waste Management and Storage Facility"**

Solid Waste Management and Storage Facility is a modern system of operational waste and decommissioning waste management.

The Facility is intended for extraction, transport, preliminary classification, classification, treatment (correspondingly), characterization and storage of:

- Long-lived and short-lived solid radioactive waste which are stored at present on INPP site;
- Operational solid and combustible liquid radioactive waste which will be generated prior to Unit 2 operation completion;
- Solid radioactive waste which will be generated during INPP decommissioning.

The Contract on Project B2,3,4 realization was signed on 30 November 2005 with NUKEM, Germany.

***B2. Solid Radioactive Waste Retrieval Facility***

In February 2008 VATESI issued a license for design work. Subsequently, Basic Design and SAR for construction of Solid Radioactive Waste Retrieval Facility have been developed and in November 2009 submitted for review by state institutions. B2,3,4 Environmental Impact Assessment Report was reviewed and agreed by state institutions in July 2008.

Construction works are scheduled to start in September 2010. Completion and commissioning of the B2 Facility is scheduled for February 2014.

***B3,4. Solid Radioactive Waste Treatment and Storage Facility***

Following approval of the Basic Design by state authorities as well as basic and comprehensive reviews of the document by expert panels, in August 2009 INPP received VATESI license for construction of Solid Radioactive Waste Treatment and Storage Facility. On 10 September 2009 the State Inspection on Territory Planning and Construction under the Ministry of Environment issued permission for construction of the Facility. Construction work on the site started end September 2009. Completion and commissioning of the B3,4 Facility is scheduled for July 2012.

**Project B5 "Reliable Heat and Steam Source for INPP and Visaginas"**

Contracts for construction of Steam Boiler Station and Heat Only Boiler Station were signed on 2 July 2003. Steam Boiler Station was put in commission on 9 September 2005, Heat Only Boiler Station was put in commission on 10 May 2006. At present Boiler Stations operate according to the projects.

On 27 October 2003 the contract for rehabilitation of supply pipeline from Heat Only Boiler Station to INPP (about 7000 m) and for industrial pipeline and internal installations inside INPP was signed within the frames of the same B5 project. The works related to rehabilitation of pipeline from Heat Only Boiler Station to INPP were completed in July 2005. Works related to rehabilitation of industrial pipelines inside INPP were completed in October 2005.

The works on rehabilitation of INPP buildings heat substations were moved into a separate Project B5-5. The Contract was signed on 14 June 2007 with Closed Joint-stock Company Kašgarija, Lithuania. Modification of heating sub-stations TP-2, TP-21 and heating sub-stations in INPP buildings was carried out within the frame of this Project. The works under the Contract were completed in February 2010.

**Project B6 "Modernisation of the Technical Documentation Archive at INPP"**

Two Contracts were awarded within the frames of this project. The contract for design and construction of archive building was signed on 29 August 2003. The construction was completed and the archive building was put in commission on 25 August 2004. The contract for design and installation of archive system was signed on 21 January 2004. Installation of the System was put in commission on 7 September 2005. At present the archive operates according to the project.

**Project B9-0 "INPP Building 117/1 Equipment Decontamination and Dismantling Project Development"**

The objective of Project B9-0 is the development of engineering documentation (Basic Design and Detailed Design) and licensing documentation that will allow INPP personnel dismantling of Building 117/1 (ECCS) decommissioning equipment.

The Contract was signed on 23 August 2007 with British Nuclear Group Project Services ltd, UK.

By the end of 2009 the following activities have been completed:

- EIA Report has been prepared and agreed with state institutions.

- General Data Set covering disposal of radioactive waste (Article 37, EURATOM) has been prepared and agreed.
- Basic Engineering Design for Dismantling and Decontamination of equipment in Building 117/1 has been developed.
- Simplified Design for Construction Works, which is used to carry out preparatory works in Building 117/1 has been prepared 117/1.
- Data Sheets which will be used to procure dismantling and decontamination tools to be used in Building 117/1 have been developed.

Completion of works is scheduled for September 2010.

**Project B9-1 "INPP Unit 1 Turbine Hall Equipment Decontamination and Dismantling Project Development"**

The objective of Project B9-1 is the development of engineering documentation (Basic Design and Detailed Design) and licensing documentation that will allow INPP personnel dismantling of INPP Unit 1 Turbine hall decommissioning equipment. The Contract was signed on 22 November 2007 with United Kingdom Atomic Energy Authority, UK. By the end of 2009 the Contractor has submitted the following documents:

- EIA Report, Issues 1-3.
- General Data Set for the Radioactive Waste Disposal Plan, Issues 1-3.
- Basic Engineering Design for Dismantling and Decontamination of equipment in INPP Unit 1 Turbine Hall, Issues 2-4.
- Safety Case, Issues 1-3.
- Detailed Design DD1,2,3, Issues 1-2.
- Data Sheets for equipment procurement, Issues 1-6.
- Strategy for handling of ion-exchange resins of the TG-1,2 condensate purification systems, Issues 1-3.
- Training Programme.

Radiological characterization and nuclide vector identification activities related to ion-exchange resins of the TG-1,2 condensate purification systems have been carried out. Completion of works is scheduled for March 2011.

**Project B9-2 "INPP Building V1 Equipment Dismantling & Decontamination Design Development"**

The objective of Project B9-2 is the development of engineering documentation (Basic Design and Detailed Design) and licensing documentation that will allow INPP personnel dismantling of INPP Building V1 decommissioning equipment.

The Contract was signed on 14 January 2009 with VTNS, UK.

Building V1 equipment dismantling and decontamination strategy was developed in 2009. The strategy is now undergoing review. Completion of works is scheduled for August 2011.

**Project B9-4 "INPP Units 1 and 2 Reactors Dismantling & Decontamination. Feasibility Study"**

After INPP Units 1 and 2 shutdown, Units 1 and 2 reactors cores defuelling and execution of PC in - line decontamination Units 1 and 2 reactors become the candidates for dismantling. Dismantling of reactors can be started only on condition that the equipment for radioactive waste treatment is prepared and the license of appropriate state institutions is received. Taking into account that dismantling of such type of the reactor has not been performed in the world, this project will start with the study of reactor RBMK dismantling possibility.

The objective of the project is the development of the possible reactor dismantling strategy, development of waste, produced during reactor dismantling, management strategy, determination of equipment for dismantling, preliminary evaluation of dismantling works cost. These data will be initial ones for development of the Basic Design for reactor dismantling.

Tender documents based on EBRD rules were prepared at the end of 2009 and send to the tenderers. The tender is to be conducted in 2010. Completion of works under this Contract is scheduled for December 2012.

**Project B9-5 "INPP Boiler House Equipment Dismantling & Decontamination Design Development"**

The objective of Project B9-5 is the development of engineering documentation (Basic Design and Detailed Design) and licensing documentation that will allow INPP personnel dismantling of INPP Boiler House decommissioning equipment. The Contract was signed on 5 May 2009 with UKAEA Ltd., UK. By the end of 2009 the Contractor has submitted the following documents:

- EIA Report, Issue 1.
- General Data Set for the Radioactive Waste Disposal Plan, Issue 1.
- Basic Engineering Design for Dismantling and Decontamination of INPP Boiler House equipment, Issue 1.
- Safety Case, Issue 1.
- Simplified Design for Construction Works for INPP Boiler House, Issue 1.
- Data Sheets for equipment procurement, Issue 1.
- Training Programme.

Completion of works is scheduled for December 2010.

**Project B10 "Free Release Measurement Facility"**

The decommissioning of nuclear power plants results in the production of great amount of materials and equipment which contamination levels are below clearance levels. A significant part of these materials and equipment could be reused, recycled or otherwise disposed without further regulatory control. Final Decommissioning Plan of INPP gives quantity of such type waste as 17000 tons. Huge quantity of building concrete debris to be produced during decommissioning should be also noted. Project B10 has been initiated for reduction of the amount of disposed waste as radioactive and possibility of its further use at INPP.

The Contract was signed on 11 December 2006 with Joint Venture Partnership (JVP) VF, a.s. and ENVINET, a.s., Czech Republic.

Construction of Facility Building is completed. Installation and testing of the building's engineering systems is complete. The measurement equipment has been installed and metrologically verified. Guarantee testing and commissioning of the measurement equipment are scheduled for April 2010.

**Project B11 "Supply and Installation of Tools and Equipment for Radiological Characterization of INPP"**

Equipment for radiological characterization of INPP is necessary for radiological characterization of INPP equipment and getting necessary data about radionuclides content in the waste, which will appear as a result of nuclear object decommissioning. These data are necessary for evaluation of the future expenses and potential risk, connected with waste treatment, storage and especially disposal, reduction of ionizing radiation impact on the personnel, as well as effective decommissioning planning. These tools and equipment also enable to pre-characterize the decommissioning waste (dismantled components) at the place of the ware production, i.e. prior to its transportation to the conditioning unit.

The Contract was awarded to the winner of Tender Company ENVINET (Czech) and was completed in November 2006.

**Project B12 "Equipment and Consumables for In-line Decontamination at Unit 1"**

At the end of 2009 a Contract was placed with a JVP including «Specialus Montazas-NTP» (Lithuania), All-Russian Scientific Research Institute for Nuclear Power Plant Operation (ВНИИАЭС, Russia) and LEI (Lithuania). The works to decontaminate the Primary Circuit (PC), Blow-down & Cool-downs System (BCS) and the bypass purification system of Unit 1 are expected to commence in June 2011.

**Tools and Equipment for Dismantling & Decontamination of Systems/Equipment Components**

Tools and equipment for dismantling of systems/equipment components shall ensure safe dismantling of this INPP equipment (turbines, steam generators, drum separators, etc.) and preparation for the further treatment/storage.

Tools/equipment for decontamination of systems/equipment components shall ensure acceptable level of contamination for further treatment and disposal, to reduce the impact on the personnel and to assure that the release of radioactive contaminants to the environment will be maintained within authorised limits during dismantling activities.

**Project B13 "Provision of Dismantling & Decontamination Tools for INPP Building 117/1"**

These project will be initiated in the process of appropriate Projects B9-0 realization, in which it will be specified what tools and equipment will be applied for decontamination and dismantling in INPP Building 117/1.

On 1 December 2009 contracts were signed with JVP «Specialus Montazas-NTP» and «Vilniaus Kranai» (Lithuania) for delivery of lifting equipment (Project B13-1), with Caverion GmbH (Germany) for delivery of ventilation equipment (Project B13-2), and with «Specialus Montazas» for delivery of special equipment (Project B13-3). Respective design documents have been prepared and submitted by the Contractors for INPP approval. Completion of works is scheduled for August 2010.

**Project B14 "Provision of Dismantling Tools for INPP Building G1"**

These project will be initiated in the process of appropriate Projects B9-1 realization, in which it will be specified what tools and equipment will be applied for dismantling in INPP building G1.

Tender documents for procurement of necessary dismantling equipment are now being prepared.

**Project B15 "Provision of Decontamination Tools for INPP Building G1"**

These project will be initiated in the process of appropriate Projects B9-1 realization, in which it will be specified what tools and equipment will be applied for decontamination in INPP building G1. The Project Delivery Strategy covering delivery of decontamination equipment is now being prepared.

**Project B16 "Controlled Shunt Reactor at INPP 330kV Switchyard"**

After closure of INPP Unit 1 and when INPP Unit 2 will be in outage due to reactive power that is being generated by the energy system, excess, voltage in INPP AtS-330 kV buses can increase to 366-370 kV. This will exceed the maximum allowed voltage of 362 kV and might cause INPP's 330 kV equipment, as well as other adjacent energy system substation equipment failure. When Unit 2 generators will be connected to the power grid, they will be used to compensate when operating in the reactor power utilization mode. However this will increase wear out and reduce

their reliability. Therefore one compensating reactor AtS-330 kV at INPP of 180 MVar need to be installed at INPP's substation as a measure consequential to the closure of INPP.

On 19 October 2006 the Contract was concluded for design, construction, equipment delivery, installation and fettling of shunt reactor at INPP 330 kV switchyard. Main activities on preparation of construction site for works execution have been completed by now, the stage of designing is in its completion phase, the orders for manufacturing of high-voltage equipment, metal constructions and relay protection devices have been located, manufacture of the reactor and its control system has been started.

The Project was completed in May 2008. Work completion Certificate has been issued. State Committee's Statement confirming operational suitability of the Controlled Shunt Reactor (CSR) was signed in September 2008. In October 2008 the CSR and all auxiliary equipment was handed over to the Electrical Department of INPP.

**Project B17 "Decommissioning Management System and Database"**

The solution of such tasks as inventory of decommissioning objects, forming of projects scopes and schedules, assessment and planning of expenditures, as well as multilevel planning of works, taking into account efficiency and amount of resources, and evaluation of technical, time and commercial risks is required for effective decommissioning processes management. Strict requirements to effective realization within the frames of planned budgets and terms dictate the necessity of up-to-the-minute control automation technologies application.

INPP Decommissioning Management System (B17) shall connect all sides of decommissioning management process, including waste management, human resources planning, projects management, material expenditures planning, documentation and submit unified interface of INPP decommissioning processes, dismantling, decontamination management.

The Contract was signed on 31 December 2007 with Joint Venture Consortium including "Energiewerke Nord GmbH" (Germany), "Sintagma" (Lithuania), and "Ernst&Young" (Lithuania).

Design, manufacturing, installation and commissioning of equipment and software as well as personnel training have been carried out within the frame of this Project. The works were completed on 15 September 2008. The registration module of the system has been put into industrial operation. The guarantee period is ongoing.

**Project B19 "Landfill Facility for Short-Lived Very Low Level Waste"**

Segregation and disposal of Short-Lived Very Low Level activity (group A) waste in the Landfill will reduce the volume of the near surface repository, and hence, the overall waste disposal costs. Landfill availability will enable to dedicate the near-surface repository only for the disposal of Low and Intermediate Level Waste (group B and C waste). The availability of a Landfill disposal is a key pre-requisite to start the dismantling of the low contaminated system. Timely availability of the Landfill facility is also an important interface for cost-effective implementation of the solid waste management and storage facility.

On 13 December 2006 the Government of the Republic of Lithuania approved the Order on the Designing of the INPP Buffer Storage and Disposal Facilities for Short-Lived Very Low Level Waste.

On 29 December 2007 29 the Contract for design and construction of Buffer Storage and design of Landfill for Short-lived Very Low Level Waste was signed. By the end of 2009 the following activities have been completed:

- Environmental Impact Assessment Report for Buffer Storage and Landfill for Very Low Level Waste has been prepared and approved.
- General Dataset for Buffer Storage for Very Low Level Waste has been developed and approved.

- Basic and comprehensive expert reviews of the Basic Design of Buffer Storage for Very Low Level Waste have been carried out.
- Preliminary SAR for Buffer Storage for Very Low Level Waste has been agreed.
- Basic Design and preliminary SAR for Landfill for Very Low Level Waste have been prepared and submitted for review by involved institutions.

In the beginning of 2010 VATESI issued a license for construction of Buffer Storage for Very Low Level Waste. Completion of construction and commissioning of the Buffer Storage is scheduled for May 2011; Landfill – May 2013.

**Project B21 "Modernization of Training Centre for Personnel Training on Performance of INPP Decommissioning Activities"**

Decommissioning activities require new skills of the current operating INPP personnel. Consequently retraining is needed. Also ensuring of high safety awareness and efficiency of plant personnel utilization during decommissioning is mandatory.

On 12 October 2009 a contract for design and construction of the Training Centre's building was signed with a Lithuanian company "Skirnuva". Design work is currently underway. Completion of work under this Contract is scheduled for December 2010.

**Project B25 "Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste"**

The Facility provides final disposal of conditioned Short Lived Low and Intermediate Level radioactive waste (RAW). A 100000 m³ storage capacity is needed for the disposal of both the operational and decommissioning waste.

In 2002-2004 RATA worked out the concept of radioactive waste disposal in a near surface repository, and conducted a study on selection of sites suitable for a near surface repository. Lithuanian scientists studied the geological structure of the proposed Galilauke and Apvardai sites and assessed the environmental impacts of the repository. The sites are in the vicinity of the INPP, a short distance away from Lithuania's border with Belarus and Latvia. Therefore the issue gained considerable attention from the public of Lithuania and the two neighbouring countries. In 2005, the decision was taken to study Stabatiške site, too. In 2006 the competent authorities reviewed and assessed the environmental impact assessment study. On June 2007 the Ministry of Environment took the decision regarding the sites on that the repository is to be constructed.

**Project B25-1 "Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste" (Design)**

The Contract was signed on 23 October 2009 with a JVP including "AREVA" (France) - JVP leader, "ANDRA" (France), "Specialus Montazas-NTP" (Lithuania), "LEI" (Lithuania) and "Pramprojektas" (Lithuania). In November 2009 the Contractor submitted for review first documents: Project Design Plan, Quality Assurance Programme and Programme of Performance.

Completion of Near Surface Repository design works is scheduled for October 2017.

**Project B25-2 "Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste" (Construction and Commissioning)**

Construction of Near Surface Repository is scheduled to begin at the end of 2012 and complete in October 2017.

## 6.5. Statement on the position of the contracting party concerning the continued operation of the nuclear installations

**INPP Unit 1**

As long as nuclear fuel is still in the reactor or spent fuel storage pool (SFSP), Unit 1 is classified as nuclear facility. All decommissioning activities during this stage shall be performed in accordance with the design requirements, safe operation limits and conditions.

The safety case of Unit 1 decommissioning during the reactor and SFSP defuelling stages is provided in „INPP Unit 1 DSAR for Defuelling Stages 1 and 2", which was developed by the Decommissioning Service and agreed with the Regulatory Authority of the Republic of Lithuania in 2005. The 1st defuelling stage can be characterized as a stage of fuel unloading from the reactor and the subsequent storage of spent FA in SFSP or their transportation to Unit 2 for complete burn up. This stage started after the final shutdown of Unit 1 (FRS) and covers all activities related to defuelling process until no fuel elements are left in the reactor core. When this task is accomplished, some of the systems that were necessary for the reactor defuelling, can be put out. The second stage - unloading of spent fuel elements from SFSP - is performed after accomplishing of the 1st stage. The 2nd stage continues until all fuel elements are transferred to the off-site interim storage facility and there is no fuel left in Unit 1. DSAR defined the safety systems and equipment that shall remain in operation during the Unit 1 decommissioning process.

„Technological Regulation for Operation of INPP Unit 1 during the Reactor Defuelling Stage" is the main guiding document defining safe maintenance of Unit 1 and safe operation limits and conditions. The Technological Regulation is developed for defuelling stage and is approved by Regulatory Authority of the Republic of Lithuania. All procedures related to operation and maintenance of systems and equipment of Unit 1 have been reviewed.

Safe maintenance of Unit 1 is financed from the Ignalina Program. Since 2005 January 1 Salaries for main personnel involved in servicing Unit 1 have been paid from the funds of European Commission. Technical maintenance of Unit 1 is financed from the national fund.

**INPP Unit 2**

The second Unit was shut down on the 31st December 2009. In accordance with the Requirements for decommissioning of nuclear facilities, INPP must obtain VATESI permission for final shutdown of Unit 2 reactor. For this purpose, in December 2009 a package of documentation was sent for VATESI review and approval. The package contained Unit 2 DSAR covering the final shutdown and defuelling phase and Technical specifications for operation of Unit 2 at the reactor defuelling stage.

# ARTICLE 7 LEGISLATIVE AND REGULATORY FRAMEWORK

*1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.*

*2. The legislative and regulatory framework shall provide for:*

*i. the establishment of applicable national safety requirements and regulations;*

*ii. a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license;*

*iii. a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses;*

*iv. the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.*

## 7.1. Article 7(1) - The legislative and regulatory framework governing the safety of nuclear installations

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

Current legislation in nuclear field is based on *the Law on Nuclear Energy which was adopted by Lithuanian Parliament in 1996*. The Law defines the principal objectives of state regulation of nuclear energy, rights and responsibilities of the state authorities, obligations of operator, basics of the procedures of licensing and areas and other nuclear activities.

More detailed conditions in the fields of radiation protection, of radioactive waste management and of the NPP's decommissioning are provided by the following specific laws:

*The Law on Radiation Protection* establishes the legal basis for protection of people and the environment from the harmful effects of ionizing radiation. It also establishes a licensing system for the use of radioactive materials and radiation-emitting devices, and prescribes general rules for their use. The Law also provides powers and responsibilities of the authorities in this field.

*Law on Radioactive Waste Management* establishes the rights, duties and functions of the state executive and supervisory authorities and of persons and legal entities involved in radioactive waste management, including its export and transit. The Law is divided into ten chapters governing, inter alia, licensing, responsibilities of waste generators, establishment of the Radioactive Waste Management Agency and requirements concerning radioactive waste management facilities, including their sitting, design, construction, commissioning, operation, decommissioning and control after closure. The Law stipulates that the principal objective of the Radioactive Waste Management Agency is to manage and dispose all radioactive waste transferred to it, assuring nuclear and radiation protection and to act as the operator of storage facilities and repositories assigned to it.

*The Law on Environmental Protection in conjunction with the law on Environmental Impact Assessment* stipulates that installation of any nuclear facility must be accompanied by an environmental impact assessment. The Law on Environmental Protection regulates all environmental issues, whereas the Law on Nuclear Energy regulates only nuclear facilities safety issues.

*Law on the Control of Strategic Goods* regulates the import, export and transport of strategic goods and technologies that are considered as the activities that could contribute to the proliferation of nuclear weapons, thus ensuring the implementation of international agreements that prohibit such proliferation. The Law establishes lists of goods subject to control. Licenses are necessary for all

goods subject to control, and are issued by the Ministry of Economy. The Ministries of the Environment, Defense, Finance and various other state entities whose activities involve goods subject to control, must consult the Ministry of Economy on any decisions concerning such goods.

*The Law on the Nuclear Power Plant.* The purpose and objective of this Law is to lay down provisions and to create legal, financial and organizational preconditions for the implementation of a new nuclear power plant project. According the Law a project implementing company shall be established, registered and operated to implement this project and be responsible for carrying out project implementation activities in compliance with the safety requirements imposed on nuclear activities. Having fulfilled the requirements laid down in legal acts and having received authorizations and licenses, the project implementing company shall become the operator of the nuclear power plant.

In the Annex to Article 7.1 is provided information about competence of national authorities, laws, main regulations and international agreements applicable in nuclear energy sector.

The most important events, considering the amendments of the primary legislation are as follows:

*The Law on the Nuclear Power Plant* was amended in February 2008 to establish principles of the management of the shares owned by the State in the national investor company and create the legal instruments for the implementation of these provisions.

The Parliament of the Republic of Lithuania in June 2010 debated about new draft of Law on Nuclear Safety and other relevant drafts, particularly new edit of Law on Nuclear Energy, new edit of Law on Radioactive Waste Management, amendments of Law on Radiation Safety, Law on Constructions and other related laws. The decision on approval is not finalized.

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

*In May 2008 Amendment to the Convention of Physical Protection* came into force in Lithuania by the Law on its ratification in the Parliament. According to this Law the Government appointed VATESI to be a contact point for the implementation of the Convention of Physical Protection and its Amendment.

From the 1st of 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 organization 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.

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

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

During the reported period the most significant Governmental legal documents were approved as follows:

In April 2009 the Government of the Republic of Lithuania approved *The Strategic Directions of the Implementation of the New Nuclear Power Plant Project*. This document sets down basics of the strategic partnership also political, technical and economical directions of the project implementation and Preliminary Plan for the project development.

In September 2009 the Government appointed the Commission for the Supervision of the Implementation of the new Nuclear Power Plant Project.

On the 25th of November 2009, the Government of the Republic of Lithuania by its Resolution No. 1609 approved the *Concept of the Law on Nuclear Safety* of the Republic of Lithuania. This Law is

intended for strengthening the regulatory system of nuclear safety and for setting more detailed rules of the state regulation and supervision of nuclear safety in nuclear installations, use of nuclear materials and materials of nuclear cycle, transportation, management of radioactive waste and spent nuclear fuel, including more explicitly defined system of licensing and other forms of authorization, enforcement measures, etc., the functions and responsibilities of the nuclear safety regulatory institution along with the functions and responsibilities of other state authorities and offices in exercising administrative procedures, the functions and responsibilities of organizations operating nuclear facilities and other institutions and offices the activities thereof are related to the assurance of nuclear safety. As a constituent part of the nuclear safety measures, the Law will also regulate the radiation protection in nuclear installations, use of nuclear materials and materials of nuclear cycle, transportation, management of radioactive waste and spent nuclear fuel.

On the 4th of November 2009, the Government of the Republic of Lithuania passed the Resolution No. 1448 on *"Decommissioning of Unit 2 of the State Enterprise Ignalina Nuclear Power Plant"*. According to this Resolution the second unit of INPP was shut down on 31 December 2009.

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

During reported period the most significant regulations and guides issued by the regulatory body are as follows:

In February 2010 *The General requirements for Nuclear Safety of Nuclear Power Plants with RBMK-1500 reactors* were approved by VATESI. This document provides general criteria and principles of nuclear safety, classification of systems and components, different areas of nuclear safety as well as basis of the state supervision and control. This document replaced the *General Requirements for Nuclear Safety of Nuclear Power Plants* which were adopted in 1997.

In November 2009 VATESI issued the *Requirements for INPP Deterministic Safety Analysis,* that determine the scope of initiating events to be analyzed, classification of events, acceptance criteria, analysis methods, analysis assumptions and analysis documentation.

*The Requirements on the Operational Experience Feedback in the field of Nuclear Energy* were approved in May, 2009. According to these Requirements the licensee shall systematically analyze his own operational experience along with the operational experience of other persons operating in the field of nuclear energy with an aim to prevent accidents, safety – important events, to avoid their recurrence, to assure and further improve safety in the field of nuclear energy.

In April 2009 the new edition of *Requirements for the Decommissioning of Nuclear Facilities* was adopted. These requirements set down basics of planning (principles, preparation of the preliminary and final decommissioning plan), management of the decommissioning process, safety evaluation in this process, general requirements for the waste management, ensuring of the radiation protection and other activities in this process.

On the 24th of December 2008 of Minister of Health Care and Head of State Nuclear Power Safety Inspectorate passed an order "*On approval of regulations on import, export, transit and transportation of radioactive materials, radioactive waste and spent nuclear fuel in Republic of Lithuania*". This document provides the procedure of authorization for all these activities and cooperation of both regulatory bodies – VATESI and Radiation Safety Centre.

In October 2008, 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 organization 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.

In August 2008 VATESI approved *The Nuclear Safety Requirements for Modifications of the Nuclear Facility*. This document sets down the classification of modifications, the management of

the implementation, coordination of the implementation of the modifications with the regulatory body and responsibility of the Operating organization.

From the 1st of January 2008 Lithuania has passed on from the implementation of the Bilateral Safeguards Agreement and the Additional Protocol signed with the IAEA, to the Trilateral Safeguards Agreement (with IAEA and EURATOM) and the Additional Protocol. After this alteration, in January 2008 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.

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

In June 2009 VATESI approved the *Regulations for the Development of Normative and Technical Documents in the Nuclear Safety Field*. This document provides the system of normative and technical documents in the nuclear safety field (Safety requirements, Safety Rules, Standards and Technical documents of the operator) and procedure of planning, drafting, and involvement of the interested parties in the drafting process, approving and publishing of these documents.

Each year VATESI shall approve a Plan for drafting of normative and technical documents. The Plan for 2010 includes 74 documents. In December 2009 VATESI approved the Program for Development of Normative and Technical Documents. This Program describes priorities and needs of the development of these documents in the different areas of nuclear safety. Program shall be revised each 5 years.

Concerning involvement of the interested parties in the decision making, The Government of the Republic of Lithuania approved the Rules of Legislative Process in September 2009. According this legal act each Governmental institution must place its draft of legal documents into special database before its approval so all interested parties, including institutions, operators, and other organizations have possibilities to comment these drafts. This requirement is also reflected in VATESI Regulations for the Development of Normative and Technical Documents in the Nuclear Safety Field. Before adopting Safety requirements and rules, VATESI organizes, if needed, discussions with interested parties (usually, INPP, RATA and VAE) on problems identified during the drafting process.

## 7.3. Article 7(2) ii - System of licensing

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

The Law on Nuclear Energy of the Republic of Lithuania of 1996 defines basic licensing conditions in nuclear energy sector. As provided in the Article 25 of the Law, without a license issued in prescribed manner of the Government of the Republic of Lithuania, it is prohibited:

1. to design, construct and reconstruct nuclear facilities, installations and equipment;
2. to operate nuclear facilities;
3. to store nuclear and radioactive materials and their waste;
4. to decommission a nuclear facility;
5. to dispose nuclear and radioactive materials and their waste;
6. to acquire, possess and transport nuclear materials;
7. to acquire, possess and transport radioactive materials.

All the licences according to the Civil Code of the Republic of Lithuania shall be issued for an unlimited period of time.

The Article 35 of the Law on Nuclear Energy provides the permits that are necessary to be received during the testing of a nuclear reactor:

1. shipping of nuclear fuel to the site of the facility;
2. the first loading of nuclear fuel into the reactor;
3. the commissioning of the reactor.

Rules on Export, Import and Transit in the Territory of Lithuania of Radioactive Material, Radioactive Waste and Spent Nuclear Fuel, which were issued by VATESI and the Ministry of Health in 2008 according to the implementation of the EU Directive 2006/117/Euratom on the Supervision and Control of Shipments of Radioactive Waste and Spent Fuel, establishes permits for transportation (import, export and transit) of radioactive material, radioactive waste and spent nuclear fuel.

The Regulation on Licensing of the Activities in Nuclear Energy, which was issued by Government of Lithuania in 1998, establishes procedures for licensing as well as the main documents related to nuclear safety, radiation safety and physical protection. More detailed list of the documents is established in the requirements and rules of the regulatory bodies. Specific safety issues in the field of radioactive waste and decommissioning are established in the Law on Radioactive Waste Management of 1999 and the Law on Ignalina Nuclear Power Plant Decommissioning of 2000.

The legislation as presented in Article 7 (1) of the Report together with the regulations of the regulatory bodies provide safety requirements to be applied for a nuclear facility and nuclear material during the life-stages of the nuclear facility: designing, construction, recognising as fit for use, operation, decommissioning, as well as acquisition, keeping, use and transportation nuclear or nuclear fuel cycle materials. These regulations encompass the following areas:

- nuclear safety, radiation protection and physical protection of nuclear facilities, nuclear and nuclear fuel cycle materials;
- fire protection of safety relevant constructions, systems and components;
- emergency preparedness in nuclear facilities and in transportation of nuclear and nuclear fuel cycle materials;
- control of radioactive waste and radionuclide emissions into the environment;
- management systems of persons engaged in licensed and other activities related to nuclear facility, nuclear and nuclear fuel cycle materials and assessment of the nuclear facility construction site.

### *7.3.2. Involvement of the public and interested parties within the authorization process*

The Article 26 of the Law on Nuclear Energy defines the licensing institutions as follows:

- Licenses for the activities referred to in the item 1 of above paragraph are issued by the VATESI after co-ordination with the Ministry of the Environment, RPC and a local authority whose territory or its part is within the sanitary protection zone of a nuclear facility.
- Licenses for the activities referred to in the items 2-5 of above paragraph are issued by VATESI after co-ordination with the Ministry of the Environment and Radiation Protection Centre.
- Licenses for the activities referred to in the item 6 of above paragraph are issued by VATESI after co-ordination with Radiation Protection Centre.
- Licenses for the activities referred to in the item 7 of above paragraph are issued by RPC after co-ordination with VATESI.

All the permits established by the Article 35 of the Law have to be issued by VATESI after co-ordination with the Ministry of the Environment or an institution authorised by it and the Radiation Protection Centre.

The permit for transportation (import, export and transit) of radioactive material, radioactive waste and spent nuclear fuel is have to be issued by VATESI or RPC according to the sphere of its competence (subject to amount of fissile material and source of radioactive waste).

Design of the nuclear facility has to be performed and assessed according to the requirements established by the Law on Nuclear Energy and competent institutions, including VATESI, Ministry of Environment, Ministry of Health, Ministry of Interior, Ministry of Energy, State Security Department, Ministry of Social Security and Labour, Ministry of Defence and Local Authorities.

The figure 7.3.2. illustrates the involvement of the public and interested parties within Lithuania as established by the legislation provided in Article 7 (1) of the Report.

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

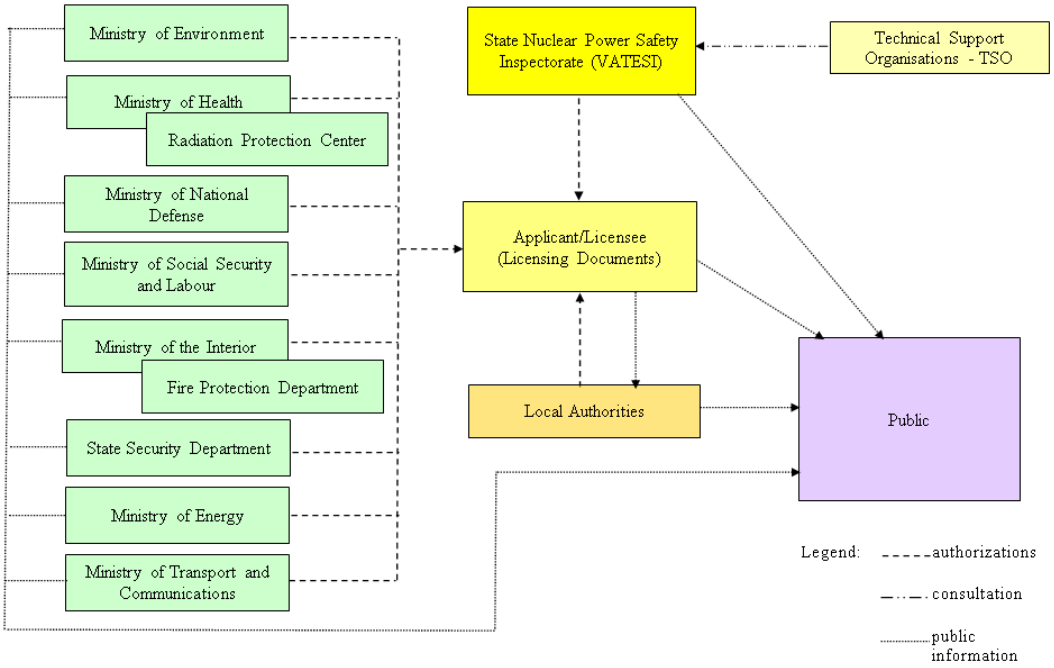



Figure 7.3.2. Authorisation process

Article 3 of the Law on Nuclear Energy provides the legal principles of activities in nuclear energy. It stipulates that nuclear activities in the Republic of Lithuania are subject to a licence issued by an authorised state institution. If nuclear activities are conducted without a licence or in contravention of the laws of the Republic of Lithuania or its international obligations, they shall be held illegal and shall incur legal responsibility as provided by the laws of the Republic of Lithuania.

According to the Law, the operator of a nuclear facility shall be responsible for conducting nuclear activities in compliance with the provisions of the Law on Nuclear Energy and regulatory acts of the Republic of Lithuania. Competent authorities issuing licences for an activity specified in the Law on Nuclear Energy must develop a system of requirements that guarantee nuclear safety, radiation safety and physical protection, non-proliferation of nuclear weapons, a lawful use of nuclear materials and waste management. Decisions taken by officers of state control and supervision bodies within the scope of their competence shall be binding on all natural and legal entities and shall be implemented strictly within the established time limits and in accordance with the prescribed procedure.

In section 7.5 of the Report provided also the information about the liability and criminal sanctions set down in the Criminal Code, the administrative responsibility and sanctions for violations of nuclear safety rules and norms set down in the Code of Administrative Law Violations.

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

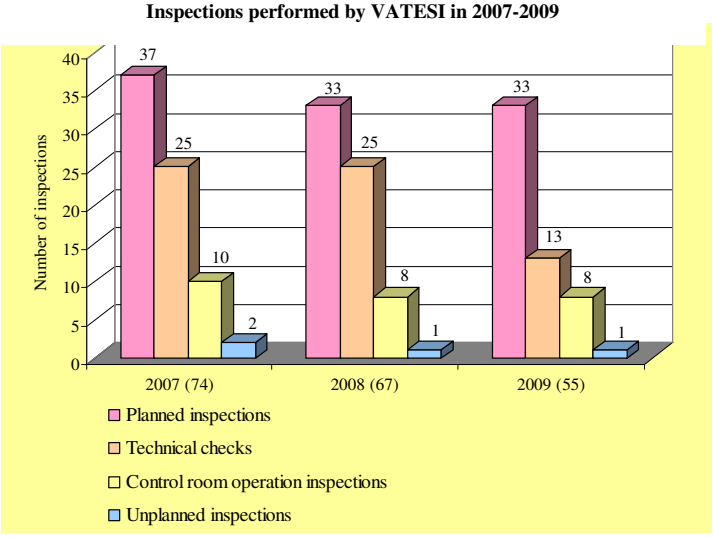
### *7.4.1. Regulatory strategies*

VATESI is conducting regulatory inspections at all stages of nuclear facilities lifetime: construction, commissioning, operation or decommissioning. In addition to that, VATESI inspectors have the rights to inspect organizations that provide services to license holders. 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 Regular inspections, Technical checks as well as unplanned inspections are performed. General Requirements for VATESI Inspections were approved by the order of the VATESI Head on June 19, 2007. Based on these Requirements, VATESI quality management documents were prepared and approved: The Procedure for Special Inspections by VATESI and the Procedure of Regular Inspections, Technical Checks.

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

Regular inspections during the period 2007 - 2009

Every December VATESI, having assessed the gained experience of inspection activities, having analysed the experience of organisations operating nuclear installations, the results of the analysis of the safety improvement programme and other documents related to safety, plan inspections for the coming year. Each year the following safety-related areas were inspected: training of INPP personnel, safety systems and safety-related systems (emergency core cooling system, emergency power systems, fire protection systems, system of protection against overpressure in the Main Circulation Circuit and others), management of beyond design basis accidents, quality management, management of radioactive waste, safety culture, ageing management, emergency preparedness, assessment of operational experience and others.




The results of an inspection are put down in report, and the organization that has been inspected is familiarized with them. Having received from VATESI the inspection report the inspected organization shall draw up a plan of corrective measures aimed at rectifying the identified noncompliance, then implement it and submit appropriate documents to VATESI.

Technical checks and Operation Regulation inspections

The objective of technical checks is to ascertain that technical conditions of individual systems, installations and equipment of nuclear facilities complies with the requirements set in special operation, testing and repair regulations (for instance, a check on technical conditions of tanks of main circulations pumps, external inspection of the Accident Confinement System at operational parameters, external inspection of the Emergency Core Cooling System at operational parameters, external inspection of the welds of on pipelines of Main Circulation Circuit at operational parameters and others).

The Operation Regulation is the principal document that defines safety of INPP operation. Therefore certain actions by the personnel prescribed by the Operation Regulation are examined in the course of control room operation inspections.

The results of Operation Regulation inspections and Technical checks are summarized in report. Usually those inspections are carried out by VATESI's resident inspectors.

### *7.4.3. Basic features of inspection programmes*

VATESI's inspection activities concentrate on areas of safety significance. Basic features of inspection programmes are described in VATESI quality management documents: The Procedure for Special Inspections by VATESI and The Procedure of Regular Inspections, Operation Regulation Inspections and Technical Checks.

Comprehensive analysis of particular area (for instance, management of beyond design basis accidents, quality management, safety culture, ageing management, assessment of operational experience, implementation of modification) are performed during special inspections. Crucial provisions of these inspections are determination of priorities, periodicity and scope of inspections taken into account potential magnitude and nature of the hazard associated with nuclear facilities, planned modifications, unusual events, implementation of safety improvement measures. Also description of safety related areas, which should be cover during construction, operation or decommissioning, are described in The Procedure for Special Inspections by VATESI.

The basis of VATESI inspection program is regular inspections. It is periodical repetitive activity with aim to oversight license holder's compliance with regulatory requirements and operational procedures. The annual plan of regular inspections are based on inspection areas (initiating events, safety systems, integrity of physical barriers, emergency preparedness, radiation protection, radioactive waste management), safety indicators (unplanned shut down of reactor, readiness of safety systems, integrity of fuel and others) as well as list of safety related systems (Emergency core cooling system, system of protection against overpressure in the Main Circulation Circuit, Accident confinement system, Service water system, Intermediate circuits, Electric power supply system, Reactor power control systems and others) which are under supervision of VATESI.

## 7.5. Article 7(2) iv – enforcement of applicable regulations and terms of licences

### *7.5.1. Power for legal actions*

The Criminal Code sets down the liability and criminal sanctions for:

- Prohibited military attack against nuclear power plant;
- Unlawful possession of nuclear or radioactive materials or other sources of ionizing radiation;
- Threat to use or otherwise influence or unlawfully acquire nuclear or radioactive materials or other sources of ionizing radiation;
- Violation of the regulations governing lawful possession of nuclear or radioactive materials or other sources of ionizing radiation.

The Code of Administrative Law Violations sets down the administrative responsibility and sanctions for violations of nuclear safety rules and norms. There is a separate article which provides the responsibility for inhibition to perform the functions of the VATESI inspectors in this code.

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

According to the Law on Nuclear Energy and its Statute VATESI is empowered:

- to revoke or suspend the license or other issued authorization;
- to require to shut down the reactor or stop other activities which contradicts to the requirements of legal acts;
- to give a written order for removal of detected violations of the nuclear safety requirements and rules (to take remedial actions).

According to the Code of Administrative Law Violations VATESI is empowered to impose administrative sanctions for natural persons for violation of nuclear safety requirements and rules.

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

In the period of 2007-2010 VATESI provided only written orders for removal of detected violations of the nuclear safety requirements and rules (to take remedial actions) which were included in the inspection acts or written separately. Other enforcement measures were not used.

# ARTICLE 8 REGULATORY BODY

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

*2. Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.*

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

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

In accordance with national legislation, the Nuclear Safety Convention, other international conventions and treaties, the Republic of Lithuania undertakes appropriate measures to ensure the safety of NI under its jurisdiction through the establishment of legal framework and infrastructure necessary to maintain the effective nuclear safety regulatory system. VATESI – State Nuclear Power Safety Inspectorate – was established by the Decree of Government on 18 October 1991 to regulate and supervise the safety of nuclear power facilities within the territory of Lithuania. On 21 October 1992, the Government of the Republic of Lithuania approved the Statute of VATESI assigning its main duties, functions and rights. The Statute was amended in 1997 with provisions that established the Board of VATESI to advise the Government and the Regulatory Body on matters related to the effective functioning of nuclear safety regulatory infrastructure. From 1996 Articles 12 and 14 of the Law on Nuclear Energy (last amendment in 2009) establish legal foundations for VATESI as a regulatory body and provide for main legal authority and responsibilities of Regulatory Body. A new edit of the Statue of VATESI was approved by Government resolution No. 1014 of 1 July 2002.

### *8.1.2. Mandate, mission and tasks*

The mission of VATESI is to perform regulation and state oversight of nuclear safety and radiation protection at nuclear power facilities with the aim to protect the society and the environment against harmful impact of nuclear and radiological events and accidents. The main tasks of VATESI:

- 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 INPP;
- 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 tasks:

- To prepare and submit national reports in accordance with international conventions and agreements;

- To take part in the activity of the IAEA, missions, commissions and committees of safety experts – advisors;
- To represent Lithuania in the IAEA Board of Governors;
- Within VATESI competence, to represent interests of the country in international organisations, associations and forums ENSREG established by the European Commission, 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.

### *8.1.3. Authorities and responsibilities*

The Law on Nuclear Energy (last amendment in 2009) provides for main legal authority and responsibilities of Regulatory Body. Furthermore, the duties and responsibilities of VATESI are stated in the Statute of VATESI (Government resolution No. 1014 of 1 July 2002).

According the Statute VATESI performs the following activities to regulate nuclear safety:

- drafting of laws, resolutions of the Government of the Republic of Lithuania and other legal acts on the issues of the safe use of nuclear energy, the use of nuclear materials, their transportation, their accounting and control, as well as nuclear, radioactive materials used in nuclear energy, as well as waste storage and disposal, within its competence co-ordinate draft legal acts of the ministries, governmental institutions, county governors' administrations, municipalities and other institutions, which may have an effect on the safe use of nuclear energy;
- establishes the principles, criteria, requirements and recommendations for safe operation of NIs and their decommissioning, and monitor compliance with them;
- establishes the principles, criteria, requirements and recommendations for safe use, storage of nuclear materials, disposal of their waste, and monitor compliance with them;
- establishes the principles, criteria, requirements and recommendations for storage of radioactive materials used in nuclear energy, disposal of their waste, and monitor compliance with them;
- develops procedures for accounting for and control of nuclear materials, control their compliance during import, export, re-export, transportation, use, storage and burying of those materials;
- establishes physical protection principles, criteria, requirements and recommendations of NIs, nuclear as well as radioactive materials existing in NIs, and monitor compliance with them;
- reviews and controls implementation of requirements for staff at NIs performing tasks important to nuclear safety, regulates the organization of the staff training, certification and requalification;
- within its competence controls the fulfilment of radiation protection requirements for NIs;
- within its competence control the fulfilment of nuclear safety requirements when transporting nuclear materials;
- issues licences for activities, which are prescribed in the Law on Nuclear Energy of the Republic of Lithuania, establishes conditions for validity of licences and monitors compliance with them;
- within its competence prepares inspection programmes and implements them;
- on the basis of the submitted safety analysis results, inspection conclusions and (or) independent research, evaluates the condition of safety in NIs, prepares reports on the

safety of NIs and submits them to the Government of the Republic of Lithuania, local authorities and other bodies concerned;
- co-ordinates measures for safety improvement of NIs and monitors their implementation;
- assesses the projects for new activities and design of new NsI in terms of nuclear safety;
- monitors accident preparedness at INPP;
- in the event of a nuclear accident, evaluates the situation and forecasts the course of the nuclear accident, provides information on the existing situation to the public and state institutions.

In order to implement tasks of a nuclear safety regulatory body VATESI is entitled to:

- inspect at any time any NIs and assess the compliance with the requirements of accounting and control of nuclear materials;
- demand from licensees to eliminate identified violations of nuclear safety norms, suspend works, reduce power or stop operation if the safety requirements are neglected, equipment defects are identified, the qualifications of the specialists (staff) is insufficient or if the safe operation of a NIs is endangered also performed other enforcement measures which are delegated by on Nuclear Energy and other Laws;
- require from the persons disposing of nuclear materials to eliminate the violations of accounting and control norms of the said materials;
- demand to perform control tests of equipment and materials, operating medium analysis, calculations for justification of the safety of a NIs, reliability and technical checking of equipment and systems;
- submit proposals to the Ministry of Economy or the administration of NIs concerning the dismissal of persons who have committed the violations;
- prohibit preparation and execution of NIs designing and construction documents and equipment, after noticing violations of nuclear energy safety rules and norms therein;
- participate in checking the knowledge of the licence holders' employees responsible for safety important decisions and (or) tasks, including managers, managers of divisions, engineering and technical staff;
- check documents at NIs, attend the meetings on the safety issues and obtain immediate information on the violations of operation and decommissioning of NIs.

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

The reorganisation of VATESI was completed in 2008 – new improved administrative structure complying with the contemporary international practice and the recommendations of the IAEA was established. Three departments – the Administration, Nuclear Safety and Radiation Protection – were established. Department of Administration consists of the Legal Affairs and Personnel Division, Division of Information Technologies and Division of Economy. Department of Nuclear Safety consists of the Division of Safety Analysis, Division of Systems and Components, Division of Operational Experience Analysis and Division of Surveillance. The structure of Department of Radiation Protection consists of Division of Radioactive Waste Management, Division of Decommissioning, Division of Transportation and Radiation Protection. In addition to that, four Divisions are functioning at VATESI which are directly subordinate to the Head of VATESI. They are: Division of Finance and Accounting, Division of Project Management, Division of International Communication and Public Relations and Division of Nuclear Materials Control and Physical Protection. The new improved administrative structure entails:

- clear and functional structure;

- clear distribution of responsibilities (more detailed job instructions and regulations of divisions);
- improved leadership at departmental level;
- basis for further development of organization.

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 to fill in new positions in administrative structure (also see „Development and maintenance of human resources over the past three years“) – some of them are young graduates and others have already gained working experience in a nuclear power plant.

### *8.1.5. Development and maintenance of human resources over the past three years*

VATESI had 59 full-time staff positions and 52 employees at the end of 2007. In order to strengthen VATESI human resources, starting from June 2008, the number of VATESI staff has been augmented by 15 full-time positions. In July of 2008 new improved administrative structure was established (see paragraph „Organizational structure of the regulatory body“). In all, 29 new employees were employed during the year of 2008, 9 employees were dismissed. At the end of 2008 73 employees were working at VATESI, which shows an increase of 21 staff members from the prior year.

Due to economic situation of Lithuania, in October 2009 the number of VATESI staff positions has been decreased from 74 till 70. In all, 6 new employees were employed during the year of 2009, 8 employees were dismissed, including head of VATESI, who leaved office on 7 of July, 2009. At the end of the year 2009 the number of VATESI full-time staff positions was 70, and 69 of these 70 positions were filled.

Overall number of VATESI staff increased by 16 additional staff positions over reported period.

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

One of the most important goals of VATESI in order to complete regulatory functions in a timely and appropriate manner are to maintain highly qualified and equipped with special knowledge personnel. Increased number of staff of VATESI over reported period, approval of new structure of VATESI in 2008 and remained necessity to ensure the performance of duties of VATESI, stipulated exceptional attention to the development and maintaining of the competence of all staff members of VATESI.

Over reported period different methods of training – formal training (courses, workshops), introductory training of civil servants, initial internal training, lecturing by VATESI employees, self study, work with more experienced specialists – were used in order to maintain the qualification of more experienced employees and to train new employees. Dividing by topic, training included training of basic administrative skills and abilities, needed for civil servants, and training of special professional knowledge (e.g. specific nuclear technologies).

In 2007 39 VATESI employees improved their skills at different training events in Lithuania and abroad. Six new employees participated in introductory training courses.

In 2008 seventy percent of VATESI employees participated in different training events. Seven of twelve new employees took part in the introductory training courses of civil servants. In all, 74 training events dedicated to the development of competence related to the implementation of strategic goals of VATESI in 2008 and 61 training events in the same field in 2009 were organized for VATESI employees.

Accordingly in 2009 seventy nine percent of VATESI employees participated in the training courses, thirteen new employees participated in the introductory training courses of civil servants.

Over reported period VATESI specialists also actively participated in the qualification improvement events arranged by the IAEA. In all, seven VATESI specialists took part in 11 training events, organized by IAEA in 2007, 40 training events arranged by IAEA were attended by 32 VATESI specialists in 2008 and 44 training events by 35 VATESI specialists in 2009. Also VATESI specialists have an ability to participate in training events arranged by other international organisations.

### *8.1.7. Developments with respect to financial resources over the past three years*

In the past three years VATESI was financed by State Budget. The VATESI budget is approved every year in the frame work of the State Budget allocated to all state administrations. VATESI drafts its budget proposal and presents it to the Ministry of Finance and the Government for consideration. The final State Budget approval is with the Lithuanian Parliament.

### *8.1.8. Statement of adequacy of resources*

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

In view of forthcoming licensing of new power plant, VATESI recruited additional staff (see „Development and maintenance of human resources over the past three years“), therefore over reported period human resources were adequate to VATESI needs.

### *8.1.9. (Quality) management system of the regulatory body*

On the 5th of October 2000 VATESI quality management system was established by VATESI head's approval of Order No. 21. The main goals of establishing VATESI quality management system were:

- to improve the institution management efficiency;
- to optimize resource‘s planning and use;
- to ensure proper licensing of nuclear facilities, safety assessment and monitoring;
- to ensure adequate implementation of the European Union support for project control;
- to ensure proper VATESI personnel qualification;
- to ensure effective information management and use.

The following 1st and 2nd level VATESI QM documents (procedures) were prepared and approved:

- VATESI Mission;
- VATESI QM Manual (KU-I-01);
- Safety Assessment Procedure (KU-II-01);
- Methodology for Strategic Planning of activities (KU-II-02);
- Regulations for Preparation of Legal Acts (KU-II-03);
- Regulations for the Training of VATESI Personnel (KU-II-04);
- Regulations for Public Information (KU-II-05);
- Procedure of VATESI Special Inspections (KU-II-06);
- Procedure of VATESI Regular Inspections (KU-II-06(2));
- Licensing Procedure (KU-II-07);
- Rules of Financial Control (KU-II-08);

- EU Support Project Management Procedure (KU-II-09);
- Internal Regulations for Co-Ordinating EU Related Issues (KU-II-10);
- VATESI Management Procedure on Receiving and Sending of Documents (KU-II-11)
- Manual for Certification of Safety Important Systems and Elements of INPP (KU-II-12).
- Accounting Policy (KU-II-13);
- Simplified Rules of Public Procurement (KU-II-14).

According to the changes in requirements and continuous improvement of quality assurance documents, in 2009 and in the beginning of 2010 VATESI approved 13 and revised 13 quality management system procedures and instructions.

In 2009 VATESI initiated project „The State Nuclear Power Safety Inspectorate Management Systems Implementation“ financed from the EU structural funds. The aim of the project – to update and improve the quality management system in VATESI. The iniatial documents of the project were positively evaluated in the Lithuanian Interior Ministry and the European Social Fund Agency.

### *8.1.10. Openness and transparency of regulatory activities*

In accordance with Article 14 of the Law on Nuclear Energy, VATESI acts independently while executing its mandated duties in accordance with national legislation, its statute and other legislative acts (also see “Means by which effective separation of the regulatory body from the agencies responsible for promotion of nuclear energy is ensured”).

The main means of ensuring the transparency of the decisions:

- draft legal documents are public in order to inform and get a response (suggestions, remarks, comments) from interested parties (also see “Overview of the process of establishing and revising regulatory requirements, including the involvement of interested parties”);
- consultations and meetings are organized on different issues with interested parties.

Paragraph 7 of Article 14 of Law on Nuclear Energy establishes responsibility of VATESI to inform the media about the radiological situation and the safety of nuclear facilities. Convention on environmental impact assessment in a transboundary context (done at Espoo, Finland, on 25 February, 1991), Convention on access to information, public participation in decision-making and access to justice in environmental matters (done at Aarhus, Denmark, on 25 June 1998) and other international documents also oblige VATESI to inform public about the situation of nuclear safety. Information on nuclear safety is prepared and disseminated using these methods:

- reports on conventions and other legal acts of Lithuania, EU, international institutions;
- VATESI annual reports (Nuclear energy in Lithuania: Nuclear Safety);
- VATESI annual reports for government;
- VATESI website;
- press releases and other publications;
- discussions and meetings with interested parties;
- possibility for interns from universities to visit VATESI.

Market and opinion research company „Baltijos tyrimai“ carried out a survey “Public opinion survey on the approach to nuclear safety problems in Lithuania” in 2009. One of the aspects of what the study showed, was that the bigger share of Lithuanian population aged 15-74 years said they trust VATESI activities (after been familiarized with its goals).

### *8.1.11. External technical support*

VATESI cooperates with the Technical Support Organisations of Lithuania, which provide VATESI with expertise and necessary technical-scientific support during safety reviews, verification of safety justifications, drafting of norms and regulations. Some TSOs of VATESI are involved in international projects implemented through international and bilateral cooperation, coordinated by VATESI.

There are more than 10 departments, centres and laboratories of 7 Technical Support Organisations – Institute of Physics, Lithuanian Energy Institute, Kaunas University of Technology, Vilnius Gediminas Technical University, ITECHA JSC, the Scientific Research Center of Electromagnetic Compatibility and Institute of Chemistry.

### *8.1.12. Advisory committees*

The VATESI Statute was amended in 1997 with provisions that established the Board of VATESI to advise the Government and the Regulatory Body on matters related to the effective functioning of nuclear safety regulatory infrastructure. The Board is comprised of 7 members: two members of Parliament, two representatives of ministries (the Ministry of Health and the Ministry of Environment), two nuclear experts and the Head of VATESI. The Head of VATESI can't be Chairperson of the Board. The Board is empowered to consult the Government of the Republic of Lithuania and VATESI on nuclear safety issues.

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

### *8.2.1. Place of the regulatory body in the governmental structure*

Over reported period there were no changes of VATESI's position in Governmental structure as shown in Annex to Article 8.2 (figure A1). (for additional information see in "Legal foundations and statute of the regulatory body" and "Authorities and responsibilities"). However it should be noted, that Ministry of Energy, established in the beginning of 2009, took over the responsibilities in the field of nuclear energy from The Ministry of Economy. Also, from the 1st of July 2010 the functions of Country Governors shall be assigned to Local authorities.

Almost all main duties and competence of VATESI is described in Law on Nuclear Energy. Supplementary to the Law on Nuclear Energy, other laws and legislative acts state the duties and competence of other state institutions and regulatory bodies, which provide VATESI with their respective statements before the regulatory authorization is granted by VATESI. The competence of other state institutions is described in detail in Annex to Article 8.2 (figure A2).

### *8.2.2. Reporting obligations (to the parliament, government, specific ministries)*

VATESI is a governmental institution, directly subordinate to the Government. The Head of VATESI directly reports to the Prime Minister. VATESI reports its activities to the Government and accordingly informs other national and international bodies. In accordance with national legislation, VATESI coordinates its activities with other state bodies and institutions responsible for radiation safety and health care, emergency preparedness, civil protection, environmental protection, industrial safety and supervision of potentially dangerous industrial facilities.

### *8.2.3. Means by which effective separation of the regulatory body from the agencies responsible for promotion of nuclear energy is ensured*

In accordance with the Law on Nuclear Energy the Ministry of Energy is the competent authority responsible for the implementation of the Energy Policy. Article 9 of the Law on Nuclear Energy obliges the Ministry of Energy to arrange means for development of nuclear energy infrastructure and, in cooperation with the Ministry of Science and Education, to establish necessary scientific and technical bodies to accommodate the needs of utilities operating nuclear power plants. The Article 4 of the Law on Nuclear Energy states that operating organizations bear responsibility for safety of nuclear facilities they operate.

National legislation provides clear division between the responsibilities and functions of VATESI and those organizations or bodies that are charged with the promotion or use of nuclear installations or activities.

To address nuclear safety issues, functions are clearly divided between the operating and regulatory institutions. The INPP is responsible for safe operation of nuclear reactors and has been granted the status of the operating organisation. The Maišiagala Radioactive Waste Storage is operated by the State Company Radioactive Waste Management Agency, and the Public Limited Liability Company Lietuvos Geležinkeliai has got a license for the transportation of nuclear materials.

As it was indicated, VATESI acts as independent governmental institution subordinated directly to the Government. In accordance with Article 14 of the Law on Nuclear Energy, VATESI acts independently while executing its mandated duties in accordance with national legislation, its statute and other legislative acts.

# ARTICLE 9 RESPONSIBILITY OF THE LICENSE HOLDER

*Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license and shall take the appropriate step to ensure that each such holder meets its responsibility.*

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

Article 3 within the Law on Nuclear Energy of the Republic of Lithuania identifies the legal principals of activities in the field of nuclear energy:

- The first paragraph of the article states, that activity in the field of nuclear energy can be carried out only according to a licence issued by a competent institution of the state. In case such an activity is performed without the licence or in contradiction to Law of the Republic of Lithuania or to international commitments of the state, such an activity is unlawful and is damning the legal responsibility.
- The second paragraph states that a licence holder is responsible for conducting activities in accordance to the requirements of this Law and other normative documents of the state.
- The final paragraph of the article defines, that the competent institution who issues licences for a certain activity in the field of nuclear energy must establish framework of the national requirements, that guaranties: nuclear safety, non-proliferation of nuclear weapons, and only the lawful use of nuclear materials and management of waste.

Article 13 within the Law on Nuclear Energy of the Republic of Lithuania states that responsible state institutions on the basis of the legal requirements control, oversee and check state of nuclear safety, protection from radiation, physical protection and take the necessary actions to eliminate identified deficiencies according their competence. The decisions taken by such state institutions and servants of the institutions are compulsory to physical and legal persons and must be implemented precisely within the prescribed time and according to a required procedure.

Article 14 within the Law on Nuclear Energy of the Republic of Lithuania states that VATESI is the competent state institution performing state regulation in the areas of nuclear safety, protection from radiation, and accounting and control of nuclear materials in the area of nuclear power.

In accordance with Article 25 within the Law on Nuclear Energy of the Republic of Lithuania licences are issued for those activities:

- to design, construct and reconstruct nuclear installations (NIs) and equipment;
- to operate NIs;
- to store nuclear and radioactive materials and their waste;
- to retire a NI from service;
- to dispose nuclear and radioactive materials and their waste;
- to acquire, possess and transport nuclear materials;
- to acquire, possess and transport radioactive materials;
- to export, import and carry in transit in the territory of Lithuania nuclear, radioactive and other materials used in the nuclear power sector, nuclear equipment, and dual purpose goods that may be used in nuclear technologies.

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

- to use a NI according it purpose;
- to operate a NI according to legal requirements and requirements of a licence;

- accounting and control of nuclear materials according commitments of the Republic of Lithuania and the corresponding guarantees;
- to investigate nuclear incidents according to legal requirements;
- to inform VATESI and other interested state institutions about all non-conformances to the legal requirements (including licence requirements) and foul-ups of safety important equipment;
- ensure readiness to perform emergency response in case of a nuclear accident and elimination of consequences of such accidents.

In addition, according to the national legal requirements a licence holder must:

- ensure radiation protection of staff and population during normal operation, and for design basis and beyond design basis accidents not to exceed the allowed levels of exposure for staff and population;
- develop and maintain efficient measures to prevent and control accidents at NIs;
- unconditionally follow the conditions of licence validity;
- prepares annual nuclear safety reports;
- ensures quality of the licensed activity, proper management of documentation, its storage during all life-time of a NI, renewal in time and approval by licensing authority when it is necessary;
- ensures a high level of safety culture in its activity giving the highest priority to safety in decision-making process;
- informs the institutions of regulatory authority about existing (possible) hazard for the safety of a NI;
- be responsible for the safety of a NI even if the validity of the license is suspended or it is revoked;
- monitor emissions of radio nuclides into the environment in a systematic manner;
- monitor and investigate the contamination of a NI/site and environment in a systematic manner and present to the regulatory institutions with the data about emission of radio nuclides, contamination of a NI/site and the environment;
- apply principles of “defence-in-depth defence” and ALARA.

A licence holder is liable for the damage caused by radioactive effluent discharges from a NI to the natural and legal persons, their property or to the natural environment. The organization must insure a NI or procure in some other way the funds necessary to compensate for the damage after a nuclear accident as assumed by the Republic of Lithuania according to the Vienna Convention.

### 9.2. Description of the main means by which INPP discharges the prime responsibility for safety

INPP implemented management system to manage safety of the NPP in a reliable and systematic way (see Article 13 within this report).

A licensee is responsible for establishing management system must ensure implementation of all safety requirements, perform activities strictly within the scope of a licence and to modify a NI only after due pro-active consideration of safety and other issues, independent review for nuclear safety important issues and necessary reviews, decisions and permits from state control and supervision institutions. Changes in the management structure of a licence holder and activities also must be prepared, assessed, implemented, monitored and assessed according to the established nuclear safety and other requirements.

INPP is responsible for creating the necessary organizational structures for safe operation and decommissioning of INPP in advance. It ensures that the plant has the necessary financial, material, human and technical resources, procedures, norms and technical requirements, necessary scientific support in the all stages of lifetime of a NI. The organization also likewise organizes physical protection and fire protection of the plant, as well as recruitment and training of operating personnel, safety culture and must provide continuous monitoring of plant safety. The organization ensures continuous monitoring and own supervision of all activities which have a bearing on plant safety. The results of safety inspections and periodic reports on plant safety are to be submitted by the organization to the state control and supervision institutions.

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

Unit 1 of INPP was safely permanently shut down in 2004, and Unit 2 was safely permanently shut down in 2009 according to the shut-down programmes agreed with VATESI beforehand.

### 9.3. Description of the mechanism by which the regulatory body will ensure that the licence holder meets its primary responsibility for safety

VATESI is obliged to ensure the state regulation and supervision of nuclear safety and radiation protection at nuclear installations and other related organizations. VATESI authorities and responsibilities for ensuring state regulation in this area could be grouped as follows:

- formulating of the requirements, principles and criteria for safe operation of nuclear facilities, safe utilisation, transportation and storage of radioactive and nuclear materials, also for accounting of nuclear materials and physical protection of nuclear materials, within its competence;
- issuing of licenses for the operators of nuclear facilities and other nuclear activities;
- performing of regulatory safety assessments;
- control and supervision of the activities within its competence, including regulatory inspections and necessary enforcement measures.

VATESI performs the following activities to regulate nuclear safety:

- drafting of laws, resolutions of the Government of the Republic of Lithuania and other legal acts on the issues of the safe use of nuclear energy, the use of nuclear materials, their transportation, their accounting and control, as well as nuclear, radioactive materials used in nuclear energy, as well as waste storage and disposal, within its competence co-ordinate draft legal acts of the ministries, governmental institutions, county governors' administrations, municipalities and other institutions, which may have an effect on the safe use of nuclear energy;
- establishes the principles, criteria, requirements and recommendations for safe operation of NIs and their decommissioning, and monitor compliance with them;
- establishes the principles, criteria, requirements and recommendations for safe use, storage of nuclear materials, disposal of their waste, and monitor compliance with them;
- establishes the principles, criteria, requirements and recommendations for storage of radioactive materials used in nuclear energy, disposal of their waste, and monitor compliance with them;

- develops procedures for accounting for and control of nuclear materials, control their compliance during import, export, re-export, transportation, use, storage and burying of those materials;
- establishes physical protection principles, criteria, requirements and recommendations of NIs, nuclear as well as radioactive materials existing in NIs, and monitor compliance with them;
- reviews and controls implementation of requirements for staff at NIs performing tasks important to nuclear safety, regulates the organization of the staff training, certification and requalification;
- within its competence controls the fulfilment of radiation protection requirements for NIs;
- within its competence control the fulfilment of nuclear safety requirements when transporting nuclear materials;
- issues licences for activities, which are prescribed in the Law on Nuclear Energy of the Republic of Lithuania, establishes conditions for validity of licences and monitors compliance with them;
- within its competence prepares inspection programmes and implements them;
- on the basis of the submitted safety analysis results, inspection conclusions and (or) independent research, evaluates the condition of safety in NIs, prepares reports on the safety of NIs and submits them to the Government of the Republic of Lithuania, local authorities and other bodies concerned;
- co-ordinates measures for safety improvement of NIs and monitors their implementation;
- assesses the projects for new activities and design of new NIs in terms of nuclear safety;
- monitors accident preparedness at INPP;
- in the event of a nuclear accident, evaluates the situation and forecasts the course of the nuclear accident, provides information on the existing situation to the public and state institutions.

At the demand of VATESI, the administration of a NI must:

- submit necessary documents (technical specifications, operating instructions, drawings, diagrams, standards and other documents);
- provide control measuring devices and appoint staff for performance of tests and works related to the execution of supervision, as well as provide necessary laboratory analysis and research data;
- supply with special clothes, special footwear and other personal protection devices;
- provide official premises, international and interurban telephone, facsimile communication measures;
- provide necessary scientific technical information and literature.

To ensure reliable fulfilment of VATESI functions the regulatory body implemented QM system with the following aims:

- Enhancing the efficiency of VATESI management, optimizing the planning and use of VATESI resources;
- Assuring adequate licensing, safety assessment and supervision of NIs;
- Assuring adequate management and control of other internal VATESI activities (management of information, projects, training activities and other).

The 1st and 2nd level VATESI Quality Management procedures are listed in section 8.1.9.

# ARTICLE 10 SAFETY PRIORITY

*Each Contracting Party shall take appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.*

## 10.1. Overview of National Arrangements and Regulatory Requirements Regarding Policies and Programmes of Licence Holders to Prioritise Safety

Safety as the highest priority is emphasised within the Law on Nuclear Energy of the Republic of Lithuania and within the national system of regulation of nuclear safety. The first article of the Law identifies the main goal of state regulation in the field of nuclear energy – to ensure nuclear safety and preclude impermissible use and proliferation of nuclear materials and technologies.

The priority is emphasised within VATESI Mission, QM documents, strategic and annual plans of VATESI activities and nuclear safety requirements. The main goal of VATESI strategy is to assure high level of nuclear safety. VATESI has established and continuously improves system of nuclear safety requirements. Monitoring and evaluation of activities and performance both of VATESI and licensees emphasise the priority of safety. INPP performance and safety results suggest that the goals of VATESI strategy were achieved.

Article 3 within the Law establishes the following principles for activities in the area of nuclear power:

1. Activities in the area of nuclear power are only permitted with a licence from the competent regulatory institution.
2. A licensee is responsible to compliance to nuclear safety requirements and other legal requirements.
3. A regulatory body issuing licensees for activities in the area of nuclear power must to establish a system of requirements that ensure:
   a) nuclear safety;
   b) non-proliferation of nuclear weapons;
   c) only legal use of nuclear materials and radioactive waste.

VATESI as the national regulatory body has established and constantly develops the national requirements for ensuring safety of nuclear installations.

According to the Law, the safety requirements and other legal documents INPP established its policies, necessary structures, activities and integrated QM system based upon the priority of safety. VATESI constantly performs the regulatory activities to ensure constant adherence to the safety requirements and proper prioritization of safety.

The information presented within the sections bellow demonstrates implementation of safety priority in decisions and activities of INPP and VATESI.

### *10.1.1. Safety Policies*

INPP as a licensee is fully responsible for safety of its NIs and INPP policy gives the top priority to safety. INPP policy in the field of safety and QM was adopted in 1988 and updated in 2000 and 2005. The policy also applies to the decommissioning process and demonstrates INPP commitment to the safe and effective decommissioning.

The INPP policy indicates commitment of INPP management to:

1. Ensure high quality at all levels of the organization and at the same time assign the highest priority to safety;

2. Involve all INPP personnel in safety and quality improvement by explaining INPP objectives, tasks and permanently inform employees regarding results of the work carried out;
3. Ensure that all INPP employees have a sufficient qualification to perform their tasks and implement INPP objectives. INPP management is committed to develop the needed competencies of all INPP employees;
4. To formulate the tasks and INPP requirements by making sure that their form is assessable and known to all personnel, also to ensure for each employee the adequate conditions for their work;
5. To ensure the same high quality of interactions in operation activities and to ensure safe decommissioning of INPP;
6. Ensure social protection of personnel in the process of decommissioning and to preserve the key personnel of INPP according to the Strategy on Social Support to Personnel;
7. To monitor and constantly assess INPP activities in order to improve their quality and efficiency and use own experience and experience of industry to improve organization, processes and competence;
8. To fulfil responsibilities of INPP employees for society and to comply with all laws and safety requirements with sufficient margins;
9. To maintain effective and integrated management system at INPP.

This policy is disseminated in the plant by several means, e.g. oral communication, leaflets, brochures, intranet and supported by INPP QM system and daily activities.

Joint stock company "Visagino atominė elektrinė" (VAE) is not a licence holder but this organization is responsible for the implementation of the preparatory works for construction of the new nuclear power plant in Lithuania. VAE is responsible for the comprehensive VNPP construction sites study and other project preparatory works that are necessary in order to have proper arrangements, after the establishment of project implementing company, to develop VNPP construction project.

VAE was established in August 2008 and took over the preparatory works, which were carried out by the Nuclear Energy Department of Company "Lithuania Energy" established at the end of 2006. The implementation of the new VNPP Project in Lithuania is supervised by the New NPP Project Implementation Supervision Committee chaired by the Minister of Energy.

According to the statute of VAE, the main aim of VAE activities is the development of a new NPP project in Lithuania, including, but not limited to, project design studies, strategic planning and risk management, investment planning, organizing of project development activities and their implementation and control. The company has the right to perform activities which do not contradict with the main aim of company's activities and with the requirements given in the laws of the Republic of Lithuania. Having fulfilled all the requirements prescribed by the legal acts and having obtained appropriate permits and licenses, the company shall construct and operate the new nuclear power plant, develop capacities of electricity production and shall provide electricity.

VAE is comprised of the following main departments:

- Project Management Office;
- Technologies Competence Centre;
- Legal and Regulatory Environment Competence Centre;
- General Infrastructure Competence Centre.

Project Management Office is responsible for initiation and implementation of preparatory works projects using the specific knowledge concentrated in the competence centres. Technologies competence centre is developing knowledge in nuclear and auxiliary technologies, including nuclear fuel cycle and radioactive waste management, while General Infrastructure Competence Centre is concentrating on the issues related to the construction site and territorial planning, geology

and logistics, including the transportation routes from the closest seaport to the site. Legal and Regulatory Environment Competence Centre is responsible for analysis and proposals related to the improvements of the legal environment with the goal to achieve the transparent and most streamlined legal and regulatory regime with no undue interference with smooth planning, construction and operations of the new VNPP.

VAE is developing and improving its own competence in safety and seeks external competences in the safety related aspects of activities of the organization. All the sites studies and assessments, including EIA, are done in accordance with international practice and in line with the relevant IAEA safety standards.

Regardless VAE is not a license holder and not even an applicant for obtaining a license for activities in the field of nuclear energy yet, this organization recognizes the safety as a top priority for both ongoing and planned future activities the company.

### *10.1.2. INPP Safety Culture and Its Development*

According to Article 27 of the Law on Nuclear Energy of the Republic of Lithuania, VATESI must ensure that an organization granted with the license to operate a NPP must guarantee the high level of safety culture in licensees' organizations. Provisions for Licensing Nuclear Power Activities (the document was approved by Government of the Republic of Lithuania) requires the VATESI to assess effectiveness of the organization's QM system, safety culture, organizational and technical means to assure safety culture, before a licence can be issued.

The requirement to develop safety culture is stated within a number of VATESI issued requirements, e.g.:

- VD-B-001-0-97;
- BSR-1.4.1-2010;
- Nuclear Safety Requirements for Procurement Activities of Operating Organization (P-2004-03).

Also it is required that qualification of all managers and other employees of a licence holder involved in safety-related activities have to be assessed and periodically re-examined regarding understand of their work and the manner and degree in which their activities affect safety. The employees should be fully aware of the consequences, which might follow the violation of rules or any deficient application of the prevailing norms and technical requirements.

Safety culture at INPP is ensured through:

- Appropriate selection and training of personnel in each area of safety related activity;
- Creation and maintenance of a strict discipline with a clear distribution of responsibilities among managers and other employees;
- Development and use of QM documents (e.g. procedures, work instructions) and observation of performance, as well as their periodical updating and other reviews with consideration of experience.

INPP assesses safety culture applying personnel questionnaire and safety culture monitoring indicators. INPP were performed the assessments in 1998, 2000 and 2004, 2007 and 2008. The questionnaire was developed considering the safety culture features which are applied in nuclear industry.

Since 2004 INPP applies safety culture indicators to monitor safety culture and timely identify latent weaknesses. The indicators cover such areas INPP activities like QM and safety improvements, human behaviour and personnel motivation. Numeric values of the indicators are presented in reports together with analysis of significant trends. The reports are submitted to INPP

Director General, INPP departments and VATESI. Also the numeric values of the indicators are presented on the internal INPP web-site for all INPP employees.

INPP internal QM audits are used by INPP to monitor development of INPP safety culture. During internal and external (those are conducted at contractor organizations with INPP safety important tasks) QM adherence to QM requirements and needs to further improve QM system of INPP are assessed. The audits also periodically assess application of 2nd level management procedure Safety Culture QA-2-001 of QM system of INPP. Such special internal QM audits on implementation of QA-2-001 were carried out in 2004, 2006 and 2009.

Annual programmes of Safety Culture Development at INPP are annually approved, implemented and followed-up according to the management procedure Safety Culture QA-2-001 approved by INPP Director General. The main aim of the programme is to orientate behaviour of personnel of the plant and contractors, also plant management methods to the achievement of the highest priority – SAFETY. Activities for safety culture development aim to constantly improve nuclear safety by developing and maintaining the corresponding professional attitudes for safe and correct execution of work, also to support the atmosphere of professional openness and mutual respect between managers and subordinates. The procedure identifies the following main tasks for continuous development of INPP safety culture:

- plant management must demonstrate continuous support and commitment to INPP Quality and Safety Policy;
- safety culture shall be the main element to implement the INPP policy;
- attitude of employees towards work shall prevent negligence and support self-control and cooperation with regard to the safety issues;
- to ensure understanding of the common tasks by each employee, the personnel should be openly informed about operation and decommissioning of INPP;
- personnel must be trained on using safety culture principles and provide examples of good practice and other industrial experience for the learning;
- safety culture assessments and audits should lead to further improvements in activities and QM system.

Safety culture concept, the related INPP and industrial experience as well as examples of relevant practice are included into the training process. The safety culture seminars for plant employees are performed since 2004. During these seminars the problems in the area of safety culture and their possible solutions are discussed. The participants of the seminars review the reports on events at INPP related to the deficiencies in safety culture. In order to conduct the seminars the monthly schedules are developed. The applied Safety Culture Training Manual was updated in 2006.

INPP activities to maintain and develop safety culture include:

- application of safety performance indicator system;
- quantitative safety culture monitoring quarterly reports;
- periodic safety culture assessment and analysis derived from staff opinion survey (see Appendix 1);
- “logbooks for personnel’s proposals on improvements” are introduced at plant departments. The staff of the plant may advise their direct managers about safety issues. Everybody can make a suggestion to perform improvements in the area of documentation, equipment or personnel behaviour. Managers provide feed back to personnel on the proposals received;
- keeping good house keeping and cleanliness, though the design is not convenient from this point of view, and building structures and items of equipment are old (e.g. fire water system and components);
- management support to introduction of modern approaches towards safety culture and management system;

- INPP maintenance contractors have several training sessions during a year concerning safety culture, maintenance planning and outage management;
- prior to assignment to a new job position each candidate has to attend a course on safety culture principles. The training manual of this training include introduction to INSAG-4, INPP safety policy, self-control (STARK) principles, INPP safety indicators, INES scale, managerial and individual role in safety culture, blame free atmosphere, etc.

At INPP monthly meetings are held to review the suggestions provided by the personnel. The aim of these meetings is to exchange information about situation at the plant, to discuss the important safety and organizational issues.

### *10.1.3. Arrangements for Safety Management*

Following Lithuania's legislation the licence holder bears full responsibility to ensure the safety and establishes necessary organizational structures. The licence holder must ensure necessary financial, material, human and technical resources are in place as well as administration rules and technical requirements, scientific support and effective QM in the all stages of lifetime of a NI, physical protection, the fire protection of its NIs and maintaining safety culture and continuous monitoring of safety. The arrangements for implementation of licence holder's responsibility for safety are explained within Article 9 of this report.

INPP approach towards nuclear safety is based upon the principle of "defence-in-depth", i.e. by the sequential implementation of protection measures based on a system of barriers to prevent the spread of ionizing radiation and radioactive materials to the environment and a system of technical and organizational measures to protect these barriers and retain their effectiveness, and to provide direct protection for the population.

To ensure safety in continuous and reliable way and to implement nuclear safety requirements INPP has implemented QM system (see also Article 13 within this report) and identified safety requirements to be followed in all activities of INPP, established the necessary organizational structure and performs internal safety oversight activities, including independent assessments.

Safety related activities at INPP are planned in advance. Precautionary measures for routine jobs are included in work instructions.

An independent audit and review system is established to monitor and evaluate safety performance. Corrective actions are reviewed are assessed prior and after their implementation whether they adequately address the issues identified during audits and reviews. A number of peer reviews (ASSET, OSART and WANO) have been conducted in the past to provide an independent judgment on the effectiveness of the safety management system.

Workers are allowed (by law) to refuse and stop unsafe work. Several mechanisms are in place to report deviations (FOBOS-, ARKI-system, logbooks, yellow forms, event reporting, etc) and to follow-up on implementation of approved improvements.

The configuration management program is established and implemented at the plant. A program controls plant modifications, including those of a temporary nature. The actual number of outstanding temporary modifications is small.

A program for ageing management is in place. The physical degradation phenomena, including degradation caused by the various activities of operation, surveillance and maintenance, are analyzed.

Root Cause Analysis is performed for the events reported. Event evaluation reports have to be completed within one month after the event. From 2006 "Procedure for additional analysis of events caused by the incorrect personnel actions during unusual events" is applied. The procedure specifies the additional analysis of the root causes of human factor related events.

INPP and other industrial experience is transferred within the operating organization by means of meetings, training, intranet support, etc. INPP Director General has monthly meetings with all managers, where safety matters are discussed.

### *10.1.4. Arrangements for Safety Monitoring and Self-Assessment*

INPP as an operating organization ensures continuous monitoring and supervision of all activities related to the plant safety. For self-assessment INPP has developed and applies 2nd level QM procedure "Self-Assessment" QA-2-001-2. According to this procedure, INPP self-assessment activities are carried out by:

- INPP administration management;
- Managers of directorates and services;
- Managers of other divisions.

The procedure also defines, that self-assessment is performed by the following means:

- safety inspections and audits are performed by INPP Safety and Quality Assurance Service (after 2010-01-05 – Technical Surveillance and Quality Management Division) and a responsible manager participates in decisions on what improvement actions are needed;
- checking whether work areas, buildings and rooms are in proper conditions;
- collecting information on activities and their results;
- daily communication of managers with personnel and observations of their work;
- analysis of INPP staff suggestions on improvement;
- investigations of unusual events and identification of their root causes;
- meetings to review performance indicators (including those corresponding to targets set for a particular division) and follow-up on improvement activities.

The procedure identifies the following periodic meetings at INPP to review performance (including safety performance):

- quarterly INPP management meetings;
- quarterly INPP management meetings at INPP directorates and services;
- monthly meetings at other INPP divisions.

Annual schedules of self-assessment activities at INPP contain information about:

- safety inspections and internal QM audits (The results are subject to improvement activities according to 1st level QM document "Corrective Measures and Improvement Programme" QA-1-018);
- checks of employees' safety and health, other specific checks;
- planned dates for submitting reports on employees' safety and health;
- planned checks of work areas to be performed by managers.

INPP performance results (including safety performance results) are reviewed within the following periodic reports:

- quarterly bulletin "Results of Implementing of INPP Targets";
- quarterly report "Comparison of the Main INPP Techno-Economic Indicators and SPIs with the Average World NPPs and NPPs with RBMK Reactors";
- monthly reports on operation of INPP;

- quarterly reports on (1) safety culture indicators and (1) safety culture related organizational issues;
- annual reports by INPP divisions on implementing goals and achieving targets for a year;
- the following reports issued by INPP Safety and Quality Assurance Service (after 2010-01-05 – Technical Surveillance and Quality Management Division):
  1) on INPP self-assessment results;
  2) on results of internal and external audits;
  3) on effectiveness of INPP QM system;
  4) on results of safety inspections.

The results of safety inspections, QM audits and periodic reports on plant safety are to be submitted by INPP to the relevant state regulatory institutions.

From December 2006 INPP applies a special procedure for determining and evaluating safety performance indicators (SPIs). Calculations of SPIs are performed monthly. The reports are submitted to management of INPP and to VATESI.

### *10.1.5. Independent Safety Assessment*

All documentation submitted for VATESI approval is the subject of independent safety assessment by INPP Safety and Quality Assurance Service (after 2010-01-05 – Technical Surveillance and QM Division). This department reports directly to INPP Director General and is responsible for independent safety assessments, safety inspections, assessments of modifications and QM audits (internal and external).

INPP Safety Committee of performs additional independent assessment of decisions, important from the safety point of view and gives advice directly to the management of INPP, e.g. on safety important modifications, on INPP personnel motivation policy.

### *10.1.5. A Process Oriented (Quality) Management System*

Currently, VATESI is in the stage of preparation of new requirements for management systems (implementation of IAEA GS-R-3 process-based approach towards an integrated management system) and development of detailed requirements for personnel management in licensees' organizations. Both documents will provide additional requirements on personnel management activities, knowledge management and development of safety culture.

At the same time INPP is in preparation for upgrading INPP integrated QM system to a process-based management system using IAEA GS-R-3 approach. VATESI performs oversight activities to ensure that the changeover is performed in a safe manner and does not impair safety of INPP.

Specialists of VATESI and INPP maintained professional contacts to discuss the draft requirements of VATESI and INPP plans to introduce process-based management of activities. For instance, in May 2010 INPP presented to VATESI an internal list of foreseen processes and sub-processes to be used to begin upgrading of the INPP QM system to the process-based approach.

## 10.2. Measures taken by licence holder to implement arrangements for the priority of safety

INPP safety Committee after review of safety culture development programme has recommended to INPP management to pay more attention to the personnel work motivation issues. On this

recommendation, INPP Director General developed INPP Policy in the area of personnel motivation. Text of the Policy is presented below:

"INPP Policy in the Field of Personnel Motivation during Operation of INPP

Adhering INPP policy in the field of safety and quality assurance, INPP management staff under the leadership of Director General declares:

1. We have to motivate the personnel for good work, for making the contribution to the plant safety improvement. The tendency to note well performed work has to become a priority element of management. The work is considered to be well executed, when it is executed safely and to high quality level.
2. Every manager has to create an atmosphere of such kind when the personnel avow problems and own errors. The personnel mistakes are considered as well as a possibility to refrain from their repetition, not with the purpose to impose a penalty. It is necessary to learn lessons from each error and thereby to help itself and others not to make this error again.
3. However, we must be intolerant to violation of safety, of internal regulations and hiding of errors. Moreover, we have to make a decision on each penalty recovery applying weighted approach in order not to impair atmosphere of openness. INPP management staff declares its adherence to this Policy in the Field of Personnel Motivation."

During operation, in accordance with the results of the performed outages of power units and for works related to safety improvement, many plant employees obtained honourable mentions from the plant managers. According to the results, every month INPP employees could receive incentives of 20-30 per cent of their monthly salary during operation.

INPP Management Procedure "External and Internal information" was approved in 2003 and updated in 2007 to inform the plant personnel, public, mass media and state institutions. The goal of the procedure is to provide information about INPP operation, important projects, and organizational changes at INPP (including those related to the decommissioning). It is presented by Information Centre (www.iae.lt). Internal INPP information includes regular editions of Information bulletins, broadcasting of weekly news by the plant radio.

In November 2003 INPP Director General and INPP Joint Trade Unions adopted INPP Personnel Social Support Strategy for the period of INPP decommissioning. The strategy was foreseen to be implemented by 2010 and it covered all employees of the plant. The goals of the strategy were:

- to support INPP personnel in solving the social problems which can arise during this period,
- to ensure safe operation of the plant,
- to maintain high level of safety culture during the remaining operation and decommissioning.

INPP participated in the following international independent safety assessment activities:

- In 1989 and 1993 safety assessments were carried out at INPP under ASSET mission, and in 1995, 1997, 2006 and 2008 under OSART (including follow-up) missions;
- In 2001 Level I and II INPP probabilistic safety assessments were fulfilled, and the plan hosted the IPSART Mission, which made an independent review of the work done;
- INPP hosted peer reviews by Ontario Hydro in 1993 and by WANO in 2002 and 2007.

The 2002 WANO partnership check-up experts marked positive practice in the development of safety culture at INPP and suggested WANO Moscow Centre to distribute INPP experience to other Nuclear Power Plants.

During the OSART mission in 2006, based on the request of the Government of the Republic of Lithuanian, international experts highly evaluated safety and management of Unit 2 operation. OSART team have concluded that both INPP management and other personnel aspire to execute

safe operation of the plant and to use safety related improvement programs, approved methods and proper personnel attitude towards safety at the stage of INPP decommissioning. IAEA experts have appreciated work of INPP in the area of safety culture as a good practice to be recommended to other nuclear power plants: at INPP 2 safety culture monitoring systems have been developed and implemented.

In 2007 a second check-up of measures on the results of recommendations obtained from the WANO partnership check-up experts was held. The team of experts had presented some recommendations and suggestions, INPP has prepared the plan of corrective measures and currently implementation of those measures is in progress.

During the OSART follow-up mission in 2008 the experts identified some areas for the further improvement. All remarks were either recommendations or suggestions. INPP has prepared the plan of corrective measures and the work to implement them is in progress.

### 10.3. Regulatory process of monitoring and oversight of arrangements used by the licence holder to prioritize safety

VATESI performs safety review and assessment activities as well as implements inspection programme to define if safety level of nuclear power corresponds to requirements. When needed, VATESI use assistance of TSO for independent safety verification.

VATESI requires from INPP to present approved results of independent assessments of submittals for licensing, permits, modifications and other safety important decisions.

VATESI continuously monitors INPP safety culture by the following activities:

- inspections and other activities to assess licensees' compliance with requirements of the granted licences and other requirements;
- reviewing quarterly safety culture related reports on (1) INPP safety culture indicators and (2) organizational issues related to safety culture;
- review of results from INPP employees' surveys for assessing safety culture at INPP;
- performing review and assessment of INPP submittals (e.g. on safety important changes to INPP organizational structure);
- quarterly and other meetings with INPP management.

The safety assessment at VATESI is performed according to the 2nd level VATESI QM procedure KU-II-01. The procedure identifies requirements and responsibilities in the following steps of the safety assessment process:

- Reception of submittals and assigning responsibilities;
- Preliminary review, identification of relevant requirements and evaluation of needs to contract competent TSOs (also signing contracts in case such TSOs are needed);
- Safety assessment review and documentation of results and the related communication, including development of safety assessment conclusions;
- Decision regarding assessment results;
- Drawing lessons from the gained experience and identifying measures to improve VATESI activities.

In the case if VATESI decides to use support from a competent TSO, the experts are carefully selected regarding their competence and independency from INPP. VATESI does not use services of the TSO experts who have participated on the side of a licensee regarding the issue in question.

VATESI regulatory inspections are planned, performed and followed-up according to the 2nd level VATESI QM procedure KU-II-06.

## 10.4. Means used by Regulatory body to prioritize safety in its own activities

VATESI safety policy is stated within VATESI Mission: "Taking into account risk of nuclear energy use as well as wish of the society to avoid nuclear and radiological accidents and incidents, and understanding its responsibility for society of Lithuania and worldwide, VATESI performs regulation and state oversight of nuclear and radiation safety at nuclear installations with the aim to protect the society and the environment against harmful impact of nuclear and radiological events and accidents."

Safety oversight is performed on the basis of specific and clearly defined requirements. Every VATESI employee must perform his (her) duties with responsibility, using his (her) professional knowledge and experience, enhancing his (her) qualification and sharing the knowledge with the colleagues.

VATESI seeks constructive dialogue and cooperation with other institutions and bases its activities on the gained experience and international practice. VATESI management system is integrated into the everyday work and ensures that the employees receive the necessary information, assistance and tools to perform their tasks properly. Heads of the divisions are responsible for the quality of work performed and services provided by their divisions. Each employee is responsible for the quality of work performed by him (her). VATESI activities are based upon principals of honesty, openness and clarity. VATESI provides reliable and correct information on nuclear safety in Lithuania to the public in timely and proactive manner.

Implementation of VATESI safety policy is integrated into VATESI QM system, described in Article 9 (see the last page of the section 9.3).

Corporative VATESI activities and those of individual employees are subject of continuous improvement which is based on the self-assessment.

The self-assessment of VATESI is integrated in different processes and activities:

- Self assessment within VATESI strategic planning process;
- Self assessment within separate processes (licensing, safety assessment, inspections, etc.), performed by the responsible specialist for the timely update of it;
- Specific assessments before and during preparation of new legal acts;
- Specific assessments before major organizational changes;
- Review of activities as a part of preparation for state audit, IAEA missions, etc.;
- Preparation of annual VATESI activity report for the Government;
- Annual evaluation of state servants;
- Weekly meetings of VATESI management organized in the morning of each Thursday;
- Yearly meetings of VATESI staff with the aim to review and assess VATESI activities of the past year.

VATESI strategic plan is prepared each year based on the approved requirements, methodology and priorities of the Lithuanian Government, taking into account and including the Environmental analysis consisting of Analysis of external factors, Analysis of resources and SWOT analysis.

The analysis of external factors, performed within the strategic planning, covers analysis of Political factors, Economical factors, Social factors and Technological factors.

Analysis of resources, performed within the strategic planning, covers analysis of the:

- Legal basis
- Organizational structure
- Human resources
- IT and telecommunication system
- System of planning
- Financial resources

- System of accountancy, and
- Internal control system

The achievements of VATESI activities in correspondence with the Strategic plan have to be evaluated each year. The evaluation criteria of "Strategic aim" is Effect, the evaluation criteria of "Aim of the programme" is Result and the evaluation criteria of each "Task" is Product. All evaluation criteria are measurable. Each year VATESI provide report to the Government, prepared based on the commitments foreseen in the Strategic plan. Evaluation of the results is an essential part of this report.

VATESI performs periodic meetings to review activities and results on the weekly and annual bases. Results of VATESI activities are reflected within internal weekly and quarterly internal reports, and also in VATESI annual reports available on www.vatesi.lt .

# ARTICLE 11 FINANCIAL AND HUMAN RESOURCES

*i. Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.*

*ii. Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.*

## 11.1. Article 11(1) – Financial recourses

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

INPP was the main energy generator in Lithuania. In compliance with the requirements of the European Union, Lithuania took the obligation to end the plant operation in December 31, 2009. Unit 1 was shut down in 2004, December 31. But nevertheless within 2007 - 2009 the INPP was the leader on the energy market of Lithuania by selling 70% of generated electricity.

The state controlled electricity monopoly was reorganized to market relations, so since April 1, 2002 INPP has started electricity trade with public and independent suppliers. In the period of 2007 - 2009 INPP made electricity purchase and sale contracts and sold electricity to the following companies, which had independent licenses: "Achema" AB, "Prekybos namai Giro" CJSC, "Mažeikių elektrinė" AB (at present "Mažeikiu Nafta" AB), "Akmenės cementas" AB, "Visagino energija" SE, "Korelita" CJSC. About 70% of INPP electricity, sold to domestic market, was purchased by public suppliers "Rytų skirstomieji tinklai" JSC and "Vakarų skirstomieji tinklai" JSC, about 20% was sold to "Lietuvos energija" AB, which acted as electricity market operator. "Lietuvos energija" AB as well exported electricity to other countries.

**Table 11.1. INPP Electricity Production Results**

| No. | Years | Sold electrical Energy, M/kWh | Income (Lt) | Rate, ct/ kWh (according to report) | Profit, (loss) (Lt) |
|---|---|---|---|---|---|
| 1. | 2004 | 14 039 | 716 766 | 5,106 | 22 799 |
| 2. | 2005 | 9 624 | 564 470 | 5,865 | 13 585 |
| 3. | 2006 | 7 977 | 507 850 | 6,366 | 19 090 |
| 4. | 2007 | 9 066 | 572 003 | 6,24 | 6 096 |
| 5. | 2008 | 9 041 | 596 735 | 6,6 | 2 019 |
| 6. | 2009 | 10 025 | 597 229 | 5,95 | (1 393 535) |

After final shutdown, reappraisal of the enterprise's property performed on base of articles 23 and 9 of the Business Accounting Standard was the reason of the loss.

During 2007 – 2009 Unit 1 was not operated and it was financed in the frame of the Ignalina Program from the funds of European Union and National Fund. After the final shut down of Unit 2 at the end of 2009 the unit is also financed by European Union and National Fund.

*11.1.1.2. Financing Sources for INPP Decommissioning*

The Republic of Lithuania is the owner of INPP and ensures the funds necessary to ensure safety and activities of INPP. The measures include financial support to decommissioning of INPP from EU. Sufficiency of funds to ensure safety and activities of INPP are reviewed by INPP management and Ministry of Energy of the Republic of Lithuania.

Funds for closing of INPP were accumulated at the national INPP Decommissioning Fund from 1995. Due to decision for early shut down of INNP units, European Union member states and donor-states provide the additional support for safe decommissioning of INPP. The EU support is provided through (1) the EBRD-managed Ignalina International Decommissioning Support Fund (IIDSF) and (2) EU Ignalina Programme, coordinated by Ministry of Energy.

IIDSF was established on the bases of agreement between EBRD and Lithuania in 2001. With support from IIDSF an interim storage facility for spent nuclear fuels and a treatment centre for solid radioactive waste are nearing completion. Other ancillary facilities are already in place. Total costs of the Ignalina decommissioning are estimated to be around €1 billion, with final completion not expected before 2029.[1]

The EU long-term Ignalina Programme supports various projects related to decommissioning of INPP, including support for radioactive waste treatment activities, technical support to institutions supervising safety of INPP. The projects also include ones for mitigation of negative social consequences of early closure of INPP and improvement of national power infrastructure.

*11.1.2. Statement with Regard to Adequacy of Financial Provisions for INPP*

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

*11.1.3. Processes to Assess Financial Provisions*

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

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

## 11.2. Article 11(2) - Human Resources

*11.2.1. Personnel and Training for Safety-Related Activities at INPP*

INPP has a quantitatively high number of personnel in comparison with the other NNPs in the world (except for the former Soviet plants). Firstly, operation and maintenance of INPP demands a lot of efforts and manpower. Secondly, after Lithuania gained its independence, the restructuring of the existing organizations dealing with the maintenance and repair of the nuclear installations on nuclear facilities started. In order to preserve the experienced personnel recruited to perform outage works and other activities, INPP had to incorporate all these external organizations into its structure.

When INPP became property of Lithuania in 1991, a huge work was commenced on nuclear facilities targeted to the plant upgrade and safety improvement by applying nuclear experience

[1] This information is taken from http://www.ebrd.com/new/stories/2010/100111.htm

gained by Sweden, Germany, USA, Japan and other countries. Supported by the above countries, INPP safety and reliability were upgraded sufficiently and the works are still ongoing. The relevant activities are in progress in order to implement procedures, manuals, guidelines performed meeting the IAEA standards. Many INPP experts have been trained at NPPs of Sweden, USA, Canada, Japan and other countries. Such training provides efficient tool to adopt the safety improvement experience. At that time INPP personnel is very well educated and properly trained:

- more than 38% of personnel have higher education;
- 26% – college education;
- 20% – vocational schools and the others have the general secondary education.

As on 2009-06-01 education of INPP personnel (the total number is 2087) is the following:

- about 44 % of personnel have higher education (908 employees),
- about 21 % – college education (443 employees),
- 34 % – vocational schools and the others have the general secondary education (721 employees).

The Law of the Lithuanian Republic on additional social warranties and employment warranties for INPP personnel was adopted on 29 April 2003. The Law provides additional employment warranties, life insurance of personnel responsible for nuclear safety, whose work is significant to ensure safe and uninterruptible operation of INPP, procedures on discharge payments, retirement payment, and migration payment. After the shutdown of INPP Unit 1 in 31 December 2004 the Law on social warranties has been put in force.

5788 employees were working at INPP in 1992. The number became 4680 by 1 January 2001, and the number dropped to 3642 by 2004. Later, the number of employees decreased further and became 3230 employees by 1 April 2007. As of 1 January 2008, the number of employees was 3145, on 1 January 2009 – 2995. After shut down of Unit 2 at the end of 2009 there were 2354 employees (as of 1 January 2010). In 2010 about 400 employees are planned to be dismissed.

INPP activities to assess and develop Safety Culture are described in Chapter 10 of this report (sections 10.2.2 and 10.3).

### *11.2.2. Arrangements for Training of INPP Personnel*

The Training Centre was founded on 1 August 1996 on the basis of the training unit and it is the structural department of the INPP. After the shutdown of Unit 2 the new INPP organizational structure was reviewed by VATESI and from 32010-01-05 is applied by INPP. The main changes to INPP structure are due to focus of INPP on safe decommissioning of the units. INPP Training Centre (TC) and INPP Full Scope Simulator remain at INPP. The simulator is used for periodic training of the unit operators to ensure safety (e.g. to train on emergency procedures).

Training Centre activities are regulated by the following Laws of the Republic of Lithuania:

- Law Nuclear Energy;
- BSR-2.1.2-2010;
- VD-T-001-0-97;
- VD-E-11-2001;
- VD-KS-02-99;
- “Uniform regulations on employees training and qualification on safety and health issues” approved by the Order No. A1-223/V-792 dated 2003-12-31 of the Minister of social insurance and labour and Minister of public health;
- List of main laws regulating nuclear energy safety in the Lithuanian Republic, VD-VP-01, section XIII.

Personnel training system is focused to provide knowledge and practical skills necessary for work performance and process and equipment control, as well as the responsible attitude to work which is required for implementation of the established tasks and allotted functions as per the job description.

Personnel training system comprises the following components:

- Psycho-physiological examination of unit operators;
- Input check of knowledge and development of individual training programme;
- Training in accordance with the training programme;
- Qualification;
- Development of technical training means and their appropriate maintenance by means of organizational, training, procedural, technical and operational documentation;
- Preparation and archiving of training documentation.

At INPP the personnel training is conducted by means of initial training and continuing training.

*11.2.2.1. Initial Training*

*Purpose of the initial training – to prepare an employees for a position at INPP, including the training for promotion.*

The initial training is conducted in the following sequence:

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

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

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

Training on the full scope simulator or other technical means (training computer programmes, equipment mock-ups, actual components and samples, etc.) is provided when required by a training programme and is conducted by the TC instructor.

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

*11.2.2.2. Continuous Training and Re-Training*

*The purpose of continuing training is to maintain and further improve knowledge, skills and attitudes. Job proficiency maintenance training includes:*

- Training in TC or in other training institutions;
- Periodic instructions;
- Studying of industry and in-house experience;
- Qualification in the form of periodic knowledge check-up and re-qualification;
- Performance of required practical exercises and drills (emergency and fire protection training, full-scale simulator training);
- Studying of modifications.

Qualification improvement includes:

- Qualification and enhancing of professional competence level via special courses at TC or other organizations in Lithuanian and abroad;
- Experience exchange activities implemented in co-operation with other NPPs.

During continuing training the MCR staffs solves the follow main tasks:

- Maintaining of the basic knowledge scope at the proper level;
- MCR staff training with respect to the diagnostics skills and emergency situation mitigation;
- Complex training on the basis of modifications performed;
- Training of organisational and managerial skills;
- Training of operative work skills;
- Improvement of team work methods.

Within the frames of personnel continuing training the annual sessions are arranged with lectures, seminars and practical exercises on the full-scope simulator for MCR operators. Each lesson is analyzed upon its completion to:

- Solidify the skills acquired;
- Indicate good achievements throughout the exercise task performance;
- Reach thorough understanding of technological process dynamics;
- Work out ability of situation analysis;
- Work out skills of teamwork.

To improve skills on the MCR operators in the accident management training programmes, the following circumstances are simulated for the trainees:

- Time constraints;
- Sudden increase of information flow in case of accident;
- Possible stress of operator,
- Lack of operational experience in accident conditions;
- Hidden failures of safety important and other systems.

Continuous training for the maintenance personnel includes:

- General and special preparation requirements for a particular task;
- Practical training to apply equipment maintenance procedures and to exchange experience;

- Periodical and additional instructions on modifications in technological processes and (or) equipment, including the additional requirements regarding repair technique and instructions before a major repair;
- May include courses at other educational institutions in Lithuania and abroad;

### *11.2.3. Approval of Personnel Qualification for a Job*

Knowledge check within the frames of qualification procedure is performed on the basis of test-papers or special questions by means of oral or written examination. During this examination additional questions (within the scope of the training programme but not included into the written questions) can be asked.

Checking of professional skills is a part of the qualification procedure. It is performed at the end of the on-the-job training as a part of the initial training for the relevant position:

- For MCR personnel – full-scale simulator training, which is evaluated by a mark;
- For managers and experts of maintenance personnel, as well as operation personnel – evaluative work that verifies knowledge of rules, regulations, job descriptions, operation manuals and ability to use the above documentation at workplaces.
- For qualified workers of maintenance personnel – qualification (trial) work (qualification (trial) work is considered to be successfully performed if no time limits were exceeded, no spoilage is found caused by the examined person, no industrial safety rules are violated).

After an employee (operation personnel) has successfully passed over all qualification stages, he/she is allowed either to the doubling work performance under supervision and guidance of the experienced employee and/or independent work performance.

Further on, the qualification committee concludes on the employee's compliance with the work status in accordance with the results of the periodic knowledge check. The committee also evaluates the efficiency of the employee's practical activity during performance of his/her functions since the last qualification.

Qualification of INPP personnel is performed by the qualification committee, which is appointed by the order of the Director General. Number of examination committees at INPP is determined considering the necessity of timely and proper qualification. Qualification committee shall consist, as minimum, of three members.

Qualification results are drawn up in the protocol and documented in the certificate of standard pattern given to the employee upon passing his first exam. Qualification category on electrical safety and permit for special work performance is indicated in the certificate as well.

### *11.2.4. Training Development*

Continuous and further training of INPP personnel is performed according requirements for a particular position (e.g. periodic training to re-approve compliance to the qualification requirements of a safety important position), need to prepare for new activities or tasks of a division, other needs identified by a manager and discussed with an employee during annual individual appraisal meetings. TC is supporting managers of departments as an internal provider of training and, when needed, helps to find and organise external training according the established needs. TC continuously is assessing effectiveness of training content and process, develops new programmes and training tools to support implementation of plans of INPP (e.g. to prepare new mock-ups for training on dismantling of contaminated equipment). TC work with line managers to establish training needs, assess training results after a trainee has worked for some time after the training.

TC also performs analysis of OEF lessons, organises training for TC specialists and makes practical observations of the related tasks to improve training content and methods.

### *11.2.5. Methods to Assess Sufficiency of INPP Staff*

VATESI document BSR-1.4.1-2010 requires from a licensee to assess, plan and ensure sufficiency of staff performing safety important activities and affecting safety related professes of a licensed organization. It's necessary to assess and establish the number of staff needed for safe operation, and their competence in a systematic and documented way. The document will also require to establish and annually update a long-term staffing plan for activities that are important to safety.

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

Before approval of BSR-1.4.1-2010 there were less specific regulatory requirements regarding numbers of a licensee personnel. However, it is required by requirements document P-2008-02 to assess changes to the number of staff, which might be significant for safety, and agree with VATESI in advance.

According to P-2008-02 INPP in 2009 carried out assessment of needed personnel and other preparatory work to prepare and justify modification of a new INPP management structure, in force from 2010-01-05. Before INPP implemented this organizational modification, VATESI assessed justification for this modification, the foreseen new organizational structure of INPP and measures to perform the modification safely, provided comments to those documents and, after necessary amendments to this modification documents, sanctioned the transition.

The regulatory requirements and quality management procedures applied by INPP require to monitor sufficiency of staff for safe operation, their competence, and suitability for safety work on a regular basis and to document results of such assessments. For instance, assessment of the staffing level at INPP was annually indicated within the annual INPP safety report.

VATESI during regulatory inspections and other activities verifies suitability of personnel qualifications, quality of safety important training and sufficiency of competent INPP personnel to ensure safety of INPP.

### *11.2.6. Policy and Methods to Ensure Competency of INPP Contractors*

BSR-1.4.1-2010 requires from a licensee to establish personnel qualification requirements for safety important contractors within procurement documents, to monitor adherence to those and to this end to have enough in-hose specialists competent to perform this oversight and assess performance of a contractor.

INPP has implemented 2$^{nd}$ level quality management system procedure "Procurement" QA-2-017 that requires careful assessment of qualification of a possible INPP contractor. The assessment includes checking of competence of the key personnel of contractor and applied management system before a contract is approved.

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

INPP requires from contractors for safety important tasks to be performed at INPP to undergo a special training programme on INPP requirements for safety, application of quality requirements and principles of safety culture. For instance, for maintenance contractors INPP provided several training sessions during on concerning safety culture, maintenance planning and outage management.

### *11.2.7. National Supply and Demands for Experts in Nuclear Science and Technology*

Plans to build a new NPP create an opportunity for a certain number of younger INPP specialists to join this project and use their knowledge and experiences for the new NPP. After a political decision on construction of a new NPP young people begin nuclear engineering studies at Lithuanian universities.

In preparation for building a new NPP in Lithuania the Government is supporting activities of several national universities to establish and implement university studies in the areas important for work at a NPP. The first students began the studies in the 2008-2009 academic year.

Number of national TSO already exists in Lithuania. They provide needed support to nuclear safety related projects in Lithuania and other countries. The activities will continue in the context of INPP decommissioning projects and projects in preparation to build a new NPP in Lithuania.

### *11.2.8. Human resources at "Visagino Atominė Elektrinė"*

VAE is not a licensee, but this organization is responsible for the implementation of the preparatory works for construction of the new NPP in Lithuania. Staff Management Procedure has been developed at VAE in order to ensure the quality of activities performed and ongoing projects. The aims of the human resources management process described in this procedure are:

1. To ensure that company shall have adequate human resources management competent to achieve VAE objectives;
2. To ensure high level of the relevant personnel qualification for implementation of the objectives;
3. To ensure VAE employees are provided with the necessary means and tools for their everyday work.

The procedure describes the responsibilities and order of performing the following activities:

- search for and selection and recruitment of competent new employees;
- provision of work equipment and tools required for work of employees;
- organization of work and training;
- termination of employment.

The procedure requires to select a new employee for particular positions at VAE with the relevant background and experience in a particular field.

# ARTICLE 12 HUMAN FACTORS

*Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account thought the life of a nuclear installation.*

## 12.1. Overview of human factors and organizational factors related Regulatory requirements

Human factors and organisational issues have significant importance for safety of NI. Lithuanian legislation covers the above issues in the several regulations: VD-E-11-2001, VD-KS-02-99 (from 21 June 2010 BSR-1.4.1-2010), VD-T-001-0-97.

The extensive regulatory requirements on human factor are set in VD-B-001-0-97, (from 5 February 2010 – BSR-2.1.2-2010) and cover the following aspects:

- Operating organization;
- Responsibility and authorities;
- Assurance of resources for adequate performance of functions and tasks;
- Safety culture;
- Staff competence assurance;
- Operational experience feedback;
- Design (see also chapter 18 (3)):
  - Requirements to prevent single human error as well as mitigate its consequences;
  - Control room design;
  - Optimal human-machine interface;
  - Submission with adequate information for operators.

VD-E-11-2001 defines more specific requirements for:

- Organizational structure and distribution of functions;
- Staff recruitment;
- Training and qualification;
- Staff certification.

Human factors and organizational issues during modification process are addressed in "Nuclear Safety Requirements for Nuclear Facility Modifications" (P-2008-02). The information on regulatory requirements regarding organizational factors and arrangements to implement them is presented within Article 10 and Article 13 of this report. INPP adheres to the requirements and VATESI performs the regulatory oversight of INPP compliance to them.

## 12.2. Consideration of human factors in the dDesign of NI and subsequent modifications

HF management at INPP is based on the consideration of organizational, labour (professional), environmental factors, as well as individual abilities and other characteristics of human behaviour at work to preclude safety problems.

INPP personnel management process includes recruitment, primary and continuous training, certification and permission of personnel to work on their own at INPP, is regulated by the documents indicated in Article 11 (see the section 11.2).

## 12.3. Methods and programmes of the licence holder for analysing, preventing, detecting and correcting human errors in the operation and maintenance of NIs

The registration and analysis of events related to human factors is covered by the following INPP quality management (QM) 1st level procedures "Safety Assurance Programme", "Personnel Training and Qualification" (QA-1-009), "Corrective Measures and Improvement Program" (QA-1-018), and the 2nd level QM procedure "Assessment of Internal and Industrial Experience" (QA –2-003), and "Instruction on Assessment and Use of Internal and Industrial Experience" (the 3rd level QM document).

Currently the INPP applies human factor Management Programme which defines activities on human factor and organizational issues management in the following areas:

- Selection of staff;
- Personnel recruitment;
- Personnel training and qualification;
- Personnel motivation;
- Provision of information;
- Personnel reliability;
- Workplace organization;
- Documentation control;
- Modifications;
- Using internal and industrial experience;
- Operating organization.

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

Human factor Management Methods and Programmes at "Visagino atominė elektrinė"

Joint stock company "Visagino atominė elektrinė" is not a licensee, but this company is responsible for the implementation of the preparatory works for construction of the new NPP in Lithuania. VAE does not perform works requiring a license and is not yet required to have a management system as advanced as required from a license holder. Still, taking into account the nature of the activities of VAE and that their results will form a basis for the future NPP construction, HF related risks are managed by implementation of effective procedures, quality management system and by providing the adequate training.

The activities of the company are project based. In line with the company's procedures the experience gained during the implementation of the preparatory works projects is being taken into account throughout all the stages of the implementation of other projects of VAE.

Experience is being reported by the projects managers to the Project Management Committee which ensures the distribution of the received information to all VAE project managers thus providing the input to apply the lessons learned across VAE projects.

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

Self-assessment activities of INPP are described within Article 10 of this report (e.g. see sections 10.1.2.2. and 10.1.4.1.).

## 12.5. Arrangements for feed-back of experience in relation to human factor

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

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

Safety and Quality Assurance Service (from 2010-01-05 – Technical Surveillance and QM Division) carries out analysis of human factor impact on INPP safety. The department is responsible for carrying out special investigation of unusual events due to personnel error and (or) organizational factors. To perform the analysis INPP applies a special document "Method for Detail Analysis of Unusual Events Related to Incorrect Actions of Personnel". According the document, the department forms a team of competent specialists (including a psychologist). The methodology combines Man-Technology-Organization and ASSET methodology (AMTO). The analysis is performed by using a relevant method (or their combination) from the following list of methods:

- Task analysis;
- Changes analysis;
- Barrier analysis (for physical and administrative barriers that ensure safety);
- Event cause-effect analysis diagram;
- Fault tree analysis;
- Psychological analysis of wrong actions of personnel.

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

## 12.6. Regulatory review and control activities

Through the regulatory review and assessment of safety documentation submitted by a licence holder, as well as inspection activities, VATESI ensures that the licence holder adequately addresses human factor issues through all lifetime of nuclear facilities. The general information on regulatory activities of VATESI is presented within Article 9 (see section 9.3) of this report.

VATESI has established the permanent commission of competent specialists of the regulatory body for analysis of unusual events. This commission monthly meetings cover reviews of recent and other IAEA IRS reports as well as reports from INPP on unusual events, including those on the events due to human factor and (or) organizational factors. Commission provides recommendations

to INPP to apply lessons learned, to review relevant IRS reports and (or) to present additional information on the events at INPP. The commission also provides recommendations to INPP for application of the lessons and performs follow-up of its recommendations to INPP.

# ARTICLE 13 QUALITY ASSURANCE

*Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of the nuclear installation.*

## 13.1. Overview of the national quality management requirements for licence holders

VD-B-001-0-97 required that the NPP safety be ensured by implementing a system of technical and organizational measures, including a QM system at the NPP.

The VD-KS-02-99 specify regulatory requirements for the organizations operating nuclear facilities (NFs) in terms of their responsibilities for development, implementation and maintenance of an effective QM system. VD-KS-02-99 (in force by the end of 2010) requires to cover by QM documentation all activities related to the use of safety important systems and components, periodically asses effectiveness of the QM system. To this end an operating organization must establish an independent department to oversee application of QM requirements and coordinate its improvement. VD-KS-02-99 requires to develop and implement the following QM documents:

- QM Policy and QM Manual (the 1st level QM documents), setting the key goals of QM system and activities of an organization;
- QM procedures (the 2nd level QM documents) identifying specific measures, use of resources, responsibilities and management of activities covered by QM system;
- Working instructions (the 3rd level documents) with detailed requirements for work to be performed.

According to VD-KS-02-99 INPP QM system shall comply with IAEA Safety Series 50-C/SG-Q code and guides. VD-KS-02-99 also requires INPP to comply with all national legal requirements and regulations, including those in the area of nuclear safety. The requirements also require compliance of safety-important contractors with requirements of management system standards.

VATESI on 21 June 2010 approved Management Systems Requirements BSR-1.4.1-2010, developed taking into account the IAEA document "The Management System for Facilities and Activities" GS-R-3, published in 2006. .

BSR-1.4.1-2010 includes the requirements for implementation of the integrated management system based upon GS-R-3 process approach:

1. General requirements to implement and constantly improve the integrated management system covering all activities and employees of a licence holder;
2. To periodically assess, monitor and continuously develop safety culture;
3. To establish and constantly update management system documentation, and manage changes to the documents and identify the changed content within the documents;
4. To approve safety as the top priority and the related commitment of management of a licence holder;
5. To take into account requirements of interested parties during establishment and development of the management system, in decision-making process and in activities of a licence holder;
6. To identify clearly responsibilities and roles of all employees for safety, implementation of the system requirements and adherence to safety and other legal requirements;
7. To plan and ensure necessary human, financial and other resources necessary to ensure safety and implement goals and commitments of a licence holder;

8. To identify, implement and improve processes with strict and systematic consideration of safety and other requirements when establishing processes and their interactions so the applicable legal requirements and standards are implemented in a safe and proper way;
9. To ensure proper cooperation of management levels and different divisions for safe and effective performance;
10. To apply reliable control mechanisms over activities performed by safety important contractors and still to retain the ultimate responsibility of a licence holder for safety;
11. To carefully prepare, plan, implement, monitor, adjust organizational changes and assess them after implementation to preclude deterioration of safety;
12. To apply sufficient measurements, monitoring, control and checking activities and needed methods to ensure high level of safety, identification and following-up of needed improvements and effectiveness of the management system;
13. To apply management self-assessment through all levels of management and to use the results to improve safety, safety culture and activities;
14. To apply independent assessments and audits as an additional mechanism to proactively resolve safety issues and retro-actively identify needed corrections and opportunities to improve processes, the management system and (or) their documents;
15. To periodically perform comprehensive management reviews of the management system and to plan continuous improvement and resources to implement improvement activities.

BSR-1.4.1-2010 also requires from a licence holder to consider application of IAEA recommendations published in GS-G-3.1 and GS-G-3.5.

Project Management Procedure has been developed at VAE for ongoing projects and preparatory works. VAE was established in 2008 with the main task to develop a new NPP project in Lithuania, see section 10.1.3. within Article 10 of this report. The aim of Project Management Procedure is to ensure the success of projects and effective results achievement by effective utilizing of the organization resources. This procedure is applied for all VAE projects.

Project Management Procedure describes the order of project initiation, project initial assessment, project planning, assessment of the project implementation methods and potential risks, project implementation and control, project closing and acceptance of the results.

VAE developed and approved the integrated management system in 2009. The integrated management system also includes the Quality Policy. The main goal of VAE stated within this policy is „to collect quality and reliable information to make investment decision for safe and economical new NPP".

### 13.2. Status of implementation of integrated management system at INPP

INPP already applies the integrated management system. Until 2010-01-05 INPP Safety and Quality Assurance Service was responsible for implementation, assessment and improvement of INPP QM system. After introduction of new INPP organizational structure from 2010-01-05 the function of development, implementation and continual improvement of the QM system are assigned to the new Technical Surveillance and QM Division of INPP. This new department is independent from other functions and reports directly to Director General of INPP. The department is responsible for:

- assessment of management system effectiveness and efficiency,
- training in the area of QM, and
- auditing QM systems of the safety important contractors and their products important to safety. This is done in accordance with the Nuclear Safety Requirements for Activities of the Operating Organization Related to Procurement of Goods, Works and Services (P-2004-03) and VD-KS-02-99.

The personnel of this department are appropriately trained and qualified to conduct the tasks.

### 13.3. Main elements of INPP QM System

INPP Safety and Quality Policy is described within Chapter 10 (see section 10.1.2.). INPP deploys a three-level QM documentation system according to VD-KS-02-99.

The Quality Manual is the main 1st level document applicable to development, implementation and improvement of the QM System. It specifies the Safety and QM Policy and objectives, and establishes the basis for effective management of all activities performed at INPP. The QM Manual includes the following sections:

- INPP Mission and Objectives;
- Legislative Framework of INPP Operations;
- INPP Safety and Quality Policy;
- Safety and QM Codes and Standards;
- INPP Organization and Responsibilities;
- INPP Management Principles and Performance Evaluation;
- Planning;
- Personnel Training and Competence;
- Control of Non-conformities;
- Control of Documents and Records;
- Self-assessment of Management;
- Control of Work Processes;
- Procurement;
- Inspection and Testing;
- Audits.
- Corrective Actions and Improvements Program;
- Safety;
- Description of INPP QM System.

The 2nd level of QM system documents embraces the following 27 management procedures:

- Safety Culture;
- Self-assessment;
- Control of Documentation;
- Evaluation of Internal and Industrial Experience;
- External and Internal Communications;
- Environment Protection;
- Radiation Safety;
- Fire Safety;
- Industrial Safety;
- Emergency Preparedness;
- Operations;
- Software;
- Maintenance;
- Ageing Management;
- Inspection and Testing;
- Core and Fuel Management;
- Radioactive Waste Handling and House-keeping;
- Personnel;
- Chemistry Control;

- Plant Modifications;
- Procurement;
- In-house Fabrication of Spare Parts and Items;
- Storage of Materials and Equipment;
- Physical protection;
- Decommissioning;
- Management of Dismantling;
- Management of Construction.

The underlined QM procedures within the list presented above reflect the extent to which safety important elements identified GS-R-3 are already covered by INPP QM documentation.

The 3rd level documents are detailed working procedures that specify the requirements of management procedures and explain how and by whom work shall be done.

### 13.4. INPP programme of internal and external audits

Technical Surveillance and QM Division plans, conducts and reports on audits of the INPP QM system. Audits are planned so that each activity area are audited at least once per three years and each INPP department is audited at least biannually. Technical Surveillance and QM Division also conducts external audits of organizations supplying goods, works and services to the INPP.

There are INPP work procedures specifying requirements for planning, preparation, conduct and reporting on internal and external audits. Audit reports are distributed to respective INPP top managers, managers of audited departments and to VATESI.

INPP specialists, who are in the list of qualified lead auditor/auditors, participate in internal and external audits. There is a work procedure specifying requirements for lead auditor/auditor competences. The list of qualified lead auditor/auditors is updated annually.

INPP Director General exercises continuous control over QM related activities. QM issues are discussed at regular meetings chaired by General Director. Annual reports on effectiveness and possibilities to further improvement of the INPP QM system are submitted to VATESI.

Following VD-KS-02-99 requirements licensees are obliged to present for VATESI review QM 1st and 2nd level documents.

### 13.5. Regulatory review and control activities

VATESI periodically reviews such QM documents of INPP. VATESI also performs the review of INPP audit reports, including those performed at contracted organizations.

During other regulatory oversight activities, e.g. inspections, VATESI specialists analyze and check QM documents related to a particular activity or safety issue. When needed, inspectors of VATESI require to improve activities or to make necessary corrections in INPP QM documents and (or) practice.

INPP is in preparation for upgrading INPP integrated QM system to a process-based management system using IAEA GS-R-3 approach. VATESI performs oversight activities to ensure that the changeover is performed in a safe manner and does not impair safety of INPP. One of example of this work could be that in May 2010 INPP has presented for VATESI review a list of foreseen processes and sub-processes of the future the INPP management system and VATESI provided suggestions to INPP after the review.

# ARTICLE 14 ASSESSMENT AND VERIFICATION OF SAFETY

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

*i. Comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;*

*ii. Verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.*

## 14.1. Article 14(1) – Assessment of safety

### *14.1.1. Overview of the Contracting Party's arrangements and regulatory requirements to perform comprehensive and systematic safety assessments*

Lithuania has established basic criteria of safety, and also the main principles and character of the technical and organizational measures aimed at ensuring safety. The detailed application of these principles and measures is laid down in norms and technical requirements.

It is stated in the Law on Nuclear Energy (Articles 25 and 26) that it is prohibited to construct, reconstruct, operate and decommission nuclear facilities without a license issued by VATESI. Article 27 of the Law says that VATESI may establish additional requirements for the licensed activity. One of such principal requirements of VATESI to the applicants is a submission of safety analysis reports for getting a license.

Article 31 of the Law says that designs for the construction or reconstruction, upgrading, expansion, dismantling and decommissioning of nuclear facilities are subject to a comprehensive state expert evaluation. The expert evaluation organized by the Ministry of the Environment upon receiving the design.

These statements are further specified and developed in the "Regulations for Licensing of Nuclear Power Related Activities", VD-L-001-0-97, VD-B-001-0-97, VD-T-001-0-97 and in the other norms and standards.

The VD-T-001-0-97 in their turn say that the "Technical Justification of Nuclear Power Plant Safety" should contain the chapter "The Reactor Plant Technical Safety Justification". "The Reactor Plant Technical Safety Justification" shall be prepared by competent organizations and approved by Operating Organization. The shape and content of the reactor plant Safety Justification Report should conform with the current normative technical document. The indicated regulations also set a number of specific requirements to the content of safety justification (safety analysis) reports.

### *14.1.2. Safety assessments within the licensing process and safety analysis reports for different stages in the lifetime of nuclear installations (e.g. siting, design, construction, operation)*

Safety Assessment is part of licensing procedure before issue of licence for construction, operation or decommissioning of a nuclear facility. In the case of safety related modification when the licence is not required to issue, technical justifications shall be performed based on highest scientific and technical knowledge. In both cases, Safety Assessment and Technical justifications have to have an

independent expertise review, be approved by the Operating Organization and presented to the State Control and Supervision Institutions for review.

Before a construction permit for plant or systems (components) of an NP is issued, the Operating Organization shall create the infrastructure (subdivisions) required for safe operation of the nuclear plant, endowing those subdivisions with the necessary rights as well as financial, material and human resources, imposing on them full responsibility for their activities, and monitoring the correct implementation thereof.

The State Control and Supervision Institution require additional documents or conduct inspections, if it finds out that after review of the submitted documents the information is not sufficient to assess the documents following the valid criteria. It also assess the safety culture in the applicant organization and assess its technical and organizational measures, verify the effectiveness of the quality assurance system of the applicant and check if the requirements of the quality assurance system at the nuclear facility for purchased services or goods are kept.

The licence is liable to develop the annual report for the nuclear facility in accordance with the requirements of the nuclear safety regulations and submit it to the State Control and Supervision Institution. Periodic safety assessment is required to perform under licence condition in period of 10 years.

Before start of operation shall be submitted assessment of tests results and confirmation of their acceptability. Information concerning radiation protection at the nuclear facility has to be presented. Radiation sources shall be described in detail, analysis and assessment of possible effects shall be performed in accordance with the requirements of radioactive protection regulations, organizational and technical means and methods of radiation protection, and measurement methods and means shall be indicated. Shall be presented the description of the means, equipment, technologies, work processes, which will be used during the dismantling of equipment, assessment of the radiological status, ensuring the radiation protection of personnel and inhabitants during decommissioning activities.

The following permissions are issued by State Control and Supervision Institution at the beginning of operation of a nuclear facility:

- to bring nuclear fuel onto the site of a nuclear facility;
- to load the nuclear fuel into the reactor for the first time;
- to perform the physical start-up (experiments) of the reactor;
- to perform the industrial start-up of the reactor;
- to perform the functional experiments of systems;
- to use the natural resources;
- to perform emissions of radionuclides into the environment.

In the case of non-routine operation, test or experiment the licensee is required to establish the programme for such operation and agree it with State Control and Supervision Institution. The licensee has established quality assurance procedure QA-2-016 “Modifications of NPP” to ensure proper design, review, control and implementation of modifications. The State Control and Supervision Institution review and assess modifications, which are safety related.

The following documents shall be submitted for review, assessment and decision about License, such as:

*Administrative*

- ”Application letter” in which the Operator presents the request to be licensed
- Certificate of state registration of entity
- Document certifying that the Operator is in charge of NPP property Statute of the Operating organisation (Operator)
- Plant organisation for operation and safety management arrangements
- QA manual and procedures
- Plant personnel qualification and training program

*Technical*

- Technical Safety Justification of Nuclear Plant and of the Reactor Unit with updating Justification of the plant safety status
- SAR and PSA Reports
- Status of implementation of the remedial measures (including commissioning program and test results) and plan for the future Compliance demonstration with the yearly permits conditions
- Operator position on international recommendations and status of their implementation
- Preliminary decommissioning program
- Commissioning program and test results
- Description and verification of current plant state
- History of safety performance
- Operating experience evaluation (analysis of safety significant events occurred in the plant and lessons learned from experience of similar plants and world-wide plants)
- Assessment of plant systems design and capability
- Improvements and updating of safety analysis (considering assumptions and data consistent with the actual status of the plant and with an enlarged spectrum of reference events)
- Modifications (design, implementation and commissioning) and repairs
- Backbiting from technical developments (including research findings)
- Management of equipment ageing
- Equipment qualification
- Human factors
- Radiation protection
- Emergency planning and preparedness
- Fire protection
- Waste and spent fuel management
- List of modifications since unit commissioning etc

*Operation*

- Technical Specifications
- List of operating procedures
- Emergency and accidents management's procedures
- Emergency planning
- Long term in-service inspection program
- Provisions of Physical security.

### *14.1.3. Periodic safety assessments of nuclear installations using deterministic and probabilistic methods of analysis, as appropriate*

Periodic safety assessment of nuclear installations using deterministic and probabilistic methods of analysis is required to perform under licence condition in period of 10 years. License for operation of Unit 1 was granted to INPP in July 1999 and Unit 1 was shutdown on 31 December 2004. License for operation of Unit 2 was granted to INPP in September 2004 and Unit 2 was shutdown on 31 December 2009. Due to these facts no periodic safety assessments of Unit 1 and Unit 2 using deterministic and probabilistic methods of analysis was conducted.

### *14.1.4. Overview of safety assessments performed and the main results of those assessments for existing nuclear installations*

As to the deterministic safety assessment of INPP, it was performed initially by the designers of reactor plant and INPP as a whole and was documented in so called "Technical Justification of Safety". The first in-depth safety analysis of INPP using Western methodology was completed in 1997. Main results of this analysis were presented in the first Lithuanian report.

In-depth safety analysis for Unit 2 was finished in 2004. The Safety Analysis Report (SAR-2) for INPP Unit 2 was one of the key documents for obtaining the license. The principal objectives of the report were to identify the current safety level of the Unit 2, to assess the factors that may affect its operating safety, and to recommend compensatory measures that would improve safety. SAR-2 and its review conclusions confirmed that the technical condition and operation of Unit 2 meet the key nuclear and radiation safety requirements set forth in standard documents of the Republic of Lithuania and international regulations. No major deficiencies were revealed that would necessitate shutting the Unit 2 down immediately or reducing its power.

Based on the results of SAR-2 and its review a new SIP-3 was initiated. More details on safety improvement programs are presented in section 6 of this report.

As to the PSA, both PSA Level 1 and 2 studies were completed for INPP. In 2006, the INPP prepared two reports on implementation of the IAEA IPSART mission recommendations aimed at improving the quality of PSA, i.e. quality assurance in implementing PSA procedure and the model of introduction of a diverse shutdown system at the INPP.

In 2008, INPP prepared the report on the Probabilistic Safety Assessment at INPP 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.

In 2009, INPP prepared the Report on Supplement of PSA Model with Analysis of External Events and Analysis of Events in the Shutdown Reactor. The INPP PSA model was upgraded, updated data and made details analysis of external events (aircraft crash, extreme winds and precipitation, external fire, external flooding). The initiating events in the shutdown reactor were analyzed in this report.

VATESI specialists analyzed the aforementioned PSA reports and found no non-compliances with VATESI requirements or modern practice.

### *14.1.5. Regulatory review and control activities*

In 2007, two inspections were conducted with a view to checking implementation by the INPP of the analytical measures (deterministic safety analyses) in accordance with SIP-3/2007 program, the application of emergency operating procedures, the training of operational personnel and modernization of the full-scope simulator. Certain drawbacks were recorded in the inspection statements, and the INPP was instructed to rectify non-compliances.

In 2008, INPP completed the implementation of five deterministic safety analysis measures under the SIP-3/2008 program 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 INPP Unit 2, in 2001-2004. The reports submitted by INPP revealed that:

1. 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,
2. with regard to the release of radioactive materials during postulated design basis accidents, doses to the public are below the allowed limits.

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.

## 14.2. Article 14(2) – Verification of safety

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

VATESI performs the supervision of preventive maintenance, in-service inspection of main components, ageing management processes at INPP in accordance with BSR-2.1.2-2010, VD-E-01-98 and VD-E-05-99.

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

In compliance with the Quality Management Programme and Documentation control system acting at INPP all works relating to preventive maintenance, in-service inspection of main components and ageing management shall be performed only on the basis and in accordance with the approved documents.

Operational staff of INPP performs preventive maintenance during walk down with control condition of equipment and environment. Also during operation INPP engineering support staff carries out the diagnostic activities of system and components, vibration and failures analysis of equipment, which are important to safety. The results of preventive maintenance are the basis to prepare the plans for repair or replace the components, to carry out modifications.

In-service inspection is carried out in according to INPP regulations for systems, equipment and pipework important for safety. These regulations have been developed in accordance with the requirements for in-service inspection [PNAE G-7-008-89] and experience of in-service inspection in other nuclear power plants, and IAEA Guidelines [NS-G-2.6, IAEA-TECDOC-1400]. They determine the in-service inspection requirements for all safety-related systems, except for the metal components of the active zone, which are inspected in accordance with the requirements of other regulations.

Large attention is given to the condition of the plant and pipework, and both destructive and non-destructive checks. This testing, carried out according to regulations for RBMK-1500 reactors. The manager of the INPP Safety and Quality Assurance Service is responsible for objectives, activities, methods, quantity, frequency, organizational and administrative arrangements of these activities.

Non-destructive testing is carried out by the INPP Department of Metals and Technical Inspection and, if necessary, by certified organisations. The regulations list the plant that must be inspected, and the areas and volumes for defined non-destructive testing. They also present the programme for checking the state of the corrosion samples, and describe the main inspection methods used for metals, such as non-destructive surface and volumetric methods, and the destructive methods and inspection using samples. All inspections are carried out according to existing standards or instructions, agreed by VATESI.

The regulations define the methods for assessing the results, consistent with the IAEA Guidelines, and the recording requirements. Personnel carrying out inspections are certified, in accordance with the regulations [PNAE G-7-010-89], to carry out inspections according to specified methods. Staff is performing non-destructive testing which is certified according to the European Standard EN473. Personnel supervising the inspections are also certified.

*14.2.3. Elements of ageing management programme(s)*

In accordance with VD-E-05-99, INPP have prepared the ageing management programme for safety related systems, components and structures. The main task of this programme is to select components, which are important from safety point of view, to assess the condition of these components, tendencies of degradation and, if it is necessary, to take corrective measures – repair or replace them or make modifications. It is continuous work and INPP constantly provide analyses of the faults, the maintenance and in-service inspections programs analyses to ensure the reliability of systems and components important to safety of nuclear facilities.

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

Prior to the document entering into force (including testing programs) the applicability, usability of the documents shall be confirmed (review, endorsement and approval). Confirmation of applicability shall be based on the critical analysis of adequacy of the measures providing safe and correct operation and shall be performed in compliance with the established procedures. The most important documents shall be agreed with the VATESI.

*14.2.5. Regulatory review and control activities.*

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.

During inspections, amongst the others the following safety areas were verified:

- Training of Ignalina NPP personnel;
- 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);
- Management of beyond-design-basis accidents;
- Management of nuclear fuel;
- Quality management;
- Transportation of nuclear fuel;
- Compliance with license conditions of Unit 2;
- Implementation of safety improvement measures;
- Safety culture;
- Equipment qualification and ageing management of safety-related systems;
- Emergency preparedness;
- Assessment of operational experience;
- Expansions (modification) of spent nuclear fuel storage facility at Ignalina NPP.

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

# ARTICLE 15 RADIATION PROTECTION

*Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.*

## 15.1. Overview of the arrangements and regulatory requirements concerning radiation protection at nuclear installations, including applicable laws

The protection of general public, workers of nuclear facilities and environment from the possible radiation impact is regulated by the following laws, norms and standards:

- Law on Radiation Protection (No. VIII-1019, 1999, last amended 2004)
- Law on Nuclear Energy (No. I-1613, 1996, last amended 2006)
- Law on the Management of Radioactive Waste (No. VIII-1190, 1999, last amended 2005)
- Law on Environmental Protection (No. I-2223, 1992, last amended 2005)
- Law on Environmental Monitoring (No. VIII-529, last amended 2006)
- Governmental Resolution No. 461 On the Regulation on Providing of Data Concerning Activities Related with the Disposal of Radioactive Waste to the Commission of the European Communities (2007)
- Order of the Minister of Health and the Head of the State Nuclear Power Safety Inspectorate No. V-1271/22.3-139 On the Rules of Radioactive Substances, Radioactive Waste and Spent Nuclear Fuel Import, Export, Transportation in Transit and inside the Republic of Lithuania (2008).
- Order of the Minister of Health No. V-687 On Approval of the Rules of Safety of the Sources of Ionizing Radiation (2005)
- Order of the Head of State Nuclear Power Safety Inspectorate No. 22.3-39 On Requirements on Nuclear Power Facilities Decommissioning (2009)
- Order of the Director of Radiation Protection Centre No. 63 On Rules for Monitoring of Exposure of Personnel and Workplaces (2007)
- Lithuanian Hygiene Standard HN 73:2001 “Basic Standards of Radiation Protection” (2001, amended in 2003)
- Lithuanian Hygiene Standard HN 87:2002 “Radiation Protection at Nuclear Facilities” (2002, amended in 2008)
- Lithuanian Hygiene Standard HN 112:2001 “Requirements for Monitoring of Internal Exposure” (2008)
- Lithuanian Hygiene Standard HN 83:2004 "Radiation Protection of Outside Workers" (2004)
- Lithuanian Hygiene Standard HN 52:2005 "Radiation Protection in Industrial Radiography" (2005)
- Lithuanian Hygiene Standard HN 88:2005 “Radiation Safety of the Open Ionizing Radiation Sources of Not Medical Purpose” (2005)
- Normative Document LAND 42 – 2007 “Description of the Regulation on the Limitation of Radioactive Discharges from Nuclear Facilities, Permitting of Discharges and Radiological Monitoring” (2007, last amended 2010)
- Normative Document LAND 34 – 2008 “Description of Procedure for Determination and Application of Free Release Levels of Radionuclides, Conditions for Reuse of Materials and Waste Removal” (2008)

- Normative Document LAND 36 – 2000 “Measurement of Radionuclide Content in Environmental Components – Gamma Spectroscopic Analyze of Samples by Spectrometer with Semiconductor Detector” (2000, amended in 2005)
- Normative Document LAND 37 – 2000 “Measurement of Radionuclide Content in Environmental Components – Concentration of Caesium Dissolved in Water Employing Absorbing Filters and Estimation of Water Activity Concentration” (2000, amended in 2005)
- Normative Document LAND 64 – 2005 “Determination of Strontium-90 in Environmental Samples. Radiochemical Method” (2005)
- Order of the Director of the Radiation Protection Centre No. 46 On Approval of Danger Categories for Radiation Sources and on Approval of Rules for their Assignment (2004).

The basic standards and safety requirements for occupational and public exposure (including dose limits) are established in HN 73:2001, which is in line with the requirements of Safety Series No. 115, International Basic Safety Standards for Protection against Ionizing Radiation and the Council Directive 96/29/EURATOM of 13 May 1996 Basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation.

The basic regulation, which sets out requirements for radiation protection of workers working at the nuclear facilities and for radiation protection of members of the public during the nuclear facilities operation and decommissioning of the nuclear facilities, is the Lithuanian Hygiene Standard HN 87:2002. The requirements of the Hygiene Standards are in compliance with International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, BSS No. 115, Vienna, IAEA, 1996, and Council Directive 96/29/EURATOM of 13 May 1996 laying down Basic Safety Standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation, No L 159, vol. 39.

Below are listed the most important requirements for occupational radiation protection established by HN 87:2002:

- Practices at the nuclear facility shall be authorized and conducted in accordance with the basic radiation protection principles: justification of the operation, optimization of exposure and limitation of doses. The license holder shall introduce and maintain such a protection in nuclear facility which encourages seeking for knowledge and obtaining critical viewpoint in the field of protection taking into account a "human factor".
- Workers shall be encouraged to recognize that safety of nuclear facility is the prioritised objective and internal demand that acquires the responsibility and self-control in performance of all safety related activities. For this reason the qualification of workers and qualification in the field of radiation protection shall be improved according to approved programmes.
- Keeping the high safety culture and proper quality assurance and radiation protection programmes implemented at the nuclear facility shall ensure that the doses of workers are as low as reasonably achievable and below the established dose limits.

In March 14, 2008 the amendments of HN 87:2002 were approved. The application of dose constraint for population (0.2 mSv per year) due to the operation and decommissioning of the nuclear facilities was clarified. The amendments set requirement that if there are a few nuclear facilities in one site, then all nuclear facilities in the site must be considered. The total dose for the members of the public due to the operation or decommissioning of all nuclear facilities in the site must be not higher than 0.2 mSv per year. The dose limit for population (10 mSv/event) was set for design basis accidents at nuclear facilities.

The radiation protection requirements of outside workers are set in the HN 83:2004. The principal requirement is that the radiation protection of outside workers shall be at the same scale as of permanent workers of the NPP. The employers, whose workers are performing their activities within the controlled area of the nuclear power plant, shall establish the co-operation agreements

with license holders, where the order and procedure of registration and estimation of workers exposure, measures of exposure reduction and other significant means from the radiation protection point of view shall be described. The requirements of HN 83:2004 are in compliance with Council Directive of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas (90/641/Euratom).

The limits for discharges from INPP, the order of permitting of discharges, requirements for radiological monitoring are set in the LAND 42 – 2007.

### 15.2. Regulatory expectations for the licence holder's processes to optimize radiation doses and to implement the ALARA principle

Relying on the European Directive EURATOM 96/29, as well as on the international recommendations, the Lithuanian regulation (the Law on Radiation Protection, Lithuanian Hygiene Standards HN 73:2001 and HN 87:2002) clearly refer to the ALARA principle: *any kind of exposure of individuals and society must be as low as reasonably achievable, economic and social factors being taken into account*. There is a regulatory requirement that the optimisation of radiation protection is to be applied, together with the principle of justification of practices and the principle of limitation of individual exposures.

According to the requirements of HN 87:2002, one of the items of the radiation protection programme must be application of optimisation principle (ALARA) and measures on exposure reduction. For this purpose the optimization programme shall be carried out at nuclear facility.

The following principles are considered to be the basis of the ALARA programme:

- Any exposure may be authorized if the assumed advantage is higher than the exposure risk;
- The exposure level shall be as low as reasonably achievable considering all social and economic conditions;
- Certain regulations and instructions shall be to restrict the exposure level in order to make the exposure risk as low as possible.

In order to optimize radiation protection of nuclear facilities workers, when they are performing routine, planned, maintenance, revision and other works at nuclear facility, the measures and procedures for exposure reduction of workers and reduction of amount of generated radioactive materials (reduction of exposure level in workplaces, decrease of surface and airborne radioactive contamination, determination of optimum number of workers, taking into account type of work, use of protective shielding, decontamination, iodine prophylaxis etc.) shall be included in the ALARA programme.

An ALARA programme dedicated to the dismantling of a nuclear power plant shall comprise the traditional phases of prediction, performance follow-up and feedback analysis and also it must allow defining at least:

- Objectives and dose targets for the short, medium and long terms. The rationality behind the choice of such objectives and targets must be clearly stated;
- A radiation dose plan and a dose reduction plan (sources, dose rates and exposure times to be considered), for the different stages of the decommissioning, demonstrating that the doses have been optimised;
- Ways to monitor, follow up and analyse the experience;
- Plans and strategies for extended education and training of the work force as well as organisational aspects of the ALARA programme requirements.

## 15.3. Implementation of radiation protection program by the licensee holder

According to the requirements of HN 87:2002, the radiation protection program is established at the INPP. Following items are included in the programme:

- classification of working areas and access control;
- local rules, measures of supervision of safety at work and order of organisation of work;
- procedures of monitoring of workplaces and individual monitoring of workers;
- individual protective equipment and rules for their application;
- main premises, control systems for assurance of radiation protection;
- application of optimisation principle (ALARA) and measures on exposure reduction;
- programs of health surveillance;
- mandatory training of workers and their instructions.

### *15.3.1. Observation of dose limits, main results for doses to exposed workers at the INPP*

According to the HN 73:2001 the dose limit for the exposure of a worker is 50 mSv a year. In addition it is stated, that the radiation exposure of a person engaged in radiation work is limited so that the added dose does not exceed 100 mSv for the period of 5 years.

Limits of exposure of critical organs determined by HN 73:2001 is presented in table below.

| **Equivalent dose in a year** | **Dose limit** | |
|---|---|---|
| for the lens of the eye | 150 mSv | 15 mSv |
| for the skin | 500 mSv | 50 mSv |
| for the extremities (hands and feet) | 500 mSv in a year | - |

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

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

- Thermo luminescence dosimetry system RADOS;
- Direct-reading electronic dosimetry system RAD-51, RAD-52, RAD-62;
- Gamma spectrometric system WBC ACCUSCAN 2260-G2KG (Whole Body Counter);
- Local net;
- Software support for collecting, storing, processing and displaying the information of individual personnel radiation monitoring from individual dosimetry control system RADOS and WBC ACCUSCAN 2260-G2KG.

Individual monitoring of external exposure of INPP personnel and outside workers is set for a period of one month. The extraordinary control of the personnel exposure doses is carried out at reception of a total individual dose 2,0 mSv according to the results of the operative control. The results of individual monitoring of INPP personnel and outside workers for 2007 – 2009 are given in the tables.

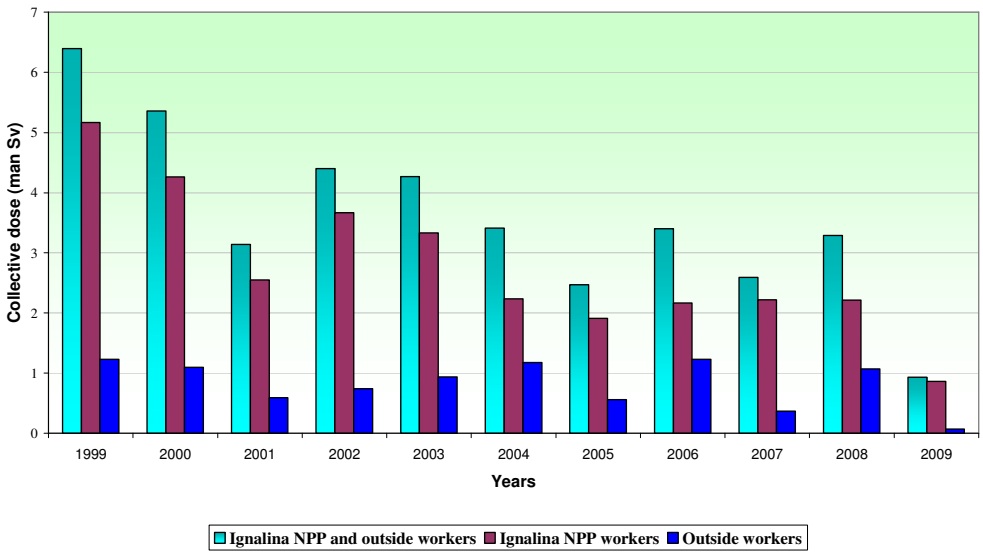
Exposure and collective dose dynamics of the INPP workers 2007–2009

| Year | Collective dose, ManSv | Highest individual exposure dose, mSv | Average dose, mSv |
|---|---|---|---|
| 2007 | 2.29 | 17.97 | 0.92 |
| 2008 | 2.22 | 18.09 | 0.96 |
| 2009 | 0.86 | 11.59 | 0.40 |

Exposure and collective dose dynamics of the outside workers 2007–2009

| Year | Collective dose, ManSv | Highest individual exposure dose, mSv | Average dose, mSv |
|---|---|---|---|
| 2007 | 0.37 | 9.87 | 0.30 |
| 2008 | 1.07 | 19.98 | 0.83 |
| 2009 | 0.07 | 2.71 | 0.06 |

In the figure below the collective doses of INPP and outside workers (per one unit) from 1999 to 2009 are presented in graphic form:




The annual individual exposure doses at the INPP did not exceed established dose limits. Higher collective dose and individual exposure dose in 2008 were determined by the extensive outage works.

Individual monitoring of internal exposure of INPP personnel and outside workers is conducted by gamma spectrometric measuring system WBC ACCUSCAN with the aim of obtaining the information about internal exposure doses, timely identification of cases of increased radionuclide content level in organism and prevention of fixed annual exposure dose exceeding. Personnel internal exposure control is realized in accordance with the "Time Schedule for Radiation Safety

Monitoring at INPP". The values of an effective dose of the personnel internal exposure from 2007 till 2009 are given in the table.

Monitoring results for nuclide content in personnel organisms 2007 – 2009

| Year | The internal exposure effective dose of INPP personnel and outside workers, man | | | | | | Number of people measured with WBC, man |
|---|---|---|---|---|---|---|---|
| | Less than minimal registration level of WBC (RLWBC= 0.001 mSv) | RLWBC -0.1 mSv | 0.1-0.2 mSv | 0.2-0.3 mSv | 0.3-0.4 mSv | 0.4-0.5 mSv | |
| 2007 | 2115 | 107 | 24 | 2 | 1 | 1 | 2250 |
| 2008 | 1901 | 109 | 12 | – | – | – | 2022 |
| 2009 | 1853 | 165 | 27 | 5 | – | – | 2050 |

The highest internal exposure value of INPP worker was registered in 2007, which amounted to 0.47 mSv. The highest measured activity of Co-60 radionuclide equals 922 Bq.

According to the "Schedule of INPP Radiation Safety Support Monitoring", carrying out of the following kinds of the personnel internal exposure monitoring is foreseen: confirmative, target, regular monitoring prior to the beginning of works, monitoring after the completion of works.

The confirmative monitoring of personnel internal exposure is carried out once a year for all personnel in order to ensure the sufficiency of radiation safety of personnel.

The target monitoring of internal exposure is carried out during and after plant preventive maintenance for the INPP personnel and outside workers depending on radiation conditions at working places and results of external exposure individual dose measurement when performing volume-dose jobs.

Regular monitoring of the personnel internal exposure is carried out according to the results of confirmative monitoring for the workers, whose expected effective annual dose of internal exposure is higher than 0,1 mSv/year.

The special monitoring is performed for workers whose individual external exposure dose is higher that 20 mSv. Monitoring prior to the beginning of works is carried out with the purpose of internal irradiation individual background levels establishment for the personnel who have got a job in the controlled area. Monitoring after the completion of works is carried out with the purpose of estimation of internal exposure dose for the workers upon completion of work in the INPP controlled area at dismissal or transfer of the worker from the controlled area.

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

Requirements of Normative Document LAND 42 – 2007 limiting discharge of radionuclides into environment are applied in order to protect humans, other living organisms, natural resources (the land, forest, water) and other environmental entities from harmful influence of ionizing radiation and contamination by radionuclides from nuclear installations. The requirements of this document are obligatory to nuclear facilities when designing, constructing and operating them as well as to nuclear facilities during decommissioning. This normative document regulates operation of nuclear facilities under normal conditions, including short-time anticipated operational transient, and it is not applicable for accidents.

The total annual limit values of radionuclide releases to the water and releases to the air should not exceed 0.2 mSv.

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

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

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

Authorized discharges limits from INPP to atmosphere are provided in the table below:

| **Airborne discharges** | **Bq/year** |
|---|---|
| Noble radioactive gases | $1.39 \cdot 10^{16}$ |
| Particulate Pollutant | $9.4 \cdot 10^{11}$ |
| Iodine-131 | $9.87 \cdot 10^{11}$ |

Automated Radiation Safety Monitoring System SAMRB ensures the control of radioactive releases into the environment by means of the Radiometric Facility РКС-07П. Measurements are made by means of determination of the activity of each controlled environment component in the samples constantly taken into the facility detection units.

Sampling of air releases for analysis is ensured by means of the sampling device fit into the air medium pipes. The sampling device faces the flow. Samples are taken from the central area of the flow. Gas and aerosol media are delivered to the place of sampling by the sampling routes made of stainless steel.

Laboratory control is based on the stationary and portable sampling equipment, as well as on the stationary radiometric and spectrometric equipment.

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

Discharges of noble radioactive gases, radioactive aerosols and iodine-131 from INPP during 2007-2009

| **Year** | **Noble radioactive gases, $10^{13}$ Bq** | | **Radioactive aerosols, $10^{8}$ Bq** | | **Iodine-131, $10^{9}$ Bq** | |
|---|---|---|---|---|---|---|
| | Sum | % from DL* | Sum | % from DL | Sum | % from DL |
| 2007 | 7.76 | 0.56 | 7.82 | 0.08 | 8.49 | 0.86 |
| 2008 | 10.3 | 0.74 | 21.4 | 0.23 | 11.4 | 1.16 |
| 2009 | 3.90 | 0.28 | 5.38 | 0.057 | 0.938 | 0.095 |

*DL – Discharge limit

Activity of noble gases discharges was defined by the following isotopes (in percentage of the total aerosols discharge in 2009):

Xenon-133 – 69.62 %, Argon-41 – 21.33 %, Krypton-85m – 2.25 %, Krypton-87 – 0.25 %, Krypton-88 – 0.49 %, Xenon-135 – 5.93 %, Xenon-135m – 0.13 %.

Tritium discharges have made 4,281 $10^{9}$ Bq/year, radio carbon – 3,085 $10^{10}$ Bq/year.

The key nuclides defining activity of aerosols discharges were (in percentage of the total aerosols discharge in 2009):

Iodine-133 – 44.26 %, Sodium-24 – 13.21 %, Cobalt-60 – 7.42 %, Strontium-90 – 11.83 %, Strontium-89 – 9.43 %, Manganese -54 – 3.71 %, Cesium-137 – 3.21 %, Iodine-135 – 1.24 %, Molybdenum-99 – 0.25 %, Iodine-131 (aerosol) – 0.41 %, Chromium-51 – 2.83 %, Iron-59 – 0.45 %, Cesium-134–0.26 %, Niobium-95 – 1.25 %, Zirconium-95 – 0.19 %, Cobalt -58 – 0.06 %, Cesium-136 – 0.01 %.

No exceeding of limits in discharges was fixed.

For decrease of gas-aerosol discharges into the atmosphere, replacement of filters is regularly carried out in filtering cells or their sealing at deterioration of their filtering features according to the results of measurements by Health and Safety Department. In 2008 for reduction of discharges of Iodine-131 into the atmosphere from cementation facility (Building 150) technological blowing-offs after evaporator facilities EF-1 and EF-2 were sent to filtering station of ventilation system B-1. For this purpose the filtering station of ventilation system B-1 was equipped by an additional step of clearing from radioactive iodine. Replacement of filters in filtering cells or their sealing at deterioration of their filtering features according to the results of measurements by Health and Safety Department is carried out regularly

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

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

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

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

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

Discharges into environmental water from INPP are provided in the table below:

| Year | Discharges, MBq |
|---|---|
| 2007 | 680 |
| 2008 | 340 |
| 2009 | 17.5 |

The key nuclides defining the activity of discharge to water were: Cs-137 (~39%) and Co-60 (~60%).

The permissible maximal release to water is $8.811 \cdot 10^{12}$ Bq/year. No exceeding of limits in discharges was fixed.

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

Using INPP monitoring data regarding airborne discharges and discharges into the lake Druksiai doses for critical group of public during normal operation of INPP were evaluated.

Annual dose for critical group of public during normal operation of INPP did not exceed dose constraint value (0,2 mSv):

- in 2007 – $1.37 \cdot 10^{-3}$ mSv and $1.94 \cdot 10^{-3}$ mSv due to the airborne and liquid discharges respectively, in total $2{,}09 \cdot 10^{-3}$ mSv per year;
- in 2008 – $1.43 \cdot 10^{-3}$ mSv and $6.56 \cdot 10^{-4}$ mSv due to the airborne and liquid discharges respectively, in total $1{,}54 \cdot 10^{-4}$ mSv per year;
- in 2009 – $0.4 \cdot 10^{-4}$ mSv and $1.14 \cdot 10^{-4}$ mSv due to the airborne and liquid discharges respectively, in total $1.54 \cdot 10^{-4}$ mSv per year.

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

Implementation of the ALARA Programme at the INPP was started in 1996. The aim of the ALARA Programme at INPP for 2007–2009 is to make the personnel exposure dose as low as reasonable achievable and to provide maintaining of individual exposure limit within 20 mSv/year for 5 years, as well as to reduce the personnel collective annual dose.

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

- Proper organization of the activities.
- Personnel learning and training.
- Improvement of working conditions.
- Perfection of engineering process.
- Quality maintenance.
- Safety culture.
- Human factor impact.

ALARA principles are applied and adapted at all stages of activity related to radiation exposure. Application of the new principles of the works organization, performance of large-scale works on equipment isolation and dismantling, reduction of power Unit 1, being shut down since 2005, personnel dose loads allowed to lower a collective dose of INPP personnel and outside workers from 10.71 manSv (2000) to 0.93 manSv (2009). Under normal operation the collective dose is 12-35%, and during maintenance it is 65-88% of annual personnel exposure collective dose.

Since 1997 INPP has been implementing the Quality Assurance Program. The procedures of the first and second levels have been prepared and their main purpose was the implementation of the ALARA Program at the INPP.

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

- Director General is responsible for radiation protection of INPP, distribution of authority and allocation of responsibility, implementation ALARA foundations at INPP as well as financing of radiation protection activity.
- Technical Director is responsible for organisation of activities on INPP radiation protection according to ALARA rules, standards and principles.
- Heads of subdivisions are responsible for organisation of activities on radiation protection in their subdivisions in accordance with rules and standards, for training and professional skills of their stuff, for making such working conditions when personnel exposure doses will be maintained as low as reasonable achievable.
- Head of the Radiation Protection Department is responsible for INPP radiation protection program management.
- Head of the Safety and Quality Assurance Service is responsible for organisation and conducting of audits on radiation protection activity as well as coordination and corrective actions in this document.
- Every worker is responsible for fulfilment of radiation protection requirements.

The staff that works in radiation exposure conditions is trained according to the programs on radiation protection preparation in INPP Training Centre.

Radiation protection skill content is included in a worker's Job Description as well as a program for a post preparation. The course duration is 30 hours for workers dealing with the ionising exposure sources and 60 hours for those responsible for radiation protection.

The personnel engaged in works related to high exposure doses shall undergo additional training course before they can start working. The training is arranged on a regular basis, and special training simulators are applied.

Outside workers are also trained and examined on radiation protection according to the same programs in the INPP Training Centre before they are left for work in a protected area.

Radiation protection and ALARA foundation training is realized in accordance with a Control Procedure QA-2-014.

According to the Lithuanian Hygiene Standard HN 87:2002 the INPP territory and its rooms are divided into the protected area and the monitored area. The premises in the INPP protected area are subdivided into three categories according to their radiation condition.

Classification of INPP protected areas

| Room category | Colour of the area | Frequency of service | Dose rate mSv/h | Surface alpha contamination Bq $\cdot cm^{-2}$ | Surface beta contamination Bq $\cdot cm^{-2}$ | Total aerosol activity Bq $\cdot cm^{-3}$ |
|---|---|---|---|---|---|---|
| I | Red | No service | >56 | >20 | >266 | >1110 |
| II | Yellow | Periodic | 12-56 | 4-20 | 40-266 | 185-1110 |
| III | Green | Permanent | <12 | <4 | <40 | <185 |

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

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

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

a sign with green labels. The requirements for the colour of the doors are not imposed.

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

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

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

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

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

The results of assessment of occupational doses of INPP workers show, that the main part of occupational doses in 2007-2008 (up to 80%) is governed by the works carried out during outages. In 2009 the part of occupational doses received during the outage was less than 30 % due to reduced amount of works during this period which was conditioned by the planned shutdown of the Unit 2. Therefore, during inspections serious consideration was paid to assessment of radiation protection measures and implementation of radiation protection optimization (ALARA) principle during the outages.

### *15.3.4. Environmental monitoring and main results*

To evaluate INPP impact to environment and population permanent radiation monitoring is carried out on the INPP site and within a radius of 30 km. Radionuclide concentration measurements in foodstuffs, drinking water and soil have been conducting since the moment the INPP had been put into operation. The investigation data show that the Caesium and Strontium radionuclide activities in foodstuffs and drinking water do not considerably differ from the activity level in other regions of Lithuania and do not exceed those laid out in the Lithuanian normative documents.

Concentration of Cs-137 in the fish and soil in INPP Region in 2007-2009

| **Name of sample** | **Average values in INPP region (Bq/kg)** | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| Fish | 1.09 | 1.26 | 1.08 |
| Soil | 2.77 | 3.59 | 2.99 |

Measured Activities of Sr-90 and Cs-137 in the fish of the Lake Drūkšiai in 2007-2009

| **Type of sample** | **Activity (Bq/kg)** | | | | | |
|---|---|---|---|---|---|---|
| | **2007** | | **2008** | | **2009** | |
| | **$^{90}$Sr** | **$^{137}$Cs** | **$^{90}$Sr** | **$^{137}$Cs** | **$^{90}$Sr** | **$^{137}$Cs** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pike (fillet) | 0.21 | 1.22 | 0.18 | 2.65 | 0.11 | 1.69 |
| Perch (fillet) | 0.41 | 2.45 | 0.37 | 2.31 | 0.42 | 2.37 |
| Roach (fillet) | 1.05 | 0.55 | 0.93 | 0.80 | 1.04 | 0.84 |
| Bream (fillet) | 0.52 | 0.66 | 0.58 | 0.72 | 0.24 | 0.66 |
| Tench (fillet) | 0.18 | 0.61 | 0.28 | 0.70 | 0.26 | 0.74 |
| Crucian carp (fillet) | 0.87 | 0.52 | 0.70 | 0.39 | 0.76 | 0.19 |

The monitoring of the population exposure in the zone of 30 kilometres is carried out. It was determined that the annual exposure dose of the population does not exceed the fixed limit of 0.2 mSv.

All release pathways at the INPP are monitored. The ventilation stacks of NPP are monitored (activities of noble gases, particles, iodine and aerosol) continuously. The water is checked every time before the content is discharged into the lake and also the water from intake and outlet channel is tested for laboratory measurements every day.

On the site and in the vicinity there are TL dosimeters set out for measurements of accumulated dose, which are evaluated by power plant not less than twice a year. Also, on- line monitors of in-situ dose rate measurement are set around the INPP. The monitor readings permanently can by made available to the authority.

In order to control the influence of the INPP to environment sampling of aerosols and atmospheric precipitation (continuously), water, bottom sediments, grass and other environmental samplings are performed. The results of measurements are reported to the authority.

The automatized system AKRB-06 for control of assurance of radiation protection of workers and environment is in operation at the INPP. System operates in the territory of INPP and in the monitoring area of potential radioactive contamination.

AKRB-06 registers all parameters (levels of radioactive discharges into environment, levels of gamma radiation and air contamination in the INPP rooms, contamination of technological media), characterizing radiological situation in the INPP and environment, for all the modes of operation. Information with signaling or alarming devices is automatically presented to the radiation situation supervision desk by the system of radiation control.

### 15.4. Regulatory review and control activities

The regulatory institutions implement the state maintenance and control of the workers and outside workers in the field of radiation protection and carry out analysis of the reports. The licence holder presents the data on the exposure doses of the workers, the discharged amounts to the atmosphere and to the lake water regularly (every month, once per quarter and at the end of the year). At the end of the year, the report on the influence of the nuclear facilities on the environment is presented.

The regulatory body coordinating the activities of executive and other bodies of public administration and local government in the field of radiation protection, monitoring and expert examination of public exposure is the RPC. Among other responsibilities the RPC is responsible for the radiation protection of workers and the general public from negative impact which may cause the ionizing radiation, including ionizing radiation, arising from nuclear facilities in operation and decommissioning.

The functions of control of safety of nuclear facilities are performed by the VATESI. In implementing state regulation of nuclear safety, radiation protection within its competence, accounting for and control of nuclear materials in the sphere of nuclear energy, VATESI approves standards and rules of operation of nuclear facilities, in those radiation protection issues are always taken into account, and performs surveillance over compliance with radiation protection regulations, standards and procedures during operation and maintenance of these facilities.

The Ministry of Environment approves requirements on radiation protection of environment while Environment Protection Agency (EPA) issues permits for radioactive discharges into the environment and controls the implementation of these requirements. EPA provides environmental radiological control within the sanitary protection zone of the nuclear facility. There are four automatic gamma dose rate measurement stations around INPP. Renovation of automatic gamma dose rate measurement stations was done in 2006 with the aim to improve radiation and nuclear safety control system. There is a station of aerosol sampling in 60 km distance from INPP. Environment samples are periodically taken within the zone of INPP: water and bottom sediments of the Lake Drukšiai, including water and other samples from release canal, additionally control of discharges to the air is performed. Control of INPP laboratory is provided for ensuring of reliability of results.

The Regulatory authorities conduct inspections at nuclear facilities. The radiation situation (levels of ionizing radiation, surface radioactive contamination, etc.) is assessed during inspections. The implementation of radiation protection requirements during the management of radioactive waste and spent nuclear fuel, measures for optimization of occupational radiation protection, occupational exposure measurement and results, monitoring of work places and workers' individual exposure, effectiveness of training in radiation protection and other issues important from radiation protection viewpoint are also inspected.

During the inspections is also assessed how the outside workers follow the radiation protection requirements during their work in the controlled area of INPP and keeps under the control the occupational doses of outside workers as well as the occupational doses of INPP workers.

During the annual inspections implementation of environmental monitoring programme, procedures of operational control of liquid and gaseous discharges from INPP are inspected.

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

# ARTICLE 16 EMERGENCY PREPAREDNESS

*1. Each Contacting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.*

*For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.*

*2. Each Contacting Party shall take the appropriate steps to ensure that, insofar as they are likely to be effected by a radiological emergency, its own population and competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.*

*3. Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be effected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.*

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

### *16.1.1 Overview of the Contracting Party's arrangements and regulatory requirements for on-site and of-site emergency preparedness.*

The main document that regulates development of defence and national security system of the Republic of Lithuania is the Law on the Fundamentals of National Security accepted in Seimas (Parliament) on 19 December, 1996. The system of national security in Lithuania consists of the basic resolutions, principles and methods confirmed by this purpose activities of the State and population, the whole complex of means directed towards the country integration into Europe and Transatlantic Unions, laws and other legal acts, activities of state institutions founded for this purpose and ways of their interaction. There are civil protection and rescue institutions among them. Government manages all national security means implementation and obligates all civil protection institutions and Lithuanian economy infrastructure objects to execute compulsory rescue and civil protection tasks.

The Civil Protection Law (accepted on 15 December, 1998, updated on 15 December, 2009). The Law says how the Civil Protection and Rescue System activities must be organized in Lithuania, provides the basics for legislative and organizational matters and describes responsibilities which lie on state and municipal authorities, public and private organizations and population of Lithuania.

Atomic Energy Law, accepted in Seimas (Parliament) on 14 November, 1996, defines allocation of functions for responsible institutions in the field of nuclear accident prevention and management of accidents and their consequences.

Radiation Protection Law, passed by Seimas (Parliament) on 12 January 1999, defines allocation of functions for responsible institutions in the field of control of radioactive materials and radiological accidents prevention and management of their consequences.

The procedure of stockpile, storage, renewal and usage of the national reserves of civil protection means is defined by the Law State Reserve, approved by Seimas on 31 August 2000.

Criteria of The Emergency Events approved by Government of Republic of Lithuania on 23 Decmber 2009, defines a list of emergency events which can lead to an emergency situations. It also includes criteria for nuclear and radiological accidents.

Governmental Resolution No. 578 "On the approval of general provisions of dosimetric control in case of radiological accident" approved by the Government of the Lithuania on 12 May 1998 is the

main document coordinating dosimetric control of the workers at the accident site, population and environment. In case of a radiological accident dosimetric control should be organized and carried out according to this Resolution and following to the approved instructions of the Fire protection and rescue services. Radiation Protection Centre and Environmental Protection Agency under the Ministry of Environment are responsible institutions for organizing, coordinating and control of dosimetric procedures within the limits of its competence.

General Regulations for Nuclear Power Plant Safety. Order of VATESI No. 56, June 9, 1997 establishes the purpose, reference points and basic criteria of safety, and also the main principles and character of the technical and organizational measures aimed at ensuring safety including on-site emergency response planning.

General Regulations BSR-2.1.2-2010, approved by the order of VATESI Head No 22.3-16 in 2010.

Emergency preparedness and response requirements for the operators of nuclear facilities (adopted on 24 October 2008). Issued on 24 October, 2008 by order Head of VATESI. Based on IAEA GS-R-2; GS-R-2.1; Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency (TECDOC-953 update).

There are other normative legitimate acts which, inter alia, covers emergency preparedness issues such as HN 73-2001, HN 99-2000, etc. Numerous legitimate acts regulating specific fields exist at the district and local levels.

The responsibilities for various governmental or other institutions are stated in legal acts approved by the Government.

### *16.1.2. Overview of main elements of national plan for emergency preparedness, including the role and responsibilities of the regulatory body and other main actors.*

The Civil Protection and rescue system is comprised off hhe Government of Lithuania, the Government Emergency Commission, the Ministry of Interior, the Fire and Rescue Department under the Ministry of Interior, the State Emergency Operation Centre, Ministerial, other state and municipal civil protection offices, fire protection offices, searching and rescue groups, other territorial offices involved in warning, rescue, support to and evacuation of the population.

National management of emergencies is carried out on two levels: state (governmental) and municipal. The state level comprises the Government of the Republic of Lithuania, the Government Emergency Commission, the State Emergency Operation Centre, ministries, other governmental institutions, including VATESI and FRD.

The municipality level comprises the Municipal Administration, the municipal Emergency Commissions, the Municipal Emergency Response Centers, the Fire Protection Services, the Population Warning and Notification Services, as well as other institutions, economic entities. Preparations for likely emergencies are carried out by means of planning related activities on each level of the civil protection system.

The Civil Protection and rescue system comprised of three preparedness levels:

- First (ordinary) level – the subjects of civil protection system implements preventive civil protection measures defined in approved strategic, annual plans and regulations of public and municipal institutions.
- Second (reinforced) level – the subjects of civil protection system are in readiness mode to activate full preparedness for emergency situations control.
- Third (full preparedness) – the subjects of civil protection system are ready to respond to an emergency. Human and material recourses are invoked, Emergency Response Centers and Emergency Commissions are activated, stockpile and storage of the national reserves of civil protection means are prepared to be used.

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

The Ministry of Energy is responsible for coordination of emergencies prevention, emergencies liquidation and investigation, elimination of emergency consequences at national level.

Administrations of municipalities of Zarasai and Visagino regions are responsible for development of plans for evacuation and temporary inhabitation for affected population.

VATESI is responsible for collecting information about situation in the nuclear facilities, analyzing and forecasting the development of the situation and predicting possible emissions and pathways of radioactive materials, providing information and advice to the Government, Fire and Rescue Department, Ministry of Environment and Radiation Protection Centre, providing information and consulting the Government Emergency Commission, providing information to the mass-media and public about the situation in the nuclear facilities, notifying European Commission, IAEA, neighbouring countries in accordance with the Convention on early notification and bilateral agreements.

The Ministry of Environment is responsible for providing the data from gamma monitoring station network, analyzing the data and forecasting the spread of radio nuclides in the environment.

RPC under the Ministry of Health in case of nuclear accident in INPP presents recommendations to the Government Emergency Commission, to all levels of Emergency Management Centres, executive and other bodies of public administration for the reduction of exposure doses and prevention of deterministic and stochastic effects of radiation on the public and emergency workers. RPC performs analysis of foodstuffs, drinking-water and other samples, contaminated by radionuclides, and presents suggest to the Ministry of Health to approve foodstuffs and their raw materials, drinking-water, feeding stuffs temporary maximum permissible levels of radioactive contamination for the emergency consequences liquidation period, organizes supervision and control of their compliance. Also RPC presents suggest to the Ministry of Health about the necessity of applying iodine prophylaxis and provide information to the public, within the limits of its competence, about protection actions. In order to continually ensure emergency preparedness, RPC has approved the emergency preparedness plan and established internal EPO. Currently a new national off-site plan for is under development by FRD.

### *16.1.3. Implementation of related measures*

In the event of a nuclear accident in the INPP, ministries and governmental authorities are engaged to execute the functions carried out by the ministries and governmental authorities in their daily routine. Concerning the FRD it means: organization of warning, fire protection and rescue and public information and inspection of contaminated territory. In the case of emergency actions of ministries and government authorities shall be coordinated by the Government Emergency Commission, which is comprised of ministerial and governmental officers entitled to decisions making. Operation body of the Government Emergency Commission is the State Emergency Operations Centre comprised of ministerial officers and the headquarters of the FRD.

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

- forthwith inform the Prime Minister on likely or de facto nuclear accident, its forecast consequences and the applied preventive measures;
- manage rescue operations and liquidation of consequences of the general emergency, aggregate the existing national forces and material resources, if the accident covered territories of more than one district;

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

In the event of an emergency the personnel of the INPP shall inform about emergency in the NPP and the existing situation in compliance with approved scheme for preliminary information on a radiation emergency in the INPP. Such kind of notices shall be given to: municipalities situated in the zones of preventive and urgent protection measures and administration of territorial units in neighbouring countries: Daugavpils Region in Latvia and Braslav Region in Byelorussia.

FRD shall pass information on the emergency to the ministries, municipalities of cities/towns. For this purpose it shall use automatic system for the national managing bodies and warning of the population, public means of communication (subscribers' telephone, fax for general purposes) and direct telephone and radio communication channels additionally arranged by FRD. In addition, the FRD also transmits information on the emergency to state civil protection management bodies in the neighbouring countries. International notification and information issues lay on VATESI.

In order to minimize the consequences of an emergency, a number of preventive measures against radiation effects are prepared: prevention of the population from being exposed to radioactive release in open areas by means of providing shelters or staying at home, application of individual prevention measures, evacuation, limitation or prohibition of consumption of contaminated foodstuffs, regulation of the population entering the contaminated zones, elementary cleaning of contaminated foodstuffs, organization of health care, deactivating of the contaminated area.

Radiation surveillance in the contaminated area is arranged and actively implemented during early phase of a nuclear accident. As for the late phase, radioactive contamination is constantly observed, while inspection of radiation is carried out only if this is required. Radiation surveillance is planned and coordinated by the FRD on the basis of information provided by administration of the INPP on characteristics of the accident, dose metric data, forecasts of Hydro meteorological Service, needs and recommendations of the Ministry of Environment, Ministry of Health Care and other authorities. First of all radiation surveillance is to be carried out in the zone of 30 km in four different routes. For this purpose, forces of units of FRD shall be used.

Decisions concerning regular prophylactic application of iodine preparations in the event of an emergency in the INPP shall be made by municipal Emergency management centres. Population in the zones of long-term protection measures (in radius of 50 km from the INPP) shall be supplied with stabile iodine preparations in advance by local municipalities of cities and regions. The latter shall acquire such preparations on their own account, consequently distributing iodine preparations for the population and replacing them prior to the date of expiration.

The remaining population of the Republic of Lithuania shall by themselves acquire regular iodine preparations and ensure their stocks in advance. Iodine preparations should be supplied to drugstores enabling the population to acquire them for regular usage.

In the event of the general emergency in the INPP a decision to evacuate the population exposed to radioactive contamination as well as the process of evacuation itself shall be managed on the highest level by a head official for civil protection operations assigned by the Prime Minister. Proposals concerning evacuation shall be given by municipal emergency management centres on the basis of the situation analysis and likely future forecasts.

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

In the early phase of the accident, what is of the most importance is sanitary cleaning of the population, deactivation of transport modes, buildings and roads. Initial sanitary cleaning of the population shall be carried out in the interim evacuation posts. If the level of radioactive contamination detected in clothes and footwear of the evacuated population is within the permitted limits, further sanitary cleaning shall be carried out in the places provided for acceptance and settlement of the evacuated individuals. In the event of higher level of contamination of the evacuated population and being it impossible to carry out sanitary cleaning in intermediate evacuation point, the evacuated individuals might be asked to get off and be provided with uncontaminated cloths from the state reserve for civil protection measures. Sanitary cleaning of the evacuated individuals shall be carried out in the places of their acceptance and settlement by means of showers existing in hostels, sports halls and other places.

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

In order to protect the INPP personnel and people of the Republic of Lithuania against potential consequences of radiological emergencies, the INPP carries out emergency planning and preparedness activities.

Emergency planning process at the INPP includes:

- analyzing potential emergencies and assessing their consequences to the personnel, people and environment taking into account the worst-case conditions;
- establishing the EPO capable of eliminating potential emergencies and their consequences;
- monitoring operability of the equipment ensuring accident prevention, localization and elimination;
- accumulating the material and technical recourses required for the EPO functioning;
- maintaining continuous availability of the Accident Management Centers;
- training the managers and personnel of the EPO Services, and the personnel not involved in the EPO Services;
- developing the documents prescribed by VATESI and recommended by IAEA;
- timely updating the Emergency Preparedness Plan with due consideration of the comprehensive and staff training results as well as results of inspections conducted by VATESI, the FRD under the Ministry of the Interior, and audits conducted by INPP Technical Surveillance and Quality Management Department.

General Director is in charge of emergency planning through the Manager of Fire Surveillance and Civil Protection Group of INPP Technical Surveillance and Quality Management Department.

The EPO structure, including the EPO headquarters, the heads of the EPO Services and their subordinate personnel, is based on the functional principle and formed from the workshops and divisions personnel taking into account the specific functions they perform during normal INPP operation.

In order to ensure continuous EPO preparedness, there are at least 3 specially trained persons for each EPO Service and Unit head position, who meets the requirements for this position.

The EPO personnel are continuously trained to meet the requirements for those positions.

*16.1.4.1. Classification of emergencies*

The following accident classes are defined at INPP:

**Alert** – a nuclear power plant status involving failures resulting in significant or unknown degradation of plant safety. At the emergency of this class EPO shall be put into the state of readiness and additional assessment of the situation shall be performed.

**Local Accident** – failures in the operation of nuclear power plant resulting in:

- Release of radioactive materials beyond the normal operation limits within the controlled area;
- Considerable decrease in the level of protection provided to the core or spent fuel;
- Any additional failures in the operation, which may result in the core or spent fuel damage.

At the emergency of this class measures shall be taken to perform protective actions off-site and limit radiation exposure to the plant personnel.

**General Accident** – failures resulting in release or substantial risk of radioactivity release beyond the controlled area requiring urgent protective actions. These failures include:

- Actual or projected damage to the core or large amounts of spent fuel;
- Radioactivity releases beyond the controlled area resulting in the course of several hours in doses exceeding intervention levels for urgent protective actions.

In case of declaring this accident class urgent protective actions are recommended for the public residing in the vicinity of the plant.

Accidents at INPP are classified in accordance with the Procedure for classification of accidents at INPP. In the event of an accident emergency protective actions shall be applied according to the following criteria:

- Arranged in advance to allow for immediate actions;
- Measured by the devices used at work;
- Understandable and based on the international recommendations.

At the beginning of the accident the decision to apply protective actions is based on the class of accident, after applying the protective actions the case is reviewed on the basis of environment monitoring results. The decision to apply protective actions is based on the OIL.

Environment measurable parameters levels are presented at the OIL that determine the order of applying protective actions. IAEA developed OIL for four types of measurements in the environment that are described in the "Manual on radiation protection in case of nuclear reactor accident TECDOC-955/R":

- Dose rate from plume;
- Dose rate from fallout;
- Concentration of radionuclides in fallouts.

Following the IAEA recommendations nine acting intervention levels with stated criteria and protective measures were set at the INPP.

*16.1.4.2. Main elements of the on-site emergency plan*

The INPP EPP is the main procedure to follow during organizational, technical, medical, evacuation and other activities related to protection of the personnel and the environment from consequences of emergencies, natural disasters and man-made hazards. The EPP requirements apply to the EPO heads and personnel, to the INPP the personnel not involved in the EPO services and to the contractors working at INPP. The following documents were used to develop the EPP:

- Law of the Republic of Lithuania on Nuclear Energy No VIII-1309, dated 1996-11-04;
- Law of the Republic of Lithuania on Civil Security No XI-635 dated 2009-12-22;
- HN 99:2000;
- HN 73:2001;
- HN 87:2002;
- Resolution No. 718 of the Government of the Republic of Lithuania "On Approval of the Procedure for Organization of Civil Protection Training and Exercises", dated 2010-08-22;
- BSR-2.1.2-2010;
- VD-KS-02-99;
- Method for the Development of Emergency Response Preparedness for Nuclear or Radiological Accidents, IAEA-TECDOC-953/R;
- Manual on radiation protection in case of nuclear reactor accident, TECDOC-955/R;
- Emergency Response Plan of Municipality of Visaginas Town, Resolution No ĮV-189, approved by Head of Administration of Municipality of Visaginas Town, dated June 09, 2003;
- Plan of the Fire and Rescue Service for Protection of Visaginas Town and INPP on Concentration of Forces and Resources for Elimination of Extreme Events at INPP approved by order of the Director of the Fire and rescue Department under the Ministry of the Interior of the Republic of Lithuania No 52 dated 2003-03-28.

The INPP EPP consists of two parts:

- General part with appendices;
- Operational part.

The EPP general part with appendices contains:

- Policy, goals and objectives specified by the INPP management for the EPO;
- Responsibility of the INPP management for emergency planning;
- EPO structure;
- Functions of EPO Services and Units;
- EPO notification and preparedness;
- Actions to be taken in the event of an emergency at INPP;
- Premises and technical means necessary for execution of emergency preparedness functions;
- Interaction with local, territorial and state institutions for support in the event of an emergency;
- Resources available at INPP in the event of an emergency;
- Radiation dose limits;
- Organization of emergency preparedness training for the INPP managers and personnel not involved in the EPO Services.

Appendixes:

- List of heads of EPO Services;
- Checklists for heads of EPO Services;
- Decision-making block diagram;
- INPP EPO structure;
- Time-schedule for major actions;
- List of organizations interacting with the EPO Services;
- Criteria for application of protective actions;
- Applicable iodine tablet dosage;
- Procedure for EPO interaction with state institutions in the event of a general accident at INPP.

EPP Operational part contains:

- Emergency planning procedure;
- Procedure for notification in the event of an emergency;
- Procedure for assembly, preparedness and actions of the EPO Management in the event of an emergency at INPP;
- Procedure for organization of assembly places and activities of the personnel not involved in the EPO Services in the event of an emergency at INPP;
- Procedure for management of emergency actions from the EPO Accident Management Centre;
- Procedure for classification of accidents at INPP;
- Procedure for protection and actions of facility personnel against impact of harmful toxic materials in the event of an emergency at the plant and neighbouring facilities;
- Procedure for interaction of EPO Services personnel with the Fire and Rescue Service for Visaginas Town and INPP during fire-fighting at the equipment under the authority of INPP structural units;
- Instructions for the EPO Services.

INPP EPP applies to:

- EPO management and personnel;
- INPP personnel not involved in EPO;
- Personnel of Fire and Rescue Service for Visaginas city and INPP;
- INPP Guards Unit personnel;
- Contractors working at INPP;
- Business visitors.

The actions covered by EPP shall be carried out within the INPP Controlled Area. The EPP shall be agreed with VATESI and other surveillance organizations and state management institutions. EPP shall be updated every three years. The INPP TS&QMD Fire Surveillance and Civil Protection Group Manager is responsible for updating of EPP.

EPO Notification, Assembly and Preparedness

Emergency preparedness signals are predefined at the INPP that are communicated to the plant management and personnel by appropriate technical communication means. In case of INPP EPP activation Plant Shift Supervisor notifies:

- The plant management;
- The plant personnel;
- Central dispatcher office of joint-stock company “Lithuanian Energy”;
- Fire Rescue Service for Visaginas city and INPP;
- VATESI early notification officer in Vilnius;

- VATESI Supervision group at INPP;
- INPP Protection Team;
- Municipality of Visaginas city;
- the Head of FRD Civil Protection Management Situation Coordination Division under the Ministry of the Interior.

After Heads of EPO services gather in the Accident Management Centre and after the accident category is confirmed, the INPP management informs:

- General Director – the Ministry of Energy, the Fire and Rescue Department under the Ministry of the Interior of the Republic of Lithuania;
- Decommissioning Director;
- the Head of VATESI;
- the EPO Headquarters managers;
- the Ministry of Environment, the Ministry of Health, State Security Department.

Then the EPO headquarters prepare a form of "Initial Message on Radiation Accident" and send it to local, territorial, and state institutions.

After radiation survey outside INPP and data processing and forecast, the EPO headquarters prepare a form of "Power Plant State Assessment" and send it to local, territorial, and state institutions.

Assembly and preparedness of the Heads of EPO Services is performed on the basis of requirements of EPO Management Assembly and Preparedness Instruction in the Event of an Emergency at the INPP.

Assembly and preparedness of EPO Services personnel is performed on the basis of requirements of EPO Services Emergency Preparedness Instructions.

Assembly and order of acting of the plant personnel, not included into the EPO Services is presented in the Personnel not Included into EPO Services Assembly and Order of Acting Instruction.

In the event of a general accident, after the Government Emergency Commission gathers and starts work, the manager of the state level civil protection operations provides decisions made in relation to the power plant to the Head of EPO as respective directions obligatory for all executors in case of the emergency situation.

At implementation of the EPP, the plant shift supervisor notifies the Head of FRD Civil Protection Management Situation Coordination Division under the Ministry of the Interior, the Director General notifies the FRD Director.

Accident management. Actions by the EPO Services.

The Heads of EPO services organize their work and manage the subordinate services in accordance with requirements of the Instruction on Accident Management from the EPO Accident Management Centre. Accident management is in accordance with corresponding strategies. Accident management actions are aimed at the following safety objectives:

- Prevent accident propagation in case of reactor core damage;
- Ensure continuous reactor core cooling;
- If possible, ensure integrity of the Accident Localization System.

The specified in-depth safety concept calls for two strategic objectives – prevention of accidents and mitigation of their consequences.

The EPO Services perform the following tasks:

- Emergency Recovery Service performs emergency recovery work;

- Technical Support Centre makes comprehensive analysis of the NPP technological conditions and recommendations for Plant Operation Manager and Plant Shift Supervisor.

Radiation and Chemical Protection Service performs:

- Radiation monitoring inside the units, on-site and in the controlled area;
- Personnel radiation monitoring;
- Personnel sanitary cleaning control;
- Transport and specialized mechanisms decontamination control.

Notification and Communications Service provides the EPO Services and EPO Headquarters with non-interruptible communication.

Shelter Service ensures functioning and operability of systems and equipment in Emergency Operation Centre.

The Information Centre service ensures timely transfer of technical and general information to local, territorial, and state institutions, mass media, public; it also ensures maintenance of the feedback.

Physical Protection Service executes physical security measures. Procurement Service:

- Provides EPO Services with required material and technical resources, and foodstuffs;
- Ensures permanent accounting for material and technical recourses, transportation and finances.

Medical Service carries out medical care measures.

Evacuation Service performs evacuation procedures.

The Heads of EPO services control the subordinate personnel from the EPO Accident Management Centre and special room in the Technical Assistance Centre.

Accident management is in accordance with corresponding strategies. Accident management actions are aimed at the following safety objectives. The specified in-depth safety concept calls for two strategic objectives – prevention of accidents and mitigation of their consequences.

Cooperation between the EPO and local, territorial, and state institutions.

Cooperation with the local organizations involved in activities in the event of an accident at the INPP is documented as provisional agreements between the INPP and corresponding local organizations.

Cooperation with state institutions is maintained according to requirements of the Law on Civil Protection of the Republic of Lithuania and Protection Plan for the public of the Republic of Lithuania in the event of a nuclear accident at INPP, where functions and organization of departments and institutions management are described.

Additional information:

The EPP was supplemented with:

- Appendices (criteria for application of protective actions, usage of iodine tablets, procedure for interaction between the EPO and state institutions in the event of general accident at INPP;
- Procedure for interaction of EPO Services personnel with the Visaginas Fire and Rescue Department during fire-fighting at the equipment under the authority of INPP structural units.

Due to introduction of the new INPP organizational structure in 2010 and changes to the enterprise management, the EPO structure, membership and EPP were partlly updated.

Presently, a group of INPP experts is developing a new version of the EPP in accordance with the new risks and new organizational structure introduced after INPP shutdown in 2010.

*16.1.5. Training and exercises, evaluation activities and main results.*

Once per three years General Director, as the EPO Head, is trained under a special programme in the Civil Protection Training Centre of the Fire and Rescue Department under the Ministry of the Interior. General Director conducts:

- Annual training for the managers of the specific group in accordance with 6-hours training programme;
- Tabletop drills for the heads of EPO Services at least once per two years;
- Full scale exercises once per three years.

Once per three years Decommissioning Director, as the INPP decommissioning manager, is trained under a training programme in the FRD Civil Protection Training Centre under the Ministry of the Interior as General Director does.

Decommissioning Director conducts annual training for the managers of the specific group in accordance with 6-hours training programme

Once per three years the TS&QMD Fire Surveillance and Civil Protection Group Manager is trained under a respective programme in the FRD Civil Protection Training Centre under the Ministry of the Interior.

The TS&QMD Fire Surveillance and Civil Protection Group Manager conducts annual training in accordance with 6-hours training programme for the specific group of the managers not involved in EPO Services.

Managers of INPP structural units, as heads of EPO Services, conduct training for heads of subordinate service teams and groups.

All the EPO personnel shall be trained to respond in the event of an emergency. Training of personnel includes:

- initial training in accordance with the requirements for the position assigned;
- improvement of practical skills during exercises and drills.

EPO personnel are trained by the heads of corresponding teams, groups and services.

After completion of theoretical training the personnel of EPO Services (a part of the personnel) participate in functional exercises for improvement of practical skills to carry out the specified tasks.

Once per three years the personnel of EPO Services (a specific part of the personnel) participate in full scale exercises for checking emergency preparedness level of personnel and its ability to work in complicated conditions while carrying out the specified tasks.

After the group exercises the manager of the exercises together with EPO Headquarters Manager (or his deputy) shall write a report. The report shall be approved by INPP General Director. Then the EPO Headquarters Deputy Manager shall register the report in the Technical Surveillance and Quality Management Department, where it shall be stored.

Supervisors are appointed to supervise and estimate the activities performed by the managers and staff of the EPO Services during full-scale exercises.

During the post-exercise analysis the supervisors make a report specifying strengths and weaknesses in the activities performed by the managers and staff of the EPO Services, as well as errors and mistakes made during the exercises.

After the full-scale exercises the manager of the exercises together with EPO Headquarters Manager (or his deputy) shall write a report. The report shall be approved by INPP General Director, and registered and stored in the Technical Surveillance and Quality Management Department in the manner established at INPP.

Two copies of the report shall be sent to the Ministry of Energy and VATESI.

Based on the reports made by the supervisors after the exercises, the EPO Headquarters Deputy Manager makes a list of detected non-conformances to be included in the emergency preparedness corrective actions plan.

### *16.1.6. Training and exercises of Regulatory Authorities staff*

National level training for first responders and other competent authorities is organized every year. The purpose of this training is to strengthen the abilities of the competent authorities to respond and act in case of nuclear or radiological accident. Gained experience is shared with workers from other institutions in charge for rapid response.

Main regulating institutions, such as VATESI, RPC, has established its own emergency staff training and exercising programs.

In accordance with internal procedures on ERC staff functional training, all VATESI's Emergency response centre staff has to pass initial and refreshing training permanently. Each key staff members or groups have personal set of issues to be covered. Training consists from theoretical and practical parts and, depending on position in ERC, could last from few to few tens of hours. Training programs are based on Systematic Approach to Training philosophy.

Key Authorities also participate in various international exercises, such as Convex, ECURIE, CBSS, CCAEX08 Exercise (Lithuania, 2008) etc., organized by the IAEA, EC, NATO and other international organizations.

Specialists of RPC and other competent authorities participated in "Orphan source search and secure training" organized by U.S. Department of energy National nuclear security administration in Vilnius, 2009. Main subject of this course was to introduce radiation sources searching devices and techniques and also to provide technical assistance to Lithuania regarding the orphan sources issues. Gained knowledge and radiation sources searching techniques also could be successfully used in case of radiation accident for better radiological estimation and localization of the sources of radiation in the accident area.

### *16.1.7. Regulatory review and control activities*

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

Inspectors of VATESI participate in training and exercising activities as observers and gives recommendations.

Every year health care hospitals are checked by RPC for its preparedness to take and render medical aid for injured people during radiological and nuclear accidents. Also workshops and training courses are organized for the specialists of public and personal health care. The training is provided on how in case of an accident to provide help to injured persons.

## 16.2. Article 16(2) – Information of the public and neighboring states

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

In case of emergency the Press Service of Government of Republic Lithuania and the Government Emergency Commission are responsible for public information.

In case of an emergency Sate and municipality's institutions, public offices and citizens is notified using existing notification "Signalas" network which consists of 513 centralized electric sirens. After notifying signal, the information about situation, possible consequences and process of liquidation of emergency is vocally spread through companies and institutions emergency sound systems and using national and local broadcasters.

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

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

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

*16.2.2. Arrangements to inform competent authorities in neighboring States, as necessary.*

In 1994 Lithuania has joined to Convention on Early Notification of a Nuclear Accident and in 2000 to Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. VATESI is responsible for Convention on Early Notification and FRD is responsible for Convention on Assistance. According to IAEA's EPR-ENATOM requirements, VATESI is National Warning Point, National Competent Authority for events abroad and FRD – National Competent Authority for domestic events. VATESI is also a contact point and competent authority in ECURIE arrangements as well as CoDecS station operator.

Mutual assistance policy between Lithuania and the neighbouring countries is based on bilateral agreements.

Bilateral agreement between Lithuania and Denmark *On information exchange and co-operation in the field of nuclear safety and radiation protection* has been signed on 26 March 1993.

The bilateral agreement between Lithuania and Norway *On Early Notification of a Nuclear Accident and Information exchange about Nuclear Objects* has been signed on 13 February 1995.

The Arrangement between Lithuania and Poland *On information exchange and co-operation in the field of nuclear safety and radiation protection* has been signed on 2 June 1995.

The Agreement between Lithuania and Latvia *On Early Notification of Nuclear Accidents, Exchange of Information and Co-operation in the Field of Nuclear Safety and Radiation Protection* has been signed on 3 October 2003.

The agreement *on early notification of Nuclear and Radiological Emergencies between the State Nuclear Power Safety Inspectorate of the Republic of Lithuania and the Swedish Radiation Safety Authority of the Kingdom of Sweden* has been signed on 1 January 2009.

# ARTICLE 17 SITING

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

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

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

*(iii) for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to the continued safety acceptability of the nuclear installation;*

*(iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.*

## 17.1. Article 17(1) – Evaluation of site related factors

*17.1.1. Overview of the arrangements and regulatory requirements relating to the siting and evaluation of sites of nuclear installations, including applicable national laws*

Parliament of the Republic of Lithuania, by the advice of the Government, adopts a law on the construction of a new nuclear plant and its site. In making a decision on the construction of a specific nuclear facility, the Government of the Republic of Lithuania takes into consideration:

- economic and public needs;
- the principal characteristics of the use of natural resources and their impact on the environment;
- nuclear safety and radiation protection guarantees;
- the opinion of the local authority on whose territory the intended facility will be sited.

Sites for the construction of INPP are selected in accordance with the IAEA recommendations and the requirements of VATESI. Compliance with the IAEA Safety Standards is mandatory in determining the appropriateness of construction sites as well as in evaluating the engineering geological conditions of the sites and in carrying out engineering geological (geotechnical) investigations.

In 2010 VATESI adopted "Nuclear Power Plant Site Evaluation Requirements" based on IAEA Safety Requirements No. NS-R-3 „Site Evaluation for Nuclear Installations" and good international practice.

***Overview of assessments made and criteria applied for evaluating all site related factors affecting the safety of the nuclear installation***

VAE is a company responsible for the implementation of the preparatory works for construction of the new nuclear power plant in Lithuania. VAE has undertaken a number of preparatory works that are necessary in order to be properly prepared for the Tender for the Procurement of Technologies for Visaginas Nuclear Power Plant, its siting, design and construction.

The following comprehensive VNPP construction sites study and other preparatory works (projects) related to the sitting for the Project of Visaginas Nuclear Power Plant are implemented or are currently underway:

- Measurements of Hydrological and Thermal Balance in Drūkšiai Lake;
- Assessment of Construction Sites against IAEA Safety Requirements;
- Environmental Audit of Construction Sites;
- Takeover of Ignalina NPP Infrastructure;
- Coordination of Territorial Planning Documents.

*Measurements of Hydrological and Thermal Balance in Drūkšiai Lake*

*Measurements of Thermal Balance*

VAE conducted additional Drūkšiai lake thermal behaviour investigation. Exhaustive hydrological and meteorological data was collected during summer 2009 expeditions. Data was used to recalibrate Druksiai 3D thermal model making it even more accurate. This work is partly based on previous work, done on year 2008, in which a 3D-lake flow and temperature model was constructed and calibrated for Lake Drukšiai. The work is documented in "Lake Drūkšiai Thermal Release Model" (Lauri et al., 2008). In this report the measurements are used to investigate the accuracy of the "old" model in year 2009, and also to recalibrate the model using the new measurement data.

A water temperature measurement campaign was performed during summer 2009 starting 5.5.2009 and ending 8.10.2009. An intensive measurement period with weekly water surface temperature measurements, water temperature profile measurements, and wind and air temperature measurement on lake was executed from May 5 to September 2, after which a reduced set of measurement was continued until October. The measurements were conducted and funded by VAE. The measurements were done from a boat using a GPS and a depth and temperature recording measurement probe. Additionally, submerged recording temperature probes were used in INPP inlet and outlet locations. Wind and air temperature measurement were done using tripod mounted weather recorder on the boat.

The measurement points are shown in Figure 17.1.1. In Figure 17.1.1, the yellow points show locations of surface temperature measurement points. In the red points, in addition to surface temperature, a temperature profile was recorded. Wind speed, direction and air temperature was measured in the profile points. The blue points show locations of recording submerged temperature probes that recorded the water temperature for 10-minute intervals for the whole measurement period.

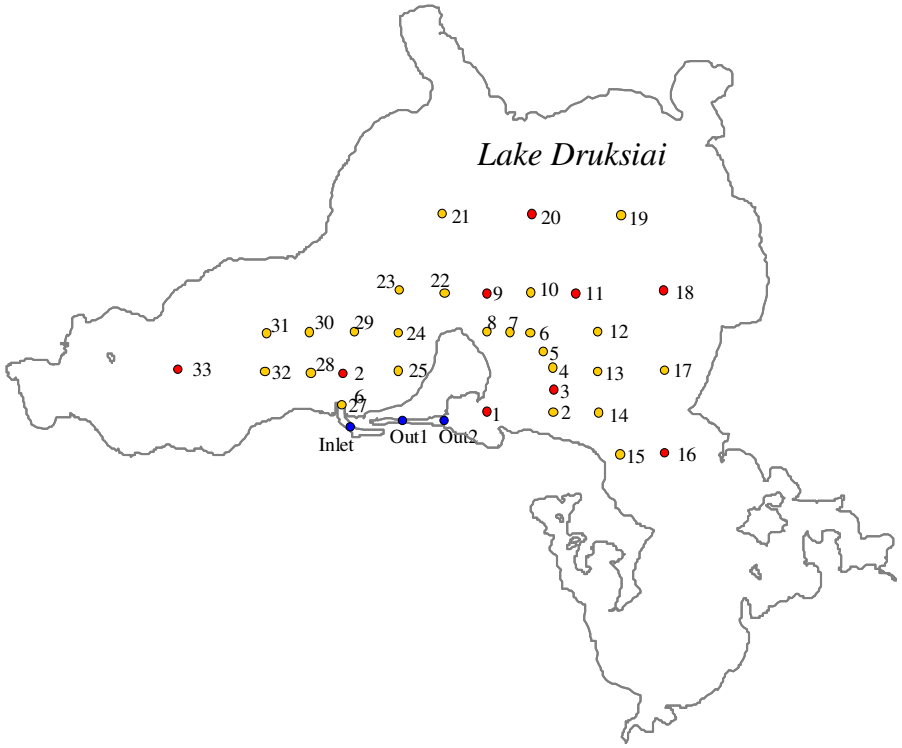



*Figure 17.1.1. Measurement points in Lake Drūkšiai during summer 2009*

A computational lake model built on year 2008 and applied to NNPP scenario computations was applied to lake Druksiai water temperature computation for year 2009. The computation results were compared to measurement performed on the lake during summer 2009. The model was also recalibrated using the new measurement data, and selected NNPP scenarios were computed using the model.

The "old" model calibration resulted in too high water temperatures for the lake. After recalibration the average surface water temperature bias from eight measurement points was reduced from 2.0 ºC to 0.2 ºC. Also 10 m depth water temperatures had similar accuracy. The improvement in the model accuracy was mainly induced by more representative meteorological data from the INPP measurement tower, and also more accurate temperature data for the INPP outlet. The extensive surface temperature and temperature profile measurements were used in model recalibration and verification.

The recalibrated model results were also compared to temperature fields interpolated from measurement data. The comparison showed that the model underestimated the size of the highest temperature areas. For July and August 2009 and temperature limit of 28 ºC the underestimation was 0.5 $km^2$, or about 1% of the lake area.

Three NNPP cooling power scenarios were computed using the recalibrated model. The resulting warmed up area sizes were lower than the areas computed using the old calibration. The temperature reduction was about one degree in lake surface temperature.

Proposals *„On Regulation on Direct Cooling of Visaginas Nuclear Power Plant"* were prepared as an outcome of the investigation. Proposals are based on 3D thermal modeling results, lake ecology, European Union and local regulations, and current practices on regulation on monitoring, with intention to provide flexibility for new nuclear power plant operation while not further deteriorating of current state of ecology of lake Drukšiai. Proposals currently undergo internal scrutiny within Ministry of Environment. New regulation is pending.

*Measurements of Hydrological Balance*

Historical data of the water outflow from Drūkšiai lake is available for the last 10 years. Water outflow is measured on the location of the former hydroelectric installation *Druzhba Narodov* ("Friendship of the nations"), located on Prorva river (the only outflow). In order to validate accuracy of the historical water flow data, decision was taken to make test measurements. Three expeditions will be conducted in year 2010, namely during May, June and August.

Based on the newly collected data historical water flow measurements will be adjusted if needed.

*Environmental Audit of Construction Sites*

*Preliminary Ecogeological survey*

Based on the prospects of the detailed plan and perceived needs of NNPP at the moment of subproject initiation three plots were investigated, namely "Plot I", Plot II" and "Constructional depot".

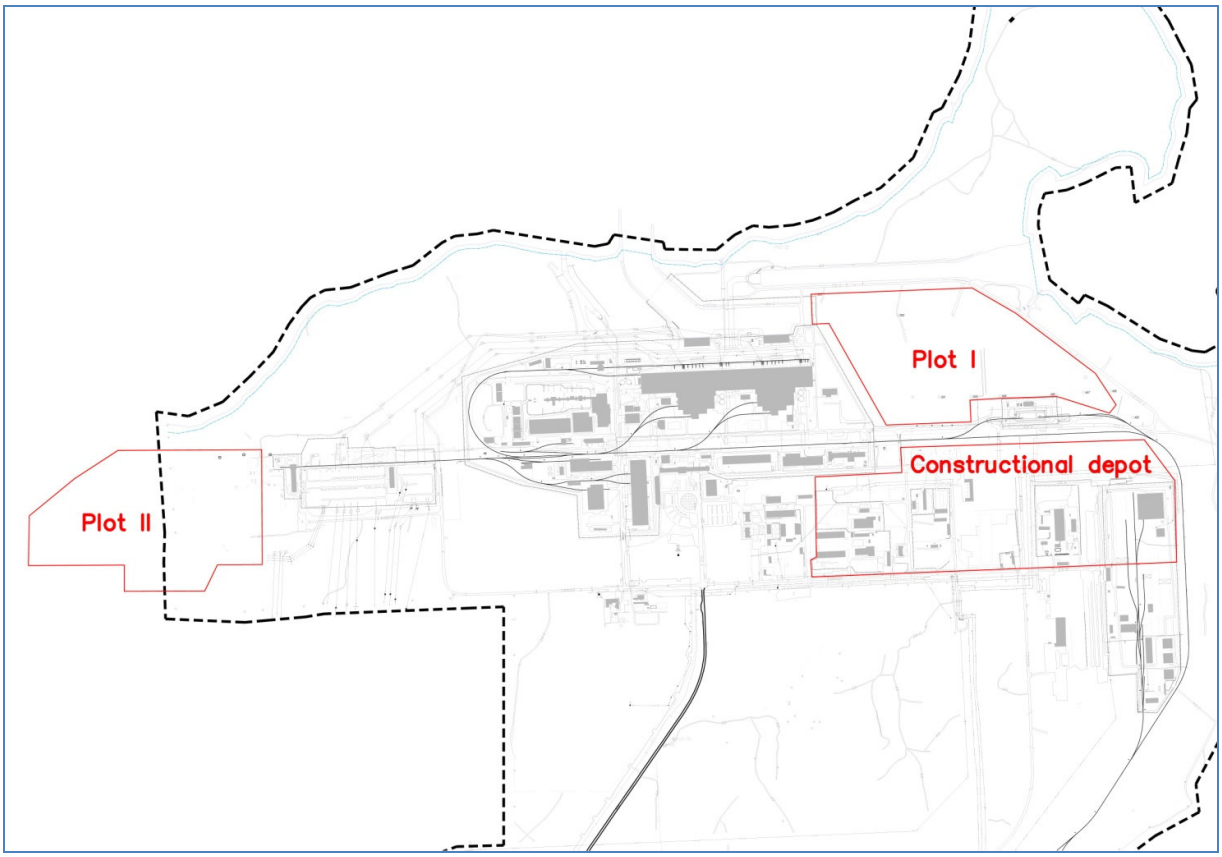



*Figure 17.1.2. Plots for investigations at NNPP proposed construction sites and constructional depot (Ignalina NPP site is in the centre of the figure)*

"Plot I"

The investigation area is situated to the east from Ignalina NPP. Spent nuclear fuel storage is the nearest object to the investigation area. Technological channels are the nearest surface water reservoirs. They are situated to the north and to the south from the area. The nearest well field is located ~3.5 km to the south-west (Visaginas well field). The territory was flattered and the channel in the central part of the area was filled.

The area of the site is ~36.9 ha.

"Plot II"

The investigation area is situated to the west from Ignalina NPP. Administrative and transformer buildings are the nearest objects to the investigation area. Drūkšiai lake is the nearest surface water reservoirs. It is situated to the north from the area. The distance is 90 m from the site to the lake. The collective gardens and Tumelina village are situated to the west. The distance from the area is 630 m. The nearest well field is located ~1.3 km to the south (Visaginas well field). The eastern part of the investigated territory was flattered; the rest of the territory was forest or swamp. There is a melioration channel in the western part of the area. It divides the area from south to the north.

The area of the site is ~37.5 ha. The investigation on environmental geology in this site has never been done before.

"Constructional depot"

The investigation area is situated to the south-east from Ignalina NPP. Spent nuclear fuel storage is the nearest nuclear object to the investigation area. Several lakes are the nearest surface water reservoirs. They are situated to the north and to the south and south-west from the area. The distance to them is 80-120 m. Also technological channels are to 120-150 m the north east from the area. There is drainage system installed in investigated area. Area is partly used by buildings. Engineering networks of various purposes are installed. The purpose of the territory is industrial. Different organizations keep transport, store various materials.

The area of the site is ~60.64 ha. The investigation on environmental geology in this site has never been done before.

*The program and the goal of the investigations*

The program of the investigations consists of the preparations, drilling works, soil and groundwater sampling, laboratory analysis, topographical works, analysis of collected field and archive data and the preparation of the report.

Following goals were defined in the program of preliminary environmental geology investigations:

- Determine geological-hydrogeological conditions of the site (lithology of unsaturated zone, unconfined groundwater level and flow directions);
- Determine hydrochemical situation of the unconfined groundwater aquifer;
- Estimate possible contamination of unsaturated zone.

The geological cross section of the upper part of lithosphere, unconfined groundwater level and direction of flow were determined during investigations. The samples of soil and groundwater were taken to evaluate contamination possibility.

*Methodology of investigation works*

Investigations have been done according to requirements given in "Environmental geology regulations" (State News, 2008, No. 71-2759). Territory has been divided into blocks, size of 1 hectare each. Places for the drilling works were selected in the middle of the blocks or in the places inside the blocks considering better access. Temporary investigation boreholes were drilled. The purpose of boreholes was to determinate lithological composition of the upper part of geological cross-section and to identify unconfined groundwater level and chemical composition. 139 mm augers were used to drill the boreholes. The core has been uplifted every 1.0 m. Temporary filters from 75 mm PE pipe have been installed. Filter useful part is made from 1.5 m perforated PE pipe and wrapped with nylon mesh. After soil and groundwater samples have been taken and groundwater level has been determined, the boreholes were liquidated with drilling mud.

*Laboratory woks, water and soil analysis*

Pits were dug to take soil and top soil samples for the heavy metals, polycyclic aromatic hydrocarbons, total hydrocarbons, organic carbon content and sieve analyses. The sampling was done under LST EN ISO 10381-5:2005(E) standard. Wells installed after the boreholes were drilled. Filters were installed to take unconfined groundwater samples. The partial chemical composition (chloride, sulphate, bicarbonate, sodium, potassium, calcium, magnesium content),

chemical oxygen demand, heavy metals concentrations (Cd, Cr, Cu, Hg, Ni, Pb, Zn), BTEX were analyzed in water samples.

*Conclusions*

"Plot I"

Soil. Laboratory investigations have found that concentration of microelements and polycyclic aromatic hydrocarbons does not exceed the established threshold limit values (TLV). Concentration of petroleum products in mining holes No.15, 16, 19, 23, 35 and 28 slightly exceeds the background level, but does not exceed maximum allowable levels (LAND 9:2002). The amount of petroleum products in the other samples does not exceed background level (50 mg/kg).

Underwater. Hydrochemical investigations have found that groundwater is very slightly affected by anthropogenic activity. The higher values of chemical oxygen demand, reaching 166 mg/l $O_2$ and too high concentration of nickel (mining hole No. 31 - 60 µg/l) indicate this. Such concentration exceeds the background level, but does not exceed TLV stated in the Environmental Requirements for Management of Territories Polluted with Chemicals. Other concentrations are characteristic to urbanized industrial territories and do not exceed TLV.

With regard to the fact that during preliminary eco-geological surveys soil and underwater pollution was not established, no environmental measures prior to changing the purpose of the territory are necessary.

"Plot II"

Soil. Laboratory researchers have found that concentration of polycyclic aromatic hydrocarbons and polychlorinated biphenyls (PCB) does not exceed the established threshold limit values (TLV). Concentration of nickel in samples, collected from mining holes No. 16 (depth 0.2m) and No. 40 (depth 0.5 m) exceeds threshold limit values stated in the Environmental Requirements for Management of Territories Polluted with Chemicals. In mining hole No. 16 the threshold limit value is exceeded 6.6 times (1000 mg/kg), and in mining hole No. 40 - even 18.6 times (2800 mg/kg). Also concentrations of other heavy metals, exceeding the background level but not exceeding the threshold limit values, were detected in these samples. Having received the results of soil laboratory researches (investigation points No. 16 and 40) it has been decided to repeatedly collect the samples close to the mining holes and to repeatedly establish concentration of nickel, and to reject the possible error probability. After having conducted the control investigations, the soil nickel concentration has not exceeded threshold limit values.

Underwater. Hydrochemical investigations have found that groundwater is very slightly affected by human activity. The too high values of chemical oxygen demand, reaching 174 mg/l $O_2$ and too high concentration of chromium and nickel (mining hole No. 29 respectively 96 and 84 µg/l) indicate this. Such concentration exceeds the background level, but does not exceed TLV stated in the Environmental Requirements for Management of Territories Polluted with Chemicals. A slightly too large concentration of aromatic hydrocarbons, exceeding the background level, was stated in mining hole No.9. But the amount of aromatic hydrocarbons does not exceed the threshold limit values.

With regard to the results of preliminary eco-geological surveys of soil and underwater, no environmental measures prior to changing the purpose of the territory - constructing a nuclear power plant - are necessary.

"Constructional depot"

Soil. Laboratory researchers have found that concentration of microelements and polycyclic aromatic hydrocarbons does not exceed the established threshold limit values. In ten mining holes, in different depth, concentration of petroleum products reaches 225 - 1010 mg/kg. However, it is below the established maximum allowable level of pollution (MAL). In one sample (mining hole No. 24. 0.2m) concentration of petroleum products exceeds maximum allowable level (1910 mg/kg, 1.5 times exceeds MAL, an allowable level of petrol hydrocarbons).

Underwater. Hydrochemical investigations have found that groundwater is affected by human anthropogenic activity. Steep values of chemical oxygen demand, reaching 161 mg /l $O_2$ indicate this (too large quantities of chemical oxygen demand are also the result of natural organic materials decomposition process in investigated site). In one mining hole nickel concentration exceeds threshold limit value according to the Environmental Requirement s for Management of Territories Polluted with Chemicals (milling hole No. 60 - 130 µg/l, exceeding 1.3 times). In another mining hole concentration of xylenes exceeds the threshold limit value (in mining hole No.2 p- and m-xylenes 1190 µg/l plus o-xylenes 343 µg/l, exceeding 3 times). Other aromatic hydrocarbons and petroleum products were found in mining holes No. 50, 57 and 59. However, their quantities do not exceed threshold limit values.

With regard to the results of preliminary eco-geological surveys of soil and underwater, no environmental measures prior to changing the purpose of the territory - constructing the object – are necessary. In places of site, where pollution exceeds threshold limit values or MAL, it should be removed or isolated.

*Investigations of Contamination with Radionuclides of Potential Plots for a New Nuclear Power Plant*

Scope of work of this project comprised of preparation of detailed plan on measurements and sampling of soil, measurements of gamma dose rate, measurements of concentrations of radon in soil gas, determination of activities of radionuclides by *in situ* gamma spectrometer, investigations of activities of strontium ($^{90}Sr$) in soil samples, measurements of activities of more than two radionuclides in soil samples by gamma spectrometry, preparation of the final report of investigations as well as investigations of activities of plutonium and transuranium elements.

**Object of investigations**

Investigations were planned in two plots with characteristics given below.

The plot for construction of a new nuclear power plant (*Case I)* (further – Plot 1). Area of plot is 36.92 hectares. The third reactor of INPP has been under construction in the plot, later it was pulled down to fundament. Constructions of forced concrete have been dismantled down to 1 m of depth. Massive constructions of enforced concrete (fundament) down to 10 m depth have remained in the plot. The area has been re-cultivated.

The plot for construction of a new nuclear power plant (*Case II)* (further – Plot 2). Area of plot is 37.51 hectares. The electricity distribution installations have been constructed in the plot. Later the above-ground constructions were dismantled, while fundament remains.

**Volumes**

Investigations performed for each plot and their volumes are presented in the table below. Volumes of investigations for each plot are the same.

| Nr. | Service | Amount |
|---|---|---|
| 1. | Measurement of gamma dose rate | 500 |
| 2. | Investigation of activity of strontium ($^{90}Sr$) | 16 |
| 3. | Determination of activities of more than two radionuclides by gamma spectrometry | 16 |
| 4. | Sampling of one sample | 16 |

| | | |
|---|---|---|
| 5. | Investigation of activities of plutonium and transuranium elements | 16 |
| 6. | Determination of activities radionuclides by *in situ* gamma spectrometer | 16 |
| 7. | Measurement of radon concentration in soil gas | 16 |

Conclusions

It was determined that values of dose rate recorded in the areas of plots under investigations were in the range of background radiation in Lithuania. No significant dose rate increase which might be related with source of ionizing radiation or contaminated area has been recorded.

Radon concentrations in soil gas were 1 to 30 Bq/$m^3$ in plot 1 and 1 to 66 Bq/$m^3$ in plot 2. Soil in the largest part of areas of plots was clay or clayey, i.e., with low permeability, therefore a radon risk is small and medium.

*Takeover of INPP Infrastrukture*

The existing infrastructure of INPP could be used in conjunction with the new nuclear power plant construction project, especially during the periods of construction and commissioning. Existing INPP infrastructure can potentially and significantly reduce expenses of Visaginas NPP construction project.

The location of construction sites next to INPP provides the opportunity to utilise infrastructure that includes, among others, the cooling water inlet and outlet channels, electric system transmission lines, roads, railways, monitoring systems, warehousing, district heating system, steam and water supply, oxygen, nitrogen and hydrogen supply, new facilities for radioactive waste treatment, interim storage and disposal.

The reuse of the INPP infrastructure and equipment for the purpose of integrating them into the new nuclear power plant has to be examined as to its age and various other aspects to assure the right selection. Among these aspects the intrinsic state-of-technology of the equipment, its compatibility with the coherent new nuclear power plant systems and the management of interfacing old and new plant equipment have to be taken into account as well. In addition, the future new nuclear power plant vendor has to accept its integration. Analysis shows that the only economic savings do not necessarily outweigh the risks involved in this process. The other aspects such as safety, functionality, reliability etc. must be taken into account.

Screening and short listing of existing infrastructure has been implemented already, but it is envisaged, that decisions on taking over and integration will be made in the frame of new NPP design activities.

*Coordination of Territorial Planning Documents*

The Visaginas NPP is intended to be built in the public land lot used by the INPP currently in operation. This land lot has been marked in the master plan of the territory of the Republic of Lithuania („the Master Plan“) as a region of functional priorities of energy interests. The Master Plan is the main planning document governing the long-term strategy for the use and management of the country‘s territory and setting the main planning conditions for the master and special plans on regional/county level. Coordination of the preparation of the territorial planning documents is required in order to include the NPP as a new nuclear energy facility (NEF) in the Master Plan and all the related territorial planning documents under preparation.

Objectives of the project:

1. To ensure that the spatial concept of development and the principles of use and protection of the territory under planning as established in the integrated territorial planning documentation do not contradict the construction of the VNPP.
2. To plan and to design the NPP construction site and industrial (auxiliary and storage) sites.
3. To prepare a territorial planning document establishing a route of transportation of heavy-weight and extra large cargoes to the NPP construction sites.

Project tasks:

1. Coordinate the preparation of the master plans seeking to include the Visaginas NPP as a new NEF and of the detailed plan seeking to establish the boundaries of the NPP sites and the conditions for the management and use of the territory.
2. Draw up a layout of the NPP construction site and industrial (auxiliary and storage) site, i.e. a layout of the land lot.
3. Draw up a special communications plan for the NPP including the identification of the lines, measures and requirements of/for the territorial development and infrastructure management and/or protection.

As the subjects covered by the project are quite varied, the implementation of the project has been divided into works and subprojects. Two subprojects have been identified in the Territorial Planning Project:

1. Coordination of the preparation of territorial planning documents;
2. Preparation of the special NPP communications plan.

A site layout comprising the NPP construction and industrial sites and defining the territorial requirements will be prepared within the scope of the project. Based on the NPP construction and industrial sites' requirements the land lots for the NPP construction will be formed. The land lot layout will form a basis for the preparation of the detailed plan.

The first subproject is a specific one as direct preparation of the territorial planning documents is impossible – public authorities are responsible for their preparation (Ministry of Environment, Utena County Administration and Ignalina, Zarasai and Visaginas municipalities). Therefore, participation in the preparation process is indirect, i.e. through coordination of preparation and ensuring compatibility of the documents. The detailed plan whereby the land lots for the NPP construction will be formed is of particular importance. According to the Procedure for the Preparation, Coordination and Approval of Detailed Plans for the State Border, National Defence and Strategic Objects, detailed territorial planning is organised and funded by the public land manager – the Utena County Governor's Administration. However, the Administration does not have information about the planned plots, territorial requirements etc., so smooth and timely collaboration with the initiators of the detailed plan must be ensured. There are two initiators: JSC "Visagino Atominė Elektrinė" and INPP – and efficient participation and collaboration of these two entities are also important.

The preparation of the special NPP communications plan will be started upon taking over of the rights and responsibilities of the plan's organiser. It can be started once the heavy-weight and extra large cargo transportation route from the State Klaipėda Seaport to the NPP construction sites is established. It is planned that the route will cross several counties and will be made more exact on completion of the route's technical and economic evaluation. On completion of the special plan, a reserve of areas for the elimination of the route constraints will be made and the relevant requirements will be set.

With regard to Coordination of territorial planning documents preparation, the main achievement is that a new Visaginas NPP is involved in all levels of territorial planning. Starting with the Master plan of the State which is the main territorial planning document in Lithuania, the Government approved special resolution concerning involvement of the New NPP. Continuing with general

planning Utena County Governor and Visaginas town municipality council also made decisions to include the new NPP into their regions plans.

The Detailed Plan was initiated in 2009, and VAE was appointed as an official Coordinator of Detail plan. The mail stones have been reached and this document was approved by the Visaginas town municipality council on the 19 of May, 2010.

Planning of VNPP construction and industrial sites was completed, and VNPP site and infrastructure Plan was finished in September, 2009. This plan was used as an input for Detailed Plan.

***Overview of design provisions used against human made external events and natural occurring external events such as fire, explosion, aircraft crash, external flooding, severe weather conditions and earthquakes***

*Site Assessment Against IAEA Safety Requirements*

Potential external factors which may influence the NPP safety and design solutions and which shall be analysed in determining the appropriateness of the potential sites:

- seismic hazards;
- geotechnical aspects;
- meteorological conditions;
- flooding hazards;
- external and human-induced events.

The results of the assessment show whether the selected sites for the construction of the VNPP are compliant with the nati`onal requirements and whether there is a potential of any unplanned dispersion of Projektas pateiktas pastaboms EM, IAE, RATA, UAB VAE cts are quite specific, and therefore, the implementation of the project has been divided into a number of subprojects. There are three subprojects:

1. Evaluation of Geotechnical Conditions
2. Evaluation of Seismic Factors
3. Evaluation of human-induced events and meteorological hazards as well as dispersion of radioactive substances and distribution of population

To support and control the main project “Site Evaluation According to IAEA Safety Standards”, VAE established a special Quality Assurance Programme. The Programme includes the following areas:

- Scope of Quality Assurance Programme;
- Control over Procurement Documentation Implementation;
- Document Management;
- Control over Goods and Services Procured;
- Control over Special Works;
- Inspections and Checks;
- Non-conformances and their control;
- Quality Assurance Records;
- Audit.

The scope of the Project is depicted in the Figure 17.1.3, showing the links among the sub-projects:

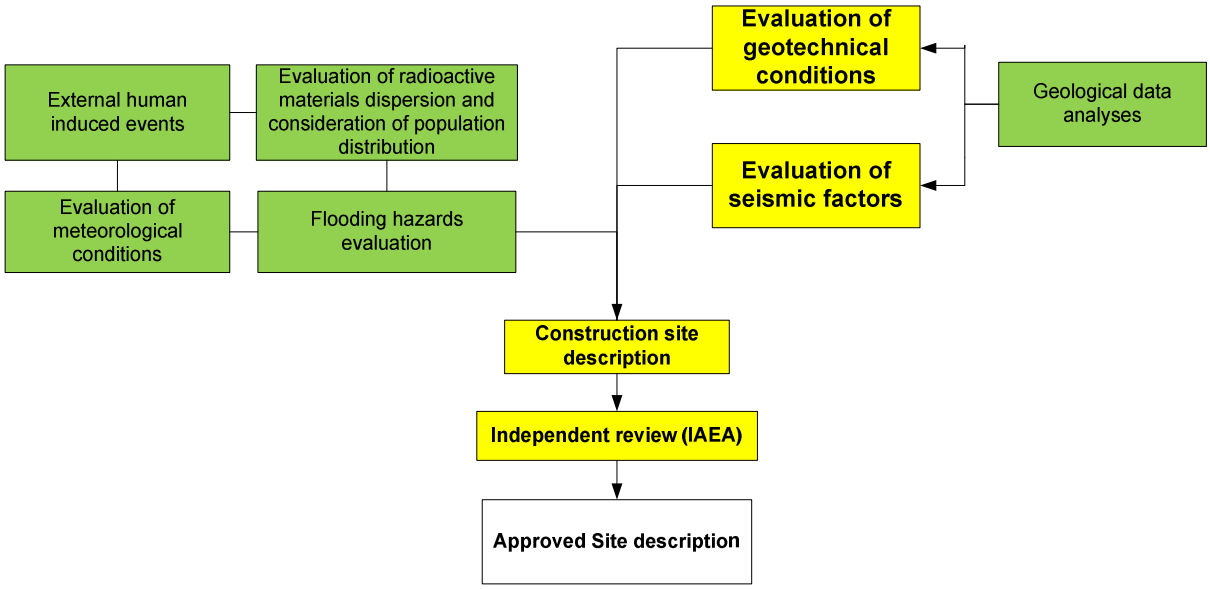



*Figure17.1.3. Scope of the project on site assessment against IAEA requirements*

The scope of the first subproject comprises a soil investigations analysis including the liquefaction coefficient, slopes stability hazards and existing buried structures. The following tasks have been identified: determining the limits and depth of occurrence of weak soils in the sites; assessing the liquefaction potential of soils; and identifying the remnants of buried structures and objects and determining the depth of occurrence of such objects.

The subproject on seismic hazards evaluates the risks of ground movement and surface deformation related to earthquakes and geological phenomena. The focus is on ascertaining the probability of tectonic faults in the NPP construction sites and on determining the degree of the seismic hazard for the sites on SL-1 and SL-2 levels and identifying the range of potential seismic impact.

The subproject on human-induced events and meteorological hazards as well as dispersion of radioactive substances and distribution of population comprises several tasks. The task on external hazards and human-induced events deals with potential non-intentional human-induced events, detailed evaluation of selected events, and evaluation of the sites in the light of the INNP's decommissioning activities and the hazards posed by the INPP's facilities (such as the spent nuclear fuel storage, gas-pipeline etc.). The task on meteorological hazards identifies and describes the meteorological phenomena that may affect the NPP safety and design solutions and determines the quantitative parameters of the phenomena (such as probability, limit values etc.), related hazards and the scope of potential consequences. The task on flooding hazards identifies the phenomena that may result in significant water level fluctuations in the Drūkšiai Lake (both lowering and rising levels) and the related risks of flooding of the sites or other events (flooding of the area during the spring thaw, rains etc.), which may affect the NPP design solutions. The evaluation of the radioactive substances' dispersion by air, surface water and groundwater and its impact upon population comprises a separate task. In addition, the scope of this task includes an analysis of population density and distribution and the setting out of the key principles of an emergency response plan.

It is important to note that an analysis of geological conditions has already been made, the purpose of which was to analyse the previously completed investigations and studies of the interior of the Earth in the area of the INPP as well as other investigations and studies related to the sites of construction of the new NPP. The said analysis resulted in the drafting of the Terms of Reference for the geotechnical and seismic studies.

Evaluation of radioactive materials dispersion and consideration of population distribution was implemented in the scope of EIA project. Evaluation of external events, meteorological conditions and flooding hazards was completed in June 2009.

Along with evaluation the site description will be prepared. The values of site specific parameters, which are necessary for future designer to adapt NPP design to the site conditions, will be defined. Moreover, this information will be used during preparation of the preliminary safety analysis report (PSAR). It is also highlighted that IAEA mission is planned for independent review of construction site description. Although mission is foreseen in December, 2010, the organizational activities for mission preparation have started in mid October, 2009.

## 17.2. Article 17 (2) - Impact of the installation on individuals, society and environment

### *17.2.1. Criteria for evaluating the likely safety related impact of the nuclear installation on the surrounding population and the environment*

According to the Law on the Proposed Economic Activity the safety related impacts of nuclear installations on the population and environment shall be defined in EIA report. The report shall contain the following information: description of pollutants to be generated; description of waste generation and management; description of components of the environment potentially to be impacted by the proposed economic activity; description and evaluation of any potential direct and indirect impact of the proposed economic activity upon public health, flora and fauna, soil, surface and subsurface of the Earth, air, water, climate, landscape and biodiversity, material values, immovable cultural heritage and interaction among the aforesaid components of the environment; description of measures provided for in order to avoid, reduce, compensate the negative impact upon the environment or to liquidate consequences thereof; analysis of alternatives identified by the preparer of EIA documents, including reasons for selection taking account of best available manufacturing techniques and potential impact upon the environment; information about problems of technical or practical nature that the preparer has encountered in the course of preparation of the EIA documents; informational about potential emergencies as well as relevant prevention measures and emergency response measures; analysis of findings of environmental monitoring (if any), outline of any planned monitoring; and summary of all the information contained in the report. According to this Law, it is possible to decide whether the proposed economic activity by virtue of its nature and environmental impacts may be carried out on the chosen site only after having performed environmental impact assessment.

A proposed nuclear activity (nuclear power stations and other nuclear reactors, including decommissioning of power stations or reactors; production, processing, enrichment, storage and disposal of nuclear fuel) is included in Annex I, the List of the Types of Proposed Economic Activities that shall be Subject to the EIA according to the Law on Environmental Impact Assessment of the Republic of Lithuania, it means that environmental impact assessment for such activities is obligatory.

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

- The Law on Environmental Impact Assessment of the Proposed Economic Activity (1996, last amended in 2005);
- Governmental Resolution On Empowering the Ministry of Environment and the Subordinate Institutions (2000, last amended in 2003);
- The Order of the Minister of Environment on Approval of Regulations on Preparation of the Environmental Impact Assessment Program and Report (2000, revised 2006);
- The Order of the Minister of Environment on Informing the Public and Public Participation in the Process of Environmental Impact Assessment (2000, revised 2006);
- The Order of the Minister of Environment on Approval of Guidelines on the Quality Control of Environmental Impact Assessment of a proposed Economic Activity;

- The Order of the Minister of Environment on Investigating the Environmental Impact Assessment Document at the Ministry of Environment and Subordinate institutions (2000, revised 2006).

Lithuanian Hygiene Standard HN 73:2001 defines dose limits for members of the public:

- The limit for effective dose – 1 mSv in a year;
- In special circumstances limit for effective dose – 5 mSv in a year provided that the average over five consecutive years does not exceed 1 mSv in a year;
- The limit on equivalent dose for the lens of the eye – 15 mSv in a year;
- The limit on equivalent dose for the skin – 50 mSv in a year. This limit has to be averaged over 1 $cm^2$ area of skin subjected to maximal exposure.

In optimization of radiation protection the source related individual dose is bounded by a dose constraint. The dose constraint for each source is intended to ensure that the sum of doses to critical group members from all controlled sources remains within the dose limit. According to requirements of the HN 87:2002 the exposure of population shall be limited by application of dose constraint during design, operation (both normal operation conditions and anticipated operational occurrences) and decommissioning of nuclear facilities. If more than one nuclear facility contributes to the exposure of the population, the total sum of annual effective doses to members of the public from all contributing nuclear facilities shall not exceed the dose constraint. The established dose constraint for members of the public is 0.2 mSv per year.

According to requirements of the LAND 42-2007, if radionuclides are dispersed into the environment by several pathways (e.g. by atmospheric and water paths) and the members of the same or different critical groups of population are impacted, the particular pathway resulting dose shall be limited in such a way that the total sum of doses from all pathways shall not exceed the dose constraint. The impact due to direct external ionizing irradiation shall be taken into account and the total dose (due to radioactive emissions and due to direct irradiation) to the critical group member of population shall not exceed the dose constraint.

According to HN 87:2002 safety of the new designed and constructed nuclear power plant shall assure that during operation or decommissioning the dose for the members of public caused by one design basis accident shall be less than the intervention level applied for protective action – sheltering, i.e. 10 mSv. The limit of release after a severe accident must not cause acute health effects to the population in the vicinity of the NPP, nor should it cause long term restrictions on the use of extensive areas of land or water.

### *17.2.2. Implementation of these criteria in the licensing process*

Participants of the environmental impact assessment shall be as follows:

- Competent authority – Environmental Protection Agency (till May 2010 the competent authority was Ministry of Environment) as competent authority coordinates the environmental impact assessment (EIA) process. This institution also investigates and approves EIA programs, examines the proposals of the public, the EIA reports and conclusions issued by other relevant parties and makes justified decisions if the proposed economic activity, taking into account it's nature and size, may be carried in a chosen site.
- Environmental Protection Agency also has the right to require amendments or correction of EIA documents, if the quality of EIA documents is not satisfactory, or some topics are not adequately covered.

- Relevant parties of the EIA – governmental institutions, responsible for health protection, fire-prevention, protection of cultural heritage, development of economy and agriculture, and municipal administrations. In some cases, assistance of additional governmental institutions might be required. As regards radioactive waste management facilities State Nuclear Power Safety Inspectorate and Radiation Protection Centre participate in the EIA process as relevant parties. The relevant parties of EIA, in accordance with their competence review the EIA programs and reports and provide conclusions regarding the EIA programs, reports and the feasibility of the proposed economic activity. They also have the right to require for amendment or corrections of the EIA documents if the topics within the scope of their competence are not investigated sufficiently.
- Organiser of the proposed nuclear activity (developer).
- Preparer of EIA documentation that is obliged by organiser (developer).
- The public.

The preparer of EIA documentation obliged by the organizer (developer) shall carry out EIA procedures and prepare EIA documentation:

- **EIA program** shall include at least the following information: short description of the main alternatives studied by the preparer of the EIA documents; short description of the technical characteristics, technological process and materials planned to be used, as well as needed amount of natural resources and land use (during the construction and operation phases); short description of the territories that could be significantly affected; information about what components of the environment and what impacts will be analysed during the EIA; information on what aspects the impacts of the proposed economic activity on public health will be analysed; methods that will be used to predict and assess the effects on the environment, measures envisaged to avoid, reduce or offset negative environmental effects; information whether proposed economic activity may cause a significant negative impact on the environment of any foreign State; other important information.

The prepared program is submitted to the relevant parties of EIA that examine EIA program and provide conclusions in accordance with their competence. Relevant parties also have right to require for amendment or corrections of the program if the topics within the scope of their competence are not investigated sufficiently. Then the conclusions from all relevant parties of EIA and EIA program are submitted to the competent authority (Environmental Protection Agency), which reviews these documents and approves EIA program, however competent authority also has right to require for amendments and correction of the program.

- **EIA report** is prepared by the preparer of EIA documents. The report shall include at least the following information: information about the organizer (developer) of the proposed economic activity; information about the preparer of EIA documents; detailed information according to the topics of the EIA program and also additional information: description of the expected pollutants (names, calculations, hazardousness, risk group, etc.); description of waste generation and management; components of the environment that could be affected by the proposed economic activity; description and assessment of potential impacts of the proposed economic activity on public health, fauna and flora, soil, earth surface and underground, water, environmental air, climate, landscape, biodiversity, economic conditions, cultural heritage and the interaction of these components; methods that were used to predict and assess the effects on the environment; a description of measures envisaged to avoid, reduce or offset negative environmental effects or to alleviate their consequences; analysis of the alternatives and

the indication of the reasons for the choice, taking into account the best available modes and production of potential environmental impact, at least several alternatives (e.g. Alternative locations, timings, technical and technological solutions, environmental impact mitigation measures) shall be investigated in the report, including the "zero" alternative, that refers to the environmental conditions and natural changes in the environment if the activity is not carried out and is used as the environmental baseline evaluation and a base for assessment and comparisons; identification of possible emergencies and accident-avoidance and emergency measures; analysis of environmental monitoring data (if available) and plan for environmental monitoring; a summary of all information considered in the report; other information that shall be included in the report (a description of technical or practical problems encountered by the preparer of the EIA documents in performing the EIA).

The developer informs the public about its completion and the forthcoming public hearing. Public hearing is organized by the developer. The public may submit motivated proposals regarding the environmental impact assessment and EIA report. According to the justified proposals of the public, amended report is provided to EIA relevant parties, which make conclusions regarding the report and the possibilities to carry out the proposed economic activity.

In July 2007, the environmental impact assessment of the construction of a new nuclear power plant in Lithuania has begun. The impacts on general public and environment of the new NPP were evaluated and it was agreed by the Lithuanian regulatory authorities. In April 2009, the Ministry of Environment has taken a decision on the feasibility of the construction of nuclear power plant from environmental point of view that the construction and operation of new nuclear power plant with the power capacity up to 3400 $MW_{el}$ in the examined sites is permissible. The entire report and other related information is available at VAE site: http://www.vae.lt/en/pages/environmental impact_assessment.

Other decisions made during 2007-2009 on EIA of proposed nuclear activities:

- 30-05-2007 Ministry of Environment made screening conclusion that for the extension of the current interim spent fuel storage facility by installing additional space for 10 containers EIA (environmental impact assessment) is not mandatory.
- 21-11-2007 Government of Lithuania adopted Governmental Resolution on Designing of the Near Surface Repository of the Radioactive Waste. Resolution stated that repository will be constructed in Stabatiske site (in the territory of INPP). This resolution was adopted taking into account the decision of the Ministry of Environment of Lithuania regarding the feasibility of establishing a near surface repository for low and intermediate level short-lived radioactive waste considering its environmental impacts (decision regarding EIA).
- 30-11-2007 Ministry of Environment of Lithuania made a decision regarding the feasibility of constructing an interim storage facility of spent nuclear fuel (in the territory of INPP) considering its environmental impacts (decision regarding EIA).
- 15-07-2008 Ministry of Environment of Lithuania made a decision regarding the feasibility of constructing new solid waste management and storage facility at INPP considering its environmental impacts (decision regarding EIA).
- 11-08-2008 Ministry of Environment made screening conclusion that for the extension of the current interim spent fuel storage facility by installing additional space for 12 containers EIA is not mandatory.
- 21-04-2009 Ministry of Environment of Lithuania made a decision regarding the feasibility of constructing new nuclear power plant in Lithuania considering its environmental impacts (decision regarding EIA). New nuclear power plant will be constructed in the territory of INPP.

- 05-08-2009 Ministry of Environment of Lithuania made a decision regarding the feasibility of constructing landfill facility for short-lived very low level waste in the territory of INPP considering its environmental impacts (decision regarding EIA).
- 05-08-2009 Ministry of Environment of Lithuania made a decision regarding the feasibility of decontamination and dismantling of INPP Building 117/1 equipment (decision regarding EIA).

## 17.3. Article 17 (3) – Re-evaluation of site related factors

### *17.3.1. Activities for re-evaluation of the site related factors as mentioned in Article 17 (1) to ensure the continued acceptability of the safety of the nuclear installation*

Some INPP site-related factors were evaluated by VNPP during preparatory works for construction of the new nuclear power plant, because plots investigated overlaps with land lot used by the INPP currently being decommissioned. However, results obtained during investigation will be applied for NNPP and not for INPP which is under decommissioning. Other re-evaluation of site related factors was not performed.

## 17.4. Article 17 (4) – Consultation with other Contracting Parties likely to be affected by the installation

### *17.4.1. International arrangements*

Environmental impact assessment in a transboundary context is regulated by the Law on Environmental Impact Assessment of the Proposed Economic Activity and by the United Nations Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). The parties to the Convention are entitled to participate in an environmental impact assessment procedure of the proposed nuclear activity (nuclear power stations and other nuclear reactors, including decommissioning of power stations or reactors; production, processing, enrichment, storage and disposal of nuclear fuel) carried out in Lithuania if the detrimental environmental impacts of the project could potentially affect the country in question. Correspondingly, Lithuania is entitled to participate in an EIA procedure concerning a project located in the area of another country if the impacts of the project could potentially affect Lithuania.

For other projects the transboundary impacts are analyzed through screening procedure. If competent authority decides that project might have significant transboundary effects national and transboundary EIA procedure will be applied.

The Ministry of Environment is responsible for the practical organization of the environmental assessment procedures in a transboundary context. The Ministry of Environment has informed the respective authorities of Latvia, Estonia, Poland, Belarus, Finland, Sweden and Russia about the commenced environmental assessment process of the new nuclear power plant in Lithuania and inquired about their intent to take part in the environmental assessment procedure. Countries, participating in the EIA process of the new NPP, were provided with the EIA report. Austria, Belarus, Estonia, Finland, Latvia, Poland and Sweden submitted their remarks and recommendations to the EIA report. It should be noted that out of the countries participating in the EIA process only Belarus, Latvia, Poland and Austria expressed the interest to hold further consultation meetings on the issues of the largest concern for them. Authorities of Belarus, Latvia, Poland and Austria responsible for the EIA process submitted comments and conclusions of their experts to the Ministry of Environment, and these comments and conclusions were discussed during series of interstate consultations, held in Vilnius from November 2008 to February 2009.

In accordance with the Article 37 of Euratom Treaty and Lithuanian Regulation on Providing of General Data Concerning Plans for the Disposal of Radioactive Waste, General Data relating to any plan for the disposal of radioactive waste it is submitted to the Commission of the European Communities.

### *17.4.2. Bilateral arrangements with neighbouring States, as applicable and necessary*

Information about nuclear facilities and activities on territory of Lithuania shall be submitted to neighboring countries according the bilateral agreements.

In 1994 Lithuania signed an Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Poland on the implementation of the Convention on Environment Impact Assessment in a Transboundary Context.

Lithuania has intention to sign bilateral agreements with Latvia and Belarus. The draft Agreement between the Government of the Republic of Lithuania and the Government of the Republic of Belarus on the implementation of the Convention on Environment Impact Assessment in a Transboundary Context was prepared and sent to Belarus.

# ARTICLE 18 DESIGN AND CONSTRUCTION

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

1. *the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;*
2. *the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;*
3. *the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.*

## 18.1. Article 18(1) – Implementation of the "defense-in-depth" concept

### *18.1.1. Overview of the arrangements and regulatory requirements concerning the design and construction of nuclear installations*

A necessity to implement the "defence-in-depth" concept at all stages of safety related activities (including design and construction) is going to be comprehensively explained in draft regulation “General Regulations for Nuclear Power Plant Design”. The corresponding items are going to be prepared according to IAEA recommendations and best international practice. This regulation will be applied for new designs. For existing INPP position about ‘defence-in-depth’ stated in the "General Regulations for Nuclear Power Plants with RMBK-1500 type reactors Safety", item 10 of which reads: "10. The safety of a nuclear plant shall be guaranteed by applying of the principle of "defence-in-depth", i.e. by the sequential implementation of protection measures based on a system of barriers to prevent the spread of ionizing radiation and radioactive materials to the environment, and systems of technical and organizational measures to protect these barriers and retain their effectiveness, and also to provide direct protection for the population.

The system of barriers includes:

- the fuel matrix;
- the fuel element cladding;
- the boundary of the primary coolant circuit;
- the hermetically sealed protective enclosure surrounding localizing safety systems.

The system of technical and organizational measures includes:

- the selection of an appropriate site for the nuclear plant;
- the establishment of a sanitary-protection zone and a monitoring zone around the plant;
- a conservative approach to plant design incorporating fail-safe characteristics in the reactor itself and specific safety systems;
- quality assurance designed to guarantee the requisite systems (components) of plant and of all work carried out at the plant;
- nuclear plant operation in accordance with norms and technical requirements;
- maintenance of safety-related systems in good operating conditions through the implementation of preventive maintenance measures and replacement of worn-out components;
- timely diagnosis of defects, detection of any deviations from normal functioning, and implementation of measures to remove their causes;

- organization of an effective system for registration of the operational results and monitoring measures;
- implementation of measures designed to prevent initiating events from developing into design-basis accidents, and design-basis accidents from developing into beyond-design-basis accidents;
- mitigation of the consequences of accidents which could not be effectively forestalled through localization of the radioactive materials released;
- measures designed to protect localizing safety systems against destruction during beyond-design-basis accidents and to maintain them in a functional state;
- preparation, and scrupulous implementation when required, of emergency plans for the site itself and the area surrounding the site;
- selection and training of operating personnel for the actions required in both normal and emergency conditions;
- inculcation of safety culture.

The principle of "defence-in-depth" is activated at all stages of safety-related activities. During normal operation all barriers and all means designed to protect them must be in good operating condition. If any of the barriers provided in the plant design or any of the means intended to protect those barriers (in the frames of justified conditions of safe operation) are found to be out of order, operation at power is not permitted.

The extent, to which the various safety functions are to be implemented, is specified in norms and technical requirements, and for each individual plant shall be stated and justified in the technical design" (The end of item 10).

*18.1.2. Status with regard to the application for all nuclear installations of the defence in depth concept, providing for multiple levels of protection of the fuel, the primary pressure boundary and the containment, with account taken of internal and external events*

INPP safety is provided by engineering devices and organizational activities, which ensure that the internal and external exposure of staff and public, pollution of environment by radioactive products under normal and design accidents do not exceed the prescribed limits. After final shut down of INPP Unit 1 and Unit 2 the extent of application of "defense-in-depth" principle was considerably reduced but remains in corresponding amount, for example amount of inspection of pressure boundary is reduced, but still foreseen; the emergency shutdown system in Unit 2 is still active, although some equipment is decommissioned due to that the range of its operation was foreseen only for operation of unit; control room still is operated by operators, although number of them in a shift was reduced taking into account inoperability of turbine and a wide set of other systems.

*18.1.3. Implementation of design measures (plant modifications, backfitting) to prevent beyond design basis accidents or to mitigate their radiological consequences if they were to occur*

In INPP were implemented a set of technical and organisational measures concerning management of beyond design basis accidents (see article 6). Due to final shut down of INPP extent of the measures is reduced.

*18.1.5. Improvements implemented for designs for NPP's as a result of deterministic and probabilistic safety assessments made since the previous National Report; and an overview of main improvements implemented since the commissioning of the NIs*

INPP activity for safety improvement is based upon priorities to meet the modern requirements of national and international safety standards, upon results of the analysis, carried out in SAR-1, SAR-2 and RSR scope, also it includes additional calculations, implementation of VATESI guidelines, modifications, which improve the system reliability, thus providing the INPP safety. Managerially this activity is fulfilled within the framework of SIP-1 (1993-1996), SIP-2 (1997-2004) and SIP-3 (2005 – 2009).

The first safety improvement program (SIP-1) was prepared by INPP in 1993-1996. It was the short-term program. SIP-1 was financed from the INPP resources, EBRD/NSA and western countries grants, mainly Swedish through Swedish International Project on Nuclear Safety (SiP). The most essential INPP activity under the SIP-1 program was the preparation of SAR-1. Based on the results of SAR-1 conclusions INPP have received the license for Unit 1 operation.

SAR-1, RSR-1 and ISP International Panel recommendations became the basis for the following Safety Improvement Programme (SIP-2) for the period of 1997 – 2004 years. Additionally SIP-2 included: engineering activity for safety improvement determined by INPP or proposed by the western experts. The most essential INPP activity under the SIP-2 program was the preparation of SAR-2. Based on the results of SAR-2 conclusions INPP have received the license for Unit 2 operation.

SAR-2, RSR-2 and Unit 2 safety justification report recommendations became the basis for the new Safety Improvement Program (SIP-3) for the period of 2005-2009.

Detail information about implemented improvements is presented in section 6.3.

#### *18.1.6. Regulatory review and control activities*

The implementation of the measures linked to “defense-in-depth” principle were controlled by regulatory authority in the frame of control of implementation of Safety Improvement Program (SIP, see article 6), of implementation separate modifications according regulations, and by ordinary regulatory inspections. Large scale modifications were reviewed by regulator together with its technical support organisations.

### 18.2. Article 18 (2) - Incorporation of proven technologies

#### *18.2.1. Arrangements and regulatory requirements for the use of technologies proven by experience or qualified by testing or analysis*

A necessity to incorporate proven technologies at the NPP design stage is stated in the IAEA NS-R-1 Requirements “Safety of Nuclear Power Plants: Design”.

As well as Lithuania regulations require that the technical and organizational arrangements made to ensure plant safety must be proven by prior experience or testing, experimental investigations and operational tests on prototypes, and must conform to the norms and technical requirements adopted for the nuclear power sector.

This approach is to be taken not only in the design of equipment and of the plant as a whole, but also in the actual manufacture of equipment and in the construction and operation (decommissioning) of the plant.

All contracting parties involved in design, manufacturing, installation and testing activities were/will be selected by open tenders taking into account the previous design expertise, manufacturing, installation and testing experience. Contracting parties involved in safety analysis activities were/will be selected by open tenders taking into account the previous experience in this area.

*18.2.2. Measures taken by the licence holders to implement proven technologies*

INPP as licence holder and its contracting parties meet the above requirements. The INPP design was based on the operation experience of previously designed and constructed NPPs with RBMK-1000 reactors. The main differences in comparison with RBMK-1000 reactors are:

- The reactor power is increased keeping the same dimensions of the reactor and the same number of fuel assemblies;
- ALS is introduced.

Increasing of the reactor power was achieved by increasing of power take-off from each fuel assembly using specifically designed spacers, which act as turbulence enhancers to improve the heat transfer characteristics. The safety of the improved fuel assembly was analyzed and demonstrated to be adequate by appropriate supporting research programme and by examination at special test rig before using in reactor. The safety was confirmed during the reactor operation.

Design of ALS was based on engineering calculations and was justified in the plant SAR. The ALS was qualified and required characteristics of the system were examined by tests.

Proven technologies are used by INPP at present time in process of INPP decommissioning. Main stages of decommissioning are:

- Preparation of decommissioning programme, design documents, safety analysis reports and other needed documents;
- Reactor defueling;
- Defueling of the spent fuel storage pools;
- Dismantling of plant equipment and demolishing of structures and buildings;
- Treatment and disposal of radioactive waste.

At the stage of decommissioning preparation, commonly accepted proven practice was used. Contracting parties involved in decommissioning preparation activities were selected by open tenders taking into account the previous experience.

At the stage of reactor defueling, the existing defueling procedures and facilities are used, which were used for reactor refueling during operation. All defueling works are performed by skilled INPP staff. The refueling/defueling procedures and facilities were tested many times during INPP operation and INPP staff has a good practice to perform reactor defueling. So, undoubtedly proven technology is used at the stage of reactor defueling. No contracting parties were involved in the reactor defueling works.

At the stage of the spent fuel storage pools defueling, spent fuel containers, procedures and facilities are used, which were used for spent fuel handling and storage during INPP operation. All defueling works are performed by skilled INPP staff. The containers, procedures and facilities used during the spent fuel storage pools defueling were tested many times during INPP operation and INPP staff has a good practice to perform all needed operations. So, undoubtedly proven technology is used at the stage of the spent fuel storage pools defueling. No contracting parties were involved in the spent fuel storage pools defueling works.

The comprehensive safety analysis was carried out before the stages of reactor defueling and spent fuel storage pools defueling. Contracting parties involved in safety analysis activities were selected by open tenders taking into account the previous experience in this area.

At the stage of dismantling of plant equipment and demolishing of structures and buildings, commonly accepted technologies are used (for Unit 1) and will be used (for Unit 2). Special attention is focused on monitoring and control of the equipment and waste radioactiveness. The comprehensive safety analysis was carried out (for Unit 1) and will be carried out (for Unit 2) before the stage of dismantling of plant equipment and demolishing of structures and buildings. Contracting parties involved in dismantling/demolishing works are selected and will be selected by

open tenders taking into account the previous experience in this area. A part of these works will be performed by skilled INPP staff familiar with plant equipment.

Technology of treatment and disposal of radioactive waste is based on Lithuanian norms and relevant IAEA standards and on the well-known world-wide practice. The comprehensive safety analysis is carried out before the works of treatment and disposal of radioactive waste.

The decision to build new nuclear power plant was taken by Lithuanian government. The new nuclear power plant, which was named Visaginas NPP, will be designed in accordance with nuclear energy legislation, regulatory guidelines and nuclear safety standards. Visaginas NPP as licence holder and its contracting parties will meet all the safety requirements and will take all measures to use proven technologies. The latest safety requirements will be taken into account in Visaginas NPP. The reactor type to be chosen for the new NPP in Lithuania shall be safe, employ proven technology and be in line with the most recent developments in nuclear technology. The possible technical alternatives for nuclear reactors being considered for the new nuclear power plant in Lithuania are all generation III or III+ reactors. Contracting parties, which will be involved in all activities, will be selected by open tenders taking into account the previous experience in suitable areas.

### *18.2.3. Analysis, testing and experimental methods to qualify new technologies, such as digital instrumentation and control equipment*

Many modifications were introduced into the design of INPP systems to improve reliability and safety during INPP operation. Most of improvements were based on proven technologies but some of them were unique. The most important unproved modifications are:

- Additional protection systems were designed and introduced;
- Diverse Shutdown System was designed and introduced;
- System of irradiated fuel transportation from Unit 1 to Unit 2 was designed and introduced.

The purpose of additional protection systems is to ensure ATWS for most important ATWS scenarios and to provide new emergency protections such as Low Operational Reactivity Margin protection and Low Coolant Flow protection. These systems are computer based redundant systems with independent trains. All systems were qualified by testing. The comprehensive safety analysis was carried out before the implementation of each protection system.

The purpose of DSS is to provide an independent and diverse way to shut down the reactor if the existing shutdown system fails. DSS consists of independent sensors, computer based initiating part and diverse control rod drives. The sensors and initiating part of DSS are redundant with independent trains. All parts of DSS were qualified by testing. The comprehensive safety analysis was carried out before the implementation of this system.

The purpose of transportation system is to transport the irradiated fuel from Unit 1 to Unit 2 with aim to use the remaining power potential. The special transport container and supporting systems were designed and introduced to provide the radiation shielding and safety during irradiated fuel assemblies loading/unloading to/from container and transportation between Units 1 and 2. All parts of the transportation system were qualified by analysis or testing. The comprehensive safety analysis was carried out before the implementation of this system.

The correctness of all new design decisions was confirmed by the safe operation of INPP.

### *18.2.4. Regulatory review and control activities*

VATESI performs review and inspection activities in both INPP and VNPP. VATESI activities cover all important aspects of plant specifying, designing, contracting, construction, equipment

manufacturing, qualification, testing, installation, plant commissioning, operation, maintenance and decommissioning. An important part of these aspects is using of proven technologies at all stages of NPP life cycle. The special attention is focused on design analysis, compliance with safety standards, safety justification, reliability calculation, environmental qualification and functional testing of newly designed equipment, components and systems.

## 18.3. Article 18 (3) – Design for reliable, stable and easily manageable operation

### *18.3.1. Overview of the arrangements and regulatory requirements for reliable, stable and easily manageable operation, with specific consideration of human factors and the human–machine interface*

Competencies of VATESI and responsibilities of a licence holder are described in Article 9 of this report.

The "Nuclear Safety Regulations for the Reactor's of Nuclear Power Plants" (VD-T-001-0-97) define in detail the requirements for NPP Safety. The regulations require that design of the NPP's (their systems, structures and components) shall be optimal for operator performance. It is required within this document that:

- the working areas and working environment of the site personnel shall be designed according to ergonomic principles;
- systematic consideration of human factors and the human-machine interface shall be included in the design process at an early stage and shall continue throughout the entire process, to ensure an appropriate and clear distinction of functions between operating personnel and the automatic systems provided;
- the human-machine interface shall be designed to provide the operators with comprehensive but easily manageable information, compatible with the necessary decision and action times;
- verification and validation of aspects of human factors shall be included at appropriate stages to confirm that the design adequately accommodates all necessary operator actions;
- as equipment operator, the operator shall be provided with sufficient information on parameters associated with individual plant systems and equipment to confirm that the necessary safety actions can be initiated safely;
- the design shall be aimed at promoting the success of operator actions with due regard for the time available for action, the physical environment to be expected and the psychological demands to be made on the operator. The need for intervention by the operator on a short time-scale shall be kept to a minimum. It shall be taken in to account in the design that the necessity for such intervention is only acceptable provided that the designer can demonstrate that the operator has sufficient time to make the decision and to act; that the information necessary for the operator is simply and unambiguously presented.

The "General Regulations for Nuclear Power Plant Safety" (VD-B-001-0-97, from 5 February 2010 – BSR-2.1.2-2010) require that design of a NPP shall be optimal for operator performance as well as provide means to eliminate single personnel errors or mitigate their consequences, including those during the maintenance. NPP control room shall contain equipment which provides information about the plant operational state and any deviations from normal operation as well as which monitor the state of the plant safety system during operation and their functioning during operational transients and accidents.

The information on regulatory requirements related to management of human factor and the corresponding INPP arrangements is presented within Article 12 of this report (see sections 12.1. and 12.2., respectively).

### *18.3.2. Implementation measures by the licence holder*

The final shut down of INPP Unit 1 was in 2004. After the final shut down of the remaining INPP Unit 2 on 31 December 2009 the licence holder performs preparations to decommission the units. INPP does not plan to operate the units, as well as to change or modify them for reliable, stable and manageable operation.

INPP operating personnel ensures safety of INPP and undergoes necessary training and examinations to remain competent for the assigned tasks.

### *18.3.3. Regulatory Review and Control Activities*

INPP preparations to decommission INPP as well as the related organizational changes important to INPP safety are monitored and assessed by VATESI. Information of functions and activities of VATESI is presented in Article 9 of this report.

# ARTICLE 19 OPERATION

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

*i. The initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning program demonstrating that the installation, as constructed, is consistent with design and safety requirements;*

*ii. Operational limits and conditions derived from the safety analyses, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;*

*iii. Operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;*

*iv. Procedures are established for responding to anticipated operational occurrences and to accidents;*

*v. Necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;*

*vi. Incidents significant to safety are reported in a timely manner by the holder of the relevant license to the regulatory body;*

*vii. Program to collect and analyze operating experience are established, the results obtained and the conclusions drawn are acted upon and the existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;*

*viii. The generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.*

## 19.1. Article 19(1) – Initial authorization

### *19.1.1. Overview of the arrangements and regulatory requirements for the commissioning of a nuclear installation, demonstrating that the installation, as constructed, is consistent with design requirements and safety requirements*

The licensing process of nuclear installation is described currently in Law of the Republic of Lithuania on Nuclear Energy and Provision on Licensing of Nuclear Related Activities in Energy Sector. Construction of a new nuclear power plant or a new nuclear reactor, as well as decommissioning of any nuclear installation can be commenced only if the relevant Law proposed by the Government has been enacted by the Seimas (Parliament). Construction of a new nuclear power plant or a new nuclear reactor, as well as decommissioning of any nuclear installation can be commenced only if the technical design has been duly approved and relevant license (permit) has been issued by the state control and supervision authorities. The Law of the Republic of Lithuania on Nuclear Energy foresees an issuance by State institutions of permissions for first carrying in of nuclear fuel into site of any nuclear reactor, for first loading of fuel into reactor core and for first start-up of a reactor.

There are no valid specific arrangements of commissioning of NI in legal acts yet. The concept of commissioning is planned to be described in Law of the Republic of Lithuania on Nuclear Energy, which currently is in preparation, the draft of specific requirements is going to be prepared.

*19.1.2. Conduct of appropriate safety analyses*

In current legislation is stated, that Safety analysis shall be provided by claimant for construction, operation and decommissioning of nuclear installation. Content of SAR shall be approved by Regulatory Authority.

*19.1.3. Commissioning programmes*

The commissioning program of INPP was developed prior to INPP start-up. The Program was agreed with the General Designer of INPP, General Designer of Reactor, Scientific Adviser and endorsed by the regulating body and approved by the Operating organization. Pre-commissioning tests gave the evidence that the whole INPP and its individual units, safety systems and 127 components, normal operation systems, safety-related systems operate as designed. Each Unit of INPP was brought to first criticality and power in accordance with the statuary procedures upon receipt of the corresponding permit from the regulating authority. When implementing each INPP unit commissioning program, the physical parameters of the reactor, safety systems and all components were determined, as well as the operating parameters of the safety-related systems and components, and the limits and conditions of safe operation. The operation procedures were corrected on the basis of start-up work performance. Following the full scale tests of the systems and components, each unit was accepted to put into commercial operation.

*19.1.4. Programmes of verification that installations, as constructed, are consistent with the design and in compliance with safety requirements;*

See 19.2.2.

*19.1.5. Regulatory review and control activities*

The Regulatory Authority granted an operating permit for each INPP unit. In accordance with the Operation Licenses conditions and regulation “Rules for issuance of permissions to start units after outage or short-term shutdowns”, during operation period permits were obtained after each outage.

## 19.2. Article 19(2) – Operational limits and conditions

*19.2.1 Overview of the arrangements and regulatory requirements for the definition of safe boundaries of operation and the setting of operational limits and conditions*

The main position for INPP is stated in clause 147 BSR-2.1.2-2010 that the principal document defining safe operation is the Technical Specification, which lays down main modes and functions of safe operation as well as general sequence the performance of all operations related to plant safety, and also specifies the limits and conditions of safe operation. The limits and conditions of safe operation shall be justified by design and/or other relevant documents”.

### *19.2.2 Implementation of operational limits and conditions, their documentation, training in them, and their availability to plant personnel engaged in safety related work*

For INPP, the limits and conditions of safe operation was set and justified in the Technical Safety Justification prepared by the plant Main Designer NIKIET and Scientific Adviser "Kurchatov Institute" and the General Designer (St-Petersburg, Russia). In the frames of in-depth safety assessments for INPP Unit 1 and Unit 2 - SAR-1 and SAR-2 respectively the limits and conditions of safe operation were reviewed and their correctness was confirmed.

Technical Specification - The basic document specifying the safety of INPP and determining the limits and conditions of safe operation - shall be reviewed every three years. If necessary, the relevant corrections are incorporated to the Technical Specification in case the norms, standards and regulations have changed in course of system and equipment modifications or operation experience of INPP. Each new issue of the Technical Specification or after each update of the Technical Specification it shall be endorsed by the Regulating authority of the Lithuanian Republic. Each new issue of the Technical Specification or after each update of the Technical Specification it shall be endorsed by the Regulating authority of the Lithuanian Republic.

As long as there is nuclear fuel in the reactor core or in the storage pools, INPP Units 1 and 2 are considered to be nuclear facilities. At this stage all decommissioning activities are to be carried out in accordance with the design requirements as well as the limits and conditions of safe operation.

Safety of Unit 1 decommissioning at the stages of reactor defueling and fuel removal from the pools is justified in Unit 1 DSAR for Defueling Stages 1 and 2, which was agreed by the Regulatory authority of the Republic of Lithuania in 2005. Unit 1 DSAR specifies the safety-related systems and components, which shall remain in operation during Unit 1 decommissioning.

In accordance with DSAR content of Technical Specification of Unit 1 was reduced and adapted for fuel removal from the core phase. After removal of spent fuel from the core at the end of 2009 the content Technical Specification was reduced once again and adapted for fuel removal from the storage pools. This activity included review of all relevant operation and maintenance procedures related to Unit 1 systems and components which remain in operation during stage 2 of Unit 1 defueling.

INPP Unit 2 decommissioning Safety Case covering reactor defueling and fuel removal from the pools stages is part of Unit 2 DSAR for Defueling Stages 1 and 2, which is currently being reviewed by the Regulatory Authority of the Republic of Lithuania.

The validity of the Technical Specification for Operation of Unit 2 has been extended until 31 December 2010. Operation and maintenance manuals for Unit 2 systems and components are currently being reviewed taking into account shutdown state and new organizational structure which was implemented at INPP in 2010.

The new Technical Specification as well as new operation and maintenance procedures for Unit 2 systems and components will come into force once Unit 2 is granted a status as a finally shutdown one and Unit 2 DSAR and Technical Regulations for Reactor Defueling Stage are going to be approved with the VATESI.

### *19.2.3. Review and revision of operational limits and conditions as necessary*

During an operation of INPP units operational limits and conditions were changed then needed in accordance with specific safety cases. After shutdown of the units many changes are or will be done in accordance with DSAR (see 19.2.1).

*19.2.4. Regulatory review and control activities*

Technical Specifications of the INPP units are approved by Regulatory authority as well as any changes in it. Current values of safety related parameters are supervised during inspection activity of Regulatory authority.

## 19.3. Article 19(3) – Procedures for operation, maintenance, inspection and testing

*19.3.1. Overview of the arrangements and regulatory requirements on procedures for operation, maintenance, inspection and testing of a nuclear installation*

Licensees are required to verify that operation, performance of maintenance, inspections and testing is performed in accordance with the plant-specific design and BSR-2.1.2-2010 issued by VATESI in 2010, General Maintenance Requirements for Nuclear Power Plants (VD-E-01-98) issued by VATESI in 1998.

*19.3.2. Establishing of operational procedures, their implementation, periodic review, modification, approval and documentation*

In compliance with the Quality Assurance Programme and Documentation control system acting at INPP all works related to operation, maintenance, inspection and testing of all systems and equipment, including nuclear facility and safety-related systems shall be performed only on the basis and in accordance with the approved documents. Document preparation, approval of its acceptability and support is performed in accordance with the established procedures. Normal and emergency operating procedures, as well as testing procedures are developed in the operation-by-operation manner. There are the stops provided to assess results. The most important operations are performed under the direct supervision of another person. All actions of both the executors and their supervisors are recorded and signed in the relevant reports. The application area, limitations, responsibilities and actions of the personnel to detect normal operation failures are determined in each procedure. Prior to the document entering into force (including testing programmes) the applicability, usability of the documents shall be confirmed (review, endorsement and approval). Confirmation of applicability shall be based on the critical analysis of adequacy of the measures providing safe and correct operation and shall be performed in compliance with the established procedures. The most important documents shall be agreed with the VATESI. Development, accounting and registration of operational procedures, its identification based on assessment of importance of each document in relation to safety are foreseen. Reproduction of the records is ensured considering any and all changes of the documentation preparation which may take place in the future in course of information system modifications.

*19.3.3. Availability of the procedures to the relevant nuclear installation staff*

All documents and records are accounted in a special electronic system ARKI and registered in a special electronic system @vilys. On one hand the specified systems ensure retention of documents soft copies, and on the other hand access of all INPP users to all valid documents. Plant personnel use only the documents passed review, approval and registration. All key personnel have the possibility to use ARKI and @vilys systems to search for any required document. Results of all activities, first of all related to safety shall be recorded (reports, check-lists, statements, logs, etc.). Records are made on the material providing their safe storage within the required time. Documents

and records related to safety are stored for all operation life-period of the plant and subsequently handed over to the State archive for storage.

In order to supply personnel with correct, currently acting documentation the maintaining of documentation is provided. The maintaining process covers the following stages: to put the document to operation, to determine commencement/completion dates of document using, to multiply the relevant numbers of copies, to distribute among the personnel, to analyse the existing documents referred to the new documentation, to incorporate corrections, to mark the uncontrolled copies in due way, to review and replace the obsolete documentation, to hand over the documentation to the State archive and to destroy the documentation not subject to storage.

Replacement and incorporation of corrections to the document do not require the corresponding document to be taken from the personnel. All copies of the documents availability of which is currently sustained shall be taken away (eliminated) from the personnel.

The originals of the documents and records are stored in within the established storage time. Documents and records, related to safety are stored for the period of operation. Elimination of the documents and records not in action anymore and their archiving shall be performed in accordance with the established procedures. Access to the archive documents and records shall be provided in accordance with the relevant procedures.

The documentation, which is considered to have scientific and practical value for the Republic of Lithuania, is handed over to the State archive. As a rule, these are safety-related documents and records.

### *19.3.4. Involvement of relevant nuclear installation staff in the development of procedures*

Until obtaining the document (including testing programmes) verification of acceptance, possibilities of use are being performed. Verification of acceptance is based on critical analysis of sufficient measures necessary to ensure safe and correct operation and performed in accordance with the established procedures. Most important documents are being agreed with regulatory body - VATESI.

The most important documents which inaccurate execution could directly affect safety and reliable functioning of systems and equipment, the condition of safety systems and increase releases to environment or exceed allowable limits of irradiation of personnel were verified and validated. Essentially verification validation was executed to those documents such reactor pressure vessel operational procedure, guidelines of elimination beyond design basis accidents.

In the process of determining of necessity of documentation development INPP staff introduces proposals on development of documents which are included into special lists. All proposals are analyzed by direction an appropriate division on INPP.

### *19.3.5. Incorporation of operational procedures into the management system of the nuclear installation*

Preparation, review, approval, issuing, correction and control of operational documentation has been done in compliance with the INPP quality assurance programme procedures, developed in accordance with national and IAEA legislation. The management procedure «Management of documents and records» determines the activities on documents and records and establishes purposes and methods to achieve that also the responsibilities of INPP staff. The proceeding on document management is prosecuted with the purpose to provide high quality documentation necessary to safe and reliable activities.

The management procedure «Operation» is a procedure to manage the processes of operation and establishes requirements for all activities performed to ensure safe and reliable functioning of systems and components of INPP in all states.

Operational instructions and procedures developed for all kind of activities related to operation of INPP, for every system and are stored in every work place

### *19.3.6. Regulatory review and control activities*

VATESI in accordance with the established responsibilities and national regulations for the verification of safety of nuclear installations is performing combined day to day and year to year supervision and systematic safety assessment through the inspection programme with consideration of cumulative effects of decommissioning and dismantling processes, implemented modifications, changes to procedures, operating experience and technological development so that the regulatory body can determine whether the operator has a functional self-assessment system of high quality and is conducting its activities in accordance with its own established procedures to ensure that regulatory objectives and requirements are met.

VATESI is monitoring these activities:

- Application of quality assurance principles at the decommissioning stages;
- Design safety assessment (particularly design modifications)
- Review of tests;
- Assessment of need for and control of modifications.
- Oversight of decommissioning and dismantling projects and activities.

VATESI also supervises the activities of in-service inspection at INPP:

- Review and approval of Standard ISI programme of INPP;
- Review of annual ISI programs of INPP;
- Review and assessment of annual ISI results of INPP;
- Review, development and approval of ISI regulations;
- Review and approval of ISI methodologies and procedures;
- Review of the results of material investigation of INPP components and pipelines;
- Review and consideration of safety justification in case of deviations from ISI acceptance.

## 19.4. Article 19(4) – Procedures for responding to operational occurrences and accidents

### *19.4.1. Overview of the arrangements and regulatory requirements on procedures for responding to anticipated operational occurrences and accidents*

It is stated in the "General Regulations for Nuclear Power Plant Safety" (Article 5.1.3) that on the basis of the norms and technical requirements, technological reglament and the operating documentation submitted by the suppliers of equipment the nuclear plant administration shall, before the beginning of pre-startup adjustments, draft a set of operating instructions. The instructions for operation of equipment and systems shall contain specific indications for operating personnel about the methods of conducting work during normal operation and in accident situations. The operating instructions shall be appropriately amended in the light of commissioning results and operational experience.

Article 5.1.4 of the "General Regulations for Nuclear Power Plant Safety" says that the Operating Organization and nuclear plant administration shall, on the basis of the norms and technical

requirements, technological reglament and the technical safety justification for the reactor and the plant as a whole, prepare and issue special instructions defining the actions of personnel relevant to safety during design-basis and beyond-design-basis accidents. The actions prescribed for plant staff in these special instructions shall be based on the attributes of the events and the condition of the reactor anticipated during the accident, as well as on a forecast of conditions as they are expected to evolve during the accident. Actions shall be designed to restore essential safety functions and to limit the radiation consequences of the accident.

It is stated in the "General Regulations for Nuclear Power Plant Safety" (Articles 1.2.12 and 1.2.13) that reactor and nuclear plant designs shall provide for technical means and organizational measures to prevent design-basis accidents and to limit their consequences and to ensure safety in the face of any of the initiating events anticipated in the design, with the assumption of one additional failure (independent of the initiating event) among any of the following safety system elements: an active element or a passive element having mechanical moving parts, or a personnel error independent of the initiating event. Reactor and nuclear plant designs shall provide technical means and organizational measures to prevent any infringement of the limits and conditions of safe operation.

It is stated in the "General Regulations for Nuclear Power Plant Safety" (Article 1.2.14) that reactor and nuclear plant designs shall provide measures to control beyond-design-basis accidents listed in accordance with section 1.2.16 below if such accidents are not excluded by virtue of the fail-safe characteristics of the reactor installation and the principles of its construction.

Article 1.2.16 of the "General Regulations for Nuclear Power Plant Safety" says that the list of beyond-design-basis accidents and analyses of their consequences (covering radiation and nuclear effects, the functional capacity of safety systems, prospects for future operation, and so on) is to be established by the Operating Organization and agreed with the State Control and Supervision Institutions. When the final list of beyond-design-basis accidents is submitted for approval, it must be accompanied by an assessment of the probability of each specific beyond-design-basis accident and of each specific accident path leading to serious core damage or meltdown. The analysis of the consequences of beyond-design-basis accidents submitted with nuclear plant designs shall constitute the basis for the programme of emergency measures to protect personnel and the population, and also for the compilation of special instructions to personnel regarding the control of such accidents.

### *19.4.2. Establishing of event based and/or symptom based emergency operating procedures*

The event-based emergency operating procedure “Instruction on Elimination of Emergency Situations and Accidents at INPP” was developed for INPP Units 1 and 2 for the purpose to define INPP personnel actions at elimination of emergency situations and design accidents as well as the order of cooperation and responsibility distribution during performance of these actions.

In 2001, five special symptom-based EOPs and three emergency support procedures were developed at INPP in addition to the existing event-based emergency operating procedures and introduced. symptom-based EOP’s and emergency support procedures were periodically reviewed and elaborated with regard to the configuration of systems and components at INPP and other procedures set for the emergency operation of the power unit.

Currently, after INPP Unit 2 shutdown and cooling, the effect of the abovementioned procedures is suspended in accordance with the procedure established at INPP, and they were removed from the INPP personnel working places since the area of application of these procedures was unit power operation.

*19.4.3. Establishing of procedures and guidance to prevent severe accidents or mitigate their consequences*

In 2008, five special guidelines for management of beyond design basis accidents (RUZAs) were developed and introduced at INPP in 2008. At introduction of RUZA's at INPP Unit 2, the following organizational and technical issues were settled:

1. The "List of beyond design basis accidents for INPP with RBMK-1500 reactor" was developed and agreed with the Regulatory authority of the Republic of Lithuania. 26 beyond design basis accidents (17 initiating events for the operating reactor, 3 initiating events for the shutdown reactor, 3 initiating events for spent fuel storage pools and 3 external initiating events) were included in this List.
2. The analysis of progression and possible consequences of more than 50 scenarios of possible beyond design basis accidents was carried out.
3. The high level strategies for mitigation of consequences of severe accidents in reactor and in spent fuel storage pools were defined and characterized.
4. The characteristics and location of instrumentation for control of efficiency of the applied strategies under the beyond design basis accidents conditions were documented.
5. two modifications were developed and introduced on a continuing basis, and projects for introduction of five modifications of specific equipment, which is required for detection, control and management of accidents under the beyond design basis accidents conditions, were developed.
6. five RUZA's and one special procedure for total station blackout conditions were developed:
   - RUZA-R1. Ensuring of heat removal from the reactor;
   - RUZA-R2. Pressure reduction in the reactor space;
   - RUZA-R3. Control of accident localization system condition;
   - RUZA-RB. Reduction of fission products release;
   - RUZA-B. Control of storage pools condition;
   - Procedure of Unit 2 shutdown and cooling at total station blackout.
7. The INPP emergency preparedness organization personnel training in work with new beyond design basis accidents management guidelines and procedure was conducted.
8. The permit of the Regulatory authority of the Republic of Lithuania to introduce the beyond design basis accidents management guidelines at INPP was obtained.

Currently, the abovementioned beyond design basis accidents management guidelines are being reviewed at INPP. The fact that Unit 2 reactor was finally shutdown on 31 December 2009 according to Resolution of the Government of the Republic of Lithuania No 1448 dated 2009-11-04 and that the new organizational structure of the enterprise is valid at INPP in 2010 is taken into account at the review.

In 2008, the "Emergency Preparedness Requirements for the Organization Operating the NI", P-2008-01, developed by the Regulatory authority of the Republic of Lithuania were put into effect at INPP. Currently, the "Plan of the Nuclear Accident Prevention and the Accident and its Consequences Elimination at the INPP" and its working procedures are being reviewed basing on the specified requirements. The fact that Unit 2 reactor was finally shutdown on 31 December 2009 according to Decree of Lithuanian Republic Government No 1448 dated 2009-11-04 and that the new organizational structure of the enterprise is valid at INPP in 2010 is also taken into account at the review.

After Unit 2 is granted a status of finally shutdown unit and after agreement of the reviewed beyond design basis accidents management guidelines and the reviewed "Plan of the Nuclear Accident Prevention and the Accident and its Consequences Elimination at the INPP" with the Regulatory authority of the Republic of Lithuania, they will be put into effect in accordance with procedure established at INPP.

### *19.4.4. Regulatory review and control activities*

In 2007, a consortium of TSOs with the Institute of Physics in charge assisted VATESI in reviewing the special guidelines for management of beyond design basis accidents and safety justification documents, submitted by INPP. A group of specialists from Serco Assurance, the UK, also rendered technical-scientific assistance in reviewing documents on management of beyond design basis and severe accidents within the framework of the DTI project NSP/03-L8. The experts of the IAEA RAMP Mission conducted an independent assessment of the INPP's preparedness to manage beyond design basis accidents. At VATESI's invitation, the mission worked in Lithuania on January 22–26, 2007. The mission's experts stated that the scientific-technical level of the I NPP's documentation on beyond design basis accident management was adequate, and submitted recommendations regarding improvement of the documentation.

In 2008, INPP amended the symptom-based EOPs and the emergency support procedures. In March 2008, VATESI reviewed and approved the amendments of the symptom-based EOP-2, 3, 4 and 5 and of the emergency support procedures - 3. In September 2008, VATESI reviewed and approved new revision of the symptom-based EOP-1 and 2. In December 2008, VATESI reviewed and approved a new revision of the emergency support procedure -1.

In 2008, INPP completed the implementation of the eight safety improvement measures (hardware modifications) under SIP-3/2008 related to the management of beyond design basis accidents, including the severe accidents. In March 2008, INPP 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. VATESI reviewed and approved the Manuals for management of beyond design basis accidents at INPP. In August 2008, INPP submitted an additional document – the Procedure of shutting down and cooling of INPP Unit 2 in the case of total station blackout. Upon having assessed the Procedure, safety justification and supplementary information on the verification and validation of the Procedure, VATESI approved the document. In September 2008, specialists of INPP 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 (seven hardware modifications), on the verification and validation of documents, in October 2008 VATESI issued a permit to implement the Management procedure of beyond design basis accidents at INPP Unit 2 and spent nuclear fuel pools.

In 2008, VATESI nuclear safety specialists conducted the inspection at INPP with a view to verify the performance of nuclear safety requirements in managing beyond-design-basis accidents. The inspection commission and INPP specialists discussed the implementation of the Plans of Measures for further 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. Certain non-compliances where established during the inspection, and INPP was obligated to remove them.

In 2009, VATESI nuclear safety specialists conducted the inspection at INPP with a view to verify the performance of nuclear safety requirements in the processes of managing and preventing the design-basis and beyond-design-basis accidents in the spent nuclear fuel pools. The inspection commission and INPP specialists discussed the issues related to performance of the works in the spent fuel pools after the shut-down of INPP Unit 2 that could impact the processes of managing and preventing the design-basis and beyond-design-basis accidents. In addition to that, the inspection commission performed the verification of the condition of the equipment to be used for managing and preventing the design-basis and beyond-design-basis accidents in the spent nuclear

fuel pools. Certain non-compliances where established during the inspection, and INPP was obligated to remove them.

## 19.6. Article 19(6) – Reporting of incidents significant to safety

### *19.6.1. National Arrangements and Requirements to Report Incidents Significant to Safety to the Regulatory Body*

The main requirements for reporting of unusual events occurred at INPP are established in VATESI Requirements document for Reporting of Events at NPPs (VD-E-04-98).

Within VATESI Requirements on Operational Experience Feedback in the Field of Nuclear Energy (P-2009-04) it is required from a licensee to prepare procedures with detail reportable event criteria's for reporting about the unusual events, including near-misses, accident precursors and abnormal occurrences at all stages in life-time of a nuclear installation.

INPP has established event analysis procedures based upon ASSET methodology (IAEA). Human factor related events are additionally analyzed using the special procedure for analysis of events related to erroneous actions of personnel. The event analysis is used to detect all event causes, including root causes and to develop actions for preventing their recurrence. According the INPP procedure detailed event analysis reports and planned preventive actions shall be sent to VATESI and WANO members within 30 days.

System for reporting of unusual events established within INPP is in accordance with VD-E-04-98, international practice and IAEA recommendations. INPP has all necessary administrative and technical measures to report about the safety significant events.

In order to provide reportable events to INES databases, the INES national coordinator is nominated at VATESI. He is responsible to conduct the functions of INES national coordinator.

### *19.6.2. Overview of the Established Reporting Criteria and Reporting Procedures for Incidents Significant to Safety and Other Events Such as Near Misses and Accidents*

The main criteria for reportable events and requirements for notification and report there are established within VD-E-04-98. The reporting criteria include, but are not limited to the following ones:

- power reduction of 25 % or more;
- violation of limits and conditions for safe operation;
- failure of the barriers important to safety;
- obstacles for personnel to perform work safely;
- unplanned activation of a safety system;
- failure of a system to perform a safety important function;
- unplanned discharge of radioactive materials above the permissible levels;
- any event posing a threat to physical protection of a NPP.

In accordance with VD-E-04-98 all safety significant events at a NPP and other nuclear installations in Lithuania shall be reported to VATESI in a timely manner: within 24 h to notify about and event and 30 days to present an event investigation report. The information is delivered in accordance with INPP procedure agreed by VATESI. The procedure requires informing VATESI about an event verbally as soon as possible, but not later than within an hour after an event and written notifications must be sent not later than in eight hours on the first working day after an event.

### *19.6.3. Statistics of Reported Incidents Significant to Safety for the Past Three Years*

The number of reportable unusual events at INPP in 2007 – 2009 is provided in Table 19.6.3. Each event was analysed, event reports were prepared and reported according to INPP Procedure on Analysis of Unusual Events and Procedure for Reporting Unusual Events at INPP.

**Table 19.6.3. The Reportable Unusual Events at INPP in 2007 – 2009**

| Events | Year | | | Total |
|---|---|---|---|---|
| | 2007 | 2008 | 2009 | |
| Safety related | 5 | 8 | 3 | 16 |
| Not safety related | 6 | 3 | 1 | 10 |
| Total | 11 | 11 | 4 | 26 |

### *19.6.4. Documentation and Publication of Reported Events and Incidents by INPP and VATESI*

INPP maintains database of event to facilitate the analysis and to inform departments. The INPP database supports producing of investigation reports by providing of electronic templates compatible with the ASSET methodology. As soon as the first draft of a report is ready it can be easily retrieved from the system and reviewed by the members of an event investigation team. Necessary changes can be done to the report at this stage by the investigation team. The final version of such a report becomes accessible to all departments after receiving the "approved" status. The system provides no possibility to change the content of the report after its approval by the leader of the investigation team.

All event analysis reports from INPP are collected, handled and stored at VATESI database of unusual event so that it is possible to carry out a systematic search, selection and evaluation of events and their trends. National Co-ordinator of Lithuania at VATESI is responsible for selection, preparation of national reports on safety related events and for setting to IAEA/NEA IRS or INES news basis database respectively.

In order to share operational experience and provide the lessons learned form events occurred at INPP trough the period from 2007 to 2010 it was prepared and submitted to IAEA/NEA IRS database three event reports (No. 7947, 7980 and 8063).

### *19.6.5. Policy for Use of the INES Scale*

According to VD-E-04-98 all reportable unusual events for national and international communication must be classified according to INES. For the classification of events until May 2009 INES User's Manual edition 2001 was applied, and since May 2009 INES User's Manual edition 2008 is used.

Following INPP procedure in case the event is assessed to be of INES level 2 or higher, INPP Technical Surveillance and Quality Management Department (after 2010-01-05 – Technical Surveillance and Quality Management Division) prepares and sends by fax the completed Event Rating Form to IAEA. The copy of Rating Form is sent by e-mail to VATESI (in Vilnius) and to VATESI`s Surveillance Division of Nuclear Safety Department (located at INPP).

### *19.6.6. VATESI Review and Control Activities*

The event reporting arrangements at INPP are regularly assessed by VATESI in the frames of supervision of the system of operational experience feedback. The effectiveness of the system is evaluated during annual inspection and review of corresponding submittals, including event reports, delivered following VATESI requirements P-2009-04. The regulatory activities include follow-up of the licensee's corrective actions identified as a result of event investigation.

## 19.7. Article 19 (7) – Opetational Experience feedback

### *19.7.1. National Arrangements and Regulatory Requirements on the Licence Holders to Collect and Analyse and Share Operating Experience*

With a purpose to strengthen and enhance the operational experience feedback system VATESI has revised its regulations in this area and in 2009 issued a new regulatory document "Requirements on Operational Experience Feedback in the Field of Nuclear Power" (P-2009-04) with the main requirements to licensees regarding:

- operational experience feedback management system;
- identifying, reporting and screening events in order to collect and feedback the lessons learned;
- screening and ranking of operational experience;
- analysis of operational experience feedback;
- analysis of the trends;
- operational experience feedback and dissemination of information;
- assessment of the effectiveness of the system for operational experience feedback**.**

According to P-2009-04 the operational experience feedback shall be systematically exercised in all stages of the lifetime of a nuclear installation.

### *19.7.2. Overview of Programme of Ignalina NPP for the Feedback of Information on Operating Experience*

P-2009-04 requires from a licensee to establish and apply procedures for operational experience feedback. The activity on the use of internal and industrial experience at Ignalina NPP (INPP) is carried out according to the management procedure "Evaluation of Own and Industrial Experience" (QA-2-003) and is ensured by:

- the competent personnel, whose authorities and responsibilities are defined in the power plant documentation;
- availability of the procedures describing and defining various actions on the use of own and industrial experience (analysis, planning and documenting of results, control, interrelations of subdivisions and separate persons);
- allocation of the resources necessary for realization of activity on the use of own and industrial experience.

The activities of INPP related to the use of internal and external operational experience are the following:

- reporting about the unusual events that occurred at INPP;
- the analysis of root causes of events and development of corrective measures for prevention of their repetition;
- the analysis of low level events and near-misses events in order to prevent them;
- the analysis and implementation of the relevant external industrial experience.

The operational experience at INPP is analyzed by qualified INPP specialists who are experienced in all areas of operation of the NPP. Analysis of events is carried out by the personnel that is competent to apply the event investigation methods.

In order to perform the operational experience feedback the information at INPP is collected, handled and stored using a special database allowing to carry out systematic search, selection and evaluation.

### *19.7.3. INPP Procedures to Analyse Domestic and International Events*

To analyse international and domestic events, there are specific procedures are in place at INPP. According to the procedures, all safety–important events as well as the events that may impact long-term safety of a nuclear installation are thoroughly investigated, their direct causes and root causes are identified (in case of the domestic event) or analysed (in case an event is international), the impact on safety and potential consequences are assessed, and the necessary corrective actions are established. Based on the results of the investigation INPP managers are provided with specific recommendations on corrective actions that have to be taken immediately. INPP personnel is continuously informed about investigations of events at INPP and abroad. INPP event investigation procedures require to apply event analysis methods relevant to the specific type of an event.

The terms and scope of the analysis of events, their importance to safety is taken into consideration. The initial assessment of the safety-important events is carried out immediately in order to define whether it is necessary to take urgent corrective actions.

The analysis of abnormal events and near-miss events are integrated into the common process of events' analysis, and its results are used to identify unfavourable conditions for safety assurance.

Abnormal events and near-miss events are analyzed by using computerized systems enabling to efficiently classify and manage big quantities of stored data.

By performing the analysis of the events, similar events that have occurred during operation of INPP and in other nuclear installations are taken into consideration.

### *19.7.4. Procedures to Draw Conclusions and to Implement Any Necessary Modification to the Installation and to Personnel Training Programmes and Simulators*

Application of operational experience at the INPP is evaluated in a systematic way in order to reveal eliminate any weaknesses and improve its effectiveness. To determine the effectiveness of the use of operational experience, self-assessments are periodically performed (internal inspections, audits, walk down, surveillances) and external assessments (VATESI inspections, ASSET and OSATR missions, WANO peer reviews). On the basis of the analysis of the operational experience (investigation of the event, evaluation of the trend, analysis of the external operational experience feedback and other) the corrective actions are prepared with a final target to improve the safety of INPP.

The use of operational experience is a part of other INPP programmes, e. g. equipment maintenance programmes are developed with consideration of analysis of maintenance and operational experience, information submitted by designers and by manufacturers; programmes for optimization of radiation exposure are composed taking in to account the analysis of radiation exposure in the previous years, content and scope of work, VATESI requirements.

The operating experience is used in training for of control room operators and other INPP personnel at INPP Training Centre. The data considered applicable to the plant are analysed and incorporated into training programmes.

### *19.7.5. Mechanisms to Share Important Experience with Other Operating Organization*

Following P-2009-04 requirements and INPP quality management procedure "Assessment of Own and Industrial Experience" (QA-2-003) personnel of INPP exchanges important operational experience with other operating organizations.

In order to get consultations in the cases of equipment faults or events, INPP has contacts and cooperates with the legal entities which took part in designing the nuclear installation or in manufacturing the safety-important structures, systems or components, who rendered services and carried out works related to safety.

Whit a purpose to ascertain that all persons supplying goods, rendering services or performing works to INPP are efficiently using the operational experience in their activities the communication with contractors are maintained.

### *19.7.6. Use of International Databases on Operating Experiences*

The operational experience from IAEA/NEA database is used both at INPP and VATESI. The event analysis reports are screened, assessed and analyzed whit a purpose to adopt the necessary lessons learned for safety of INPP and improvement of regulatory requirements.

The licensee has defined the procedures for the assessment and usage of the information obtained from other nuclear installations, nuclear safety regulatory institutions and other sources, including IAEA/NEA IRS databases and WANO.

### *19.7.7. VATESI Review and Control Activities for Licence Holder Programmes and Procedures*

In order to prevent accidents, safety–important events, to avoid their recurrence, to assure and further improve safety in the nuclear energy sector, VATESI require form Licensee to systematically analyze his own operational experience along with the operational experience of other legal entities operating in the nuclear power sector.

To accomplish the above mentioned goals, VATESI issued requirements P-2009-04 require from a licence holder to prepare procedures for using the information about the internal and external events, near-miss events, accident precursors, abnormal occurrences.

VATESI controls the licence holder's operational experience feedback arrangements and use of the lessons learned by performing regulatory inspections and reviewing the corresponding submittals delivered to the regulatory body according to requirements presented within P-2009-04.

### *19.7.8. VATESI Programme for Feedback of Operational Experience and the Use of Existing Mechanisms to Share Important Experience with International Organizations and with Other Regulatory Bodies*

VATESI has a permanent Commission of Unusual Events and Operational Experience (thereinafter – Commission), which systematically monitors and analyses reports on unusual events at nuclear installations from internal (i.e. that took place at INPP) and external (outside Lithuania, e.g. from IAEA IRS database) sources. Operational Experience Analysis Division (VATESI, Nuclear safety Department) provides the secretariat for Commission and performs preliminary analysis of information received.

From 2008 VATESI is a full member in the activities of European Clearinghouse on Operational Experience for NPPs, which facilitates sharing and application of operational experience feedback information and practices to improve the safety (http://clearinghouse-oef.jrc.ec.europa.eu/).

## 19.8. Article 19(8) – Management of spent fuel and radioactive waste on the site

### *19.8.1. Overview of the arrangements and regulatory requirements for the on-site handling of spent fuel and radioactive waste*

Strategy on Radioactive Waste Management was approved by the Government of Lithuania in 2002. In 2008 the Strategy was revised. Compared with previous and revised strategies, there are no changes in main strategic. The difference is that the strategy has been restructured and some elements were reworded. This Strategy was approved to implement the provisions of the Law of the Republic of Lithuania for Radioactive Waste Management, which establishes the basic principles of Radioactive Waste Management.

The strategy has three main objectives: 1) Strive to achieve a high level in nuclear and radiation safety in management of spent fuel and radioactive waste; 2) To improve the radioactive waste management infrastructure, which shall be based on modern technologies; strive to minimize activity and volume of radioactive waste; 3) Informing the Lithuanian public to achieve a better understanding of the main radioactive waste management principals and achieve acceptance of waste management projects.

INPP has developed activities on implementation of the Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Power Plant issued by VATESI. Thus, implementation of those activities enables INPP to modernize radioactive waste management to treat radioactive waste considering new requirements, which take into account interdependence of all radioactive waste management phases and new classification of waste.

The General Requirements for Dry Type Storage for Spent Nuclear Fuel issued by VATESI sets out general requirements for spent fuel storage. These requirements as well as Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Power Plant are under revision taking into account WENRA safety reference levels and new IAEA recommendations.

### *19.8.2. On-site storage of spent fuel*

The intermediate nuclear fuel storage facility (build. 192) is located on the INPP site in the distance of 1 km of the available plant units and 400 meters of Drūkščiai Lake. 20 CASTOR and 88 CONSTOR RBMK-1500 casks with 51 spent nuclear fuel assemblies in each were stored in this facility up to 2009. According to accomplished modernization that extended the capacity of the spent nuclear fuel storage facility, at the beginning of 2009 VATESI gave permission to INPP to place in it additionally 12 CONSTOR RBMK-1500 casks. 10 CONSTOR RBMK-1500 casks with spent nuclear fuel were transported to the spent nuclear fuel storage facility at the period of 2009 and the rest casks will be transported in 2010. The total amount of stored casks – 120 and the total quantity of spent nuclear fuel assemblies accommodated in the casks – 6120.

Under the necessity to handling and store of the other approximately 17000 spent nuclear fuel assemblies from closed INPP, it is obvious that existing spent fuel storage facility is not sufficient. At 2003 Lithuanian Government decided to construct a new dry type spent nuclear fuel storage facility (project B1) designed for handling and store of the other spent nuclear fuel assemblies.

The new intermediate nuclear fuel storage facility site is located in the distance of 0.6 km of INPP to the south. The contractor of the project B1 is German company Nukem Technologies. The contractor enhanced the design of CONSTOR RBMK-1500 casks. CONSTOR RBMK-1500/M2

cask consists of 2 baskets and can accommodate of 91 spent nuclear fuel assemblies. The new spent new fuel storage facility, according to the project, is designed to accommodate 200 CONSTOR RBMK-1500/M2 casks with spent nuclear fuel assemblies and store it up to 50 years. The required spent nuclear fuel handling equipment is designed too. It is foreseen to construct new intermediate nuclear fuel storage facility until 2011.

### *19.8.3. Implementation of on-site treatment, conditioning and storage of radioactive waste*

Solid radioactive waste at INPP is segregated into three groups by the surface dose rate, according to standards that were applied in a former USSR and applicable at INPP. The solid waste at INPP is dumped into reinforced concrete compartments in storage buildings No. 155, 155/1, 157, 157/1 located on INPP site. There is no reprocessing of solid waste before it is dumped. All the waste from these facilities will be retrieved, characterized and conditioned according new requirements mentioned before.

Liquid radioactive waste at INPP is collected in special tanks, from where it is directed to evaporating facilities. The concentrate is processed and conditioned in the bitumen solidification facility, i.e. mixed with bitumen. The bitumen compound then is pumped into a special storage facility (build. 158). The building is also located on INPP site. According to the Plan of Transfer of Bituminised Waste Storage Facility (build. 158) to Final Disposal Facility INPP shall perform long term safety assessment. If an outcome of this assessment is negative, build. 158 will remain as a storage facility and INPP would develop actions plan of facility decommissioning including waste retrieval. If positive then this storage facility will be transferred to disposal facility.

Spent ion-exchange resins are stored in special tanks. In 2006 the cementation facility and storage facility for cemented waste started operation. The ion-exchange resins from INPP water purification and liquid waste treatment systems together with filter aid (Perlite) as one waste mixture type and solid particle sediments from evaporator concentrate also with filter aid (Perlite) as another waste mixture type is to be solidified in cement which is poured into drums and put in storage container (waste packages) in order to reduce any further risk associated with the liquid waste storage in tanks and to assure safe storage and management of solidified waste. A new storage facility for cemented waste is designed for 60 years storage. Conditioned waste will be disposed in near surface disposal facility.

Modernization of waste management includes retrieval from old storage facilities, characterization, treatment and conditioning of waste taking into account disposal routes. Before disposal waste will stored in new storage facilities. In new treatment facilities operational and decommissioning waste will be managed. It is assumed that retrieval of the waste and operation of new treatment facilities could start in 2012-2013.

After storage the waste will be disposed of in disposal facilities. It is envisaged to construct two disposal facilities – one for very low level and other for low and intermediate level radioactive waste. According plans very low level waste disposal facility could start operation in 2011 and disposal in low and intermediate level radioactive waste disposal facility in 2013. Disposal of high level waste is not resolved yet.

### *19.8.4. Activities to keep the amount of waste generated to the minimum practicable for the process concerned, in terms of both activity and volume; Established procedures for clearance of radioactive waste*

According new regulation on predisposal management of radioactive waste, INPP shall keep the generation of radioactive waste to the minimum practicable, in terms of both activity and volume, using best available technology without involving excessive costs. For this moment INPP optimized processes of waste generation which allowed reduce amount of waste.

For minimization purpose was constructed installation for free release of solid operational radioactive waste. It started operation in 2006. After measurements in this installation part of the waste can be treated as non-radioactive and can be stored in ordinary refuse tip for non-hazardous waste.

Another free release facility will be constructed for decommissioning waste, which should start operation in 2010.

### *19.8.5. Regulatory review and control activities*

Main steps of regulatory review are related to the steps of development of waste management facility design, construction or reconstruction, operation and decommissioning or closure. In order to receive a licence operator shall provide safety documentation which shall reviewed by regulatory body. When licence is issued regulatory control is ensured by control of following of licence conditions and regular on site inspections.

## SUMMARY

The following activities were performed during reporting period:

- Continued implementation of Safety Improvement Programme (SIP-3);
- Continuous strengthening of Regulatory Activities;
- Safety assessment and decommissioning activities;
- Implementation of decommissioning projects related to the safety of spent fuel and radioactive waste management;
- Development of a new nuclear safety regulations and invitation of IAEA review missions.

During the reporting period the special attention were paid to the Challenges related to the new NPPs, which were identified during the fourth Review meeting. These areas were:

- Development of a new Regulatory body administrative structure;
- Recruitment and training of a new Regulatory body staff members;
- Extensive training programme for obtaining competences within the regulatory body.

# ANNEXES

## I. REFERENCES

| | |
|---|---|
| BSR-1.4.1-2010 | Management Systems Requirements (will be in force from 1 January 2011) |
| BSR-2.1.2-2010 | General Safety Assurance Requirements for Nuclear Power Plant with RBMK-1500 Reactor |
| VD-B-001-0-97 | General Regulations for Nuclear Power Plant Safety (from 5 February 2010 – BSR-2.1.2-2010) |
| VD-T-001-0-97 | Nuclear Safety Regulations for Reactors of Nuclear Power Plants |
| VD-E-01-98 | General Maintenance Requirements for Nuclear Power Plants |
| VD-E-05-99 | Requirements for Ageing Management of Systems and Components Important to Safety of Nuclear Facilities |
| VD-E-11-2001 | General Personnel Management Requirements for Organizations Operating Nuclear Power Facilities and Enterprises Rendering Services to them |
| VD-KS-02-99 | Requirements for Quality Assurance Systems of Nuclear Power Plants and Other Nuclear Power Facilities (will be substituted from 1 January 2011) |
| VD-L-001-0-97 | Regulations for Procedures for Issuing a License for Unit Operation at Ignalina Nuclear Power Plant |
| VD-VP-01 | List of main laws regulating nuclear energy safety in the Lithuanian Republic |
| VD-E-05-99 | Requirements for Ageing Management of Systems and Components Important to Safety of Nuclear Facilities |
| Žin., 1998, Nr. 12-274 | Regulations for Licensing of Nuclear Power Related Activities |
| P-2008-02 | Nuclear Safety Requirements for Nuclear Facility Modifications |
| P-2009-02 | Requirements for decommissioning of nuclear facilities |
| HN 73:2001 | Hygiene Standard “Basic Standards of Radiation Protection” (2001, amended in 2003) |
| HN 83:2004 | Hygiene Standard "Radiation Protection of Outside Workers" (2004) |
| HN 87:2002 | Hygiene Standard “Radiation Protection at Nuclear Facilities” (2002, amended in 2008) |
| HN 99-2000 | Hygiene Standard ”Protective actions of public in case of radiological or nuclear accident” |
| HN 112:2001 | Hygiene Standard “Requirements for Monitoring of Internal Exposure” (2008) |
| LAND 34 – 2008 | Normative Document “Description of Procedure for Determination and Application of Free Release Levels of Radionuclides, Conditions for Reuse of Materials and Waste Removal” (2008) |
| LAND 36 - 2000 | Normative Document “Measurement of Radionuclide Content in Environmental Components – Gamma Spectroscopic Analyze of Samples by Spectrometer with Semiconductor Detector” (2000, amended in 2005) |
| LAND 42 – 2007 | Normative Document “Description of the Regulation on the Limitation of Radioactive Discharges from Nuclear Facilities, Permitting of Discharges and Radiological Monitoring” (2007, last amended 2010) |
| LAND 64 – 2005 | Normative Document “Determination of Strontium-90 in Environmental Samples. Radiochemical Method” (2005) |

## II. ANNEX TO ARTICLE 7.1.

### COMPETENCE OF NATIONAL AUTHORITIES, LAWS, MAIN REGULATIONS AND INTERNATIONAL AGREEMENTS APPLICABLE IN NUCLEAR ENERGY SECTOR

The Law on Nuclear Energy (the main law in nuclear energy sector) provides following competence set for national authorities:

In exercising state powers in the field of nuclear energy *the Seimas (the Parliament*) of the Republic of Lithuania shall:

- formulate state policy in the sphere of nuclear energy;
- solve the principal issues of development of nuclear energy in Lithuania;
- by the advice of the Government, adopt a law on the construction of a new nuclear plant and its site or on the mounting of a new nuclear reactor, also on the decommissioning of a nuclear facility. The law shall establish the principal requirements for a nuclear plant or a nuclear reactor and for the zones of sanitary protection and monitoring.

*The Government of the Republic of Lithuania* shall:

- in the manner prescribed by law, adopt decisions on the construction of individual nuclear facilities;
- form a commission for the commissioning of a nuclear facility;
- prepare the nuclear safety and radiation protection regulatory system and the mechanism of its functioning;
- establish nuclear energy control and supervision institutions and approve their regulations;
- approve regulatory enactments for the acquisition, storage, transport and disposal of nuclear and radioactive materials and submit them to the ministries referred in the Law on Nuclear Energy and the Government institutions for approval in cases specified in the above articles;
- establish the procedure of licensing of nuclear activities;
- establish the specific conditions and requirements for the zones of sanitary protection and monitoring and the course of their development;
- coordinate the activities of ministries and other state institutions in drafting nuclear accident prevention and management plans.

In adopting a decision on the construction of a specific nuclear facility, the Government of the Republic of Lithuania shall take into consideration:

- the economic and public needs;
- the principal characteristics of the use of natural resources and their impact on the environment;
- nuclear safety and radiation protection guarantees;
- the opinion of the local authority on whose territory the intended facility will be sited.

*The Ministry of Energy* shall:

- perform the functions of the founder of operating organizations of nuclear facilities;
- implement state policy in the sphere of nuclear energy;
- organize bilateral and multilateral international co-operation in the area of nuclear energy;
- organize nuclear accident prevention, accident management, investigation and elimination of the consequences of the accident in the nuclear facilities under its control;

- within the scope of its competence represent the Republic of Lithuania in international nuclear energy organizations and conferences;
- organize the drafting of a special scheme for the choice of the site of a new nuclear power plant and other state nuclear facilities, exploring several alternative sites;
- after the approval of a detailed site plan, proceed in an established manner with the legal formalities of the acquisition for the public needs of the site for the construction of a nuclear power plant or other state nuclear facilities;
- organize the development of the nuclear energy infrastructure in the Republic of Lithuania; establish institutions of design, research and technology (together with the Ministry of Education and Science) to meet the needs of the operating organizations of nuclear facilities;
- perform the functions established by this Law and those assigned by the Government.

*Local authorities* in the territories under their jurisdiction which are within the sanitary protection or monitoring zones of a nuclear facility, within the framework of their competence, shall:

- take part in controlling the activities of nuclear power plants, nuclear reactors and other nuclear energy installations for which sanitary protection zones have been established;
- control the compliance with the landscape and architectural requirements of a nuclear facility, also with the sanitary, hygienic and nature protection requirements of a nuclear facility and its territory;
- take part in decision making about the construction of nuclear facilities in their territory, the reconstruction of the facilities or their decommissioning;
- obtain information from the facility operator about the failure, shut-down, release of radioactive materials and other incidents;
- prepare the population protection plans, implement them in the event of nuclear accidents;
- inform the population about the radiological situation in the area where nuclear plants and other nuclear facilities are sited and about the radiation protection measures which are being implemented.

*The Governmental Emergencies Commission* shall:

- direct the activities of management of a nuclear accident and elimination of its consequences;
- mobilize material and other resources necessary for the containment of a nuclear accident;
- perform other tasks and functions provided in its regulations.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy *State Nuclear Power Safety Inspectorate* (VATESI) shall:

- together with the Ministry of Environment approve technical regulations of the design and construction of nuclear facilities, and of maintenance of the structures;
- approve standards and rules of operation of nuclear facilities, standards and rules of storage and disposal of radioactive materials used in nuclear energy and establish the procedure for their drafting;
- control the compliance with the requirements stipulated in licenses and safety regulations;
- implement state control for the accounting for and control of nuclear materials;
- inform the mass media about the radiation and safety situation in nuclear facilities;
- prepare surveys on the safety of nuclear facilities and submit them to the Government, local authorities and other authorities concerned;
- organize and support research into and expert analysis of nuclear safety and radiation protection, independently carry out the analysis of incidents and occurrences;
- co-ordinate and control the preventive measures for the staff and the population in the event of a nuclear facility accident, monitor the state of accident preparedness of the facility;

- impose sanctions established in statutory acts on violators of safety rules;
- organize bilateral and multilateral international co-operation in the sphere of nuclear safety and radiation protection.
- In performing its functions VATESI shall act independently, in accordance with laws, its own regulations and other legal acts. To prevent a possible nuclear accident, VATESI may resort to any preventive measures within its competence, a temporary shutdown of a nuclear facility included.

*The Ministry of Health* shall:

- prepare and approve standard acts and rules on the health of the personnel of nuclear facilities and the population residing in the monitored zon*es of the facil*ity and control compliance thereof;
- undertake environmental health studies of radiation impact on people and their environment and establish health protection requirements;
- agree on the sitting for nuclear facilities and undertake state environmental health analysis of their construction;
- take part in the authorization of the constructed or reconstructed nuclear facilities, issue the environmental health passport for work with radioactive materials and other sources of ionizing radiation;
- establish the standards for medical examination for the personnel working with radioactive materials and the sources of ionizing radiation, the frequency of the examination, contraindications and control the compliance with the standards;
- undertake monitoring of the health of the nuclear facility personnel and the residents of the monitored zone of the facility;
- ensure the preparedness of medical institutions for the elimination of the consequences of the accident;
- establish the radiation protection norms for the population and control compliance with them;
- organize medical examination of the containment forces of a nuclear accident and the population affected by radiation exposure and submit findings and proposals for the reduction of radiation exposure;
- determine occupational diseases for the personnel in the sphere of nuclear energy and study the causes of the diseases;
- carry out the education on radiation protection of the population.

Most of these functions are delegated to *Radiation Protection Centre*, which was established in 1997.

*The Ministry of Environment* shall:

- after co-ordination with the Ministry of Health, determine the limits of radioactive emissions into the environment and the permitted pollution norms, monitor compliance with them, and establish the procedure of emission licensing;
- jointly with the Ministry of Health establish radiation protection standards and monitor compliance with them;
- co-ordinate in the manner prescribed by law assessment of the impact on the environment;
- together with VATESI approves technical regulations for the design and construction of nuclear facilities;
- co-ordinate the projects for sitting, reconstruction and expansion of nuclear facilities and facilities related to their operation;

- take part in state monitoring of design and construction of nuclear facilities (structures) in the manner prescribed by the Government of the Republic of Lithuania;
- issue licenses for the use of natural resources, organize state radio-ecological monitoring, co-ordinate and control radiological monitoring nuclear facilities;
- organize and co-ordinate scientific research of the impact of nuclear facilities on the environment;
- prepare and approve methodology of assessment of radiation damage to the environment and its compensation;
- periodically inform the public, national and local authorities about the radiation situation in the country and in the environment of nuclear facilities;
- on the recommendation of the institutions exercising state control and supervision of construction of nuclear facilities or at its own initiative shall cancel the authorization to construct or reconstruct a nuclear facility when it is discovered that the authorization was issued unlawfully.

Most of these functions are delegated to Environmental Protection Agency.

*The Ministry of Social Security and Labour* shall:

- The Ministry of Social Security and Labour is responsible for the supervision of the potentially dangerous technical installations. According to the Law on the Supervision of Potentially Dangerous Installations, the services for technical verification shall supervise potentially dangerous technical installations with the exception of those under the control of VATESI;
- The State Labour Inspectorate at the Ministry of Social Security and Labour shall control compliance with the requirements of labour, safety at work and related statutory acts.

*The Ministry of Transport and Communications* shall:

- takes part in drafting laws and secondary legislation regulating transportation of nuclear and radioactive materials;
- participates in training and certification of the personnel involved in transportation of nuclear and radioactive materials;
- organises railway transport for the evacuation of the population from the danger zone in the event of a nuclear accident.

*The Ministry of National Defense* shall:

- takes part in drafting and implementing coordinated interdepartmental anti-terrorist and anti-penetration protection plans of the nuclear power plant and other nuclear facilities;
- takes part in the assurance of physical safety of nuclear power plant.

*The Ministry of the Interior* shall:

- ensures fire protection of the nuclear power plant and other nuclear facilities, conduct the state fire protection examination of their construction and reconstruction designs, co-ordinate the fire protection systems of those facilities;
- set forth fire protection requirements for nuclear facilities, exercise compliance with them and apply sanctions laid down in statutory acts for violators of fire protection regulations;
- promptly extinguish fires breaking out at nuclear facilities, participates in the management of a nuclear accident and its consequences, organize radiation monitoring of a contaminated area;
- exercise and ensure physical safety of a nuclear power plant;

- drafts, co-ordinate and implement interdepartmental anti-terrorist and anti-penetration action plans;
- analyze and control the crime situation in the regions with nuclear facilities;
- investigate the cases of theft and illegal possession of nuclear and radioactive materials, also of other dual-purpose commodities;
- ensure the security of transportation of nuclear and radioactive material cargoes across the territory of the country.

The Ministry of the Interior through the *Fire-prevention and Rescue Department:*

- draws up a population radiation protection plan in the event of a nuclear accident which shall be a model for other institutions authorized in a prescribed manner;
- within the framework of its competence implements the measures for the elimination of the accident and its consequences;
- jointly with other state institutions organizes training sessions of population protection in the event of nuclear accidents.

*The State Security Department* shall:

- exercise prevention of subversive, sabotage and terrorist acts as well as other offences aimed at damaging the interests of state security at nuclear facilities, in their environment, and on transportation routes of nuclear and radioactive materials;
- in keeping with the state security interests, undertake operations and inquiries to detect and investigates actions constituting a threat to nuclear facilities, nuclear installations, equipment and technologies.
- decide upon the credibility of persons working at nuclear facilities or those who are appointed to transport nuclear and radioactive materials;
- control the effectiveness of physical safety and emergency preparedness of the nuclear power plant and other nuclear facilities;
- take part in drafting and implementing the nuclear power plant and other nuclear facilities interdepartmental anti-terrorist and anti-subversive co-coordinated action plans.

*The County Governor* on the territory whereof the construction of a nuclear facility is planned or has already started, in exercising supervision and control of the facility, acts within the limits of the powers delegated to him by the Law on the County Government, this Law and other laws and subordinate legislation of the Republic of Lithuania. From the 1st of July 2010 the functions of Country Governors shall be assigned to Local authorities.

The most significant legislation on Nuclear Energy and Radiation Protection:

I. The Laws of the Republic of Lithuania

- The Law on Environmental Protection (21 January 1992, No I-2223);
- The Law on State and Municipality Enterprises (21 Dec 1994, No I-722, new edit 16 December, 2003, No IX-1895);
- The Law on Nuclear Energy (14 Nov 1996, No I-1613);
- The Law on Construction (19 March 1996; new edit 8 Nov, 2001, No IX-583);
- The Law on the Assessment of the Impact on the Environment of the Planned Economic Activities (15 August, 1996, new edit of 21 June 2005, No X-258);
- The Law on Environmental Monitoring (20 Nov 1997, new edit of 4 May 2006, No X-595);
- The Law on Waste Management (16 June 1998, No IX-1004);

- The Law on Civil Protection (15 Dec 1998, No VIII-971, new edit 22 December, 2009, No XI-635)
- The Law on Energetics (16 May 1995, No IX-884);
- The Law on Control of Strategic Goods (5 July 1995, new edit of 29 April 2004 No IX-2198);
- The Law on Radiation Protection (12 January 1999; No VIII-1019);
- The Law on Radioactive Waste Management (20 May 1999, No VIII-1190);
- The Law on the Supervision of Potentially Dangerous Installations (2 May 1996; new edit of 2 Oct, 2000, No VIII-1972);
- The Law on the Decommissioning of Unit 1 at the State Enterprise of Ignalina Nuclear Power Plant (12 July 2001, No IX-466);
- The Law on Enterprises and Installations Possessing Strategic Influence for National Security (10 Oct 2002, No IX-1132, new edit 21 July, 2009, No XI-375);
- The Law on Additional Employment and Social Guarantees for the Employees of the State Enterprise Ignalina Nuclear Power Plant (29 April 2003, No IX-1541);
- The Law on State Enterprise Ignalina Nuclear Power Plant's Fund for Decommissioning (12 July 2001, new edit of 22 June 2006, No X-710);
- The Law on the Nuclear Power Plant (28 June 2007 No X-1231).

II. Multilateral international treaties and conventions
and treaties with international organizations

- The Convention on Nuclear Safety, (in force by the Resolution of the Parliament of 17 Oct 17 1995, No. I-1063);
- The Convention on the Physical Protection of Nuclear Materials (in force by the Resolution of the Government 16 Nov 1993 No. 778p);
- Amendment to the Convention on the Physical Protection of Nuclear Materials (ratified on 30 May, 2008, No X-1548);
- The Convention on Early Notification of a Nuclear Accident (ratified on 18 Nov 1997 No VIII-523);
- The Joint Convention on Safety in Spent Nuclear Fuel Management and in Radioactive Waste Management (ratified on 18 Dec, 2003, No IX-1921);
- Vienna Convention on Civil Liability for Nuclear Damage (ratified on 30 Nov, 1993, No I-314);
- The Joint Protocol relating to the Application of the Vienna and Paris Conventions on Liability for Nuclear Damage (ratified on 30 Nov, 1993, No I-314);
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; 1986 Sept 26 , ratified 20 July, 2000, No VIII-1882);
- Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO, 1991) (ratified on 7 Oct, 1999, No VIII-1351);
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes (ratified on 2 Dec, 2003, No IX-1863);
- Agreement Between Austria, Belgium, Denmark, the Federal Republic of Germany, Finland, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the European Atomic Energy Community and the Agency in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, and
  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 in Implementation of Article iii, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (Ratified 13 March, 2008, No X-1051)

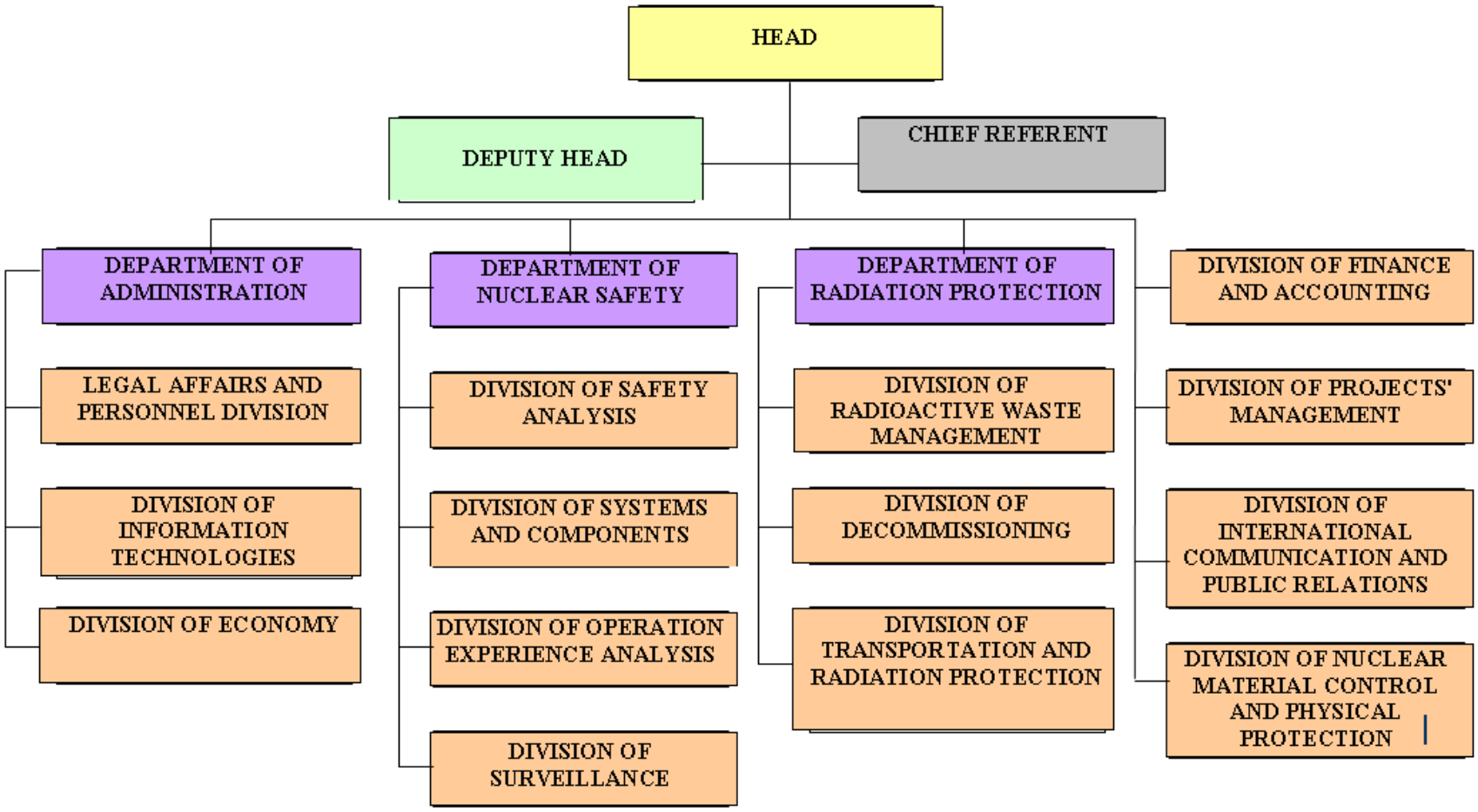
- Treaty on the Non-Proliferation of Nuclear Weapons, signed on 1 July 1968 in London, Moscow and Washington (in force by the Resolution of the Parliament of 26 June, 1991, No I-1492);
- Comprehensive Nuclear-Test-Ban Treaty (ratified on 28 Oct, 1999, No VIII-1372);
- The 1957 European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR); (ratified on 16 June, 1998, No VIII-788);
- International Convention for the Suppression of Acts of Nuclear Terrorism of 2005, New York (ratified on 17 May, 2007, No X-1143);
- The Protocol on Amendment to the Vienna Convention on Civil Liability for Nuclear Damage (signed by the Republic of Lithuania in 1998, however has not been ratified);
- The Convention on Supplementary Compensation for Nuclear Damage (signed by the Republic of Lithuania in 1998, however has not been ratified).

III. Bilateral Agreements

- Agreement between the Government of the Kingdom of Denmark and the Government of the Republic of Lithuania concerning information exchange and co-operation in the fields of nuclear safety and radiation protection, 16 March 1993;
- Agreement between the Government of the Republic of Lithuania and the Government of the Kingdom of Norway on early notification of nuclear accidents and on the exchange of information on nuclear facilities, 13 February 1995;
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic Poland on early notification of a nuclear accidents, and on co-operation in the field of nuclear safety and radiation protection, 2 June 1995;
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic Latvia on early notification of nuclear accidents, exchange of information and co-operation in the field of nuclear safety and radiation protection, 3 October 2003;
- Decree of the Premier Minister on establishment of a permanent Governmental working group for cooperation and exchange of information with Byelorussia on nuclear energy issues, 30 May, 2006;

**III. ANNEX TO ARTICLE 8.2. Figure A1.**

**STRUCTURE OF LITHUANIAN STATE NUCLEAR POWER SAFETY INSPECTORATE (VATESI)**



**ANNEX TO ARTICLE 8.2. Figure A2.**

**AUTHORITIES FOR REGULATION OF NUCLEAR POWER**