IMPLEMENTATION OF THE OBLIGATIONS OF THE CONVENTION ON NUCLEAR SAFETY IN LITHUANIA

THE THIRD LITHUANIAN REPORT IN ACCORDANCE WITH ARTICLE 5 OF THE CONVENTION

2004

Vilnius

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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

Ignalina NPP is the only nuclear installation in Lithuania. It contains two RBMK-1500 reactors (Russian acronym for "Channelized Large Power Reactor"). RBMK-1500 reactors of INPP have their own design peculiarities. Thirteen RBMK reactors of three generation are currently in operation in Russia and Lithuania. Ignalina reactors are a number of unique features, which place it between 2nd and 3rd generations of RBMKs.

Both reactors have one circuit, two cooling loops, fuel assemblies are loaded in individual channels. The neutron spectrum is thermalized by a massive graphite moderator stack. The plant can be refuelled on line and uses slightly enriched nuclear fuel. Refuelling is performed during reactor operation.

The first unit of INPP was put into commission at the end of 1983, the second unit in August 1987. Their design lifetime is projected out to 2014-2017 accordingly. A total of four units were originally planned on this site. Construction of the third unit was terminated in 1988 because of political pressure, and construction of the forth one had never been started. Ignalina NPP is located in the north-eastern part of Lithuania, near the borders of Latvia and Belarus.

Ignalina NPP 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 dearator by the feed water pumps to the water of the same drum-separators. The coolant is returned by the main circulation pumps to the core, where part of it is again converted to steam.

This fundamental heat cycle is identical to the Boiling Water Reactor (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.

Table 1 presents the most important plant parameters.

Table 1

Coolant	water (steam-water mixture)
Heat cycle configuration	single circuit
Power, MW	
Thermal (design)	4800
Thermal (permitted)	≤ 4200
Electrical (design)	1500
Electrical (actual)	1300
Core dimensions, m:	
height	7
diameter	11.8
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
Nuclear fuel burn up, MWday/kg	21.5
Nuclear fuel with erbium addition burn up, MWday/kg	25.2
Temperatures, ^{o}C:	
maximum temperature in center of fuel pellet	2100
maximum graphite stack temperature	750
maximum fuel channel temperature	350
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
Coolant flow rate through reactor at power, m^3/s	7,22... 13,33
Steam produced in reactor at power, kg/s	117…2125
Void fraction at reactor outlet, %	23...29
Maximum fuel channel parameters:	
fuel channel power, kW	4250
coolant flow rate through fuel channel, m^3/s	< 0,011
void fraction at fuel channel outlet, %	36.1
Number of main circulation pumps	8
Capacity of main circulation pumps, m^3/s	1,94…3,06

INPP was designed and constructed by the former USSR's Ministry of Nuclear Power Industry. The development of the INPP design was implemented by the All-Union Research and Development Institute for Energy Technology (Russian abbreviation - VNIPIET), St. Petersburg, Russia, which

was the principal designer. Metal structures of the main building were designed by the Main Design Office "Leningrad Steel Design" (Russian translation - "Leningradstalkonstrukcya"), St. Petersburg, Russia. 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 Center "Kurchatov Institute"), Moscow, Russia. The principal designer of the nuclear steam supply system was the Research and Development Institute of Power Engineering (Russian abbreviation - NIKIET), Moscow, Russia.

6.2. List of existing Nuclear Installations where significant corrective actions are found necessary by assessment, as relevant, under Articles 10 through 19.

Similar to an item 6.1. No additional information is needed.

6.3. Overview of safety assessments performed for INPP during 2001-2004 and the major results of those assessments for existing nuclear installations

6.3.1. Historical and Regulatory Framework

In the previous reports the main activities of State enterprise Ignalina Nuclear Power Plant (below refer to as INPP) in 1993 – 2001 for safety assessment and improvement were considered.
Safety requirements to nuclear facilities are continuously increasing. These requirements cover 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.

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 the scope of preparation of Safety Analysis Reports for Unit 1 and Unit 2 (SAR-1 and SAR-2) and review of these reports (RSR), 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 Safety Improvement Program SIP-1 (1993-1996) and SIP-2 (1997-2005).

The first safety improvement program (SIP-1) was prepared by INPP in 1993-1996. It was the short-term program. It was financed by INPP resources, EBRD/NSA grants and western countries grants, mainly Sweden through Swedish International Project on Nuclear Safety (SiP).

The most essential INPP activity regarding safety assessment was the preparation of SAR-1, performed by experienced Western and Eastern research institutes. In addition to the SAR-1 production, this particular project included the independent review of the safety analysis report (RSR) jointly by independent experts. Unit 1 of INPP was this assessment object. However, since no significant differences were identified between Units 1 and 2, the results apply to both units. A complete set of SAR-1 and RSR reports was submitted to VATESI in 1997. A Panel of international nuclear safety experts, Ignalina Safety Panel (ISP), made an assessment of the development process and scope of the INPP SAR-1/RSR.

Ignalina Safety Panel recommendations were submitted to the Lithuanian Government in written form in 1997. According to the recommendations (such as, to prepare Safety Case for Control and Protection System; Safety Case for Accident Localization System; Safety Case for Primary

Circulation Circuit Integrity; Fire Hazard Analysis for all safety systems etc.) the plans were prepared and agreed with VATESI, taking into consideration the scope and time frames of recommendation implementation, the experienced scientific and engineering support organizations were involved, all appropriate materials were prepared.

As the result of the prime additional safety cases submission, the conclusion was made: there are neither unexplored problems nor non-compliance with modern standards requirements, which could prevent the INPP Unit 1 operation.
Only supported with these comprehensive arguments the 5-year Operation License was issued for the INPP Unit 1.
Additionally, VATESI formulated the License affirmative conditions, which provide the gradual development of safety improvement issues, such as:

- The INPP, being an operating organization, shall improve INPP safety, co-ordinate the license activity for nuclear energy facilities and monitor the performance of License affirmative conditions;
- If any changes of the Law of Lithuanian Republic or any other legislation acts which regulates the safety of nuclear energy take place after modification or additional safety analysis performance, VATESI has the right to amend the License affirmative conditions;
- If any changes of the Law of Lithuanian Republic or any other legislation acts which regulates the safety of nuclear energy take place, INPP is obliged to update the internal documentation in accordance with the amended documents;
- Upon request of the State Nuclear Power Safety Inspectorate, Health Ministry and Environment Ministry, according to their competence, INPP is obliged to submit all pertinent information on INPP activity;
- The corresponding institutions in accordance with their competence shall be informed and the updated information or new documents, listed in the application for License, in case of documents amendments shall be submitted to them;
- The Lithuanian State Nuclear Power Safety Inspectorate can change the License conditions, can terminate or cancel the License, if INPP is ascertained like not performing the License affirmative conditions. The License is reinstated or the permission is issued for the Unit start after the appropriate safety justifications is submitted or the drawbacks are eliminated;
- INPP shall be staffed with trained and qualified personnel in accordance with the regulatory documents requirements. The simulator shall be used for initial and continuous training of the Main Control Room operators;
- INPP shall prepare, update and file the safety-related documents in accordance with guides, rules and norms requirements;
- INPP shall develop the quality assurance and safety culture programs.
- In accordance with established order, INPP shall inform VATESI about normal operation failures;
- INPP Unit 1 shall be shutdown if the fuel channels operation is inadmissible from the safety point of view owing to the gap state between channel and graphite stack;
- INPP shall submit to VATESI the results of operation experience and the problems substantiation within the schedule of the License affirmative conditions. The problems important for INPP safety are: results and analysis of operational monitoring; personnel staffing, training, exams and qualification, use of operational experience, human factor effect; radiation impact to the personnel, public and environment, efficiency of quality assurance system and audit results; abnormal events at INPP; efficiency of INPP safety-related systems and components ageing control; implementation of safety culture improvement activity;
- INPP shall proceed the safety improvement program SIP-2, in regard to INPP Unit 1. SIP-2 program (and its annual consecutive review) has the agreed schedule for the performance of

each activity. Upon the recommendations it was agreed that some activity is less urgent, some needs more time for implementation that is why not all SIP-2 activities were completed at the date of the License issue for Unit 1 operation. Nevertheless, it is VATESI requirement to keep the schedule agreed in SIP-2 program.

- INPP is obliged against time to perform and to develop the special plans and activity programs targeted in long-term perspective.

SAR, RSR and ISP International Panel recommendations became the basis for a new Safety Improvement Programme (SIP-2) for the period of 1997 – 2005 years. Additionally SIP-2 included: engineering activity for safety improvement determined by INPP and proposed by the western experts.
According to VATESI requirement the continued operation of INPP Unit 2 is subject to license receipt.
One of the main documents providing ground for the license receipt is Safety Analysis Report of INPP Unit 2– SAR-2. It was produced in 2001-2004. Main purposes of Safety Analysis Report of INPP Unit 2– SAR-2 are as follows:

- define actual safety status of the Unit, including safety concept and specific technical solutions;
- identify possible deviations from the existing regulations requirements and justification of adequacy and efficiency of the undertaken corrective measures;
- justification of technical condition of buildings, systems and components of INPP providing safe operation of the Unit;
- justification of adequacy of operation procedures implemented at the Unit and INPP, of administrative management schemes, supervision and quality assurance system facilitating to ensure safe operation of the Unit by the operating organization;
- Demonstrate that impact of the actual Unit operation to the personnel, population and environment does not violate the safety limits specified by the regulations.

VATESI has completed its review of SAR-2 and prepared a number of conditions for Operation License of Unit 2. Implementation of Diverse Shutdown System is one of the important factors for Unit 2 continued operation.

Given the fact that the anticipated operational time of Unit 1 and Unit 2 is different the Safety Case for INPP Unit 2 single operation has been prepared.
Therefore, the scope and timeframes for implementation of activities on INPP safety justification are defined in the following documents:

- Terms and Conditions of Operation License for Unit 1;
- Safety Analyses Report for Unit 2;
- Project on implementation of Diverse Shutdown System at Unit 2;
- Requirements to preparation of Unit 1 decommissioning and continued single Unit 2 operation;
- Current Safety Improvement Programme SIP-2.

6.3.2. Safety Assessment performed in accordance with the Terms and Conditions of Operation License for Unit 1

In compliance with the Terms and Conditions of Operation License for Unit 1 a number of activities have been undertaken including additional safety justifications:

- activities on Safety Case for Primary Circulation Circuit Integrity;
- activities on Accident Localisation System (ALS);
- analysis of inspection results on gap between the fuel channels and graphite stack;
- activities on Fire Hazard Analysis;

- activities on accident analysis on shutdown reactor;
- activities on analysis of voltage and frequency reduction;
- upgrade of SAR-1;
- continued activities under SIP-2 (see item 0);
- execution of Probabilistic Safety Analysis of 2nd level, plan development for "living" PSA system, plan development for implementation of periodic PSA.

Ignalina NPP continuously assesses the results of completed activities; additional safety related activities are planned.

6.3.2.1. Safety Case for structural integrity of Reactor Cooling System

The INPP was designed by standards of strength analysis for nuclear power plants, which were valid at that time. These standards were re-issued with additions and amendments in 1987 PNAE G - 7-002-86, adopted by VATESI and currently they are valid in Lithuania. SAR and RSR recommend that safety case for reactor cooling circuit integrity should be developed to ensure compliance of the system with the modern criteria.

Structural analysis of the components listed below was performed, including analysis defects detected during hydro-testing, ultimate design-basis earthquake:

- Drum separators and their nozzles (down comer nozzle and feed-water nozzle);
- Group distribution headers and their nozzles (lower water lines (LWL) and ECCS/GDH connection nozzles);
- LWL and ECCS/GDH pipes and their nozzles during a water-hammer event;
- Primary circuit collectors and pipelines of diameter more than 300 mm (large diameter Dy800 pipelines, downcomers, feed-water pipelines, steam piping systems in the separator area, including the main steam pipes and steam collectors) and the water supply from the ECCS to GDH pipelines Dy150.

Strength analysis of the majority of INPP reactor cooling system components proved that the adequate reserve of strength and longevity is available for the normal operation, hydro-testing and ultimate design-basis earthquake.

The following issues reviewed in period of 2001-2004:

- Determination of steel properties used for manufacturing of primary circuit pipelines;
- Fatigue evaluation of DS feed water nozzles;
- Hydraulic testing parameters for the primary circuit;
- Additional safety justifications of primary circuit on evaluation of structural components load when water is supplied from ECCS;
- Development of inspection techniques for nozzle welds of ECCS headers;
- Reinforcement of supports of ECCS hydro-accumulators;
- Elasto-plastic analysis of DS horizontal support and its fastening to the wall;
- Brittle fracture calculation of ECCS header taking into account the information on steel properties used for manufacturing;
- Studies on crack growth rate caused by IGSCC in austenite piping;
- Evaluation of feedwater piping vibration to define the fatigue crack growth rate;
- Implementation of LBB concept;
- Development of programme on mitigation of metal degradation caused by the intergranular stress corrosion cracking;
- Safety justification of DS operation with defected weldments in compliance with standards PN AE-G 002-86 and methodologies R6.

Results of the performed studies confirmed the adequacy of current safety level.

Given the composition identity of primary circuit systems of Unit 1 and 2 which results in identical operation and maintenance procedures used for these systems, the activities purposed to safety improvement of INPP reactor cooling systems are simultaneously carried out on the both Units.

6.3.2.2. Safety Case for Accident Localization System (ALS)

The accident localization system is the system of protective confinement, which protects workers, the public, and the environment from the radioactivity release in the event of a main circulation circuit rupture or actuation of a main steam relief valve or in the event of gas-steam mixture release after reactor channels rupture. The ALS also provides water for the emergency core cooling system during accident.

At INPP the main part of coolant circuit with radioactive materials is located in the leak-tight compartments in order to limit the radiation doze for the personnel and the public during normal operation and in case of design-basis accidents (even ultimate design-basis accident) with the rupture of coolant circuit, as well as to prevent the radiation release to the environment.
The ALS is a reinforced concrete building accommodating facility, intended to localize the effects of the design-basis accidents as result of coolant circuit lines rupture. The ALS consists of leak-tight compartments Low Water Lines (LWL) and Reinforced Leak-tight Compartments (RLC), accident localization towers for released steam localization and heat exchanger and pump system.

INPP design is one of the latest for RBMK type reactors. Due to this and also because of the purposeful implementation of safety improvement programmes the safety level of Ignalina NPP has been significantly increased.

To meet recommendations of the SAR-1, RSR and the International Safety Panel a complex safety analysis was performed, including:

- system operation;
- operational experience analysis;
- analysis of design-basis and beyond design-basis routs of the accident propagation;
- monitoring of walls and slabs to confirm the quality of reinforcement and concreting ALS walls and slabs during INPP construction;
- specification of chemical composition and mechanical characteristics of building reinforcement samples taken from ALS concrete structures;
- investigation of ALS concrete quality during laboratory monitoring;
- calculation of ALS thermal hydraulic parameters during ultimate design-basis accident (an accident with MCP header rupture with the check valve failure at one of GDH of effected reactor half);
- structural analysis of ALS during the ultimate design-basis accident – analysis of construction structures to sustain the maximum design-basis pressure;
- methodology analysis of ALS leak-tightness assessment, applied at INPP;
- the analysis of hydrogen explosion hazard during ultimate design-basis accidents (carried out by NIKIET and VNIPIET within the scope of substantiation of the symptom-based emergency operation procedures);
- calculation of doserates at the border of a sanitary - protective zone (3km radius out of INPP) and their comparison with hygienic norms in force.

To ensure that radioactivity would not be released from the ALS into the environment and exceed the authorized limits, it was necessary to demonstrate that the walls of the ALS compartments could withstand the pressure rise, which occurs during design-basis accidents. The resolution of this problem was one of most important ALS safety case objective.

Non-linear analysis (NEPTUNE) of the structural integrity of the ALS showed that the integrity would not be violated in the case of the ultimate design-basis accident.
For ALS safety analysis INPP involved Swedish and Danish experts, who performed the monitoring of building structures by non-destructive testing methods. Areas for monitoring were selected from such places as reinforced walls and slabs most loaded during accident.

Besides, in the places indicated by the western experts, samples of concrete and reinforcement were taken; their parameters were defined experimentally in specialized laboratories of the Lithuanian Republic and qualified on compliance to standards requirements.
The database was created in the frame of the work, which includes information about the ALS buildings geometrical data and loading on walls and slabs sections, mechanical characteristics of the building structure materials.

The results of non-destructive monitoring allowed assessing the compliance of the actual ALS building structures to the design decisions. The calculation of the ALS structures actual integrity was carried out on the base of such an assessment and with the consideration of derived experimental data.
The calculations performed and the analysis of hydrogen explosion hazard during ultimate design-basis accident demonstrated that the concentration level of hydrogen in ALS during ultimate design-basis accidents would not reach explosion-hazardous values and they are not dangerous for the integrity of ALS building structures and ALS equipment.

The calculation of doserates at the boundary of a sanitary-protective zone under the ultimate design-basis accident demonstrated that the radiation doses for population and staff will not exceed the established limits.

The INPP submitted the Unit 1 ALS safety analysis to VATESI for review.
The major findings of the ALS safety analysis for Unit 1 are the following:

- INPP ALS responds to the functional safety requirement and the ALS is expected to perform its function during all design-basis accidents with the high reliability;
- All active components are tested with an acceptable frequency, according to agreed instructions and process regulation of INPP operation;
- The inspection is carried out in sufficient scope and with an acceptable frequency;
- ALS design allows the critical parts and components to be repaired both during shutdown and during normal operation;
- The reliability value of the critical components demonstrates that the intervals between maintenance and tests are chosen so that reliability of these components is ensured.

Some non-compliance was found as the result of the ALS safety analysis, elimination of which is unreasonable from the economical point of view, and the required safety level can be ensured in the presence of such non-compliance.

In 2001-2004 complex measures have been implemented at INPP to reinforce the ALS leak-tightness. Such activities facilitated to improve the quality of defect identification, repair and inspection if ALS leak-tight circuit.

Testing of leak-tight boundary is conducted after maintenance or replacement of components important for leak-tightness has been performed in case the local inspection of this component is not possible. Leak-tightness testing of ALS leak-tight circuit by means of reduced pressure is performed annually at the beginning and at the end of outage. Modern thermo-vision, acoustic and other equipment is used to increase leak-tightness of Unit 1 and 2 ALS via detection of defects in restricted access areas.

The following works have been performed in 2001-2004 in terms of further safety justification of ALS:

- Validation of ALS models produced by means of codes CONTAIN and RALOC;
- Additional calculation on ALS condensing capability at design accidents;
- Analysis of accidents with long-term failed closure of MSV including sensitivity analysis and taking into account additional failure of ALS heat exchanger and pump system;
- Assessment of reliable operation of exhaust ventilation of rooms adjacent to ALS leak-tight circuit;
- Additional calculations for ALS on evaluation of acceptability criteria with respect to deviation from vertical of the steam distributor devices;
- Additional calculations for ALS on ability of condensation vessels and steam distributor devices to withstand the dynamic load in terms of ultimate design accident;
- Evaluation of area of equivalent leakage of boundary between Unit 1 Reinforced Leak-tight Compartments (RLC) and Accident Localisation Tower (ALT) and steam leakage in case of ultimate design accident;
- Evaluation of requirements to ALS with respect to limitation of radioactive products release on INPP Site during accident;
- Justification of ability of ALS ventilation systems to withstand emergency loads;
- Upgrade of ALS operation procedures;
- Evaluation of drainage system capacity in DS rooms;
- Calculation of initial conditions for fission products release to ALS rooms and environment in case of accident;
- Evaluation of ALS hydrogen monitoring systems.

Results of the performed studies confirmed the adequacy of current safety level.

6.3.2.3. Analysis of results of gap inspection between fuel channel and graphite cladding

In-service inspection of fuel channel (pressure tubes) was upgraded taking into consideration measurement of gap “Fuel Channel – graphite column”, determination of defect type, measurement of hydrogen saturation, determination of all parameters of crack resistance under RSR recommendation.

Significant information was received facilitating safety justification of fuel channel:

- "Lifetime engineering programme for Ignalina NPP pressure tubes", 1999;
- "Lifetime engineering programme of Ignalina Pressure Tubes for the year 2001";
- "Residual gas gap alteration forecast in reactor cells of Unit 1 and gas gap alteration forecast in reactor of Unit 2”, 2001;
- " Residual gas gap alteration forecast in reactor cells of Unit 1 as per inspection results of 2002”, 2002;
- "Lifetime engineering programme of Ignalina Pressure Tubes for the year 2002".

Experimental results confirmed that the mechanical properties including crack resistance, corrosion condition, and hydrogen saturation of pressure tubes and change of the gas gap “fuel channel – graphite stack” will not deteriorate the technical reliability of Unit 1 reactor core before it is shutdown in 2005.

On the basis of justifications the ISI optimization procedures for fuel channels have been prepared taking into consideration change of gap “fuel channel – graphite column”, programme of ISI scope extension for fuel channels has been developed and implemented.

6.3.2.4. Fire Hazard Analysis

Following RSR recommendations INPP implemented the Fire Hazard Analysis (FHA) to justify the design concept of fire protection and confirm its compliance with the current requirements. Main purpose of FHA is to justify the adequate fire protection of the safety systems responsible for safe shutdown and cooling-down of reactor. Analytical methods and criteria which reliability has been proved by the world practice are used hereof.
In 1998 FHA report for Unit 1 INPP was prepared.

Scope of FHA covered rooms accommodating safety system components of Unit 1, these components directly participate in reactor shutdown, cooling-down, retaining of radioactive substance in process systems and maintaining releases to environment within the admissible limits. In frames of FHA 531 rooms of Unit 1 INPP were reviewed, as a conclusion the high resistance of Unit to such initiating event as fire was confirmed.

Based on the results obtained from the implementation of the first stage of FHA it was recommended to improve the fire protection in NPPs. The activities (to be implemented from 2001 to 2004) to improve the fire protection as much as to make the NPP fire protection measures to conform to the applicable standards of Republic of Lithuania and international standards were developed. The activities were specified to be complete until 2004. The activities include replacing the doors of the safety system components with the doors of high fire resistance, replacing obsolete equipment and installing the updated fire fighting systems, fire alarming systems, floors and stairway flights made of non-combustible material and laid along the escape routes, installing the fire dampers in the ventilation systems, covering metal structures and electrical cables with fire retardant applications, etc., The First Stage Fire Hazard Analysis was one of the documents to be submitted to VATESI to license Unit 1.

The second stage of FHA for INPP Unit 1 (FHA1/2) was implemented to comply with the requirement of INPP Unit 1 Operational License. In 2001-2002 FHA1/2 was carried out by LEI together with SwedPower (Sweden). Complex analysis of all main rooms accommodating safety system and safety related system components (including 531 rooms covered by stage 1), rooms adjacent to the main rooms and fire hazardous rooms (warehouses, rooms with flammable materials, etc.), database on 1719 rooms was developed. Analysis has been performed, recommendations generated and conclusion made that fire in any of the rooms in question would not lead to violation of Unit 1 safe operation. In case of fire as initiating event the safe shutdown, cooling-down and condition monitoring of reactor are foreseen by means of other available safety and normal operation systems. On the basis of recommendations specific activities were developed (to be implemented in 2003-2004). Reports on 2nd stage of FHA for Unit 1 INPP have been prepared.

Given the composition identity of Unit 1 and 2 safety systems the identical FHA activities are simultaneously held at both Units. FHA of Unit 2 was carried out in 2002 on the basis of results of Unit 1 FHA, comparison of safety systems, sampling detailed analysis and comparison of results bearing the significant importance from the point of view of nuclear and fire safety of Unit 1 and 2 rooms to confirm acceptability for Unit 2 of findings and conclusions made within the frames of Unit 1 FHA. Fire protection systems of Unit 1 and 2 were compared, activities implemented fire protection improvement at Unit 2within the last 8 years were reviewed, Unit 1 FHA recommendations were studied in terms of their acceptability for Unit 2. INPP Unit 2 FHA made part of documents submitted to VATESI for Unit 2 licensing.

Recommendations were elaborated, activities developed on their basis (to be implemented in 2003-2004) and conclusion made that defense in-depth fire protection of Unit 2 INPP performs its functions of prevention, detection, fighting and mitigation of fire consequences. It provides the

safety related systems with adequate fire protection safety necessary to perform their functions (reactor shutdown, residual heat removal, monitoring and prevention of radioactivity release beyond the admissible limits). Adequate level of nuclear and radiation safety is met.

6.3.2.5. Analysis of accidents on shutdown reactor

The primary issues raised to analyse accidents occurred on the shutdown reactor include the problem of possibility to heat-up the fuel elements when the core is subject to draining and the reliability margin of the safety systems is assessed in whole.

While implementing the analysis of accidents on the shutdown reactor the worst failures, rupture places and condition of the reactor cavity before rupture were selected. In compliance with the calculations the additional limits were determined to perform the shutdown reactor activities. All the recommendations were considered in the operating procedures.

In 2002-2004 within the frames of SAR-2 preparation analysis of the following accident events on shutdown reactor was performed:

- accidents during draining of primary circuit for repair/maintenance;
- accidents during draining of cooling circuit of Control and Protection System, fission ionisation chamber and power distribution detectors;
- accidents during hydraulic testing of primary circuit and ancillary systems.

6.3.2.6. Assessment of consequences resulted from low voltage and electricity frequency for in-house consumers

The analysis of performance of in-house facilities in the event of voltage and frequency alteration was performed. The analysis specified the minimum voltage and frequency indications for pumps, fans and valve drives of safety systems. Additionally, the potential scenarios of INPP operation and energy system, potential emergency switching-off of the turbine generators or reactors were reviewed and the events, which may ultimately affect voltage and frequency of the in-house buses, were determined.

The demonstration that the safety functions are initiated in all events was provided. However, to ensure more reliable performance of the safety system facilities without any reference to the electricity system conditions, INPP implemented some modifications. The modifications were intended to complete the second stage of the start-up and to connect the diesel generators to safety buses in the event of voltage decrease in the outside power supply source and to increase the setpoints for start-up frequency and switching-on the diesel generators.

6.3.2.7. Upgrade of SAR-1

SAR-1 was upgraded on the basis of available information received in result of completed modifications, analyses and updates of INPP safety management system carried out during the period from 1996 to the beginning of 2004.

The following significant items were added to SAR-1:

- Calculation studies of water hammer impact to GDH, pipeline between ECCS pressurized tanks and water supply valve to ECCS header;
- Development and implementation of activities on reactor hall protection from excessive hydro-testing;
- Capacity analysis of drainage system of DS rooms;
- Additional inspection and study of reliability of ECCS to GDH mixer;
- Additional study of seismic stability of INPP equipment in terms of recommendations of western experts;

- Evaluation of flooding possibility in rooms accommodating safety related equipment of INPP;
- Analysis of flooding possibility in rooms accommodating ECCS pumps;
- Analysis of redundancy and reliability of I&C of ECCS pressurized tanks;
- Analysis of necessity of automatic ECCS switching on in case of steam lines rupture;
- Protection of service water supply system from external effect;
- Analysis of necessity of automatic control of ECCS water to the unaffected half of the primary circuit;
- Safety justification of primary circuit integrity;
- Justification of protection from GDH switching off and possibility of restart;
- Analysis of service water piping condition in rooms of ECCS pressurized tanks;
- Analysis of accidents on shutdown reactor;
- Safety justification in case of accidents caused by equipment failures not covered by Chapter 5 of SAR-1;
- Analysis of accident in long-terms cooling part of the primary circuit including accidents during reactor shutdown, internal and external effects;
- Analysis of steam lines filling with water;
- Analysis of radiological consequences in case of steam line rupture and feed water pipeline rupture;
- Analysis of rupture of emergency feed water pipelines during Unit start up;
- Analysis of tension in fuel channels adjacent to ruptured fuel channels;
- Safety justification of ALS;
- Analysis of pressure excess protection system in reactor cavity;
- Evaluation of performance of ventilation system and possibility of personnel presence in MCR/RCR after external events (seismic, etc.);
- Evaluation of possibility of due temperature maintaining in main I&C rooms after LOCA;
- Scientific support for application of uranium-erbium fuel at INPP reactors RBMK-1500;
- Safety package “protection from depressurization rate increase in DS”;
- Safety analysis of reactor protection system from low flow rate in one of the GDH and low reactivity margin;
- Safety package DAZ;
- Safety justification of current CPS/AZRT;
- Justification of in-house equipment performance in case of change of voltage and electricity frequency;
- Analysis of impact of the fire-proof paste covering on the electrical function of power cables;
- Fire Hazard Analysis;
- Action plan on qualification of INPP safety systems;
- Ageing management;
- Upgrade of fuel channel ISI;
- Methodology and criteria of ageing process evaluation for safety related components;
- Analysis of operation standards, rules and procedures;
- Implementation of safety management procedures.

In course of preparation of Updated safety analyses report of INPP Unit 1 the scope of Amendment of SAR-1 was defined, appropriate design and operation documentation was analyzed.
The main VATESI recommendations made during the licensing process in 1999 have been implemented. The conditions of license No. 12/99 are met.

Reviews of all operation areas as described in this report and other documents prepared for license extension, review of conformance to conditions of Unit 1 Operation License demonstrate that current safety level of INPP Unit 1 meets the existing safety criteria.

Given the actual condition of systems and equipment, implemented modifications, analysis results and the improved INPP safety, no factors are found preventing license extension. The Operation License 12/99(P) with updated conditions has been granted in July 2004.

6.3.3. Preparation of Safety Analysis Report for Unit 2 (SAR-2)

To comply with the requirements of VATESI, INPP shall get the license on continued operation of its Unit 2 earlier operated under annual permits. One of the primary documents to obtain the license is the Safety Analysis Report for Unit 2 (SAR-2).

SAR-2 was performed for Unit 2 condition as of the end of 2000 (in particular, the following was taken into account: implementation of Additional Scram System (DAZ), additional reactor scram systems in the event of low flow rate in one of the Group Distribution Headers, low reactivity margin, depressurisation rate dP/dt in the drum separators, new algorithm for ECCS, etc). Final SAR-2 meeting the comments of RSR experts was submitted to VATESI in May 2004.

Safety analysis was purposed to define the actual status of Unit 2 safety taking into account the Unit condition after all modifications implemented in compliance with the results of the previous analysis, identification of possible deviations from the current regulation requirements and justification of adequacy and efficiency of undertaken compensating measures.

SAR-2 was performed in a format further developed from the one of SAR-1 to constitute a complete internationally acceptable SAR, this format meets VATESI requirements set forth for the safety analysis reports submitted for licensing purposes. Scope of safety issues covered by the report is demonstrated via application of systematic safety analysis techniques, such as deterministic, probabilistic, defense in-depth protection method and other world practice techniques.

Accident analysis covers emergency situations in case of design initiating events. Initiating events are grouped in compliance with the requirements of USA Nuclear Energy Committee Regulatory Guide 1.70. and IAEA recommendations "Accident Analysis of RBMK Nuclear Power Plants" RBMK-SC-52 with respect to potential effect on the main safety functions or parameters. Within the scope of accident analysis the initiating events are considered for the complete reactor power range, including reactor start up (entering to Minimal Controlled Level or at MCL). Accidents during shutdown and on shutdown reactor are reviewed as a separate part. Anticipated Transients without Scram are considered separately. It includes a number of initiating failures accompanied with complete loss of functions of Emergency Protection by Technological Causes (AZRT). Within the frames of thermo-hydraulic analysis of postulated accidents the transients were defined which may impact the integrity of the primary circuit. Analysis of radiological consequences and irradiation dose rates are provided for such accidents.

During the conducted analysis a number of incompliance with some requirements of regulations or with the best international practice were identified. Hence, no incompliance was categorised as being “Not Tolerable” for continuation of safe operation.
On the basis of SAR-2 recommendations a list was prepared containing 126 safety improvement activities for INPP Unit 2. Safety Improvement Programme (SIP-3) for implementation of these activities will be prepared by the end of 2004.

Results and conclusions of Safety Analysis Report provide the basis for decision making by VATESI on issuance of Operation License for Unit 2 INPP and for decision making with respect to investment priority for further safety improvement measures.

6.3.4. Implementation of Diverse Shutdown System (DSS)

In December 1996 Unit 1 safety justification (SAR-1) was completed. Within the frames of SAR-1 analysis of Control and Protection System – (CPS) was performed. A number of inconsistencies with the modern requirements of technical regulations were identified in result. CPS performs two functions: reactor power control at normal operation and reactor shutdown in emergency situations; which is considered to be the main drawback of CPS. Recommendation was given on necessity of a diverse shutdown system which would ensure INPP safety in terms of any design basis accident. INPP agreed to this recommendation and currently DSS is being implemented at INPP.

Purpose of DSS – to provide reactor with two independent diverse means of reactor shutdown. It was achieved via implementation of the second strong protection line. DSS should achieve and maintain reactor sub-criticality with strictly defined, transparent and justified sub-criticality margin. Reactor protection should be provided by DSS in such a way that it was apparent and completely justified in full compliance with the operation and standard requirements. Reliability of the system is also the issue. DSS will meet the up-to-date requirements on redundancy, diversity, separation, independency, single failure criteria, software, etc.

Two independent shutdown systems are introduced within the frames of DSS project by dividing absorber rods into two parts: AZ system performing function of emergency protection and BSM system performing function of normal shutdown of reactor and maintaining reactor in sub-critical condition. To prevent design basis accident reaching the beyond design basis level in case of total failure of BSM rods, additional hold-down system (AHS) is provided - a system of manually inserted liquid absorber to ensure due sub criticality maintenance.

Second independent set of equipment is provided which includes I&C systems and sensors to ensure alternative independent means of AZ initiation. In January 1998 the European Commission made decision on project funding for development of design specification of diverse shutdown system.

Project implementation plan was developed. The following activities were to be undertaken in compliance with the plan:

- Define requirements to DSS;
- Define evaluation criteria for DSS options;
- Collect proposals for DSS implementation;
- Select best proposal;
- Prepare Design Specification including justifying calculations and accident analysis.

May 1998 - a report on DSS implementation options was issued.
December 1999 - Project Management Unit was established at INPP for DSS implementation.
March 2000 - the Design Specification including justifying calculations and accident analysis were submitted to VATESI for approval. Additional review performed by independent experts required document modification. Specification for DSS tender was approved in July 2001.
August 2001 - Tender Documents for DSS implementation was submitted to EC.
November 2001 – Announcement of tender for DSS implementation at INPP was issued. Contract was signed in July 2002 with company DS&S.
November 2002 – report on the first stage of safety case and safety provision plan for DSS and preliminary design of DSS were submitted to VATESI for approval.

May 2003 – first batch of DSS equipment was delivered to INPP to be installed during outage of 2003; intermediate safety case (2nd stage) for DSS was produced.
July 2003 – FAT of I&C equipment (excluding software) was conducted in France.
October 2003 – document "Accident Analysis at DSS operation" was developed.
November 2003 – Safety Plan and safety justification for DSS installation were developed.
November - December 2003 – integrated testing of DSS equipment was held.
March 2004 – DSS design documentation was developed.
March 2004 – preparatory works started for trial operation of DSS equipment and complete system.
April 2004 – testing and commissioning of equipment involved in trial operation was completed; programme for DSS equipment trial operation without CPS rods was completed.
May 2004 – integrated test of ISC TITAN software updated in accordance with DSS was completed.
May - June 2004 – continuations of DSS trial operation, development and endorsement with regulator of all pertinent documentation include operation procedures; a personnel training was conducted.
Completion of DSS implementation is scheduled for outage of 2004 at Unit 2 INPP.

6.3.5. Preparation of Safety Case for single Unit 2 operation

According to VATESI requirements in order to continue Unit 2 operation after Unit 1 final shutdown, INPP was to prepare Safety Case for single Unit 2 operation. Safety Case for single Unit 2 operation was developed assuming the Unit 2 condition at the end of December 2004 for which the Unit 1 final shutdown is scheduled.

Safety Case 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.

Safety Case for single Unit 2 operation covers two stages of Unit 1 decommissioning:

- From Unit 1 final shutdown till the start of reactor defueling;
- From start till the completion of Unit 1 reactor defueling.

Safety Case considers modifications planned to be implemented at Unit 2 (for systems affected by Unit 1 final shutdown), configurations of Unit 1 process systems during Unit 1 decommissioning and all modifications of INPP organizational structure planned to be implemented.

Safety Case for single Unit 2 operation has to confirm possibility of continued Unit 2 operation following the Unit 1 final shutdown. Results and conclusions of Safety Case for single Unit 2 operation will provide the basis for reasonable decision making by VATESI with respect to Unit 1 safe final shutdown and decommissioning.

6.3.6. Status of Probabilistic Safety Assessment of Ignalina NPP

6.3.6.1. PSA, level 1

The Probabilistic Safety Assessment Project for INPP Unit 2 commenced in 1991. The PSA was applied to support and define safety priorities, for instance, to develop two first programmes on safety improvement. They were SIP-1 and SIP-2.

The full-scope model of PSA of Level 1 for Unit 2 was first developed in June 1994. The objective was to identify the possible ways for safety improvement. In September1996 the model was updated to comply with the modifications installed in INPP, the modelling methods were improved by applying the additional INPP data. In 1998 the necessity to comply with the requirements for

follow-up improvements of INPP equipment and modelling methods as well as for developing PSA of Level 2 raised.

After modifications of the plant equipment and upgrading of the model the calculated core damage frequency is lower than 1E-5 per reactor per year[1]. The low frequency reached by applying the updated model caused the necessity to assess the consequential risk of the initial events, which earlier had not been included in the scope of study, rate of power and rate of detailing. It was identified that some events, which had not been considered by the model, could become the dominant contributors and, therefore, needed further studying.

The independent group of PSA experts (IPSART Mission) of IAEA carried out the review of Unit 2 PSA in June 2000. The review was completed in close cooperation with the experts of INPP PSA Group and under supervision of VATESI. The recommendations issued by IPSART Mission contributed sufficiently to further development of the PSA model.

The most essential comments provided by the Mission were related to the model scope and limitations. INPP PSA Group had the same opinion. It meant that in order to substantiate the received low frequencies some additional activities were to be carried out.
The last issue of PSA Level 1 Report represents results of implementation of IPSART Mission recommendations. Thanks to the performed activity the accuracy and efficiency of PSA results for INPP were increased.

6.3.6.2. PSA, level 2

The PSA of Level 2 was complete in summer 2001. The results of the PSA showed that the frequency of severe releases of radionuclides is comparable to the one of core damage. The PSA of Level 2 considered the possibility of rupture of ALS structural integrity and consequential ECCS failures. The frequencies for all important scenarios for severe accidents are at the limits of real values, which can be assessed applying the methods of PSA and at level 10^{-7}, which contributes some uncertainty to the result.

The obtained results are still demonstrating the efficiency of improvements implemented in INPP, for instance, the newly-installed Additional Scram System (DAZ), the new scram signal and initiation of ECCS in the event of low flow rate through GDH and new, more reliable MSV. These improvements have sufficiently reduced the frequency of the core damage that occurs during the early and medium stages of the accident propagation.

The structure of PSA of Level 2 and model were developed and the appropriate calculations were made. This is a basis for considering and setting forth the priorities, which will be applied to in future for further operation improvement of both INPP and PSA model.

The frequency of severe releases is once every 200-500 thousand years. These figures are put at the border of the PSA data truth since the results have been mostly obtained from PSA of Level 1. The obtained results demonstrate the efficiency of some improvements implemented in the Plant, for instance, reduction of frequency of scenarios for “postulated transients without the reactor shutdown” (ATWS) and accidents caused by loss of flow rate.

Nevertheless, the results received require making the follow-up efforts. They are as follows:

- Implementation of clear emergency procedures for decreasing high pressure in the Primary Circuit and supplying the cooling water at low pressure if the whole long-lasting emergency core cooling system fails to initiate;

[1] According to IAEA standard the core damage frequency shall lie within the range from 1E-6 to 1E-4per year, while the value for significant releases shall be 10-100 times less.

- The further study of the effects, which can affect the leakage frequency and its volume. This will help to give more realistic interpretation of scenarios of some accidents.

AEA-Technology (Great Britain) carried out the independent review of PSA of Level 2. It was recommended to clarify and improve the substantiation of some results, but the main conclusions were not subject to commenting. The experts of PSA Group accounted for the review comments and the appropriate documents were updated.

The review of IPSART Mission and AEA-T improved sufficiently the content of PSA. The consideration of the comments allowed applying to the PSA to justify the opinions when the plant safety issues are discussed and further solutions are to be taken. The updated issues of PSA of Level 1 and Level 2 were reviewed during the second IPSART mission held in October 2001.

The implemented work complies with the VATESI requirements the objective of which is to support and implement at INPP the “living” PSA. The results of PSA of Level 2 demonstrate that the Accident Localization System (ALS) can cope successfully with consequences of design-basis accidents but cannot be considered as the additional safety barrier for the beyond design-basis accidents that lead to the state “Accident”. It means that the probability of severe release is compared to the frequency of the core damage.

The frequency of the core damage is less than 1E-5 and this result is similar or even lower than the similar results obtained in many western NPPs. This is justified by the specific peculiarities of the reactor like low specific power, high heat capacity, back-up of engineering safety systems and their independence (separation).

INPP is not equipped with the full-scope containment as most western NPPs. But the reliable safety barriers help preventing from the core damage, which allows keeping the severe releases frequency at the level of 1E-6 per year as the appropriate IAEA standards specify.

6.3.6.3. Updated ("living") PSA

Expertise held by missions of IPSART and AEA-T considerably improved the quality of PSA. It is thanks to the implemented recommendations that the more reasonable usage of PSA is possible for settling the NPP safety issues and making decisions on them.

Updated PSA versions of level 1 and 2 were reviewed by second IPSART mission in October 2001. Mission made positive conclusions; improved quality of PSA was noted. Recommendations made by the mission refer to quality improvement of PSA model.

Performed activities correlate with VATESI requirements to maintain and use “living” PSA at INPP. Results meet the requirements of the Lithuanian regulations. According to the “living” PSA concept all significant modifications of INPP safety systems should be reflected in PSA model and PSA results should be calculated taking into account the implemented modifications. DSS implementation at Unit 2 will be the most significant modification. Moreover, PSA model is subject to continuous improvement and clarification.

With the help of scientific organizations deterministic and probabilistic calculations are made in order to clarify and update the PSA model. The following makes part of additional safety justifications:

- support of implementation of long-term reactor cooling as proposed by PSA level 2;
- probabilistic analysis of consequences of down-comer rupture in Drum Separators room;

- additional calculations to clarify and justify the PSA model pre-conditions – analysis of LOCA accidents taking into account additional failure to determine criteria of successful reactor cooling-down and consequences of criteria violation;
- additional ALS analysis – evaluation of whether the existing leakage between Reinforced Leaktight Compartments and Accident Localization Tower is within the admissible limits, evaluation of whether the steam distribution device is able to withstand the dynamic loads;
- development of computer programme to define equipment reliability parameters by means of Bayess method.

INPP PSA group deals with review of model of accident sequences, identified drawbacks are corrected. Data on INPP equipment failure are processed and analysed, new safety parameters are calculated and used in the model.

6.4. Overview of INPP safety improvements during 2001-2004 (SIP-2)

6.4.1. INPP safety improvements in 2001 (SIP-2/2001)

In 2001 the following 17 activities of SIP-2 (SIP-2/2001) were implemented:

- Installation of additional protections from pressure excess in DS, on flow rate reduction in MCP (in case of loss of external power) at Unit 2;
- Replacement if analogue-relay converter of LOZ type at Unit 2;
- Development and implementation of additional reactor protection in flow rate reduction via GDH and on operative reactivity margin at Unit 2;
- Development and implementation of logic of signal generation for ECCS actuation due to flowrate reduction via GDH at Unit 2;
- Development of programme of hafnium burn-up response analysis for calibration of hafnium sensors;
- Engineering study and supply of equipment for motor-driven valve inspection (diagnostics);
- Upgrade of programmes of 2D neutronic calculation and special mathematical support to transfer the physical calculation progamme to the on-line level of upgraded ICS RBMK – 1500 INPP;
- Implementation of analysis on impact of steam-lines filling with water;
- Continuation of analysis of reactor cavity ventilation to determine the limit quantity of simultaneously rupture FC;
- Implementation of symptom-based EOP;
- Implementation of activities on flood prevention in room 02 building 150 and room 017 building 154;
- Design development and implementation of support reinforcement for EECS pressurized tanks;
- Update of report on FC safety case taking into account the results of FC post-reactor study. Issue of summary report on FC post-reactor study;
- Safety justification of operation of DS No.12 at Unit 2 taking into account the availability of defected elements in compliance with standards PN AE-G 002-86 and methodologies R6;
- Implementation of reliability assessment of ventilation systems in rooms adjacent to leak-tight circuit;
- Preparation of justification that ventilation system WZ52–WZ55 is able to withstand emergency loads;
- Modification of AVRIP logic of safety buses 6 kV at Unit 2.

Due to the fact that further works will be performed within the frames of Unit 1 preparation to decommissioning the following activities are excluded from SIP-2/2001:

- Implementation of new management system for Group 3 radioactive waste;
- Implementation of project for retrieval of Group 3 radioactive waste from building 157.

6.4.2. INPP safety improvement in 2002 (SIP-2/2002)

In 2002 the following 11 activities of SIP-2 (SIP-2/2002) were implemented:

- Supply of CONSTOR casks under contract No.3;
- Upgrade of feed water supply line: design development and replacement of controllers on FWP head, valves in FWP recirculation line;
- Installation of preliminary cleaning filters of LPC TG-1;
- Preparation of technical specification for new management system for Group 1&2 radioactive waste;
- Development and implementation of compute repair and maintenance management system (RMMS);
- Upgrade of drainage system in DS rooms;
- Omission correction in analysis of accidents defined by TG-5. Additionally analysis of accident in regard on long-term cooling including accidents during reactor shutdown, internal and externals effects;
- Installation of fire protection alarm system in compartment of diesel station, building 111;
- Development of US inspection technique for corner weld of DS nozzles and ECCS-GDH;
- Refurbishment of roof of building 155 to prevent water intrusion in compartments and subsequent flushing of radionuclide with ground waters;
- Implementation of activity on security improvement of On-shore Pump Station (building 120/1).

6.4.3. INPP safety improvement in 2003 (SIP-2/2003)

In 2003 the following 20 activities of SIP-2 (SIP-2/2003) were implemented:

- Preparation of fire hazard analysis at INPP, 2nd stage (Unit 1);
- Replacement of accumulator batteries and DC boards at Unit 2 and of 2 DC boards at Unit 1;
- Implementation of new radioactive waste record system;
- Analysis of capacity of drainage system of DS rooms;
- Reduction of reactivity change due to CPS channels emptying by means of replacement of
- existing CPS rods to rods 2477;
- Calculation of fatigue of DS feed water nozzle;
- Implementation of elasto-plastic analysis of DS horizontal support and its fastening to the
- wall work;
- Brittle fracture calculation of ECCS header taking into account the information on properties
- study Ст. 20;
- Development of drainage system for water removal from compartments of buildings 157,
- 157/1 to prevent non-controlled radionuclide flushing by ground waters;
- Sealing of roofs of buildings;
- Repair of siphon of service water discharge channel;
- Replacement of metal bars on windows of buildings;
- Installation of guarding alarm system of windows of buildings;
- Cleaning of bypass and repair of bridges at industrial waste polygon;
- Repair of outer joints of wall panels of building 155/1;
- Repair of roof, building 159;
- Arrangement of pendant trays for power cable of bridge crane, building 157;

- Installation of X-ray devices for personnel checking at INPP control point;
- Upgrade of check-access system TRAX;
- Extension of SFSF Site for 8 extra CONSTOR casks.

6.4.4. The current INPP safety improvement program (SIP-2/2004)

Ignalina NPP Safety Improvement Programme No.2 (SIP-2/2004) comprised 81 activities to be implemented during the period from 2004 to 2009. The following 5 activities are already completed:

- Safety Analysis Report for Unit 2 (SAR-2);
- Implementation the project on video camera installation to inspect condition of group 3 waste in bld. 157 compartments;
- Updating of SAR for constructions 155, 157, 158 according to comments of IAEA experts;
- Development of US-inspection technique for the branch pipes of discharge and pressure headers of PC.

- Reinforcement of hipped roof's metal structures in Central Hall and Fuel Storage Pools Hall of power unit 2 order to provide required seismic stability.

The remaining most important activities are:

- Implementation of the reactor second Diverse Shutdown System at Power Unit 2;
- Transportation of spent fuel assemblies from Power Unit 1 to Power Unit 2;
- Installation of a Cementation Facility for ion exchange resins and slurry;
- Installation of small leak detection systems in rooms where PC, feed water and live steam lines are located;
- Performance of recommendations developed in SAR-2;
- Performance of recommendations developed in SAR of Single Unit 2 operation;
- Implementation of a new radioactive waste management system for the 1, 2, 3 waste group;
- Implementation of new maintenance techniques for works with large dose rates;
- Installation of servo-motor of a new construction at the second Diverse Shutdown System at Power Unit 2;
- Replacement of UPS-1500 at Unit 2;
- Performance of modification of electrical parameters and scheme state telesignalization telemetry system;
- Modernization of CH-2 crane Q=50/12.5 tons;
- Implementation of intruder alarm and television monitoring system in especially significant and significant rooms of INPP internal area;
- Improvement of physical protection system of INPP perimeter;
- Modernization of MCR full-scale simulator due to the implementation of the reactor second Diverse Shutdown System;
- Modernization of Unit 2 radiation safety automatic control system;
- Modernization of radioactive waste segregation and radioactivity measurement system in order to separate radioactive waste;
- Implementation of Beyond Design Accident Management Guidelines;
- Performance of transportation and post-irradiation examination of nuclear fuel 4 FA.

Financing of safety improvements made to the nuclear installation during its operation described in Article 11.

6.5. Position of Lithuania as to further operation of INPP

The Ignalina closure commitment is part of the National Energy Strategy (the „NES“) adopted by the Seimas of the Republic of Lithuania on 5 October 1999 approved by Resolution No. VIII-1348 and updated and approved by Resolution No. IX-1130 on 10 October 2002. In this respect section 15 of the updated NES reads as follows:
„In 1999 Seimas ratified the National energy strategy, which stipulated final shutdown of the first Unit of Ignalina Nuclear Power Plant by year 2005 pursuant to the Nuclear Safety Account Grant Agreement, provided that the long-term and essential financial assistance conditions ensured by the EU, G-7 countries and other international financial institutions are maintained. On the basis of this assumption and having in mind that the EU countries acknowledge INPP decommissioning to protract and in this respect to exceed current financial perspectives, and to be an exceptional financial burden for Lithuania, considering the fact that the Countries have claimed in expressing their solidarity to Lithuania to extend assistance provided by the Community beyond Lithuania's accession to the European Union, the second Unit will be shutdown in 2009 if sufficient financial resources supported by agreements with EU institutions and other donors are in place. Realising that the issue of implementation of an additional EU decommissioning financial assistance programme for advanced closure of Unit 1 till 2005 and advanced closure of Unit 2 in 2009 shall be adequately considered at a later stage of the country's accession negotiations, Lithuania undertakes to shut the reactors down. By implementing the above mentioned programme, Lithuania shall duly address the issue of decommissioning consequences. Should the required financing from the EC and other donors not be available, INPP Unit 1 and 2 would be operated further for the entire period considered to be safe for the reactors.

According to the Nuclear Safety Account Grant Agreement, Lithuanian Republic shall undertake all necessary measures to ensure that INPP meets international nuclear safety requirements. The Government commits to implement all nuclear safety recommendations, set forth in the Report submitted by the Nuclear Safety Working Group to the EU Council, as well as the recommendations developed on the basis of the Safety Analysis Report, its Independent Review and recommendations issued by international experts on the safety of Ignalina Nuclear Power Plant.“

VATESI prepared and issued the standard “Guidelines, Ignalina Nuclear Power Plant, Decommissioning General Requirements” VD-EN-01-99. “ The main objective of this document is to specify the basic licensing requirements for decommissioning the Ignalina Nuclear Power Plant and to formulate the State Nuclear Power Safety Inspectorate's requirements relating to the decommissioning process itself, its preparatory stages and its supervision and safety assessment, and the special requirements relating to decommissioning project documentation and to other documentation, taking into account both the experience achieved at international level and the specific national regulatory work. This document applies to the preparatory work on decommissioning process of the Ignalina Nuclear Power Plant following its final shutdown, and operations aimed at achieving unrestricted use of the site.” In order to ensure safe and smooth decommissioning, this guideline requires that the following documents shall be prepared: Final Decommissioning Plan, Decommissioning Project, Safety Analysis of Decommissioning project.

On 2 May 2000 the Seimas adopted the „Law on the Decommissioning of Unit 1 at the State Enterprise Ignalina Nuclear Power Plant“, which says that “the preparatory activities for the decommissioning of Unit 1 at INPP shall be finished before 1 January 2005. The exact date for the final shutdown of Unit 1 at INPP shall be decided by the Government of the Republic of Lithuania having considered the implementation of the Decommissioning Program and Decommissioning Plan and the possibilities of its further financing from the Republic of Lithuania and international financial assistance sources.”

On 1 May 2004, the Republic of Lithuania became member of the European Union. With the „Protocol No. 4 on the Ignalina Nuclear Power in Lithuania“ which is annexed to the Accession Treaty the Contracting Parties have agreed in Article 1 of the Protocol: „Acknowledging the readiness of the Union to provide adequate additional Community assistance to the efforts of Lithuania to decommission Ignalina Nuclear Power Plant and highlighting this expression of solidarity, Lithuania commits to close Unit 1 of the Ignalina Nuclear Power Plant before 2005 and of Unit 2 of this plant by 31 December 2009 at the latest and the subsequent decommissioning of these Units.“

Lithuania is not able to perform all works related to decommissioning, so it was decided to request for the support of the developed countries. To that end, on 12 June 2000 the EU established the International Ignalina Decommissioning Support Fund administered by EBRD. During the Donor's Conference held in Vilnius on 20-21 June 2000 the donor countries promised to allocate necessary resources for the initial (preparatory) phase.

A Framework Agreement between the Republic of Lithuania and the EBRD relating to the activities of the Ignalina International Decommissioning Support Fund in Lithuania was agreed, approved by the IIDSF Assembly of Contributors and signed on 5 April 2001.

For the purpose of this Framework Agreement a project specific to Ignalina International Decommissioning Support Fund (IIDSF) Grant Agreement No. 001 (Project Management Unit - Phase 1) was agreed between the EBRD as Administrator of grant funds provided by the Ignalina International Decommissioning Support Fund and the State Enterprise Ignalina Nuclear Power Plant, approved by the IIDSF Assembly of Contributors and signed on 5 April 2001.

On 19 February 2001 the Government of the Republic of Lithuania approved INPP Decommissioning Programme. The main objectives of the Programme are:

- to ensure safe operation of Ignalina NPP during preparatory decommissioning phase and during actual decommissioning activities;
- to ensure that preparatory works are carried out before 1 January 2005;
- to mitigate negative social and economic effects.

It also specifies necessary organisational, technical, economical and social measures to achieve the above mentioned objectives. Furthermore, a detailed plan of those measures has been prepared which specifies responsible institutions, time schedule and funding sources.

On 10 December 2001 the Contract between INPP and International Consortium consisting of NNC, Belgatom and SwedPower International was signed at the INPP for establishment of Decommissioning Project Management Unit (DPMU). Representatives of both, the Consortium and Ignalina NPP comprise Project Management Unit.

The main task for PMU is to work out essential documentation and implement investment projects required for decommissioning, in particular:

- to develop Final Decommissioning Plan;
- to develop INPP Decommissioning Project (for de-fuelling stage).

Investment projects financed from Ignalina International Decommissioning Support Fund:

- B1. „Interim Storage Facility for RBMK Spent Nuclear Fuel Assemblies from Ignalina NPP Units 1 and 2;
- B2,3,4. „Solid Waste Management and Storage Facility;
- B5. „Reliable Heat and Steam Source for Ignalina NPP and Visaginas;
- B6. „Modernisation of the Technical Documentation Archive at Ignalina NPP“.

On 19 June 2002 Grant Agreement No 002 was signed between INPP and EBRD for financing investment projects: „Interim Storage Facility for RBMK Spent Nuclear Fuel Assemblies form Ignalina NPP Units 1 and 2“, „Reliable Heat and Steam Source for Ignalina NPP and Visaginas“ and „Modernisation of the Technical Documentation Archive at Ignalina NPP” and on 20 May 2003 Grant Agreement No.003 was signed for financing Project B2,3,4 for construction of Solid Waste Management and Storage Facility.

On the basis of „Technical and financial considerations required to select an INPP decommissioning strategy“ prepared by PMU on 26th of November 2002, the Lithuanian Government by its resolution No. 1848 approved the decommissioning strategy for Unit 1 of INPP, which stipulates immediate dismantling. In May 2004 the Final Decommissioning Plan has been issued which covers all necessary decommissioning activities before and after permanent shutdown of Ignalina Units 1 and 2 and cost estimations. The main activities during the first 5-10 years following closure are the removal and intermediate storage of spent fuel, the processing of liquid and solid radioactive operational waste and preparations for interim storage and to start some dismantling.
Decommissioning project for defuelling phase including safety case and environmental impact assessment report will be issued in August 2004.

B1. „Interim Spent Fuel Storage Facility for INPP Units 1 and 2“
At the moment it is being tendered. Tenders are being evaluated. It is planned to Award Contract in September of this year. The commissioning of the first line of storage facility is planned by the end of 2007.

B2, 3, 4. „ Solid Waste Management and Storage Facility”
At the moment it is being tendered. Tenders are being evaluated. It is planned to Award Contract in September of this year. It is planned to commission the storage facility in 2007.

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. The construction of Steam Boiler Station and Heat Only Boiler Station shall be finished by the end of 2004. On 23 October 2003 the contract for rehabilitation of pipeline from Heat Only Boiler Station to INPP and for internal installations inside INPP was signed in the frame of the same B5 project. The work related to rehabilitation of pipeline from Heat Only Boiler Station to INPP shall be completed by the end of September 2004. Works related to internal installations inside INPP shall be finished at the beginning of November 2004.

B6. “Modernisation of the Technical Documentation Archive at Ignalina NPP“
Two Contracts were awarded in the frame of this project. The contract for design and construction of archive building was signed on 29 August 2003. The construction of the archive building shall be finished by 1 December 2004. The contract for design and installation of archive system was signed on 21 January 2004. The design and installation of archive system shall be completed in January 2005.

Currently INPP is finalizing Terms of reference of the DPMU Phase 2 project which will cover the period 2005 to 2007. This should ensure smooth continuation of planning, engineering, project management support to INPP.

In order to ensure continued efficient INPP decommissioning support after INPP Unit 1 permanent closure by the end of 2004 INPP prepared the new projects listed bellow what will continue to combine the overall decommissioning, including preparation of engineering and licensing

documentation for the next decommissioning phases after de-fuelling and important tools, equipment and facilities to start of the actual decommissioning work at INPP.

The following new projects have been presented by EBRD to the Donors on 8 July 2004 during the Assembly of Contributors in the Sixth Work Programme:

1. Operation of Decommissioning Project Management Unit (DPMU) – Phase 2
The main objective of this project is to continue the efficient operation of the existing Decommissioning Project Management Unit (DPMU) under INPP/Decommissioning Service (DS) responsibility, for the timely and most cost-efficient execution of all IIDSF financed or co-financed INPP decommissioning activities.

2. Engineering Documentation for Planning and Licensing of INPP Decommissioning
Provision of engineering/consultancy services to INPP Decommissioning service (DS) supporting preparation of decommissioning Project documentation after the de-fuelling phase of the units and other of engineering documentation needed for planning and licensing of the INPP decommissioning & dismantling activities.

3. Exhaustive Decommissioning Database and Decommissioning Management System
Exhaustive Decommissioning Database and Decommissioning Management System, including all necessary Software, Applications and Hardware, to ensure effective planning of decommissioning and reduction decommissioning cost in accordance with modern international practice.

The decommissioning management system supports the project management in planning, cost scheduling and realization of the whole decommissioning project in a transparent and effective manner.

4. Supply and Installation of Tools/Equipment for Radiological Inventory of INPP after Final Shutdown and for Pre-characterisation of the Decommissioning Waste
Tools/Equipment for radiological inventory of INPP after final shutdown are to ensure all necessary radiological data for effective planning of decommissioning and reduction exposure of personnel to ionizing radiation and to assure that the release of radioactive contaminants to the environmental is maintained within authorized limits.
These tools and equipment shall 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.

5. Landfill Facility for Short-Lived very Low Level Waste
Segregation and disposal of short-lived Very Low Level (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 (SWMSF) which currently being tendered with IIDSF grant funding.

6. Near Surface Repository (NSR)

Final disposal of conditioned short lived medium and low level radioactive waste (RAW) and long lived low level RAW. A 100000 m³ storage capacity is needed for the disposal of both the operational and decommissioning waste. The NSR commissioning date significantly impacts the additional interim storage costs of the waste which will be stored in the modular interim storage of the Solid Waste Management and Storage Facility (SWMSF) which is now being tendered under with IIDSF funding.

7. Free Release System and Facilities

The decommissioning of nuclear power plants results in the production of materials and equipment which are radioactively contaminated or activated to varying degrees. A significant part of these materials and equipment has very low content of radionuclides and could be reused, recycled or otherwise disposed of without further regulatory control. Final Decommissioning Plan of INPP gives quantity of such type waste/goods as approximately 17000 tons. Huge quantity of building concrete debris to be produced during decommissioning should be added (375000 tons).

As INPP does not have the instrumentation enabling to demonstrate the compliance of the concerned waste with the free release criteria, no material removed from controlled areas is allowed to leave the site. All waste or goods, which can not be reused at the plant, are disposed in situ.

Implementation of free release procedure will significantly reduce quantity of waste to be disposed of as radioactive.

8. Equipment for in-line Decontamination

A significant fraction of the deposited activity is fixed in the outer and loosely adherent oxide layer grown up onto the base material surface. The dissolution of this outer oxide layer over 2-3 micron depth is sufficient to achieve a decontamination factors > 10. The in-line decontamination can be applied to parts of the most contaminated INPP systems and equipment. It allows reducing exposures to the personnel during dismantling activities.

9. Tools/Equipment for Decontamination of system/Equipment Components after Dismantling

Tools/Equipment for decontamination of INPP system/equipment components after dismantling are to ensure acceptable level of contamination for further conditioning and disposal, to reduce the exposure of personnel to ionizing radiation and to assure that the release of radioactive contaminants to the environmental is maintained within authorised limits during dismantling activities.

10. Facilities for Dismantling of Equipment:

10.1. Facilities for Dismantling of Small-to-medium size Equipment

Tools, facilities and auxiliary equipment for the safe dismantling of pipeworks, collectors, headers and the handling of the dismantled components to the further processing/conditioning units (volume reduction before conditioning).

10.2. Facilities for Dismantling of Large Size Equipment

Facilities for dismantling of large size equipment including auxiliary tools, are to ensure safety dismantling of this main INPP equipment (turbines, steam generators, separator drums, etc.) and preparation for follow up treatment/storage (size reduction).

11. Remote Dismantling Facilities

Facility needed to allow safe dismantling and handling of most radioactive parts of INPP (reactor, MCC, spent fuel pools, etc.), their auxiliary equipment, including the mockups for personnel

training (the dismantling of INPP reactors will be the first of its kind in the world), tools for size reduction in view of the interim storage.

12. Final Disposal Facility of Bitumen Compound

Safe and reliable storage of bitumen compound (resulting from treatment of liquid radioactive waste) during a period of 300 years.

The project consists of upgrading the existing bituminous waste vaults in order to enable their use as a long term near-surface repository.

13. Development and Upgrading of existing Training Center

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.

This project is an implementation of the results of ongoing feasibility study under project „Proposal for the Design and Development of a Decommissioning Training Center for Ignalina Nuclear Power Plant, Lithuania". This feasibility study is financed by DTI of United Kingdom and to be finished in July 2004. The aim of feasibility study is to develop the Technical specification for the extension of the existing INPP traning center to meet dismantling, pre-decommissioning and decommissioning training needs in the short to medium term.

14. Melting Unit

The inclusion of a melting unit enabling the recycling or the free release of the low contaminated metallic waste in the project list is pending upon an economic justification.

15. Installation of Compensating Reactor of 180MVar at INPP's Substation AtS-330 kV

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 will 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.

The Assembly meeting noticed that these projects require further justification and review through a project due diligence process. Funding of such projects is conditional upon additional IIDSF Contributions. In order to expedite the due diligence of the above mentioned projects the Assembly approved to use part of the unallocated funds under Grant Agreement No. 001. Decision regarding financing of those projects is planned to be made during next Assembly meeting which is planned for November 2004.

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. State Regulation of Nuclear Power utilization

Chart of interaction between regulatory bodies and INPP is presented in Annex to 7.1.

7.2. Summary of Laws, Regulations, Licensing System and the Inspection, Assessment and Enforcement Process governing the safety of Nuclear Installations

National legislation has been amended, mainly to take into account requirements from regulations of the European Union.The Republic of Lithuania Law on Nuclear Energy defines that the principal objectives of state regulation of nuclear energy safety remains:

- to establish the conditions and criteria for the safe use of nuclear energy;
- to control and supervise the procedure of observance of these conditions and criteria;
- to establish sanctions for persons who violate the requirements for nuclear safety, radiation protection, accounting and control of nuclear materials.

The main national law regulating use of nuclear energy is The Republic of Lithuania Law on Nuclear Energy adopted by Seimas (Parliament) on 14 November 1996. In nuclear energy sector there are also applicable:

- The Republic of Lithuania Environmental Protection Law;
- The Republic of Lithuania Law on Environmental Monitoring;
- The Republic of Lithuania Law on Waste Management;
- The Republic of Lithuania Civil Protection Law;
- The Republic of Lithuania Law on Energy;
- The Republic of Lithuania Law on Enterprises;
- The Republic of Lithuania Law on the Assessment of the Impact on the Environment of the Planned Economic Activities;
- The Republic of Lithuania Law on the Supervision of Potentially Dangerous Installations;
- The Republic of Lithuania Law on Occupational Health Care;
- The Republic of Lithuania Law on Radiation Protection;
- The Republic of Lithuania Law on Radioactive Waste Management;
- The Republic of Lithuania Law on Construction;
- The Republic of Lithuania Law Concerning Control of Import;
- The Republic of Lithuania Law on Transit and Export of Strategic Goods and Technologies;
- The Republic of Lithuania Law on the Decommissioning of Unit 1 at the State Enterprise of Ignalina Nuclear Power Plant;

- The Republic of Lithuania Law on Reorganization of State Enterprise Ignalina NPP into a Joint Stock Company. The Law enabling change of the legal status of the state enterprise Ignalina NPP was adopted in the beginning of 2004;
- The Republic of Lithuania Law on Additional Employment and Social Guarantees for the Employees of the State Enterprise Ignalina Nuclear Power Plant.

The Law, which was adopted in year 2003, seeks to mitigate the negative social consequences and to ensure safe and uninterrupted work of the Ignalina NPP pending the end of operation. The Law establishes additional employment and social guarantees for the employees of the State Enterprise Ignalina NPP who are being or have been dismissed from work as a result of decommissioning of Units 1 and 2 of the Ignalina NPP as well as for their family members.

For the time being (after ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management in the end of 2003), the Republic of Lithuania assumes full responsibility under international conventions and treaties applicable to nuclear power safety issues:

- Convention on Nuclear Safety;
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency;
- Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO, 1991);
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes;
- Agreement between the Government of the Republic of Lithuania and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons;
- Protocol Additional to the Agreement between the Government of the Republic of Lithuania and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons;
- Treaty on the Non-Proliferation of Nuclear Weapons, signed on 1 July 1968 in London, Moscow and Washington;
- Comprehensive Nuclear-Test-Ban Treaty;
- The 1957 European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR);
- The Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963
- Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention;
- The 1979 Vienna Convention on Physical Protection of Nuclear Material;
- The 1968 Convention on Early Notification of a Nuclear Accident.

The Republic of Lithuania has signed:

- Convention on Supplementary Compensation for Nuclear Damage;
- Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage.

As defined by the Republic of Lithuania Law on Nuclear Energy, 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 to Articles 14, 15, 16 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;
- co-ordinate 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 Economy shall:

- perform the functions of the founder of operating organisations of nuclear facilities;
- implement state policy in the sphere of nuclear energy;
- organise bilateral and multilateral international co-operation in the area of nuclear energy;
- organise 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 organisations and conferences;
- organise 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;
- organise 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 organisations 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 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 zones of the facility and control compliance thereof;
- undertake environmental health studies of radiation impact on people and their environment and establish health protection requirements;
- co-ordinate the siting for nuclear facilities and undertake state environmental health analysis of their construction;
- take part in the authorisation of the constructed or reconstructed nuclear facilities, issue the environmental health passport for work with radioactive materials and other sources of ionising radiation;
- establish the standards for medical examination for the personnel working with radioactive materials and the sources of ionising radiation, the frequency of the examination, contraindications and control the compliance with the standards;
- undertakes 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;
- organise 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 population education on radiation protection.

The Ministry of Environment shall:

- after co-ordination with the Ministry of Health, establish 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 siting, 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 licences for the use of natural resources, organise state radio-ecological monitoring, co-ordinate and control radiological monitoring nuclear facilities;
- organise 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 authorisation to construct or reconstruct a nuclear facility when it is discovered that the authorisation was issued unlawfully.

Competence of the Ministry of Social Security and Labour:

- The Ministry of Social Security and Labour shall co-ordinate 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:

- 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 Defence:

- takes part in drafting and implementing co-ordinated interdepartmental anti-terrorist and anti-penetration protection plans of the nuclear power plant and other nuclear facilities;
- ensures the security of transportation of nuclear and radioactive material cargoes across the territory of the country.

The Ministry of the Interior:

- 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, organise radiation monitoring of a contaminated area;
- exercises and ensure physical safety of a nuclear power plant;
- drafts, co-ordinate and implement interdepartmental anti-terrorist and anti-penetration action plans;
- analyses 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;
- provides assistance in ensuring the safety in transportation of nuclear and radioactive materials in the territory of the country.

The Department of Civil Defence of the Ministry of the Interior:

- draws up a population radiation protection plan in the event of a nuclear accident which shall be a model for other institutions authorised 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 organises training sessions of population protection in the event of nuclear accidents.

The State Security Department:

- exercises 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, undertakes operations and inquiries to detect and investigates actions constituting a threat to nuclear facilities, nuclear installations, equipment and technologies.
- decides upon the credibility of persons working at nuclear facilities or those who are appointed to transport nuclear and radioactive materials;
- controls the effectiveness of physical safety and emergency preparedness of the nuclear power plant and other nuclear facilities;
- takes part in drafting and implementing the nuclear power plant and other nuclear facilities interdepartmental anti-terrorist and anti-subversive co-ordinated action plans.

The Governmental Emergencies Commission:

- directs the activities of management of a nuclear accident and elimination of its consequences;
- mobilises material and other resources necessary for the containment of a nuclear accident;
- performs 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 licences 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;
- organise 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;
- organise 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. After the amendment to the Nuclear Energy Law concerning to the ownership of nuclear facilities and nuclear material, the 5th Article of the Law provides:

- Nuclear facilities shall belong by the right of ownership to the State and/or to legal entities having licences provided for by this Law.
- Nuclear and radioactive materials may belong by the right of ownership to the State and/or to legal entities having licences provided for by this Law.

Basic Licensing Conditions in Nuclear Energy of the Republic of Lithuania

The Republic of Lithuania Law on Nuclear Energy defines basic licensing conditions in nuclear energy sector. Without a licence issued in prescribed manner of the Government of the Republic of Lithuania, it is prohibited:

- to design, construct and reconstruct nuclear facilities, installations and equipment;
- to operate nuclear facilities;
- to store nuclear and radioactive materials and their waste;
- to retire a nuclear facility from service;
- bury 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 energy sector, nuclear equipment, and dual purpose goods that may be used in nuclear technologies.

Licensing institutions:

- Licences for the activities referred to in the item 1 of above paragraph are issued by VATESI after co-ordination with the Ministry of the Environment, Radiation Protection Center and a local authority whose territory or its part is within the sanitary protection zone of a nuclear facility.
- Licences 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 Center. Licences for the activities referred to in the item 6 of above paragraph are issued by VATESI after co-ordination with Radiation Protection Center.
- Licences for the activities referred to in the item 7 of above paragraph are issued by Radiation Protection Centre after co-ordination with VATESI.
- Licences for the activities referred to in the item 8 of above paragraph are issued by the Ministry of Economy after co-ordination with VATESI and Radiation Protection Center.

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.

8.1. Description of the mandate and duties of the Regulatory Body

Legal framework of VATESI is described in paragraph 7.2. of this Report.
The Republic of Lithuania has undertaken an obligation to ensure safety at all nuclear installations under its jurisdiction, and to establish the legal framework for the nuclear safety regulatory system, namely:

- national safety rules and requirements;
- licensing system for nuclear facilities , excluding operation of the unlicensed installations;
- system for analysis and assessment of nuclear installations;
- enforcement mechanism, ensuring observance of the requirements and license conditions.

To deal with these issues, the Government had established State Nuclear Power Safety Inspectorate (VATESI) on 18 October 1991. To ensure nuclear safety such system is needed for any country, envisaging the development of nuclear energy. The basic guidelines for the regulatory institutions are formulated in the recommendations of IAEA. On 21 October, 1992, the Government of the Republic of Lithuania approved the statute of VATESI, regulating its activities and determining the basic objectives, functions, and rights of the inspections. The latest improvements of statute were set on in August 2004.

On 1997 statute has been updated and Board of VATESI was established. 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 restore to any preventive measures within its competence, including a temporary shutdown of a nuclear facility.

VATESI is independent governmental institution. The Prime Minister appoints the head of VATESI. VATESI reports directly to the Government. The Head of VATESI has not been affected by political changes and has been in the post since 1997. There is a direct line from the head of VATESI to the Government and he has direct access to the Prime Minister on maters related to nuclear safety and other responsibilities of VATESI.

8.2. Basic document describing the authority and responsibilities of Regulatory Body

The objectives of VATESI are formulated in Law of Nuclear Energy. Basic document describing the duties and responsibility of nuclear safety regulatory body is Statute of VATESI.
The main goal of the Inspectorate, as prescribed by the statute, is to ensure the state regulation and supervision of nuclear and radiation safety at nuclear installations and other related organizations. In addition to that, VATESI performs the following functions to:

- form the principles and criteria of safety in nuclear energy, safe utilisation, transportation and storage of radioactive and nuclear materials, establish safety related norms and regulations;
- issue licenses for the operators of nuclear facilities;
- prepare and perform inspection programs;
- make proposals related to preparation of laws and other normative acts, nuclear safety documentation in the facilities under control;
- supervise the accounting of nuclear and radioactive materials.

8.3. Structure of the Regulatory Body; its technical and support experts and organizations if appropriate, and its human and financial resources

The Structure of VATESI is shown in Annex to 8.3.

Nuclear Material Control Division organise accounting and control of nuclear materials, make the rules for accounting, supervise the physical protection of nuclear materials and nuclear facilities, participate in controlling the export, import and transit of commodities used in nuclear activities, co-operate with IAEA and other international organisations and respective institutions of other countries on issues of accounting and control of nuclear materials, maintain contacts with the Comprehensive Nuclear Test Ban Organisation and co-ordinate the activities of Lithuanian governmental institutions related with the said organisation.

Licensing Division set the conditions for licensing the INPP and its safety systems, develop rules and regulations that govern INPP safety, assess the reliability of the safety important systems, establish the operation conditions for INPP, elaborate conditions for licensing other nuclear activities.

Decommissioning and Radiation Protection Division control the radioactive waste management, license the spent fuel storage facilities, control the level of INPP preparedness for emergencies, and notify international organisations and neighbouring countries about nuclear incidents, co-ordinate decommissioning issues of INPP.

On-site Division at the INPP fulfils direct supervision functions at INPP, inspect safety systems, and control technological processes and repairs.

Safety Assessment Division coordinates the work on nuclear safety assessment in VATESI, organizes and performs review of licensee submissions in the areas of reactor and fuel storage physics, transient and accident analysis, operational safety and experience feedback, control and protection systems, as well as probabilistic safety analysis.

In 2003 the Government increased the total number of VATESI staff by 6 persons. And for today VATESI staff is limited as maximum 59 employees. Currently for VATESI are working 52 employees. There are plans to hire persons for vacant positions.

The VATESI stratedical plan and budget is defined every year in the framework of the State Budget allocated to all state administration. VATESI drafts its budget proposal and presents it to the Ministry of Finance and Government for considerations. The final State Budget approval is with the Lithuanian Parliament. In recent two years allocation of the financial resources was adequate to VATESI needs. Financing the special programme of review safety analysis report (SAR-2) has been available.

VATESI actively collaborated with the Lithuanian Energy Institute and its Nuclear Installations Safety Laboratory, departments and centers of Kaunas Technology University: the Center of Strength and Fracture Mechanics, the Department of Mechanics of Solids, Department of Thermal and Nuclear Energy, Commission of Experts for Non Destructive Tests, Institute of Physics, and Vilnius Gedimino Technical University. The Coordinating Committee of Technical Support organisations have been established.

8.4. Position of the Regulatory Body in the governmental structure, including its reporting obligations

Position of the VATESI in Governmental structure is shown in Annex to 8.4.
In the execution of its duties, VATESI is obliged by law to coordinate its activities with other state bodies with responsibilities in the regulation and central nuclear safety and radiation protection. There is effective separation between the responsibilities and functions of VATESI and those bodies.

In addition to the Law on Nuclear Energy other laws are in force, which give responsibility to other state bodies in the process of nuclear safety regulation. These other Laws referenced above deal with aspects of radiation protection, fire protection, physical security and environmental matters. These institutions charged with these respective responsibilities have to collaborate with VATESI and solve relevant regulatory issues before final regulatory permission can be given by VATESI. The Law on Nuclear Energy authorizes VATESI or the competent co-ordinating authority for nuclear regulation and gives VATESI authority to issue orders that set out haw the requirements of the Law on Nuclear Energy should be met.

8.5. Relationship of the Regulatory Body to bodies responsible for the promotion and utilization of Nuclear Energy

The Ministry of Economy is responsible for the implementation of policy in the sphere of nuclear energy and is the responsible authority for promotion and ownership of nuclear facilities. The ultimate responsibility for safety is planed solely on the operator. There is effective separation between the responsibilities and functions of VATESI and these organizations or bodies that are charged with the promotion or use of nuclear installations or activities.

VATESI independence is clearly stated in Article 14 of the Law on Nuclear Energy and in Article 5 of the Law of Radioactive Waste Management witch state that VATESI is responsible authority and can take preventive measures to enforce nuclear safety. This was demonstrated in May 1999 when VATESI refused to issue the license for operation of INPP Unit1 until all the license conditions had been fulfilled. This resulted in on extended period of shutdown for the INPP, but reinforced the independence of VATESI.

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.

In 2003 the Parliament of the Republic of Lithuania amended the Law on Nuclear Energy of the Republic of Lithuania. The amendment states that licenses issued according to the established order of the Government of the Republic of Lithuania are necessary for those activities:

- to design, construct and reconstruct nuclear facilities, installations and equipment;
- to operate nuclear facilities;
- to store nuclear and radioactive materials and their waste;
- to retire a nuclear facility from service;
- to bury 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 energy sector, nuclear equipment, and dual purpose goods that may be used in nuclear technologies.

9.1. Description of the main responsibilities of the license holder

According to the amendments stated in the Law on Nuclear Energy of the Republic of Lithuania it is prepared the new draft of Regulations for Licensing of Nuclear Power Related Activities. The document is under approval by the Government of the Republic of Lithuania. The Regulations for Licensing of Nuclear Power Related Activities determine these duties and responsibilities of license holders.

The licensee:

- is responsible for the safety of the nuclear facility;
- must ensure radiation protection of staff and inhabitants during normal operation, and for design basis and beyond design basis accidents not to exceed the allowed levels of exposure for staff and inhabitants;
- must develop and maintain efficient measures to prevent and control accidents in nuclear facilities;
- must promptly inform the licensing authority and other institutions of regulatory authority about all deviations from the conditions of license validity;
- must develop the annual safety assessment report for the nuclear facility in accordance with the requirements of the nuclear safety regulations and submit it to the licensing authority;
- must follow the requirements of the legislation of The Republic of Lithuania, regulations of nuclear power safety and general industrial regulations which are legalized in the established order in nuclear energetic;
- must inform the licensing authority about the deviations from limits of the safe operation, other safety relevant incidents related with its activity;
- must promptly inform the institution of regulatory authority and mass media about the incidents which could cause the increased interest of society;
- is responsible for the quality of the licensed activity, proper maintenance of documentation, its storage during all time of nuclear facility activity, renewal in time and approval by licensing authority when it is necessary;
- must ensure a high level of safety culture in its activity, with safety the priority in decisions;
- must establish and maintain effective quality assurance of its activity;

- must inform the institutions of regulatory authority about existing (possible) hazard for the safety of the nuclear facility, incidents, accidents;
- is responsible for the safety of the nuclear facility even if the validity of the licence is suspended or it is revoked;
- must monitor the emission of radionuclides into the environment in a systematic manner;
- must monitor and investigate the contamination of the facility/site and environment in a systematic manner;
- present to the institutions of regulatory authority the data about emission of radionuclides, contamination of the facility/site and the environment in a systematic manner;
- must follow the principle of ALARA, in accordance with which during the design and usage of ionising radiation sources, as well as during the performance of related activities, the exposure must be kept as low as is reasonably achievable, taking into account economical and social factors.

The licence validity conditions are established based on the following requirements to licensee:

- to perform only the activity for which the licence is issued;
- to follow the requirements of safety regulations;
- to implement established quality assurance programs;
- to inform promptly the institutions of regulatory authority about all changes made in quality assurance programs;
- to co-operate continuously with each contractor in order to get adequate information about possible deficiencies of works performed or errors and(or) important events (accidents, incidents, falls etc.) caused by the contractors activity;
- constantly and promptly to inform institutions of regulatory authority concerning all incidents, accidents or similar events, indicated deficiencies of licensed activity and preventive measures;
- to maintain the system of technical documentation to ensure appropriate storage of all permissions, directives, acts, conclusions during all period of activities in nuclear energetic;
- to maintain the system of accounting and reporting documentation;
- to submit to the competent institution of regulatory authority all the required documentation of licensee;
- to prevent unauthorised usage of nuclear technologies;
- to submit the annual reports on licensee activity to the licensing authority, indicating the works that have been performed or are being performed, results of authors works, recommendations presented concerning the progress of mentioned works;
- licensee must ensure the free entrance into the territory and premises of the licensee for the representatives of the licensing authority during supervision of licence conditions fulfilment;
- to present the information to the licensee concerning scientific, technical and other meetings aimed to discuss main safety issues of nuclear facility;
- to inform promptly the licensing authority about all changes of application documents.

The main responsibilities of the Nuclear Facility Operating Organisation are also described (in general) in the Law of Nuclear Energy of the Republic of Lithuania. The operator of a nuclear facility is responsible for conducting nuclear activities in compliance with the provisions of this Law and regulatory acts of the Republic of Lithuania. The safe operation of individual nuclear facilities is the responsibility of their operators. The operator of the nuclear facility is fully responsible for the adequate and safe operation of the facility in accordance with the requirements stipulated in the laws and subordinate legislation of the Republic of Lithuania, in the norms and regulations of nuclear safety and radiation protection, also in the regulations of the facility operator, the rules of labour discipline and organisation, and in the operation licence.

The Law states that the Nuclear Facility Operating Organisation is obliged:

- to manage the accounting for nuclear materials belonging to the facility and exercise their control in accordance with the requirements laid down in the safeguards agreement with the IAEA;
- to analyse nuclear accidents and incidents in the manner prescribed by statutory acts;
- to notify VATESI and other interested bodies about all the violations of conditions and requirements of operational safety and all failures of the facility safety systems and their components;
- to ensure preparedness for the elimination of the consequences of a radiological accident.

The principal rights, duties and functions of the nuclear facility operator in the event of a nuclear accident are set out in the incorporation documents and the facility operation licence. The implementing measures are established and specified in the plan of nuclear accident prevention and of the response to the accident and mitigation of its consequences drafted by the operator and approved by VATESI. Among other things, the plan indicates:

- the notification procedure of the Governmental Emergency Commission and other competent authorities about the occurrence of the nuclear accident and the progress of response to it;
- the organisational and technical measures for checking or reducing emission of radioactive materials into the environment;
- procedure of co-ordination of actions with other institutions and services participating in the response to the accident and mitigation of its consequences.

The operator of the facility is liable for the damage caused by radioactive effluent discharges from the facility to the natural and legal persons, their property or to the natural environment. The operator of the nuclear facility must insure the facility it is operating or procure in some other way the funds necessary for the compensation of the nuclear damage. If the insurance and other funds are not sufficient for the compensation of the damage, the payment of the balance is guaranteed by the Government pursuant to the obligations assumed by the Republic of Lithuania according to the Vienna Convention.

The Operating Organization is responsible for developing and implementing a quality assurance system and implementing quality assurance measures at all stages in the life of a nuclear plant. To this end the Operating Organization prepares an overall quality assurance programme and control the activities of companies (organizations) performing work or providing services for the nuclear plant (research workers, designers, suppliers of systems and components, firms responsible for the installation of equipment, assembly workers, builders, engineers responsible for final adjustments and so on).

The Operating Organization is responsible for ensuring the safety of the nuclear plant and bears full responsibility for that safety, including measures designed to prevent and/or mitigate the consequences of accidents, the accounting for and storage of nuclear materials and radioactive substances, protection of the environment and monitoring of the state of the environment in the sanitary-protection zone and in the observation zone, and also such controls as are required to ensure that the nuclear plant is used only for the purposes for which it was designed and built. The overall responsibility of the Operating Organization remains intact despite the independent activities and responsibilities of companies, institutions, organizations and their unions, managing staff or other persons performing work or providing services for the plant (designers, suppliers, firms responsible for the installation of equipment, assembly workers, builders, engineers responsible for final adjustments and so on) and despite the functions and responsibilities of the State Control and Supervision Institutions.

Before a construction permit for plant or systems (components) of an NP is issued, the Operating Organization creates 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 requisite quality of plant construction is ensured through the use of well-proven technology in conjunction with quality assurance measures. Direct responsibility for quality assurance is borne by the General Contractor for nuclear plant construction; final responsibility for quality of the complete construction is borne by the Operating Organization.

The Operating Organization bears responsibility for creating the necessary organizational structures for safe nuclear plant operation. It ensures that the plant has the necessary financial, material and technical resources, norms and technical requirements, scientific support, quality assurance in the all stages of lifetime of the NP. It 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 Operating 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 Operating Organization to the State Control and Supervision Institutions.

Operating Organization is responsible for developing the technological reglament. Before the Operating Organization will approve it the technological reglament is agreed with the organizations that developed it and the State Control and Supervision Institutions. Any changes introduced in the technological reglament must be approved in due form by the organizations that have taken part in their drafting, acceptance and approving.

Accident situations and actual accidents which have taken place at a nuclear plant are carefully investigated by commissions appointed in accordance with the norms and technical requirements in force. The Operating Organization is responsible for ensuring that the investigations are performed satisfactorily and in full, for reporting the results in good time to the State Control and Supervision Institutions and other interested organizations for analyzing accidents with the operating personnel of existing nuclear plants. Also, the Operating Organization is responsible for developing and implementing measures designed to prevent any further infringement of normal operation or any further accidents due to the same causes.

Information on equipment failures and personnel errors is routinely collected, processed, analysed and filed during plant operation. The Operating Organization is responsible for timely collection and qualitative analysis of the information received as well as for its systematization and timely transfer to the State Control and Supervision Institutions and other interested organizations.

The Operating Organization is responsible for developing and implementing a commissioning programme, and this programme is agreed with the State Control and Supervision Institutions
The plant administration is responsible for preparing the commissioning programmes and procedures for physical and power start-up. These programmes are to be approved by the state regulatory and supervision institution and confirmed by the Operating Organization.

A "Plan containing measures to protect personnel in the event of an NP accident" is devised by the Operating Organization. The "Plan containing measures to protect personnel in the event of an NP accident" provides for coordination of effort between the plant and external organizations (such as the local fire department, civil security department, medical institutions, local authority institution, etc.) within the limits of the site and in the sanitary protection zone. It also reflects the links with State

Control and Supervision Institutions. The plant administration is responsible for maintaining constant readiness and for implementing the plan should the occasion arise.

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

The institutions issuing licences for a certain type of activity in the nuclear energy sector are obliged to ensure that enterprises which have been issued licences guarantees:

- adequate standards of nuclear safety for the licensed activity;
- responsibility for nuclear safety;
- the system of internal control that would ensure the use of licensed nuclear materials and wastes and would guarantee the implementation of the provisions of the Treaty on the Non - Proliferation of Nuclear Weapons.
- high professional qualifications of the executive personnel engaged in the licensed activity.

Competent authorities issuing licences for a specified activity in the sphere of nuclear energy develop a system of requirements guaranteeing nuclear safety, non-proliferation of nuclear weapons and lawful usage of nuclear materials and waste handling. The licensing authority may establish additional duties for the licensee, indicating that in the conditions of licence validity. By request of the regulatory authority, the licensee and its contractors must provide all necessary information relating to the licensed activity.

The State Nuclear Power Safety Inspectorate (VATESI) is the institution of the Government of the Republic of Lithuania, responsible for regulation of nuclear safety. In performing tasks delegated upon VATESI, it:

- within its competence controls the fulfilment of nuclear safety requirements when transporting nuclear materials;
- on the basis of the submitted safety analysis results, inspection conclusions and (or) independent research, evaluates the condition of safety in nuclear facilities, prepares surveys on the safety of nuclear facilities and submits them to the Government of the Republic of Lithuania, local authorities and other bodies concerned;
- participates in the work of commissions carrying out analysis of incidents or occurrences in the facilities under VATESI control or performs independent research;
- co-ordinates measures for safety improvement of nuclear facilities and monitors their implementation.

In implementing tasks delegated upon VATESI, it shall be entitled to:

- propose to the Government of the Republic of Lithuania in the procedure prescribed by laws to suspend (stop) the operation of nuclear facilities prior to the time limit of their operation, in the case of failing to ensure the safety of the said facilities;
- demand that the administration of nuclear facilities and other facilities under VATESI control would perform control tests of equipment and materials, operating medium analysis, calculations for justification of the safety of nuclear facilities, reliability and technical checking of equipment and systems;
- suspend or cancel licences (permits) for production, installation and operation of nuclear facilities equipment, develop some other activity in those cases when rules and norms for safety of nuclear facilities, licence validity conditions and special requirements for technological or design documentation are not followed;
- submit proposals to the Ministry of Economy or the administration of nuclear facilities concerning the dismissal in the prescribed procedure of persons who have committed the following violations, namely, who:

  - are committing (have committed) systematic and gross violations of nuclear energy safety norms;
  - have concealed the facts of violation of nuclear energy safety norms;
  - have not completed the training course and have not passed an examination in nuclear energy safety rules and norms in the prescribed procedure.
- transfer the material about persons, guilty of accidents in nuclear facilities, to the prosecutor's office in the procedure prescribed by laws;
- examine the heads of nuclear facilities in the issues of nuclear safety rules and norms, control the procedure of verification of the knowledge of the staff of the indicated facilities on these issues, participate in checking the knowledge of the heads of divisions, engineering and technical staff, appoint extraordinary checking of know.

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. Safety Policies

10.1.1. VATESI Policy Statement

The most recent VATESI Policy Statement was issued in May 2003 in the document called "VATESI Mission". In the said document VATESI competence, responsibility, principles of operations, policy and functions are described.

VATESI mission reads as follows: "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 to society of Lithuania and worldwide, VATESI performs regulation and state oversight of nuclear and radiation safety at nuclear power facilities with the aim to protect the society and the environment against harmful impact of nuclear and radiological events and accidents."

Due to the set policy, VATESI activities must be strictly planned. Decisions must be based on the documents and facts. State nuclear safety oversight has to be performed based on the specific, clearly defined requirements. Every VATESI employee has to perform his (her) duties with responsibility, using his (her) professional knowledge and experience, raising his (her) qualification and sharing the knowledge with the colleagues. Systematic Approach to Training is used to raise employees' professional knowledge and skills.

VATESI seeks constructive dialogue and cooperation with other institutions. VATESI bases its activities on the gained experience and international practice. VATESI management formulates and apply principles, which integrate the quality assurance requirements into the everyday work, ensure that the employees would receive the necessary information, assistance and help, would have working tools to perform their tasks properly.

Heads of the divisions are responsible for the quality of work performed and services done by their divisions. Each employee is responsible for the quality of work performed by him (her). VATESI activities are based on the principals of honesty, openness and clarity. Only reliable and correct information on nuclear safety in Lithuania shall be given to the society. This information should be presented timely and in the proactive manner.

VATESI structure and number of stuff must correspond to the set goals and tasks. VATESI performs safety review and assessment as well as inspection program to define if safety level of nuclear power facilities corresponds to the set requirements. When needed, VATESI use assistance of Technical Safety Organisations for independent safety assessment.

VATESI grants the licensees, formulates and check fulfilment of their conditions. VATESI takes part in the emergency preparedness activities. Corporative and individual activities of VATESI employees are subject of continuous self-assessment process. VATESI quality assurance system is being improved using results of this process.

10.1.2. Ignalina NPP Policy Statement

Ignalina NPP, being the Operating Organisation is responsible for nuclear facility safety assurance, in accordance with international practice undertakes fully responsibility for the plant safety and establishes policy that gives the top priority to the plant safety.

10.2. Safety Culture and its Development

Activity on Safety Culture development is performed in order to increase constantly INPP safety by means of improvement of management and personnel attitude to safety, what provides safe and correct execution of works and creation of atmosphere of openness and mutual respect.

In accordance with the requirements presented in the Law on Nuclear Energy of the Lithuanian Republic (article 27), the regulatory authority is obliged to ensure that enterprises, which have been issued licences for nuclear safety activities, shall guarantee adequate standards of nuclear safety culture for the licensed activity. Safety culture related requirements are presented also in validity conditions of VATESI issued license for operation of Ignalina NPP Unit 1.

Safety Culture Management Procedure was prepared and implemented within the frames of Quality Assurance System. Coordinators were appointed officially in divisions in order to plan and coordinate activities on Safety Culture. Director General of INPP annually approves Plan on Safety Culture development at INPP, where the specific measures on implementation of the INPP Safety Culture development programme are determined. Objective of the Programme is to orientate plant and contractor personnel behaviour and plant management methods in order to achieve the highest priority – SAFETY.

10.2.1. Priority tasks on Safety Culture improvement at INPP

- the Safety Policy shall obtain support of the plant management and such a commitment to this Policy shall be demonstrated;
- safety Culture shall become the key element of the plant activity management;
- to change attitude of the plant employees to their work, to form new mentality and inner critical position of the plant personnel, which would prevent negligence, develop self-regulation with regard to the safety matters;
- to provide the plant personnel with open and effective information on all works performed at INPP in order to ensure understating of the common tasks and plant operation perspectives by each employee of INPP;
- training of personnel on the Safety Culture principles using the examples of good practice, operational experience in order to learn lessons;
- performance of Safety Culture audits with further corrective actions and improvements.

Programme of Safety Culture development at INPP was performed in accordance with the measures approved by INPP General Director. Activities in the following 8 separate areas can by highlighted:

10.2.2. Training of the NPP personnel

The matters of Safety Culture concept, matters of the own and industrial experience and examples from practice of performance of works related to Safety Culture were included into the training process.

Organizational measurements for training of the personnel involved in INPP decommissioning process were prepared. These measurements include the following issues:

- creation of working group in TC for development of materials, connected with future training of the personnel, involved in INPP decommissioning process;

- performance of analysis of requirements in personnel training for INPP decommissioning process needs;
- evaluation of the required amount of knowledge, skills for definite positions, groups of the personnel, necessary for INPP decommissioning process.

In January 2003 Amendment of Guidelines on arrangement of work with INPP operational personnel was executed. The Amendment refers to performance of personnel instructing on applying of self-control method – STARK.

Within the last three years the specific work was performed concerning the conduction of the Safety Culture seminars for those plant employees who did not participate in these seminars before. During these seminars the problems in the Safety Culture area and their possible solutions were discussed. The participants of the Seminars examined reports on events at INPP that are related with the aspects of Safety Culture.

A special Seminar on Safety Culture for the personnel of contracting organization and for specialists of I&C Department Software Support Group and Information and Computer System "TITAN" was planned as a corrective measure on the event "Operation of a reactor with faulty readings of flow rate in FA 335 due to the error during SHADR correction factors input into I&CS database".

Two Seminars were held for the repair service personnel of the plant and for the employees of contracting organizations: "Co-ordination and control of contracting organizations activity", "STARK method and Safety Culture principles".

Positive practice:

- Seminars on Safety Culture development rendered significant assistance to establish understanding of necessity and advantage of the quality assurance programme, Safety committee foundation, implementation of the principles of Safety Culture within the frames of INPP organisation structure;
- Employees of the plant participating in such training seminars consider them to be successful. Number of proposals was submitted with regard to the safety improvements.
- It was proposed to have Safety Culture audits in order to verify the practical aspects of Safety Culture in INPP departments;
- Programmes of personnel training and test-papers were updated with the issues from IAEA report on Safety Culture and Policy of safety and quality assurance.

IAEA Workshop was held at Ignalina NPP within the period from 18 till 22 of November 2002. The Workshop's objective was – to render assistance to the management staff and personnel of the plant in Safety Culture support, taking into consideration INPP Power Unit 1 decommissioning. Management staff, departments' managers and plant experts took part in work of the Workshop; VATESI representatives were present at the Workshop. The plant management and personnel obtained necessary information about IAEA new elaborations, International Agency activities in the field of Safety Culture. IAEA recommendations on maintainance of Safety Culture available level within the period of NPP decommissioning were obtained.

10.2.3. Participation and input of the personnel in Safety improvement

Guidelines on work with proposals on improvements was developed and implemented, in accordance with this Guidelines the INPP employees have an opportunity to submit their proposals to the divisions' managers. For this purpose there are special Logs for submission of proposals in

the plant divisions and post boxes with proposals-forms for proposal submission to the General Director, managers of the Directorates and Services are equipped at the plant checkpoint and in rooms for clothes changing. Recently these Guidelines were amended in the field of consideration and appliance of proposals, obtained from the personnel at Safety Culture Seminars.

10.2.4. Independent Reviews, inspections and audits

In August 2002 WANO partnership check-up was performed at INPP. Experts from eight countries took part in the check-up. According to the results of the check-up the 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. In November 2003 in accordance with INPP General Director Instructions a check-up of measurements on the results of recommendations obtained from the WANO partnership check-up experts was held.

In June 2003 VATESI inspection was performed at INPP. During this inspection a report on implementation of measurements on Safety Culture development at INPP was submitted. Reports on organizational matters, connected with Safety Culture, were directed to VATESI every month:

- Brief review of implementing or planned projects on INPP decommissioning;
- Safe operation matters;
- Matters of personnel and employees competence;
- Review of measures on INPP Safety Culture development;
- Solution of social problems of INPP employees;
- Distribution of information to INPP employees.

Internal audits were held at INPP. The problems revealed during the audits were registered as non-compliances and observations. The Safety culture issues were included into the Plan of internal audits performance. In December 2002 a Safety Culture audit was performed before the beginning of works on Reactor Diverse Shutdown System (DSS) implementation. The main attention in the process of audit was paid to those fields of activity, which can result to appearance of failures of RCPS servo drives due to the common cause.

A procedure of Safety indices definition was developed. Within the period from May till December 2004 a phase of this Procedure implementation is being executed, a working group was formed in order to perform this work. Rotation of the Safety Committee was performed at INPP in the second half of 2001. An international audit of the previous Safety Committee activity was held on the General Director suggestion prior to the rotation.

The Safety Committee performs an independent assessment of availability of decisions, important from the safety point of view. The results of Safety Culture development Programme for 2001-2002 were considered at INPP Safety Committee Meetings as well, members of the Safety Committee recommended to INPP management staff to pay attention to the issues connected with the personnel work motivation.

10.2.5. Motivation of personnel

INPP Director General developed INPP Policy in the area of personnel motivation. At the meeting of INPP Safety Committee the Policy was approved by the Members of the Committee. Content of the Policy is presented in Appendix 1 of the Report. In 2003 the Policy was presented to the entire personnel. Procedure on INPP personnel motivation order was developed.

In accordance with the results of the performed outages of Power Units and for works related to safety improvement many plant employees obtained honorable mentions from the plant Management Staff. According to the results of the year an incentive was paid out. Every month INPP employees get an incentive of 20-30 per cent from a salary attached to the position.

Due to the celebration of a jubilee – 20 years of INPP operation a large number of INPP employees got valuable gifts and incentives from INPP administration, Ministry of Economy of the Republic of Lithuanian. Some plant specialists were awarded Government decorations and orders. A special attention was paid to old stagers, INPP employees who are on a pension now, a solemn meeting with the plant management staff and representatives of Ministry of Economy was arranged for them, and they received souvenirs.

10.2.6. External and Internal information

In October 2003 Management Procedure "External and Internal information" was approved. Activity on external and internal information is performed in order to timely inform the plant personnel, public, mass media and government bodies by means of preparation and transmission of information about INPP. Information about INPP operation, information about implementation of important projects, information about organizational changes at INPP including those related to the process of INPP power unit 1 decommissioning is performed by Information Center personnel by means of allocation of constantly renewed information at INPP outside Web-site (www.iae.lt). Internal information includes regular editions of Information bulletins, and weekly news broadcasting by the plant radio and allocation of information at the internal Web-site.

10.2.7. Support to the personnel within the period of INPP decommissioning

In November 2003 INPP Director General and INPP Joint Trade Unions adopted Strategy of INPP personnel social support for the period of INPP decommissioning. The Strategy was published in INPP information bulletin. The Strategy will act till 2010 and will be related to all employees of the plant. The Strategy fulfilment will allow to give support to personnel in solving of the social problems which can raise within this period, to provide safe operation of the plant, maintain high level of Safety Culture within the process of Power Unit 2 only operation and INPP decommissioning.

In June 2003 a questioning of INPP employees was held in order to find out those persons, who wish to be discharged in 2005 receiving payments, provided by Law of the Republic of Lithuania concerning additional social security and security of employment for employees of state enterprise INPP, No.IX-1541 dated 2003-04-29. According to the results of the questioning it was determined that about 100 employees want to be discharged from INPP after 2005, these employees are not the key personnel, and the analysis showed that this discharge will not affect INPP safety.

10.2.8. Analysis of the root causes of events

Analysis of the root causes considering human factor influence to safety is performed in order to increase INPP safety and reliability level. Analysis of the events related to the human factor provides prevention of events in future by means of detection of direct and root causes of the events, development and realization of corrective measures directed to elimination of causes and prevention of events.

12 events connected to human factor happened in 2003. There were 16 such events in 2002. The main causes of the events related to the human factor are: non-observance of instructions (in 7 events), mistakes (reliability) in work execution (in 5 events).

Violations related to the mistakes prevail in the work of operations staff and violations related to non-observance of instructions' requirement prevail in the work off repair and operating personnel. Systematic reduction of number of the events during the last years, when the personnel acted not in the way it was expected, testifies that INPP activity on the analysis of the human factor influence to the safety is effective and complies with an international practice.

10.2.9. Assessment of Safety Culture

Assessment of Safety Culture is based upon the plant personnel questioning. Moreover, special working procedure on appliance of Safety Culture indicators at INPP is in the stage of preparation. The first assessment of Safety Culture at INPP was performed in 1998. The second assessment of Safety Culture was performed in 2000. The third assessment of Safety Culture at INPP was performed within the period from May till June 2004. Assessment method is based on the interview sheets – questionnaires which were developed considering the Safety Culture features which are applied in world nuclear power production. The results of Safety Culture assessment were developed on the basis of information submitted in questionnaires for questioning of INPP seven divisions' key personnel.

In order to perform Safety Culture Assessment, coordinators were appointed in each department – leading engineers on operation, they passed questionnaires to the workers. Each questionnaire comprised 33 questions. Totally 311 questionnaires were prepared. The answers were anonymous, so the names and surnames were not specified.

According to the results of questioning, trends of 11 features related to the Safety Culture are assessed. Comparative data on the Safety Culture assessment results for 1998 – 2000 – 2004 are presented in Table 1.

Table 1

No.	Safety Culture characteristic	INPP 1998, %	INPP 2000, %	INPP 2004, %	Result
1	Leadership and commitment of top management	69	83	90	Very good
2	Line management role from the point of view of safety	79	81	86	Very good
3	Strategically importance of safety for production	91	80	86	Very good
4	Assurance of support from organizational culture	84	78	84	Good
5	Involvement of all employees into Safety Improvement process	74	62	76	Good
6	Investigation of operational experience	80	78	82	Good
7	Assessment of safety	84	82	90	Very good
8	Mutual confidence and responsibility between management and workshop	76	82	88	Very good
9	Openness in communication	62	64	76	Good
10	Absence of safety vs. production conflict	62	65	73	Satisfactory
11	Demonstration of care for all those affected by the business	82	55	67	Satisfactory

From the results of assessment it is clear that data on characteristics No. 5 and 11 were improved in 2004. Measures on the specified characteristics have been implemented at INPP within the last 4 years. The corrective measures are described below:

Characteristic No. 5. Involvement of all employees:

- A lot of seminars on Safety Culture were held including IAEA seminar and WANO mission;
- External and internal information distribution for the plant employees was improved;
- Analysis of INPP safety indices is being performed;
- Large numbers of the plant specialists take part in implementation and review of the plant modifications.

Characteristic No. 11. Demonstration of care for all those affected by the business:

- INPP Policy in the Field of Personnel Motivation and Regulations on Personnel Motivation Procedure were issued;
- Strategy of Personnel Social Support for the Period of INPP decommissioning was developed;
- Official salaries of MCR operators were increased;
- Dismissal wages for retired INPP employees were paid.

10.3. Safety Commitment

INPP policy in the field of safety and quality assurance was adopted in 1988 and in 2000 it was reissued. In accordance with this document the INPP management headed by Director General undertakes overall and official responsibility for plant safety and commitments in respect to Quality Assurance and Safety. The main goal of INPP Operating Organization is to ensure safety and efficiency of INPP in all stages of lifetime of Power Units.

In order to meet the objectives of INPP policy in the field of safety and quality assurance, it is necessary to assure that:

- Activities at all levels are performed safely, with high level of quality, and plant safety is considered an overriding priority. Good quality is achieved when all requirements and objectives of the owners are met, and the people of Lithuania believe in the INPP safety;
- INPP personnel clearly understand the requirements and objectives of the INPP owners, VATESI and the public;
- All employees take an active part in safety and quality improvements. To ensure such participation every employee must know the INPP objectives, his own functions and be continuously informed about the results of activities performed at INPP;
- INPP personnel are properly qualified to perform their functions in accordance with plant objectives. A level of every employee's competence shall be improved to strengthen both INPP and the individual;
- All INPP managers exhibit personal activity and leadership. The main task of every manager is to formulate tasks and requirements facing his department, put them into an assessable form, communicate to all employees, and to provide every employee with a working environment consistent with the tasks to be accomplished;
- All INPP activities are continuously evaluated to improve their quality and efficiency. The INPP and its personnel must make the use of their experience and that of others to improve the organisation, operations and their competence;
- The INPP and each of its employees are responsible to society. All laws must be abided by and the safety requirements must be met with a sufficient safety margin;
- Efficient and integrated management and quality assurance program is implementing at INPP.

To accomplish these tasks, the Director General appoints the Safety and QA Department to head the establishment of the INPP quality assurance system, evaluate its effectiveness and provide the necessary quality training for personnel.

10.4. Regulatory Control

General Regulations for Nuclear Power Plant Safety VD-B-001-0-97 and Nuclear Safety Regulations for Reactors of Nuclear Power Plants VD-T-001-0-97 provide the main principles emphasising overriding priority of safety and main issues to be implemented in that respect. In accordance with above regulations safety culture is practical and psychological training of individuals in which the assurance of nuclear plant safety is a priority goal and an inherent requirement leading to individual awareness of responsibility and self-monitoring in the implementation of all tasks which can affect safety.

The safety of a nuclear plant shall be guaranteed by applying 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 ionising radiation and radioactive materials to the environment and a system of technical and organisational measures to protect these barriers and retain their effectiveness, and 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, and a hermetically sealed protective enclosure surrounding local safety systems. The system of technical and organisational measures among other includes implementation of safety culture at nuclear facilities.

Safety culture shall be inculcated to all personnel and organisations employed in the nuclear power field through:

- Appropriate selection and training of personnel in each sphere of safety related activity;
- Creation and maintenance of a strict discipline with a clear distribution of personal responsibility among managers and executives;
- Instructions preparation and strict observation the work performance, as well as their periodical updating with consideration of experience.

All personnel involved in safety-related activities should fully understand the nature of their work and the manner and degree in which it affects safety. They 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.

Ignalina NPP, being the Operating Organization is responsible for nuclear facility safety assurance and bear full responsibility for safety including measures intended for prevention and/or mitigation of incidents consequences during usage and storage of nuclear materials and radioactive substances, environment protection and environmental condition control providing in controlled area and in radiation-control area, and means of control necessary to ensure that the nuclear facility is used only for purposes for which it was intended and constructed.

The Operating Organisation bears responsibility for establishing the necessary organisational structures for safe nuclear plant operation. The Operating Organisation ensures that the plant has the necessary financial, material and technical resources, norms and technical requirements, scientific support, quality assurance in the all stages of lifetime. The Operating Organisation also has to organise the physical protection and the fire protection of the plant, as well as recruitment and training of operating personnel, maintain safety culture and must perform continuous monitoring of plant safety.

The Operating Organisation ensures continuous monitoring and supervision of all activities related to the plant safety. The results of safety inspections and periodic reports on plant safety are to be submitted by the Operating Organisation to the State Regulatory Institutions.

To perform above indicated requirements, the Division for Safety Supervision is established at INPP as part of the Safety and Quality Assurance Department. It carries out safety inspections, which audit the adherence to the requirements of the safety rules in accordance with the Annual Plan, daily inspections of safety conditions, and inspections of work and modification implementation. Inspection findings are recorded in reports. Annually INPP prepares an INPP Safety Report. The Report is submitted to VATESI and to other interested organizations. In accordance with national regulations, VATESI carry out the independent regulatory inspections of Ignalina NPP, which cover an assessment of safety culture.

10.5. Voluntary activities and good practices

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

- 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.
- Every manager has to create an atmosphere of such kind when the personnel avow problems and own errors. The personnel mistakes are considered only 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.
- 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.

Ignalina NPP management staff declares its adherence to the Policy in the field of personnel motivation.

Article 11: FINANCIAL AND HUMAN RESOURCES

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

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

11.1. Financial and human resources of the license holder/applicant available to support the nuclear installation throughout its life

State enterprise Ignalina Nuclear Power Plant (below referred to as INPP) is the main energy generator in Lithuania. 75% of electricity is produced and supplied by INPP. Up to the year 2002 all energy generated by INPP was supplied to "Lietuvos energija" AB.

After Electricity Law came into force in 2002, the state controlled electricity monopoly was reorganised to market relations so since April 1, 2002 INPP has started electricity trade with public suppliers (Rytu skirstomieji tinklai AB, Vakaru skirstomieji tinklai AB) and independent supplier ("Lietuvos energija" AB). With the advent of more independent and public suppliers arose and INPP 2003 additionally made electricity purchase and sale contracts with the following companies: "Achema" AB, "Ekranas" AB, Mazeikiu elektrine AB, "Akmenes cementas" AB, VI "Visagino energija". About 70% of INPP electricity, sold to domestic market, is purchased by public suppliers Rytu skirstomieji tinklai AB ir Vakaru skirstomieji tinklai AB, about 20% is sold to "Lietuvos energija" AB, which acts as electricity market operator.

Moreover, since 2003 INPP, as an enterprise holding the independent supplier licence, began trading with the independent customers: "Lifosa" AB and "Dirbtinis pluostas" BAB (nowadays after reorganisation "Korelita" UAB). On average about 65 mln. KWh was sold to these customers per annum.

No.	Years	Sold electrical energy mln./kWh	Income (K Lt)	Ratect/ kWh (according to report)	Profit, loss (KLt)
1.	2001	10240	559307	5,46	-94020
2.	2002	12897	712936	5,53	36735
3.	2003	14334	741774	5,175	15775
4.	2004 I half	4768	214509	4,499	30121

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 then existing organizations dealing with the maintenance and repair of the nuclear installations 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, a huge work commenced targeted to the plant upgrade and safety improvement by applying nuclear experience 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. It is because of the above-mentioned activities the INPP can be referred as the safest RBMK Nuclear Power Plant.

Many INPP experts have been trained and are currently being trained at the nuclear power plants of Sweden, USA, Canada, Japan and other countries. Such training provides efficient tool to adopt the safety improvement experience. INPP personnel is very well educated and properly trained. More than 36% of personnel have higher education, 24% – college education, 19% - vocational schools and the others have the general secondary education.

Personnel turnover is still very low about 1.3% and therefore there is no staffing problem. Thermal and Nuclear Power School was established in Kaunas Technological University to educate nuclear specialists.

11.2. Financing of safety improvements made to the nuclear installation during its operation

One of the most important tasks of INPP is the implementation of safety improvement programme (SIP-2). Programme of safety measures to be implemented includes the following stages:

- 2001 - 65,5 mln. Lt;
- 2002 – 44,6 mln. Lt;
- 2003 – 58,0 mln. Lt;
- 2004 I half – 31,5 mln. Lt.

Additionally the resources are received from the donors-countries: Sweden, Denmark, etc.:

- 2001 - 9,8 mln. Lt;
- 2002 – 31,1 mln. Lt;
- 2003 – 56,4 mln. Lt;
- 2004 I half – 22,0 mln. Lt.

11.2.1. Funding of SIP-2

Safety Improvement Programme is funded by different sources (see Table 2)

Table 2

Total expenditures (MLt)	**Including:**				
	Own resources	**National budget/ privatizations fund/ public concerns**	**Loan**	**EBRD/ PHARE**	**Foreign assistance ***
1997					
112.555	26.333	-	31.610	46.710	7.912
1998					
80.475	23.960	19.985	13.680	-	22.850
1999.					
36.261	1.083	16.206	-	-	18.972
2000					
69.824	35.232	3.747	12.700	-	18.145
2001					
65.563	35.099	-	20.630	-	9.834
2002					
44.569	32,431	-	6.319	-	5.819
2003					
57.970	0.237	38.622	3.411	11.839	3.861
2004					
31.492	7.054	14.618	-	9.096	0.724
498.709	Total on 2004-04-01				

11.3. Financial and human provisions for decommissioning and radioactive waste management at nuclear installations

In 1999 the National Energy Strategy was approved according to which closure of INPP Unit 1 is due in 2005. Currently the technical designs of Unit 1 decommissioning and programmes of plant personnel social insurance are being developed. A new Law of LR 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.

Since the decision for the closure of Unit 1 of Ignalina NPP was made, it was obvious while exploitation period relevant means for the decommissioning procedures should be accumulated. It was not made from the very beginning of the exploitation of Ignalina NPP, since 1992, according the decree of the Government of LR, the deduction (1,3 percent) of the Ignalina NPP from revenue received for soled electricity. Till the beginning of 1996 it was accumulated more than 13 million Litas. It became obvious, that while accumulating means according such a law revenue deduction rate, it would not be possible to have enough means for the decommissioning procedures. So it was decided to change the income deduction rate from the sold electricity every year by the decision of Government of LR and to keep and transfer accumulated means to the special treasury account of Lithuanian Republic.

In 2001 the law On the State Enterprise Ignalina Nuclear Power Plant Decommissioning Fund was adopted. According the law the founder of the fund is the Government of Republic of Lithuania, the administrator - the Council of the Fund, the manager – the Ministry of Economy of the Republic of Lithuania, keeper – the Ministry of Finance of the Republic of Lithuania. According the regulation, which was adopted in 2002, the Fund shall consist of deductions of: the Ignalina NPP from revenue received for sold electricity; volunteer target contributions of foreign countries, international organisations and financial institutions, as well as legal and natural persons of the Republic of Lithuania; proceeds obtained from the sale of the property during the closure; interest on the resources of the Fund and income for the resources of the Fund used to acquire public securities (bonds); other funds. From the moment of regulation of the Fund came in force, the means were started to use (according the programme and plan of measures) for: technical decommissioning projects; disposal of and long-term storage of radioactive waste, including spent fuel; financing social programmes of the Ignalina NPP region. The Government every year should approve the estimate and the report of the using of the means of the Fund. On the 1st of August of 2004 221,958 million Litas were accumulated in the Fund.

Within the frames of Unit 1 forthcoming decommissioning and in accordance with the decree of the Government of LR five (5) departments of INPP, which are not involved in energy generation, received the status of independent State Enterprises. Given these departments separation the number of INPP personnel reduced for 808 employees. Moreover, in 2003 and in the 1st half of 2004 within the frames of preparation to Unit 1 decommissioning approximately 150 employees were discharged. Which is why, by 01 July 2004 the number of INPP personnel amounts to 3535 employees (on 01 January 2001 – 4680 employees).

To meet the Law on social warranties a list of positions was approved which are especially important for INPP safe operation. Employees filling such positions are subject to life insurance. However, at the moment is not clear what sources should fund the insurance. Creation of new working places to compensate the discharged personnel as it is required by the Law is carried out relatively slow. Financing sources of personnel retained on the shutdown Unit 1 have not been finally defined yet.

Lithuania has not yet made any political decision concerning the further opportunities of the nuclear power industry. It results in the growing uncertainty about the future, which will probably have an unsatisfactory impact while recruiting the staff, defining the required number of the personnel to be trained and educated at educational institutions. Moreover, "leakage" of the highly experienced staff to the plants of the other countries will probably take place. It could lead to negative consequences for INPP safe and reliable operation and cause problems for its decommissioning.

But given the peculiarities of the RBMK reactor, INPP in cooperation with Kaunas University of Technology placed an agreement with the Obninsk Nuclear Power Energy Institute (Russia). 5-7 nuclear engineers per year sponsored by INPP are trained there to operate nuclear facilities.

In addition, in the vicinity of INPP there is a Vocational School which trains qualified workers to satisfy the INPP needs in electricians, welders, I&C and tool-makers. Procedures on INPP Safety Culture development have been generated. They undergo continuous upgrading in order to increase individual responsibility of the personnel in terms of work implementation and to ensure reliable and safe operation of the plant.

On 1 May 2004, the Republic of Lithuania became member of the European Union. With the „Protocol No. 4 on the Ignalina Nuclear Power in Lithuania" which is annexed to the Accession Treaty the Contracting Parties have agreed in Article 1 of the Protocol: „Acknowledging the readiness of the Union to provide adequate additional Community assistance to the efforts of Lithuania to decommission Ignalina Nuclear Power Plant and highlighting this expression of solidarity, Lithuania commits to close Unit 1 of the Ignalina Nuclear Power Plant before 2005 and of Unit 2 of this plant by 31 December 2009 at the latest and the subsequent decommissioning of these Units."

Lithuania is not able to perform all works related to decommissioning, so it was decided to request for the support of the developed countries. To that end, on 12 June 2000 the EU established the International Ignalina Decommissioning Support Fund administered by EBRD. During the Donor's Conference held in Vilnius on 20-21 June 2000 the donor countries promised to allocate necessary resources for the initial (preparatory) phase.

A Framework Agreement between the Republic of Lithuania and the EBRD relating to the activities of the Ignalina International Decommissioning Support Fund in Lithuania was agreed, approved by the IIDSF Assembly of Contributors and signed on 5 April 2001.

For the purpose of this Framework Agreement a project specific to Ignalina International Decommissioning Support Fund (IIDSF) Grant Agreement No. 001 (Project Management Unit - Phase 1) was agreed between the EBRD as Administrator of grant funds provided by the Ignalina International Decommissioning Support Fund and the State Enterprise Ignalina Nuclear Power Plant, approved by the IIDSF Assembly of Contributors and signed on 5 April 2001.

11.4. Rules, regulations and resources arrangements concerning the qualification, training and retraining of personnel, including simulator training for all safety-related activities in or for each nuclear installation

11.4.1. General Provisions

The Training Centre was founded on 1 August 1996 on the basis of the training unit. The Training Centre is the structural department of the state enterprise Ignalina Nuclear Power Plant and is located at the same address – Druksiniu k., Visagino sav., Lithuanian Republic.
Activity of the Training Centre is regulated by the:

11.4.2. Laws of the Lithuanian Republic

- Law of the Lithuanian Republic on nuclear energy № IX-586;
- General rules for nuclear plants safety provision, VD-B-001-0-97;
- Regulations on nuclear safety of reactor facilities of nuclear power plants, VD-T-001-0-97;
- General requirements for staff management of institutions operating nuclear energy installations and companies rendering them services, VD-E-11-2001;
- Requirements to quality assurance system of nuclear power plants and other nuclear energy installations, VD-KS-02-99;
- Regulations on employees instruction, training and qualification safety and health issues, approved by Order No. 76/261 dated 2002 06 10 of the Minister of social insurance and labor and Minister of public health;
- List of main laws regulating nuclear energy safety in the Lithuanian Republic, VD-VP-01, section XIII.

11.4.3. IAEA documents

- Basic safety principles for nuclear power plants, IAEA INSAG-3;
- Nuclear power plant personnel employment and selection, professional training and access to work of the operation staff, IAEA 50-SG-01;
- Quality assurance at operation, IAEA 50-C/SG-Q13;
- NPP personnel training and its evaluation: A.Guidebook, IAEA-TECDOC-380;
- Safety of Nuclear Power Plants: Operation, No. NS-R-2.

11.4.4. INPP procedures

- Training and qualification of the personnel. General requirements, QA-1-009, PTOed-0108-13;
- Personnel. Management procedure QA-2-014, PTOed-01411-1;
- Regulation on operation personnel training, PTOed-1409-4;
- Guidelines for work arrangement with INPP operation personnel, PTOed-1408-1;
- Regulation on qualification of the operation personnel. PTOed-1409-3;
- Regulation on Training Centre, PTOed-0109-27.

11.4.5. Activity of training center (TC)

11.4.5.1. Rights of TC

TC has the following rights purposed to performance of its activity within its competence frames:

- To make independent decisions with respect to arrangement of personnel training;
- To submit proposals of improvements in personnel training process to INPP Top Management, in the written form and orally;
- To manage the general process of assessment and feedback in course of training when permanently supported by the plant departments (workshops) that the training is conducted for and tightly interconnected with.

11.4.5.2. Responsibilities of TC

The Training Centre undertakes:

- To arrange training of INPP employees, check their knowledge and skills;
- To provide high technical and pedagogical competence of TC instructors, proper qualification of other employees of TC;
- To use training and methodological documentation and techniques purposed to effective training conduction;

- To ensure operative and proper condition of the full-scope simulator and other equipment of TC;
- To develop programmes of training, continuing and requalification training of INPP personnel in tight co-operation with the plant departments involved;
- To develop perspective and annual plans of INPP personnel training;
- To develop training materials for training conduction for the plant personnel, to provide monitoring of such training conduction.

11.4.6. Sequence of personnel training

All categories of operation personnel are trained in the Training Centre (irrespective of their age and education), job positions of which are included in the "Position List of managers, experts and qualified workers subject to the compulsory training at TC", code PTOed-1416-1, as well as employees servicing potentially dangerous equipment. The basis for training of a specific employee shall be the order by the Technical Director. In the order shall be appointed:

- A theoretical training instructor and an operational training instructor;
- Number of training programme;
- Form and location;
- Training period.

Expert from the corresponding plant department can be appointed as an operational training instructor.

11.4.7. Basic provisions of personnel training

Personnel training system is purposed 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 the candidates for training;
- Input check of knowledge and development of individual training programme;
- Training in accordance with the training programme;
- Check of knowledge and skills;
- Preparation and archiving of training documentation.

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

11.4.8. Initial training

Initial training – training of a fresh-comer for the relevant position at INPP, as well as training of INPP employee for promotion. The initial training is conducted in the following sequence:

- After the corresponding procedures are performed in the personnel department the employee's manager shall perform the primary on-the-job instructing of the employee;
- To determine the input knowledge level and practical skills of the trainee the input knowledge check shall be performed. It is performed by the TC instructor in form of interview or written test in the presence of the trainee's manager;
- On the basis of the input knowledge check and in accordance with the approved and registered training programme for the relevant position the individual training programme shall be developed for the specific employee training;
- Upon passing all training stages in accordance with the individual programme the employee shall take internal exam at the TC or at shift (for operation personnel);
- In case of the positive result of the internal exam the employee shall take the primary exam in committee;
- In case the primary exam is satisfactorily passed the employee on the basis of the committee conclusion and the relevant order is allowed to the doubling work performance.

After successful doubling performance the employee is allowed to independent work performance in accordance with the relevant order. 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 using the full scope simulator or other technical means (training computer programmes, equipment mock-ups, actual components and samples, etc.) shall be indicated in the promotion training programme and is conducted by the TC instructor. On-the-job training (probation) is purposed to the personnel to acquire practical skills and attitudes in situ and is conducted by the on-the-job instructor.

In course of probation the employee studies and applies in his working area the rules, standards, job description and operation manuals in accordance with his job description, obtains experience in providing proper, safe and least-cost operation of the serviced equipment.

Knowledge conformance to the established requirements for the operation personnel is checked by the qualification committee. The knowledge level is checked using the test papers and special questions by means of written and oral quiz. During exam additional questions can be asked within the frames of the training programme for corresponding job though not covered by the particular test-paper. Examination result is drawn up in the protocol and certificate. The doubling shall be performed under surveillance and guide of the experienced employee.

11.4.9. Continuing training of the operation personnel

Continuing training is purposed to maintaining and improvement of INPP operation personnel job proficiency with respect to knowledge, skills and attitude to work. Continuing training consists of support and improvement of operation personnel job proficiency and is conducted in the following forms of:

- Training in accordance with the programmes of job proficiency maintaining in TC or in other institutions;
- Periodic instruction;
- Studying of materials on evaluation and analysis of industry and in-house experience;
- Periodic checking of knowledge (qualification);
- Performance of practice exercises;
- Increase of professional and qualification level at requalification courses held in INPP TC or other organisations, at special institute faculties in Lithuania or abroad;
- Self-preparation.

The annual document “Plan of INPP personnel preparation” includes requirements of continuing and requalification training of INPP personnel: schedules of instruction conduction, emergency and fire protection training, examination schedules, training programmes. Maintaining of operation personnel job proficiency shall be performed in accordance with the approved programmes including theoretical training, training using the technical means, personnel on-the-job training in INPP departments.

Instruction conduction is one of the forms purposed to maintaining the operation personnel job proficiency and improvement of personnel knowledge of rules, job descriptions and operation manuals, as well as upgrade of operation and maintenance techniques used for equipment, systems and facilities of INPP. Another form of skill maintaining consists of lessons dealing with review of the unusual event reports, design modifications, new plant techniques and continuing training of skills required for rarely performed job.

Periodicity of knowledge checking is determined in accordance with the approved schedule on the basis of the "Guidelines for work arrangement with operation staff"; code PTOed-1408-1.
In accordance with such schedules the relevant emergency and fire protection training is conducted in INPP departments in order to maintain the skills required for accident mitigation, proper behaviour in the emergency situation, to verify shift personnel interaction, skills required for rendering the medical aid and using the individual protective and fire protective means.

Personnel requalification training is performed in TC in accordance with the programmes (Individual and group programmes) including training duration and sequence, extension of both technical knowledge and knowledge on safety culture, industry and radiation safety, ALARA principles. Requalification training forms: individual training, specific-purpose courses, increase of professional level and category (for workers). Requalification training of workers includes professional training purposed to update of the corresponding professional knowledge and skills.

Training can be conducted both individually and in groups. As a rule training groups are formed from the specialists or workers of similar or allied position, approximately equal job proficiency and the same educational level. The number of trainees of theoretical training group shall not exceed 20 people. The number of trainees in the practice training group is conditioned by the capabilities of specific training means. Requalification training can be conducted either as an on-the-job process or as a specific lesson course.

Specific-purpose courses are intended for studying the new equipment, goods, materials, processes, mechanical and automated tools used in operation process, rules and requirements of their safe operation, technical documentation and economical issues relating to the operation. Professional level increase at the requalification courses held at other organisations, special institute faculties of the Lithuanian Republic and abroad is performed on the contract basis for in-depth study and practical acquiring of the latest technological achievements, modern management techniques and labour organisation methods required for responsibility and obligations performance relating to the specific job or for promotion needs.

11.4.10. MCR operators and Plant Shift Supervisors

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 in accordance with the "Programme of MCR staff qualification training in TC" the annual sessions are arranged consisting of lecture, seminars, and practice exercises on the full-scope simulator.

In course of these sessions the seminars and lectures are conducted involving INPP senior staff, e.g.:

- "Review of last modifications and changes in the operating and technical instructions of TD, RD, I&C, CD";
- "Analysis of incidents at NPP with RBMK related to FC damage";
- "Reactor diverse shutdown system";
- "New directions in organisation of NPP with RBMK water chemistry";
- "Design and operation principle of CPS cluster-regulating device";

- "Safety justification of solely operating INPP Unit";
- "Some aspects of survey organization at INPP at present time and for the near-term outlook".

11.4.11. Training using the full-scope simulator is conducted in accordance with scenarios of normal operation, emergency situation and accidents

In course of continuing training the new knowledge is given, relevant skills and interconnections between operators are trained. 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.

While working out skills in the accident mitigation training it is taken into consideration that operator can act in the following circumstances:

- Time constraints;
- Sudden increase of information flow in case of accident;
- Possible stress of operator;
- Lack of operational experience in accident conditions;
- Probability of safety systems hidden failure to occur.

11.4.12. Technical support personnel (maintenance personnel)

Continuous training is conducted in the following forms of:

- Preparation for the special types of work;
- Seminars aimed to perform practical training for the equipment maintenance procedures and experience exchange at the results of power units overhaul;
- Special-purpose courses held at special educational institutions and other organisations of the Lithuanian Republic or abroad;
- Training using technical means or mock-ups.

Preparation for the special types of work includes the training purposed to mastering of new equipment, repair tool set and technological processes, such as:

- Work with split pipe cutter P5928M.00.00.00.00 for maintenance of weld seam of welding pipeline ДУ800 to primary circuit to MPC sucker;
- Work with machine for cutting of nib seam of FC with hydro blasting;
- Works on remedial maintenance of the system regulating heat carrier consumption in RBMK-1500 fuel channels;
- Work with power tools P5942, P5947;
- Remedial maintenance of pipeline fitting of a pump-heat exchanging installations division;
- Works on remedial maintenance of block valves;
- Maintenance of heat-exchange apparatus;
- Work with manual pneumatic machines;
- Performance of works on explosion-protected electrical equipment maintenance;
- Work on single-shell hydraulic press.

11.4.13. Rights, obligations and responsibilities of personnel trained in TC

All rights, obligations and responsibilities of an employee trained are specified and authorized in the job description of the corresponding employee.

11.4.14. Qualification requirements to instructors, their rights, obligations and responsibilities

Position of the TC instructor can be rendered to a person having higher technical education, experience of INPP equipment operation or maintenance no less than 5 years and medical permit. Position of the MCR senior instructor can be rendered to a person having higher technical education, experience of INPP equipment operation no less than 5 years with at least 2 of them performing the relevant MCR job, having medical permit and passed psycho-physiological selection.

Prior to the independent work performance the instructor shall be trained in accordance with the programme for job preparation, acquire the relevant psycho-physiological training in the TC or corresponding educational institution and be qualified by the relevant plant committee for such a position. Checking of instructors' knowledge is performed in accordance with the test-papers, approved by the General Director and endorsed by VATESI.

Further on, the instructor once per 3 years shall take regular exam on technical operation rules, industrial safety rules, fire safety rules, operation manuals and job description. All rights, obligations and responsibilities of the MCR senior instructor, TC instructor are listed and authorized in the corresponding job descriptions.

11.4.15. Examination

Knowledge of trainees during qualification (exam) is marked (checked) on the scale: GOOD, SATISFACTORY, UNSATISFACTORY. Persons got unsatisfactory mark at the routine exam shall take reexamination in one month at the latest. Checking of knowledge and skills of INPP personnel is accomplished by the certification committees appointed in accordance with the order of the General Director. Number of examination committees at INPP is determined considering the necessity of timely and proper check of knowledge.

Examination committee shall consist, as minimum, of three members. Examination results are 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. Qualification of qualified workers completed their training in TC, as well as of workers trained for qualification level (category) increase is performed by the certification committees.

Such qualification includes the following:

- Qualification trial work shall be performed. Qualification (trial) work is considered to be successfully performed if no time limits were exceeded, no spoilage is found caused by the examined person, and no industrial safety rules are violated;
- Qualification exam shall be taken.

Training and qualification of employees on performance of dangerous works and works with the potentially dangerous equipment shall be accomplished in accordance with the "Regulations on employees instruction, training and qualification safety and health issues" (NTdok-0009-104) approved by Order No. 76/261 dated 2002 06 10 of the MINISTER OF SOCIAL INSURANCE AND LABOR AND MINISTER OF PUBLIC HEALTH OF THE LITHUANIAN REPUBLIC.

11.4.16. Management of training center

The Training Center makes part of the Technical Directorate and directly reports to the Technical Director (Chief Engineer). The Training Center is guided by and the responsibility for its activity rests with the Head of TC.

Organization structure and manning table of the Training Center are approved by the General Director when submitted by the Technical Director and Personnel Director. The Training Center comprises training service and technical means service. The Training Center services are guided by and the responsibility for their activity rests with the Deputy Heads of TC.

11.4.17. Resources of the training center

INPP personnel training in the TC is accomplished in accordance with the annual training plan. Training costs are covered from INPP personnel training budget calculated in compliance with the planned costs. All TC buildings are covered by balance of Ignalina NPP.

11.4.18. TC archive and records

TC documentation on training and qualification of operation personnel is maintained in accordance with the requirements of procedure “Documentation control and records”, code PTOed-0211-1. Organizational documentation is maintained in accordance with the requirements of “Instruction on development, registration and record of INPP organizational documentation” code SEKorg-0212-16B1.

11.4.19. TC Reorganization and wind-down

TC Reorganization and wind-down shall be performed within frames of the state enterprise Ignalina Nuclear Power Plant and in compliance with provisions of Law of the Lithuanian Republic and INPP Statute.

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. Methods to prevent detect and correct human errors, including the analysis of human errors, the man-machine interface, operational aspects and experience feedback and role of the regulatory body and the operator regarding human performance issues

Human factors influence all aspects of safety of an operational nuclear power plant. They are a significant element of the plant safety culture. In “The General Regulations for Nuclear Power Plant Safety" (VD-B-001-0-97) which are main high-level document in Lithuania containing standards and regulations on the aspects of safety is stated that: "The NPP must be provided with trained staff capable of operating independently. The manning table and the training programs for the staff shall be prepared by the plant administration. The training programs shall be approved by the Operation Organization and agreed by State Nuclear Power Safety Inspectorate (VATESI).

The personnel of every nuclear plant, including those who have servicing functions, shall undergo training at training centers (sites) using simulators, and later on-the-job training. Their knowledge and abilities must be tested, and experienced personnel must back them up until they are ready for independent work. Periodic retraining is to be given in accordance with the norms and technical requirements in force.The plant training center (site) shall begin operation no later than the time of physical start-up of Unit 1.

In the training and retraining of personnel, particular attention must be given to personnel actions and interactions during accidents and to the development of practical skills for the control of the reactor installation and the plant as a whole. Training shall be designed to take into account errors committed in the past so that personnel understand their causes and consequences and their significance for staff safety as well as the safety of the population and the environment.

The qualifications required of plant personnel shall be established by the Operating Organization as part of the personnel training programme and agreed by the State Nuclear Power Safety Inspectorate (VATESI).

The following documents regulate INPP staff management process that involves recruiting, primary and continuous training, certification and access to independent work at the plant:

- Management Procedure “Personnel”;
- Personnel Training and Certification. General Requirements;
- Regulation on Arrangement of Work with INPP Operating Personnel;
- Standing Order on Operating Personnel Training;
- Standing Order on the Training Center;
- List of positions of managers, experts and skilled workers who shall undergo compulsory training in the Training Center;
- Regulation on Development and Implementation of Training Program and Examination Papers for a Position;
- Standing Order on Certification of Operating Personnel;
- The Plant Schedule of Work with INPP Operating Personnel;
- The Advanced Program of Support and Improvement of INPP Personnel Qualification;
- The Training Program for Workers in the Areas of Ionizing Radiation;
- The Instruction on Organization of Emergency Exercises at INPP.

These documents meet IAEA (International Atomic Energy Agency) recommendations as well as laws and legal acts currently in force in the Republic of Lithuania.
These documents provide that INPP meets the following criteria:

- Recruiting and personnel training ensure INPP safe operation and maintenance. Personnel state of health and their medical and psychophysical characteristics comply with the functions performed;
- Primary training provide personnel with sufficient skills to perform due tasks and understand consequences of their activities with respect to safety;
- Personnel certification makes it certain that the plant staff has enough qualification to fulfill its duties in order to provide safe and reliable operation of the plant;
- We plan and systematically conduct the work with the staff. We have also implemented the system of personnel continuous training;
- To maintain qualification and knowledge the personnel have periodical briefings;
- The personnel providing safe operation of equipment shall have periodic training on simulators and other technical means, undergo emergency preparedness and fire preparedness training and pass periodic assessment of its psychophysical state;
- The training is conducted in accordance with written procedures. With consideration of operational experience, equipment modifications and experiences of other NPPs Ignalina NPP systematically revise the procedures. The training process is planned and monitored and the results are recorded;
- The training programs contain objectives to be achieved as well as types and methods of training;
- The maintenance personnel shall have general training as for all INPP personnel, know general parameters and functions of the systems they work with, and also be aware of safety and quality assurance aspects as well as quality control issues;
- The managers are experts in their area have had basic training and obtain required knowledge and experience in nuclear energy;
- The personnel related to safety are periodically certified;
- Instructors who work in the training department shall have enough qualifications to provide training and sufficient competence of the trainees. They know the training basics and usually selected among experienced staff;
- Instructors are technically competent and carry authority among the plant personnel;
- Working places of the personnel responsible for the plant safety shall meet current ergonomics requirements. The man-machine interface provides sufficient data about the plant and its systems status as well as systems control and personnel attention in case of deviations from normal operation;
- The staff has everything necessary to carry on its duties: documentation, materials and equipment;
- The operating environment at the plant meets current standards and does not allow that hazardous influence of physical, chemical, biological and other harmful factors exceed the specified limits;
- The personnel activities are being monitored. There is a system that record incidents caused by human error at INPP, investigate the causes and develop corrective measures; perform probabilistic safety assessment considering human factor and monitor psychophysical capabilities of personnel providing safe operation of the plant.

At present the Human Factor work is being implemented in the following directions:

- Selection of staff;
- Personnel training;
- Workplace condition;

- Ergonomics and man-machine interface;
- Operating documents;
- Ensure personnel reliability.

Special attention is paid to the following directions:

- Selection, training and retraining of staff;
- Developing teamwork;
- Procedure for cooperation and relationships;
- Leadership;
- Methods for identifying, reviewing and preventing human errors;
- Self-checking and self-assessment;
- Motivation;
- Man-machine interface;
- Using internal and external experience;
- Upgrading procedures and working conditions.

Formally the Human factor activity at Ignalina NPP is regulated by "Regulation for Operating Personnel Management at INPP" (PTOed-1408-1), which has been in force since 1999. This Regulation includes all fields, which are given in IAEA recommendations and have been applied by international practice for the recent years. The Regulation was developed due to the requirement of VATESI to review the document PORP-89, which had been applied before and was not in compliance with IAEA recommendations.

The new document defines:

- Objective;
- Scope of application;
- Liabilities of the Operating Organization in the area of work with INPP personnel;
- Organizational foundations;
- Employment and instructions for work;
- Qualification requirements for managers, experts, clerks, skilled workers;
- Requirements for state of health;
- Personnel training;
- Job trainee;
- Personnel knowledge assessment;
- Examination team members and their job;
- Personnel backup and leave for work;
- Staff briefings;
- Emergency preparedness and fire preparedness training;
- Retraining and maintaining of skills level;
- Training center;
- Surveys of working places;
- Administrative methods of work with personnel;
- Management of work of the Technical Library and Offices.

The personnel action not defined in the instructions and errors are subjected to reviewing to identify direct and indirect causes and contributors to the event, to eliminate causes and prevent further recurrence, the corrective actions are developed and taken.

The analysis of human factor influence on safety is an integral part of study and application of internal and external experiences. The final goal of the analysis is to improve safety and reliability of INPP.

The activity on registration and analysis of events related to human factor is regulated by requirements of the "Safety Assurance Manual" (QA-1-009), "Personnel Training and Qualification" (QA-1-018), "Corrective Measures and Improvement Program" and Management Procedure (QA-2-003) "Assessment of Internal and Industrial Experience". Criteria for event registration, order of the reports about events, methodology and order of the events analysis, and responsibility of the staff for the activity is defined in the "Instruction on Reports about Unusual Events at INPP" (PTOed-0312-8V3) and the "Instruction on Analysis of Unusual Events" (PTOed-0312-5V1).

Methodology of the events analysis is in compliance with ASSET methodology and is based on identification of direct and indirect causes of the event. To provide wide use of internal experience in events analysis we input the reports into the INPP Information System on Unusual Events that include events that happened since the units commissioning.

The procedure for self-checking and self-assessment has been perfected owing to regular special training of the plant personnel. Nowadays STARK system is being generalized and popularized. There are posters presenting requirements of STARK system at working places of the plant personnel.

Different aspects of motivating are highlighted in "Policy" of the plant management and in the "Policy Content". These booklets have been distributed among INPP staff. In addition, the motivation issues are included in a leaflet "INPP Personnel Regulations" and considered during workshops on safety culture. It is planned to arrange the workshops on safety culture for all INPP workers.

The use of Internal and External Experience is regulated by the procedure "Assessment of Internal and Industrial Experience". The nuclear control operators are subject to testing and questioning regarding ways and tools for data displaying and computer applications. The intensity (rate) of using computer controls and applying to data display tools is currently under review. On the basis of the results obtained the corrective actions are taken to upgrade the man-machine interface. The use of Internal and External Experience is regulated by the procedure of Quality Assurance Program "Assessment of Internal and Industrial Experience".

Production Department distributes the internal experience reports among all INPP departments and divisions, where a department coordinator in this area reviews them. Then the coordinator hands the reports over to a department manager and workers in so that they could define and perform corrective actions (if they have been not defined before). The coordinator reports the results of the corrective actions to the Production Department.

External experience reports received from WANO, IAEA, NucNet and other NPPs with RBMK reactors are considered by the plant managers and distributed among coordinators in assessment and use of experience, to Production Department and other departments. The acceptable experience is disseminated to the relevant personnel and then practically used.

Every department of the plant has assigned its qualified engineers as coordinators in assessment and use of experience. They provide the department staff with information and deal with feedback. Coordinator in assessment and use of experience, who works in Production Department, provides coordination of activities regarding assessment of experience at the plant. The staff training and

retraining are provided in accordance with standard programs taking into account a level of the previous training and characteristics of a position. There are two methods of training being used at the plant: training in teams and individual training.

The retraining programs are developed on the basis of amendments incorporated into projects, processes, procedures and regulations, as well as on the results of internal and industrial experience. Any training or retraining program end in an individual proficiency examination.

The computer simulator is used to train the nuclear control operators (MCR operators). At present the simulator has been completed by the personnel of the Training Center and being in operation at full capacity. Every year the nuclear control operators (MCR operators), plant shift supervisors and their deputies are being retrained at the simulator for 2-3 weeks session. During the training course the personnel develop their skills in equipment control under different operation conditions and learn how to work in team.

The responsibility for staffing rests with INPP Personnel Management. There are procedures and requirements for staff recruitment in accordance with Lithuanian legislation considering physical condition, education and knowledge basis of candidates.
The Technical and Training Center management staff is responsible for training and retraining of the plant personnel.

The operational managers (department and service managers) bear the responsibility for practical training of the staff. This work is conducted in compliance with annual and monthly training plans and schedules. The Safety and QA Service staff carries out regular audits of the INPP activities. The Human Factor activity is an incorporated section of the INPP Audit Programs.

In accordance with Lithuanian regulations all safety related activities are to be reviewed by the regulatory authority (VATESI). It includes inspection, monitoring and review of all nuclear safety aspects with aim to eliminate human errors or mitigate their consequences.

12.2. Managerial and organizational issues

In accordance with the Statute of the State Enterprise Ignalina NPP the managing bodies of the enterprise are the Board of Directors and the Chief Manager of the enterprise the General Director of Ignalina NPP. On the basis of Order No. 274 issued by the Ministry of Economy on 14 September 2001 and status as of 15 April 2002 there are 6 members of the board:

- The chairman of the Board of Directors – the Secretary of the Ministry of Economy;
- Director General of Ignlaina NPP;
- Director of the Department of Nuclear Energy and Radioactive Waste Handling under the Ministry of Economy;
- Director of the Department of Quality of the Environment under the Ministry of the Environmental Protection;
- Director of the Department of Analysis and Projection of Social Policy under the Ministry of Social Security and Labour;
- Senior Economist of the Economy Section of the Budget Department under the Ministry of Finance.

Along with other activities the Board of Directors of Ignalina NPP shall:

- Consider and approve the management structure;
- Analyze and approve the materials submitted by the Administration and the experts of the INPP about: (i) the strategy of INPP business, production and technical activities; (ii) the

organization of INPP production and management; (iii) the INPP Administration activities in the area of the environmental protection, as well as nuclear and radiation safety.

- The Board of Directors does not deal with operation of INPP business activities. It is responsible only for concealment of violations and not proper control of business activities. In accordance with the INPP Statute the business activities are organized and performed by the INPP Administration.
- The Administration of the enterprise consists of the Administration management and the heads of divisions, which work is regulated by "Regulations for the Administration".

The management of the Administration includes:

- Director General;
- Technical Director;
- Personnel Director;
- Finance Director;
- Chief Accountant;
- Manager of Safety Surveillance and Quality Assurance Department;
- Manager of the Supply Service;
- Manager of Physical Protection Service;
- Manager of Decommissioning Service.

At present there are 45 heads of departments included in the administration of Ignalina NPP. The Administration is authorized to implement the following functions:

- Organize and implement the process of safe electricity production;
- Introduce modern quality assurance system;
- Develop and present to the Board for approval perspective and annual plans of business and production activities;
- Develop programmes for provision of the plant with nuclear fuel, equipment and materials, and hands the programmes over to the Board for approval;
- Implement acts adopted by the Seimas and the Government of the LR, the Founder and the Board;
- Select employees, organize test for their reliability, and organize training and retraining of INPP personnel;
- Develop the salary system and present it to the Board for approval;
- Establish INPP procedure and rules for internal and access control regime;
- Ensure safe labour and appropriate working conditions;
- Formulate and implement plans of social development, and work out the collective agreement together with the representatives from the plant;
- Plan and analyse application of financial resources;
- Keep record of the wealth, as well as production, business and commercial activities;
- Conclude contracts on behalf of INPP;
- Basing on advanced scientific achievements improve the production process, management and structure of INPP;
- Develop and implement programmes of environmental protection;
- Ensure the safety and profitable use of the state capital entrusted;
- Ensure security of state and official secrets; establish the procedure and limitations for working with information that contains such secrets;
- Act as INPP representative in the court, state, public and other organizations;
- Ensure adequate protection of the personnel in the event of accident.

In the management procedure QA-1-005 «Organization of the Plant and Liabilities», specifying functional duties, reporting lines, liabilities and authorities of the INPP administration management, it is stated the State enterprise Ignalina NPP is the operating organization. Ignalina NPP issued «The Provisions of the Operating Organization», where it is said that the structure of the operating organization complies with the structure of the state enterprise Ignalina NPP, the management of the operating organization is executed in accordance with the Statute of the Enterprise, and the chief manager of the operating organization is the Director General.

Each representative of INPP Administration management except the Chief Accountant is the manager of a corresponding directorate or service. For each directorate and service, as well as for each department under them there are corresponding provisions approved by the Director General. These provisions are the basic documents regulating the organizational and legal status of the departments. They also define goals of the departments' activities and their functions, the organizational structure and interface with other directorates, services and departments of INPP.

12.2.1. Technical Directorate

The Technical Directorate is authorized to implement the following objectives:

- organize production of electrical and thermal power;
- ensure reliable and safe operation of the equipment;
- implement production plans of the plant provide fail-safe and economical operation of the facilities.

In order to implement these objectives TD shall perform the following functions that include operating functions, considerable amount of supporting functions and partially directive and reviewing functions:

- Defining technical policy and the ways of its implementation together with the management of the Administration;
- Organizing technically correct operation of the equipment and the systems;
- Organizing and ensuring in a timely manner and together with SD and FD maintenance and modification of INPP long-term assets;
- Monitoring and analysing operation of the facilities, developing recommendations on elimination of the drawbacks found;
- Ensure functioning of the systems that monitor the equipment operation and prevent accidents at INPP;
- Organizing and ensuring storage and accounting of nuclear fuel;
- Organizing of development and implementation of plans for introduction of new technique and technology, designs and safety improvement programmes;
- Providing development and execution of quality assurance procedures by personnel of TD and S&QAS;
- Control and improvement of technical documents, keeping record of technical and statistical reports;
- Organization and development of operational and technical documents, technical specifications and designs, related to operation and modification of INPP;
- Control of process discipline, improvement of production culture;
- Organizing and ensuring requirements of rules and control of nuclear, radiation and industrial safety;
- Organization of works aimed at creation of safe labour conditions, prevention of injuries and professional illness, as well as reduction of radiation exposure doses for the personnel and the public;
- Organization of works aimed at observation of INPP impact on the environment;

- Organization and control of the level of hazardous substances, their collection, transport within the territory of the enterprise, decontamination, accounting and transferring;
- Organization of work with the personnel, introduction of the principles of the safety culture and quality assurance;
- Organization of training and retraining of the personnel, training of INPP personnel, checking of their knowledge and skills.

TD has 12 workshops, 6 departments; the Process Service and the Training Center (see Appendix 1). The TD management structure is based on a traditional "workshop system". According to the structure various systems, equipment and the personnel in the plant, except the staff of the MCR, are separated functionally and assigned to different equipment workshops.

The aim of the Process Service activities is to provide safe, reliable and economical operation of INPP while managing the process of electrical power and heat production. The Process Service mainly consists of operating personnel of the MCR. The head of the Process Service is the Technical Director Deputy for Operation, who is also the member of INPP Administration. The plant shift supervisor, who reports directly to the Technical Director Deputy for Operation, performs management of the MCR operating personnel and the staff of the other departments, and in the event of accident provide interface with INPP Administration and external organizations. On the operational level, not administrative, all on-duty shift personnel report to the plant shift supervisor (see hereinafter). The MCR operators are subordinated directly to the deputies of the plant shift supervisor, who actually perform the functions of the unit shift supervisor.

The key functions of the Process Service are the following:

- Control of the reactors and the turbines adhering to limits and conditions of safe operation;
- Implementation of inspection and testing programmes;
- Prevention and elimination of emergency situations;
- Control of fire alarm and automatic fire fighting systems, as well as management of the fire fighting process until the fire brigade arrives;
- Implementation of the emergency preparedness plan;
- Coordination of interaction of the operating personnel from various departments while management of the processing and maintenance of the systems and the equipment;
- Management of maintenance of the equipment that is under supervision of the plant shift supervisor.

12.2.2. Operating and Maintenance Workshops

Each operating and maintenance workshop shall organize and ensure technically correct operation and maintenance of the equipment in a timely manner. Moreover each workshop is authorized to perform modification of the systems and the equipment that is under its supervision, organize work with the personnel, and provide logistics of the workshop. Each workshop is run by the manager, who is the member of INPP Administration and, on the administration level, is subordinated to the Technical Director.

Such a workshop has its operating personnel headed by the workshop shift supervisor, who on the administration level is subordinated to the deputy of the workshop manager for operation. When on duty the deputy of the manager of the workshop for operation shall agree upon his decisions with the deputy of the Technical Director for operation – the Manager of the Process Service and interact with the deputy of the manager of the workshop for maintenance. The workshops shift supervisors and subordinated to them field engineers and operators shall agree upon their activities with the MCR operators or with the correspondent deputy of the plant shift supervisor.

The operational activities of the workshops include:

- Organizing continuous duty of the operating personnel;
- Surveillance and inspections of the systems and the equipment in a workshop and their planned preventive maintenance;
- Reveal defects and failures of the systems and the equipment;
- Performing the operations on placing systems and equipment in operation and maintenance status in accordance with the schedules;
- Performing the activities on elimination of emergency situations;
- Preparing of working places and access of the personnel for maintenance;
- Checking out of systems, equipment and components related to safety in accordance with the schedules and the procedures for operation.
- Such workshops have maintenance personnel, who through the senior foremen or the section managers, is subordinated to the deputy of the workshop manager for maintenance. When on duty the deputy of the workshop manager for maintenance shall agree upon his decisions with the deputy of the Technical Director for maintenance and interact with the deputy of the workshop manager for operation. The workshop functions in the area of maintenance include:
- Maintenance of systems and equipment, as well as rooms and constructions being under supervision of the workshop both on its own and involving external organizations;
- Preparing systems and equipment for technical inspection;
- Limited or single piece production, or postproduction change of simple parts or subsystems and equipment using maintenance facilities of the workshops;
- Performing small amount of installation works.

The workshops have also personnel performing engineering support functions. These functions include:

- Organization of works on preparation and performance of technical examination of systems and equipment, including documenting of the results;
- Keeping records of failures and violations in operation of systems and equipment and analysing their causes, developing and executing of corrective activities, and accounting systems and equipment lifetime;
- Development and review of technical documents and job descriptions, schedules for training in emergency and fire prevention and schedules for performance check of systems, equipment and components related to safety;
- Planning of systems and equipment maintenance;
- Development of technical decisions and requirement specifications for modifications;
- Development of management procedures and workmanship instructions on quality assurance;
- Organizing works, developing technical specifications, monitoring implementation and commissioning of modifications;
- Organizing training and qualification of the workshop personnel, as well as its instructions.

12.2.3. Responsibilities of the Divisions Managers

One of the main documents regulating legal status, skill requirements, responsibility, duties and authorities of INPP staff, including the plant Administration management and the managers of the divisions, is the job description (JD). Other documents of this kind are the Regulation for the Management of INPP, the Emergency Preparedness Plan of INPP, the INPP Operating Personnel Arrangement Manual, the Standing Order on Nuclear Safety at INPP, the Instruction on Liquidation of Emergency Situations and Accidents at INPP and some other instructions.

The JD of the INPP operating personnel specifies responsibility:

- For the plant safety within the framework of its responsibility and authorities;
- For violation of the requirements imposed by the Regulations for Operation (PTE), the Fire Safety Regulations (PPB), the Industrial Safety Regulations (PPrB), the Radiation Safety Regulations (PRB), the plant instructions for operation and maintenance of the equipment, liquidation of accidents, and other currently applied at the INPP codes, standing orders, provisions, manuals and instructions;
- For violation of nuclear safety regulations;
- For accidents, fires and industrial injuries caused by negligence of an employee;
- For failure to follow directives given by a higher rank personnel;
- For violation of the standing order established at INPP, damage or loss of the state assets entrusted, violation of the secrecy order;
- For breach of duties and non-using rights specified by the job description;
- For violation of labour and production process discipline.

The INPP personnel can be called to account in accordance with the legislation of the LR, and these liabilities are considered to be "standard".
The JD of the plant divisions managers are supplemented with the provisions stating that the managers of the divisions shall be responsible even if the situations were caused by their subordinated personnel for:

- violation of the requirements imposed by the PTE, PPB, PPrB, PRB, the plant instructions for operation and maintenance of the equipment, liquidation of accidents and other currently applied at INPP codes, standing orders, provisions, manuals and instructions;
- the events of accidents, fires and industrial injuries;
- violation of labour and production discipline.

Arrangement of work with subordinated personnel including its professional development, training, certification and permission for work, as well as implementation of safety culture principles and quality assurance are usually included in the JD of the division's managers, in the chapter describing their duties.

12.2.4. Administration Management Responsibility

As a rule, the JD of the INPP Administration Management includes "standard" similar to those imposed to all INPP operating personnel liabilities that might be called to account in accordance with the legislation of the LR. Some specific provisions or those, which are deviated from "standard" provisions of the divisions' managers JD and directly or indirectly related to the plant safety, are as follows:

12.2.5. Director General

According to the legislation of the LR the Director General is responsible for:

- safe operation of the plant (personally);
- adequate fulfillment of the laws of the LR, the by-laws of the Government of the LR, orders and regulations of the Ministry of Economy, other statutory acts and instructions, acts of the Board of Directors;
- INPP emergency preparedness;
- organization and supervision of business and financial activities;
- implementation of quality assurance system and safety culture at INPP.

Exclusive liabilities of the Director General are as follows:

- be the representative of INPP in the state authorities and regulatory bodies, in the court, in relations with other natural and legal persons;
- organize the INPP management structure and its productive activity;
- organize works on safety and quality assurance;
- plan changes of the organizational structure and submit them to the Board of Directors for approval;
- specify duties and authorities for directors and managers of the services;
- allocate resources for safety enhancement programmes, modifications and research;
- establish policy and organize works in the area of occupational safety;
- set up objectives for divisions that are in charge of inspections and tests.
- The General Director prerogatives include the following:
- put forward decree drafts to the Board of Directors;
- order to hold up any activity at INPP including the reactors shut down;
- order to startup the reactors after outage or short-term shutdown;
- approve the Regulation for the Management of INPP;
- make and dissolve labour contracts with the staff comprising the Administration, except for the Technical Director and the Chief Accountant, who make and dissolve labour contracts with the Founder;
- conclude contracts with outside organizations, issue letters of authority to persons from INPP staff, open INPP accounts in banks;
- handle INPP assets in accordance with the laws of the LR, the Statute of the enterprise and the bylaws of the Board;
- approve provisions concerning the divisions and INPP personnel job descriptions;
- approve programmes on nuclear safety and physical protection, production programmes, programmes of research, modifications and other activities;
- notify about decisions taken in the form of orders, and give directions in the form of decrees, and assign persons responsible for their implementation;
- reward and punish INPP staff in order specified by the laws of the LR;
- represent the plant at meetings held somewhere outside or assign another representative;
- put forward the candidates for the positions of the Technical Director and the Chief Accountant to the Founder, and the candidates for the positions of the Finance Director, Personnel Director and the managers of the plant services to the Board of Directors or proposals for displacement from these positions;
- take mandatory decisions on productive and economic activities.

The Director General is appointed by the decree of the Government of the LR. The Technical Director or other directors of the plant may act for the Director General on the basis of the appropriate INPP order. The JD of the managers-member of the Administration, if compared with the JD of the middle managers, includes the following liabilities:

- for the breach of the laws of the LR, the decrees of the Government of the LR, other statutory acts and instructions, orders and regulations of the Ministry of Economy, the Director General, decrees of the Board of Directors (this provision can also be met in the JD of the middle managers);
- for decisions taken and consequences of their fulfillment in order specified by the laws of the LR.

The JD includes the following obligations:

- form structures of divisions of corresponding directorates or services, determine necessary working methods and technical means, and order of the divisions work;

- approve operating plans of the divisions under the corresponding directorates or services and supervise their implementation;
- agree, revise and supervise changes of the provisions about the divisions and job descriptions of personnel under the corresponding directorates or services;
- organize in cooperation with the PD professional development and retraining of personnel under corresponding directorates or services.

The JD also includes the following authorities:

- put forward proposals on the draft decrees of the Board;
- do correspondence with outside organizations: Technical Director, Personnel Director, Finance Director, Chief Accountant, the Managers of the LS and PhPS – letters addressed to the Ministries, VATESI and other bodies, establishments, enterprises and organizations in the LR and other states;
- The Managers of S&QAS and DS, if authorized by the Director General, – letters addressed to VATESI and other bodies in the LR;
- develop draft orders for INPP;
- put forward proposals to the Director General on rewards or disciplinary actions to be imposed to certain employees of the directorates or services;
- agree upon candidates to be recruited, appointed, redeployed or discharged among the staff of corresponding directorates or services;
- within the frames of its liabilities and authorities represent INPP or appoint representative of INPP from corresponding directorates or services;
- give directives to the personnel of corresponding directorates or services in the form of decrees, which can be withdrawn only by the managers of directorates or services or by the Director General;
- appoint a person from the staff of corresponding directorates or services that will be responsible for implementation of orders, decrees or other directives;
- conclude contracts on issues determined by the Director General (except for the manager of the PhPS).

12.2.6.. Technical Director

The exclusive liabilities of the Technical Director include:

- establish technical policy and the ways of its implementation;
- ensure occupational, nuclear, radiation, technical and fire safety at the plant;
- organize technically correct operation and maintenance of the plant systems and equipment in a timely manner;
- organize reliable and profitable production of electrical and thermal power;
- ensure constant improvement of the level of technical preproduction, its effectiveness and reduction of financial and material costs;
- organize development and implementation of plans for introduction of new technologies and techniques, development activities and safety enhancement programmes;
- participate in liquidation of accidents and prevention of their development and also in elimination of the most complicated defects;
- perform duties of the plant operation manager while implementing the Emergency Preparedness Plan;
- supervise revision of operational and technical documentation of the TD;
- arrange works related to implementation of safety culture;
- be the head of the commission testing knowledge of INPP management;
- ensure that the personnel of the TD develop and implement procedures of the quality assurance programme.

The authorities of the Technical Director also include the following:

- decide on his own the issues related to INPP production – economical activities;
- give directives to shut down equipment or prohibit works if the requirements to the occupational, nuclear, fire and technical safety are violated or the provisions of other regulatory and operational documents applied at INPP are breached;
- make a request to the Director General to call the TD personnel from vacation or involve it in overtime job in compliance with the labour legislation of the LR;
- approve the technical specifications for modifications, specifications and programmes for nuclear works, instructions, lists of measures and other technical documents related to nuclear safety;
- approve operational-technical and design documents, acts and minutes of meetings;
- issue decrees about leave of the TD personnel for independent work;
- not to fulfill decrees that contradict the requirements of safety regulations, or jeopardize people's safety or safety of the equipment.

12.2.7. Personnel Director

The exclusive liabilities of the Personnel Director include the following:

- establish policy concerning the INPP personnel and form the system of labour motivation and payment;
- establish order of recruiting and conclusion of labour contracts with INPP personnel;
- organize negotiations with trade unions and representatives of the collective while concluding the labour contract;
- establish order for consideration of labour disputes and represent INPP in disputes related to personnel management;
- supervise formation of organizational structures of INPP divisions, establishing and liquidation of working places;
- provide surveillance of fulfillment of requirements for occupational safety and medicine, and also fire safety in the divisions under the PD;
- approval of provisions about the INPP divisions and job descriptions of the plant personnel;
- organize recruiting of skilled workers and their record;
- supervise job management and work measurement being carried out in INPP divisions;
- develop regulations for internal standing order at INPP, work schedules, surveillance of labour discipline and keeping record of labour time of INPP personnel;
- provide periodical medical examination of INPP personnel;
- organize INPP personnel training together with the managers of the divisions;
- provide interface with the media and organize excursions to the plant;
- provide catering of INPP personnel.

The authorities of the Personnel Director also include the following:

- issue orders on personnel (except for the members of the Administration), withdrawal orders based on the law of the LR on Labour Contract or on the labour contract and in accordance with the court decisions;
- prohibit works that breach the specified requirements.

12.2.8. Finance Director

According to the law of the LR the Finance Director is additionally responsible for the following:

- due arrangement and surveillance of financing activities;
- violations of financial activities and their concealment.

Moreover, the JD contains the provision stating that the Finance Director shall indemnify losses occurred through his/her fault in order specified by the laws of the LR.

The exclusive liabilities of the Finance Director are as follows:

- provide effective use of financial resources;
- form principal planned performances and system of their planning;
- arrange the system for keeping record, reporting and surveillance of material and financial resources;
- be involved on behalf of the Director General in preparation of payment conditions specified by contracts;
- control in the FD divisions of fulfillment of the requirements related to safety, occupational medicine, fire safety and physical protection.

The authorities of the Finance Director also include the following:

- prohibit works violating the specified requirements;
- approve wealth and materials charge-off acts, except for charge-off acts for long-term assets.

12.2.9. The Manager of Safety and Quality Assurance Service

The exclusive liabilities of the S&QAS manager include:

- arrange works on implementation of the Quality Assurance System at INPP;
- organize audits of the quality assurance system in INPP divisions and at the suppliers that provide the plant with goods, works and services;
- issue permissions for work at the INPP site to the plant contractors;
- organize works on metal inspection and safety inspections in INPP divisions;
- organize works on metrological control of the instrumentation;
- organize works on introduction of advance methods of event analysis at INPP;
- organize preparation of information messages about events at INPP for the INPP Information Center;
- notify VATESI on a daily basis about INPP daily activities and provide constant communication with VATESI concerning agreement of newly applied norms and regulations;
- be the head of the commission testing knowledge of S&QAS personnel;
- implement safety culture in the plant divisions.

The authorities of the S&QAS manager also include the following:

- approve operational and technical documentation, acts, minutes of meetings, operation plans and other administrative and order documents related to S&QAS activities;
- apply to the Director General to call the S&QAS personnel from vacation or involve it inovertime work in compliance with the labour legislation of the LR;
- require work stoppage if the work jeopardizes or might jeopardize the plant safety;
- not to follow the directives that contradict the requirements of the safety regulations, or threaten people's safety or safety of systems and equipment.

12.2.10. The Manager of Logistics Service

In accordance with the legislation of the LR the manager of the LS shall be additionally in charge of:

- due organization and control of activities related to procurement of equipment and materials and keeping appropriate conditions for the plant activities;
- violations of procurement activities and concealment of these violations.

Moreover, the JD includes the provision specifying that the manager of the LS shall make amends for losses caused by his/her negligence in order established by the laws of the LR.

The exclusive liabilities of the LS manager include:

- develop the materials and equipment procurement plan and arrange its implementation;
- head the procurement commission appointed by the Director General;
- provide accounting and distribution of material resources stored in the warehouse;
- control deliveries and conditions of delivery contracts;
- establish order of warehousing and distribution of the resources;
- organize research of material resources market in order to minimize material and production costs and also procurement, warehousing, distribution and transport costs;
- organize and control cleaning of administrative rooms, as well as accomplishment and plant verdure of the INPP site;
- organize transport of INPP personnel to work and back home;
- organize in the LS divisions works related to occupational safety and medicine, and also fire and physical safety .

The LS manager is also authorized to:

- prohibit works that breach the specified requirements;
- approve acts for discharge of material resources except for the acts for discharge of capital assets;
- approve orders for the use of transport and mechanisms.

12.2.11. The Manager of Physical Protection Service

According to the legislation of the LR, the manager of the Physical Protection Service is additionally responsible for:

- arrangement of activities on physical protection, internal and access control order and their implementation and control;
- security and control of the enterprise data that contain state secrets.

The PhPS manager is exclusively obliged to:

- organize security of the plant together the headquarters of the Security Unit of the Boarder Protection Service under the Ministry of the Interior, control effectiveness of security and preparedness of the Security Unit for activities in case of emergency;
- organize security of state and official secrets and prevent disclosure of confidential information;
- test effectiveness of physical protection, reveal and prevent illegal actions from INPP personnel and external organizations that might have negative impact on the plant normal operation and safety;
- organize proper operation and control of security facilities of INPP units;
- develop and review plans for anti-terrorist interagency cooperation together with adequate state bodies, organize training within the department and all-inclusive training;
- organize checks of personal data of INPP staff and persons to be recruited;
- control implementation of the requirements imposed by the statutory acts regulating internal order, access control order, order of inventory behaviour and organize training of the personnel in this spheres;
- organize and control security of the material resources that include fresh and spent nuclear fuel;
- organize preventive activities aimed at implementation of the requirements to physical protection;
- control the order of giving permissions for works within the territory of INPP to subcontractors and their employees;
- organize investigation of events when the requirements to physical protection and internal order are violated, and events of embezzlement;

- participate in revealing of infringement of labour and production discipline that might lead to an accident or other failures at the plant;
- approve designs of constructions being built and reconstructed at the INPP site with respect to their compliance with the requirements to physical protection.

The PhPS manager is additionally authorized to:

- put forward draft decrees of the Government of the LR concerning arrangement and improvement of INPP physical protection to the INPP physical protection interagency committee;
- take decisions upon reinforcement of INPP physical protection in case of emergency;
- give directives upon agreement with the Director General to pause any activity at INPP if it is performed with violation of the requirements to physical protection and internal order;
- require from INPP personnel explanations in case of violation of the requirements to security of state and official secrets, and internal and access control order;
- make changes in the INPP security system upon agreement with the INPP Security Unit, if necessary;
- submit upon agreement with the Director General materials about violations and cases of embezzlement at INPP to the legal bodies.

12.2.12. The Manager of Decommissioning Service

The manager of the Decommissioning Service is exclusively obliged to:

- organize and control INPP decommissioning process;
- participate in establishing of the decommissioning policy and ways of its implementation;
- head the committee checking competence of the DS staff;
- ensure and control nuclear, radiation, fire and industrial safety, and also appropriate labour conditions in the DS;
- control adherence of design and production discipline;
- control timely development and revision of operational and technical documentation in the DS divisions;
- organize works on implementation of safety culture in the DS;
- ensure development and implementation of procedures of the quality assurance programme by the DS staff.

The manager of the DS is additionally authorized to:

- supervise fulfillment of orders, decrees, managerial and technical activities related to the plant decommissioning;
- apply to the Director General about calling of the DS personnel from vacation or involving the personnel in the overtime works adhering to the labour legislation of the LR;
- approve acts or other managerial and order documentation;
- obtain from the plant directorates and services complete information on a timely basis that is necessary for fulfillment of the DS liabilities and activities.

12.2.13. Chief Accountant

According to the laws of the LR the Chief Accountant bears additional responsibility for:

- arrangement of the accounting;
- documentary proof of all commercial and economical activities accepted by the Accounting Department;
- preparation of financial reports on a timely basis.

The Chief Accountant is exclusively obliged to:

- organize accounting at INPP in accordance with the law of the LR;
- ensure timely submission of correct information to the tax inspection and the Bureau of Statistics of the Founder;
- ensure accounting of financial operations, long-term assets, capital investments, production costs and wages of INPP personnel and budget, materials in a timely and high quality manner;
- ensure arrangement of audits and inventory;
- take part in the analysis of economical and financial activities of INPP and in development of activities aimed at improving the INPP financial state;
- control timely submission of the documents to the Accounting Department by the divisions, services and directorates;
- control the application of INPP financial resources;
- supervise timely submission to the Lawyers Office at INPP the documents on due debts;
- supervise adequate execution of business transactions performed by INPP.
- The Chief Accountant is additionally authorized to:
- issue decrees at INPP concerning execution of financial and other accounting documents;
- require from the managers of divisions, directorates and services, and, if necessary, from the Director General to provide effective use of resources and proper arrangement of accounting and control;
- not to file the documents on business transactions, as well as instructions and provisions in force at INPP that violate the laws of the LR;
- supervise the way how INPP divisions follow the order of acceptance, receiving and use of facilities, materials and other assets;
- approve contracts, minutes of meetings, orders and other documents stipulating financial aspects

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. Quality assurance (QA) policies

The INPP established clearly defined safety and quality assurance policy and objectives. The INPP mission is providing safe, reliable and cost-effective operation of both power units, as well as a competitive position among other power facilities.

The main principles of the INPP Safety and Quality Assurance Policy are implementing safety culture at all levels within the INPP organization; ensuring reliable, safe and cost-effective plant performance; and providing clear distribution of functions, authorities and responsibilities within the INPP organization in order to avoid plant management shortcomings. The Policy provides necessary conditions for continual improvement of the organizational management, improvement of the personnel and equipment; upgrading of the responsibility of each manager for specifying tasks and requirements for the personnel under his/her authority. Additionally, the Policy makes necessary provisions for encouragement of all INPP employees to actively participate in safety and quality improvement process; in continual assessment of INPP performance for the purpose of quality improvement.

The INPP Safety and Quality Assurance Policy is planned to update in the end of 2004 taking into account the changing situation with Unit 1 due to the decommissioning process.

13.2. QA programmes relating to all aspects of safety throughout the life of the nuclear installation

The INPP has established a three-level QA documentation system. The Quality Assurance Manual is the main 1st level document applicable to development, implementation and improvement of the Quality Assurance System. It specifies the Safety and Quality Assurance Policy and objectives, and establishes the basis for effective management of all activities performed at INPP. The Quality Assurance Manual includes the following sections:

- INPP Mission and Objectives;
- Legislative Framework of INPP Operations;
- Safety and Quality Codes and Standards;
- INPP Organization and Responsibilities;
- INPP Safety and Quality Policy;
- Management Principles and Assessment of INPP Performance;
- Management Self-assessment;
- Description of INPP QA System;
- Terms and Definitions;
- Safety;
- Planning;
- Personnel Training and Competence;
- Control of Non-conformities;
- Corrective Actions and Improvements Program;
- Control of Documents and Records;

- Control of Work Processes;
- Design;
- Procurement;
- Inspection and Testing;
- Audits.

The 2nd level of QA system documents is the so-called management procedures. The INPP developed, implemented are regularly update 24 management procedures covering the following main activity areas:

- Safety Culture;
- Control of Documents and Records;
- Evaluation of Internal and Industrial Experience;
- Environment Protection;
- Radiation Safety;
- Fire Safety;
- Industrial Safety;
- Emergency Preparedness;
- Operations;
- Maintenance;
- Ageing Management;
- Inspection and Testing;
- Core and Fuel Management;
- Radioactive Waste Handling and House-keeping;
- Personnel;
- Chemistry Control;
- Plant Modifications;
- Procurement;
- Design Control;
- In-house Fabrication of Spare Parts and Items;
- Storage of Materials and Equipment;
- Physical protection;
- External and Internal Communications;
- Construction.

The management procedure for decommissioning is in the process of implementation. New procedures are developed and implemented in accordance with detailed implementation plan. The implementation plan shall specify a project leader, required human resources and personnel training, review and updating of existing work procedures and development of new work procedures, if necessary. 3rd level documents are detailed work procedures; they are developed in accordance with the requirements of management procedures and specify how work shall be done.

Safety and Quality Assurance Department fulfils the function of managing the development, implementation and continual improvement of the Quality Assurance System at the INPP. This department is independent from the production function and reports directly to INPP Director General.

Manager of Safety and Quality Assurance Department is Deputy Director General for safety and quality assurance, and possesses the delegated authority for development, implementation and maintenance of the INPP Quality Assurance System, for assessment of its effectiveness and for required personnel training in the area of quality.

The Quality Assurance Division, which is under the Safety and Quality Assurance Department, performs the independent function of monitoring the effectiveness of the INPP Quality Assurance System. Additionally, the Quality Assurance Division performs the function of auditing quality management systems of the contractors supplying equipment, doing contract work or supplying services to the INPP. The Quality Assurance Division personnel received the required training related to contractors' changeover to the new quality management standards.

13.3. Methods used in implementing and assessing QA programmes

The Quality Assurance Division is responsible for planning, conduct and reporting on audits of the INPP Quality Assurance System. Audits are planned in such way that each activity area is audited once per three years; and each plant department be audited once per two years. Besides it, the Quality Assurance Division conducts external audits of organizations supplying goods, work and services to the INPP. There are work procedures specifying requirements for planning, preparation, conduct and reporting on internal and external audits. Audit reports are distributed to respective INPP top managers and to the managers of audited departments and to VATESI.

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

INPP General Director exercises continuous control over quality assurance related activities. Quality assurance issues are discussed at regular meetings chaired by General Director. Annual reports on improvement of the INPP Quality Assurance System are submitted to VATESI.

13.4. Regulatory control activities

In accordance with the General Regulations for Nuclear Power Plant Safety, VD-B-001-0-97, the safety of NPP must be ensured by the implementation of system of technical and organizational measures, which includes also the implementation of quality assurance system at NPP.

The General Requirements for Quality Assurance at Nuclear Power Plant and other nuclear facilities, VD-KS-02-99, were issued by VATESI on the basis of the Law on Nuclear Energy of the Republic of Lithuania. The Regulations VD-KS-02-99 establishes regulatory requirements to the organization operating nuclear power facilities with respect to their obligations to develop implement and maintain the efficient QA system. The requirements are of general type and concern all types of activities, which have direct and indirect influence to the safety of nuclear power facility. The requirements are obligatory for organizations, carrying out transportation, treatment and storage of nuclear and radioactive materials and as well shall be considered by the organizations, which activities can influence the safety of nuclear facility. According to VATESI requirements, the INPP Quality Assurance System shall comply also with IAEA Safety Series QA 50-C/SG code and guides.

In accordance with national regulations, VATESI carry out regulatory inspections of Ignalina NPP, which cover also an assessment of INPP quality management system. In July of 2003 VATESI carried out special inspection of INPP quality system. Inspection was conducted with participation of western nuclear safety experts from Sweden and France. 10 inadequacies were determined and 2 good practices were highlighted in the inspection report. The determined inadequacies were related mainly with the quality management of activities connected to the decommissioning process.

As a result of the mentioned inspection, INPP performed corresponding corrective measures to eliminate the determined inadequacies, including review of the Quality Assurance Manual, review of corresponding and preparation of additional management procedures.

13.4.1. VATESI quality management system

The official decision to establish VATESI quality management system was made on 5 October 2000 (order No. 21 of Head of VATESI). The general principles of quality management system were defined; plans for preparation of individual documents were approved.

The implementation of VATESI quality management system is aimed at:

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

The following VATESI quality management documents were prepared and approved:

- VATESI Mission;
- VATESI Quality Manual (KU-I-01);
- Regulations for strategic planning of VATESI activities (KU-II-02);
- Regulations for preparation of nuclear safety regulatory documents (KU-II-03);
- Regulations for the training of VATESI staff (KU-II-04);
- Regulations for public information (KU-II-05);
- Procedure of VATESI inspection activities (KU-II-06);
- Licensing procedure (KU-II-07);
- Rules of financial control (KU-II-08);
- EU support project management procedure (KU-II-09);
- Instructions for drawing of nuclear safety regulations (KU-III-01);
- Instructions for registering inspections and monitoring corrective measures (KU-III-02).

VATESI QMS is to be further enhanced through preparing new and improving the already approved quality management documents. In addition to the already approved documents, quality management documents describing inspection activities, the Regulations for VATESI internal administration and distribution of functions, the Safety assessment procedure and the Procedure for enforcement measures were being developed. The said documents are to be approved in 2004 and 2005.

VATESI QM documents are reviewed in accordance with existing necessity. Responsible specialist for the timely review of the document is indicated on the first page of it. VATESI Quality Manual (KU-I-01) describes principles for management of internal QM documents. It is determined that further development of quality management system is performed in accordance with defined internal VATESI needs and recommendations received from external institutions, organizations, enterprises or individual experts.

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. Licensing process and Safety Analysis Reports for different stages of a Nuclear Installation project (e.g. sitting, design, construction, operation)

14.1.1. Licensing Process

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

Administrative

- ”Application letter” in which the Operator presents to VATESI the request to be licensed
- Certificate of NPP state registration;
- 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 (Safety validation)

- Technical Safety Justification of Nuclear Plant (TOB AS) and of the Reactor Unit (TOB RU) with updating Justification of the plant safety status;
- The Safety Analysis Report (SAR);
- Probabilistic Safety Assessment Report (PSA);
- 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 and environmental impact;
- 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;
- Physical security provisions.

14.1.2. Safety analysis reports for different stages of a Nuclear Installation project

It is stated in the Law on Nuclear Energy (Articles 25 and 26) that it is prohibited to design, construct, reconstruct, operate and decommission nuclear facilities, installations and equipment 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.

These statements are further specified and developed in the "Regulations for Licensing of Nuclear Power Related Activities", "Regulations for Procedures for Issuing a License for Unit Operation at Ignalina Nuclear Power Plant", "General Regulations for Nuclear Power Plant Safety", "Nuclear Safety Regulations for Reactor Installations of Nuclear Power Plants" and in the other norms and standards.

For example, in accordance with point 1.2.18 of the "General Regulations for Nuclear Power Plant Safety" every nuclear plant design must include a special document called a "technical justification of nuclear plant safety", which has to be based on highest scientific and technical knowledge. Technical justification has to pass an independent review and to be approved by the Operating Organization before its submission to VATESI.

The "Nuclear Safety Regulations for Reactor Installations of Nuclear Power Plants" in their turn say that the "Technical Justification of Nuclear Power Plant Safety" should contain the chapter „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 to the current normative technical document. The indicated regulations also set a number of specific requirements to the content of safety justification (safety analysis) reports.

"Guidelines for Production of Safety Analysis Report for Ignalina NPP Unit 2" was prepared and agreed on with VATESI in January 2001. It stated the content of SAR, which had to be prepared in the frame of Unit 2 licensing process. In comparison to SAR-1 content of SAR-2 is expanded and generally corresponds to the content directed by US NRC Regulatory Guide 1.70.

Overview of the safety assessments performed for INPP and the major results of those assessments are presented in section 6.3 of this report.

14.2. Summary of essential generic results of continued monitoring and periodic Safety Assessments of INPP using deterministic and Probabilistic Analyses

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 on NSC. A wide range of additional safety analyses, including preparation of SAR-2, was performed in the frames of Safety Improvement Program No.2 implementation. These analyses are described in section 6.3 of this report.

Both Level 1 and 2 PSA studies were completed for INPP. The main results are presented in section 6.3 of this report. Principal result of the analyses performed was preparation of a list of safety improvement measures, timely implementation of which allows further safe operation of the plant.

14.3. In-service inspection of main components

Lithuanian Nuclear Power Safety Inspectorate VATESI performs the supervision of ISI program at INPP in accordance with legislative basis provided by the Law on Nuclear Energy and in compliance with General Requirements for Nuclear Power Plant Safety (VD-B-001-0-97) issued by VATESI in 1997.

In-service inspection is carried out 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 [50-SG-02, 50-P-2]. 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.

Much importance is attached 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. These detail the objectives, activities, methods, quantity, frequency, and the organisational and administrative arrangements. The manager of the INPP Safety and Quality Assurance Service is responsible for this.

Non-destructive testing is carried out by the INPP Department of Metals and Technical Inspection and, if necessary, by certified organisations, with the permission of VATESI. 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 for each Unit, 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's performing non-destructive testing is certified according to the European Standard EN473. Personnel supervising the inspections are also certified.

14.4. Regulatory control activities

As it was already mentioned above, Lithuanian nuclear power safety inspectorate (VATESI) in accordance with the national regulations for the verification of the safety of nuclear installations is performing combined day to day and year to year surveillance and systematic safety reassessment reviews through the inspection program with consideration of cumulative effects of modifications, changes to procedures, the aging of components, operating experience and technological developments 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 for ensuring that regulatory objectives and requirements are met, all activities at the plant have been executed safely and meet the safety objectives and licence conditions.

Regulatory control covers such activities:

- Application of quality assurance principles at all stages;
- Assessment of the safety of the design (particularly design modifications)
- Review of tests;
- Continuing monitoring and inspection of the installation during operation, including environmental monitoring;
- Assessment of the need for and control of modifications.

Regulatory supervision of ISI at INPP includes:

- Review and approval of Standard ISI program 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 materials investigations of INPP components and pipelines;
- Review and consideration of safety justifications in case of deviations from ISI acceptance.

Also, maintenance of safety-related systems and equipment in good operating condition through the implementation of preventive maintenance measures and replacement of worn-out components of nuclear power plants is required by [VD-B-001-0-97].

As stated in the [VD-E-01-98], maintenance is a complex activity of planned and systematically executed measures, with the purpose of ensuring the reliable functioning of systems (elements) consistent with the design assumptions, in particular those of safety. The maintenance activity includes routine service, overhaul, planned maintenance, breakdown maintenance, and replacement of obsolete components, plant modifications and the proving of plant by tests, calibration and inspections. The basic tasks of maintenance are thus:

- prevention of damage to, and failure of, NPP systems (components) by means of condition monitoring and preventive maintenance;
- replacement of worn systems (components) prior to their failure;
- restoration of the function of systems (components) in the event of failure and/or damage during operation;
- improvements to systems (components) by means of modifications;
- reduction of dose levels to ones that are As Low As Reasonably Achievable (ALARA principle).

The management of the maintenance activity is carried out in accordance with the “Maintenance and repair” procedure [QA-2-010]. This document is consistent with the requirements of QA, [VD-

E-01-98] and takes into account the Guidelines of the IAEA [50-SG-Q]. The procedure covers the following aspects:

- general principles;
- planning;
- standards, repair procedures and other documentation;
- personnel training;
- means of provision;
- stored backlog;
- permission to carry out the work;
- protection and safety of work;
- criteria of quality;
- preparation of work and its control;
- isolation of equipment and control of its acceptance for repair;
- control of the execution of repair work;
- acceptance after repair;
- quality control of the repair work, meeting the production plans;
- inspections and tests;
- documents;
- self-estimation of maintenance activities;
- elimination of discrepancies;
- responsibilities and powers.

Maintenance is organised on the principles of precaution, specialisation, control and co-ordination. The plant maintenance service has the following resources:

- specialised workshops that carry out the maintenance and repair of equipment and structures in accordance with their function (e.g. reactor workshop, electrical workshops, etc.);
- workshops carrying out special kinds of work (e.g. a workshop for centralised repair, decontamination workshop, etc.);
- functional departments (departments for the planning and preparation of repairs, and a design department).

Workshop maintenance services have specialised workplaces arranged in accordance with the needs of the equipment being maintained. The INPP administration is responsible for the quality of work carried out by both INPP divisions and contractors. For co-ordination of the INPP divisions, procedures are reviewed annually. The permission of VATESI for restart units of INPP after annual outage is obligatory.

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. Summary of Laws, Regulations and Requirements Dealing with Radiation Protection as Applied to Nuclear Installations

Changes in the legislation dealing with radiation protection at the period of 2001-2004 are following:

- Law on Radiation Protection (No. VIII-1019, 1999, last amended 2004);
- Law on Nuclear Energy (No I-1613, 1996, last amended 2004);
- Law on the Management of Radioactive Waste (No. VIII-1190, 1999, last amended 2004);
- Law on Environmental Protection (No. I-2223, 1992, last amended 2004);
- Law on Environmental Monitoring (No. VIII-529, last amended 2003);
- Government Resolution No. 653 On Regulations of Licensing the Practices Involving Sources of Ionizing Radiation (1999, amended 2004);
- Lithuanian Hygiene Standard HN 87:2002 "Radiation Protection in Nuclear Facilities" (2002);
- Order of the Director of the Radiation Protection Centre No. 2 On Approval of the Application Form for the License for the Practices with Sources of Ionizing Radiation and on Approval of the License Forms (2004);
- Temporary rules of export, import, transit transportation and transportation within Lithuania of radioactive materials and wastes, Order of the Director of the Radiation Protection Centre No 15 dated 2004 04 30;
- Rules for licensing of activity with the ionising exposure sources, Decree of the Government of the Lithuanian Republic No. 205 dated 2004 02 23;
- Hygiene Norms of the Lithuanian Republic HN 85: 2003. Natural exposure, Radiation protection norms, Order of Minister of Health of the Lithuanian Republic No. V-749 dated 2003 12 22;
- Requirements on low and mean activity short-lived waste disposal, P-2002-02, Order of Head of Lithuanian State Nuclear Power Safety Inspectorate No 45 dated 2002 10 28;
- Strategy of radioactive waste handling, Decree of the Government of the Lithuanian Republic No 174 dated 2002 02 06;
- Requirements to extra low activity radioactive waste disposal, P-2003-02, Order of Head of Lithuanian State Nuclear Power Safety Inspectorate No 22.3 dated 2002 09 18.

The Regulation on Providing of General Data Concerning Plans for the Disposal of Radioactive Waste to the Commission of the European Communities was adopted by the Government Resolution No. 1872 on 6 December 2002. The requirements of the Regulation are in compliance with the Article 37 of the Euratom Treaty and Commission Recommendation 1999/829/Euratom of 6 December 1999 on the application of Article 37 of the Euratom Treaty.

The Government Resolution sets out the requirements that implementation of any plans related to the disposal of radioactive waste in the territory of Lithuania can be started and a licence for such activities can be issued by competent authorities when the general data on such plans have been submitted to the Commission and Commission's opinion has been given, or in case if no Commission's opinion has been given over six months since the data have been submitted. The procedure on preparation of general data concerning plans for the disposal of radioactive waste

when implementation of such plans can cause radioactive contamination of water, soil or airspace of another EU state and submission to the Commission was established.
The requirements of the Regulation are applied to the following activities:

- The operation of nuclear reactors;
- The reprocessing of irradiated nuclear fuel;
- The mining, milling and conversion of uranium and thorium;
- U-235 enrichment of uranium;
- The fabrication of nuclear fuel;
- The storage of irradiated nuclear fuel in dedicated facilities;
- The handling and processing of radioactive substances on an industrial scale;
- The processing or storage of radioactive waste arising from operations listed above and from the dismantling of nuclear reactors and reprocessing plants;
- The dismantling of nuclear reactors and reprocessing plants;
- The emplacement above or under the ground of radioactive waste without the intention of retrieval ;
- The sea dumping of radioactive waste;
- The sub-seabed burial of radioactive wastes;
- Work activities involving natural radiation sources, if the licenses are required for the activities.

The enterprise intending to start an appropriate activity shall prepare and submit the general data inventory to the competent authorities (Ministry of Environment, State Nuclear Safety Inspectorate, Radiation Protection Center, and Civil Protection Department) for the approval. The data inventory and the conclusions of the authorities have to be presented to the Ministry of Environment. Ministry of Environment is responsible for the submission of the general data inventory to the Commission and informing of the enterprise and mentioned above authorities on the Commission opinion. Additionally Ministry of Environment submits the annual data on the radioactive liquid and atmospheric waste discharges to the environment as well as informs the Commission about radioactive discharges permissions and licenses for disposal of radioactive waste issued during last year.

15.2. Implementation of National Laws, Regulations and Requirements relating to Radiation Protection

15.2.1. Dose limits

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 ,,Radiation Protection in Nuclear Facilities" (2002). It was approved by the Order of the Minister of Health and came into force on 17 December 2002. The Hygiene Standard shall be applied for all legal persons conducting their activities at the nuclear facilities. 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.

The requirements of HN 87:2002 and other legal documents establishing radiation protection requirements shall be included in the radiation protection instructions of any nuclear facilities including nuclear power plant.

As regards the limitation of public exposure that might cause the nuclear facilities operation and decommissioning, HN 87:2002 establishes the dose constraints for the members of public. The annual effective dose constraint for the members of public because of operation of NPP is 0.2 mSv. The annual dose constraint is a basis for calculation of maximum permitted activity levels of radionuclides released to atmosphere or discharged into the water.

Document HN 73-2001 defines the following limits for critical organs of the plant personnel and general public exposure doses caused by internal and external radiation sources.

Critical organs group	***Critical organs***	**Dose limit**	
		Personnel	**General public**
		MSv/year	**MSv/year**
I	The whole body, gonads, red marrow	50*	5**
II	Muscles, thyroid, liver, lungs, digestive tract, eye lenses and others (with exception of those belonging to group I and III)	150	15
III	Skin, bone tissue, hands, fore arms, legs and feet	500	50

- * Annual effective dose 50 mSv is permissible provided that an average dose does not exceed 100 mSv for 5 years in succession;
- ** Annual effective dose in special cases is 5 mSv provided that an average dose does not exceed 1 mSv for 5 years in succession;

According to the "Basic Standards of Radiation Protection" HN 73-2001 the value of 100 mSv per a five-year period is adopted as a limit effective dose for INPP personnel and outside workers. Annual limit effective dose cannot exceed 50 mSv/year provided that an average annual dose should not exceed 20mSv/year for any 5 years.

This requirement is met for INPP personnel and there are no recorded cases of a dose 100 mSv/year exceeding for any 5 years. The number of INPP workers with individual exposure dose higher than 20 mSv was not recorded in 2001. There were 40 people in 2002 and 3 people in 2003. At the same time an average dose does not exceed 20 mSv/year for the last 5 years. The maximum annual individual dose for outside workers has not exceeded 20 mSv since 2000.

15.2.2 Fulfillment of conditions for the release of radioactive materials

Taking into consideration the fact that the major impact to population exposure can be provided by INPP gas-aerosol release the Tables 1, 2, 3 present the data on INPP gas-aerosol release for the period starting from 2001 for each Unit, the whole plant; total release for a year, average daily and percentage from allowable release (AR).

Inert radioactive gases (IRG)

Table 1

Year	1 Unit			2 Unit			Plant		
	Bq/year	Bq/day	% from AR	Bq/year	Bq/day	% from AR	Bq/ year	Bq/day	% from AR
2001	$3{,}97\cdot10^{13}$	$1{,}09\cdot10^{11}$	0,47	$5{,}674\cdot10^{13}$	$1{,}554\cdot10^{11}$	0,64	$9{,}640\cdot10^{13}$	$2{,}642\cdot10^{11}$	0,57
2002	$2{,}603\cdot10^{13}$	$7{,}141\cdot10^{10}$	0,31	$7{,}476\cdot10^{13}$	$2{,}05\cdot10^{11}$	0,89	$1{,}008\cdot10^{14}$	$2{,}76\cdot10^{11}$	0,60
2003	$2{,}225\cdot10^{13}$	$6{,}105\cdot10^{10}$	0,26	$4{,}494\cdot10^{13}$	$1{,}221\cdot10^{11}$	0,53	$6{,}718\cdot10^{13}$	$1{,}850\cdot10^{11}$	0,40
6 months of 2004	$1{,}238\cdot10^{13}$	$6{,}66\cdot10^{10}$	0,29	$1{,}964\cdot10^{13}$	$1{,}073\cdot10^{10}$	0,47	$3{,}238\cdot10^{13}$	$1{,}776\cdot10^{11}$	0,38

Activity of inert gas release was basically determined by the following isotopes (% from total release per 2003):

Xenon-133 - 40,82%; Krypton -85м - 2,82%; Krypton -88 - 0,85%; Krypton -87 - 0,34%; Xenon -133м - 0,18%; Argon -41- 47,91%; Xenon -135 - 6,99%.

Particulate Pollutant (PP)

Table 2

Year	1 Unit			2 Unit			Plant		
	Bq/year	Bq/day	% from AR	Bq/year	Bq/day	% from AR	Bq/ year	Bq/day	% from AR
2001	$5{,}905\cdot10^{8}$	$1{,}617\cdot10^{6}$	0,23	$7{,}287\cdot10^{8}$	$1{,}998\cdot10^{6}$	0,29	$1{,}335\cdot10^{9}$	$3{,}663\cdot10^{6}$	0,26
2002	$4{,}117\cdot10^{8}$	$1{,}147\cdot10^{6}$	0,16	$4{,}723\cdot10^{8}$	$1{,}295\cdot10^{5}$	0,19	$9{,}077\cdot10^{8}$	$2{,}479\cdot10^{6}$	0,18
2003	$4{,}874\cdot10^{8}$	$1{,}132\cdot10^{6}$	0,19	$3{,}227\cdot10^{8}$	$8{,}88\cdot10^{5}$	0,13	$8{,}304\cdot10^{8}$	$2{,}257\cdot10^{6}$	0,16
6 months 2004	$2{,}466\cdot10^{8}$	$1{,}369\cdot10^{6}$	0,2	$1{,}447\cdot10^{8}$	$8{,}14\cdot10^{5}$	0,12	$4{,}074\cdot10^{8}$	$4{,}257\cdot10^{6}$	0,16

Activity of Particulate Pollutant release was basically determined by the following nuclide (% from total release):

Cobalt-60 - 28,14%; Niobium-95 - 5,71%; Caesium-137 - 11,52%; Zirconium-95 - 1,5%; Manganese -54 - 17,85%; Strontium-90 - 5,65%; Iodine-131(aerosol) - 0,17%; Strontium -89 - 7,31%; Cobalt -58 - 1,39%; Caesium -134 - 1,83%; Iron-59 - 3,96%; Natrium-24 – 6,58%; Iodine-133 – 4,25%; Chrmium-51 – 2,36%; Zinc-65 – 0,23%; Caesium-136 - 0,006%.

Iodine-131

Table 3

Year	1 Unit			2 Unit			Building 150			Plant		
	Bq/ year	Bq/ day	% from AR	Bq/ year	Bq/ day	% from AR	Bq/ year	Bq/ day	% from AR	Bq/ year	Bq/ day	% from AR
2001	5,647 $*10^8$	1,547 $*10^6$	0,34	7,633 $*10^8$	2,091 $*10^6$	0,45	6,223 $*10^8$	1,705 $*10^6$	0,18	1,95* 10^9	5,328 $*10^6$	0,58
2002	6,331 $*10^8$	1,739 $*10^6$	0,38	1,703 $*10^9$	4,667 $*10^6$	1,01	1,576 $*10^8$	4,318 $*10^6$	0,047	2,493 $*10^9$	6,845 $*10^6$	0,74
2003	2,091 $*10^8$	5,735 $*10^5$	0,12	8,425 $*10^8$	2,294 $*10^6$	0,5	3,717 $*10^8$	1,018 $*10^6$	0,11	1,423 $*10^9$	4,07* 10^6	0,42
6 mon. 2004	6,198 $*10^8$	3,404 $*10^6$	0,74	3,7* 10^8	2,035 $*10^6$	0,44	8,860 $*10^9$	4,866 $*10^7$	5,3	9,846 $*10^9$	5,55* 10^7	5,85

The shown data on radioactive release to atmosphere includes release from all INPP buildings and constructions.

Allowable release of radioactive substance to atmosphere at INPP amounts to:

IRG	Particulate Pollutant	Iodine-131
Bq/day	Bq/day	Bq/day
$4{,}625 \cdot 10^{13}$	$1{,}39 \cdot 10^9$	$9{,}25 \cdot 10^8$

According to the normative document LAND 42-2001 “Restriction of Radio Nuclides Release into Environment from the Objects of Nuclear Energy and the Release Approval Procedure as well as the Order Radiological Monitoring” a restricted exposure dose for critical group of population caused by gas-aerosol release shall not exceed 0,1 mSv/year. A real exposure dose for critical group of population caused by gas-aerosol release was $6{,}501 \cdot 10^{-8}$ Sv in 2003 that was 1538 times less permissible.

Activity of inert radioactive gases coming to the inlet of gas decay tank is an important indicator of core condition. Table 4 presents data on IRG release to decay tank for the period starting from 2001.

Table 4

Year	1 Unit	2 Unit	Plant
	Bq/year	Bq/year	Bq/year
2001	$1{,}913 \cdot 10^{15}$	$5{,}635 \cdot 10^{15}$	$7{,}548 \cdot 10^{15}$
2002	$2{,}168 \cdot 10^{15}$	$1{,}261 \cdot 10^{16}$	$1{,}478 \cdot 10^{16}$
2003	$1{,}991 \cdot 10^{15}$	$4{,}526 \cdot 10^{15}$	$6{,}517 \cdot 10^{15}$
6 months 2004	$1{,}3 \cdot 10^{15}$	$2{,}231 \cdot 10^{14}$	$3{,}531 \cdot 10^{15}$

In order to reduce the gas-aerosol release to atmosphere the following measures were implemented in 2003:

- During the plant preventive maintenance leak-tight control and rectification of defects identified were performed in buildings 135/1, 2;
- Inspection of filtering cell boxes, check valves was performed to reduce the release of long-lived nuclides to atmosphere;
- Filters are regularly replaced in the filtering cells or their leak-tightness properties are improved in case the deterioration of their filtering function is identified on the basis of measurement results performed by the Radiation Protection Department;
- Works on gas release temperature and humidity reduction were performed.

Total release of radio-nuclides with water discharge to the lake Druksiai amounts to:

- 2001-$1{,}40 \cdot 10^{9}$ Bq/year;
- 2002-$1{,}19 \cdot 10^{9}$ Bq/year;
- 2003-$0{,}39 \cdot 10^{9}$ Bq/year.

While extreme permissible release is $3{,}358 \cdot 10^{13}$ Bq/year.

The main nuclides determining the release activity within the period of 2001 – 2003 were as follows: Cs-137 ~ 70%, Co-60 ~ 15%, Nb-95 ~ 4%. The lake Druksiai water is polluted with globally-spread in ecosystem radio nuclides ^{90}Sr and ^{3}H. Against the background of the contamination it is not possible to determine the inflow of the nuclides with service water because their concentration in water of both intake and outlet channels is practically equal and amounts to the device detection limits - 0,007 Bq/l for ^{90}Sr and 3 Bq/l for ^{3}H.

According to the normative document LAND 42-2001 “Restriction of Radio Nuclides Release into Environment from the Nuclear Energy Objects and the Release Approval Procedure as well as Radiation Monitoring Order” a restricted exposure dose for critical group of population caused by water release shall not exceed 0,1 mSv/year. A real exposure dose for critical group of population caused by water release was $9{,}303 \cdot 10^{-7}$ Sv in 2003 that was 93 times less permissible.

15.2.3 Steps taken to ensure that radiation exposures are kept as low as reasonably achievable

Implementation of the ALARA Program at the Ignalina NPP was started in 1996. The aim of the ALARA Program at INPP for 2004 and subsequent years 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 following principles are considered to be the basis of the ALARA Program:

- Any exposure can 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.

The ALARA Program has the following basic directions at the Ignalina NPP:

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

The ALARA foundations are applied and adapted in all operation stages related to radiation. Application of new principles of activity organisation, performance of scaled works on equipment upgrading permitted to reduce the INPP personnel and outside workers collective dose from 10,7mSv (in 2000) to 8,53 mSv (in 2003). The main works, which contributed to the highest collective doses during the last three years, were:

- In the reactor vessel: maintenance, repairs, control of the reactor fuel channels; installation of the system of the additional emergency reactor protection;
- Main circulation circuit: inspection of the primary system pipes d=300mm, d=800 mm, of drum separators, repairing of the primary system pipes;
- Repairing of the reactor equipment and refueling;
- Insulation works;
- Installation of the temporary shielding;
- Rooms decontamination;
- Other general works.

Under normal operation the collective dose is 12-20% and during maintenance it is 80-88% of annual personnel exposure collective dose.

15.2.4. Environmental radiological surveillance

The individual doses of the personnel, involved in the works in controlled area of the Ignalina NPP, are monitored by ,,ALNOR" thermo luminescent dosimeter (TLD) system with frequency once a month. This frequency should increase should the individual exposure exceed 2 mSv. Also individual dosimeters ALBEDO with LiF-7, LiF-6 tablets inside are used for neutron exposure control. The operational (every shift) control is carried out by means of electronic dosimeters RAD, which are given in addition to TLD, ALNOR" during implementation of works in high radiation fields. The results of the operational dose measurements are registered in the database every day and analyzed by health physicists.

The TLD-MAGIC computer code is used for dose registration and analysis. The data of occupational exposures can be presented in different dose report forms, which allow to make analysis and evaluate the data and to plan the dose budget both during the maintenance period and normal operation. It also allows getting information for separate department, type of personnel, professions or one single worker.

The automated system AKRB-06 for control of assurance of radiation protection of workers and environment is in operation. 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. Portable equipment enabling to detect alpha, beta, gamma and neutron radiation is also available.

System is equipped by sound and visible alarm signalization in case of measured control values exceed the pre-established levels. Information with signaling or alarming devices is automatically presented to the radiation situation supervision desk by the system of radiation control. The system is operated in accordance with "Instruction on operation of radiological monitoring system AKRB-06 "Gorbach-1", ПТОэд-0512-11, according to amounts and frequency of monitoring.
Modernization of the system AKRB-06 began in 2003. All modifications shall be agreed with the Radiation Protection Centre. In order to keep the personnel doses within established limits, the planned daily, monthly and annual exposures associated to specific tasks are established. The whole body counter (ACCUSCAN) is used in case, when it is the risk of internal contamination. The

control level of internal contamination is 4% of Permitted Value of Activity (PVA). The results of internal contamination measurements are given in the table below.

The personal dosimeters are replaced and measured at least once a month. In the period of the plant preventive maintenance an extraordinary exposure dose monitoring is conducted (basing on the results of shift-time measurements with electronic dosimeters RAD), if the total individual dose exceeds 2mSv.

The results of individual monitoring of the INPP personnel and outside workers for 2001-2004 are shown in the Tables below.

15.2.4.1. Exposure and collective dose dynamics of the INPP workers 2001 – 2004

Year	Number of workers	Average/highest exposure dose mSv	Collective dose ManSv
2001	3187	1.6/19.3	5.1
2002	3121	2.35/24.62	7.33
2003	2957	2.251/20.52	6.66
For 6 months 2004	2898	0.56/13.24	1.614

15.2.4.2. Exposure and collective dose dynamics of the outside workers 2001 – 2004

Year	Number of workers	Average/highest Exposure dose mSv	Collective dose ManSv
2001	1188	0.99/18.41	1.18
2002	1342	1.1/19.15	1.1478
2003	1501	1.25/19.17	1.879
For 6 months 2004	1319	0.62/17.94	0.815

The Radiation Protection Department of the Ignalina NPP, which is in direct subordination to The Technical Director, carries out an internal control of radiation protection and safety. The Department is responsible for the organization, control and implementation of the requirements ensuring the radiation protection and safety. The tasks, duties, coordination of the activities between the subdivisions of the department are laid down in “The Standing Orders of the Department”.

According to the laws of the Lithuanian Republic, requirements of the rules and standards of industrial and radiation safety, environment protection and Quality Assurance Program, the Radiation Protection Department is made responsible for the following functions:

- Organisation of works on radiation safety assurance and personnel exposure reduction;
- Carrying out of dosimetric monitoring in the protected and monitored areas;
- Individual dosimetric monitoring of personnel exposure;
- Monitoring of INPP radioactive substance emissions and discharging into environment;
- Control of emission and discharging permissible quota observance;
- Carrying out of environment objects radiation and chemical monitoring;
- Performance of meteorological watches;
- Control of norm observance specifying radio nuclide and hazardous chemical substance content in environmental objects;

- Assessment of impact to environment and assessment of a population critical group exposure dose;
- Control of plant subdivisions to fulfil the requirements of normative documents in the field of environmental protection;
- Providing of continuous work of radiation safety control (RSC) and ecological monitoring equipment by means of timely and qualitative repair works;
- Upgrading and modernization of radiation safety control devices and equipment;
- Supervising and installation of new systems of radiation safety control and ecological monitoring;
- Organisation of assembling works and production of optional equipment and auxiliaries.
- Organisation of repair work by contractors;
- Conformance inspection of plant means of labour, working places, man-to-man defence means, production areas and accommodation spaces, buildings and labour management to industrial safety normative standards;
- Participation in trial boards on equipment, working places, production divisions, production areas and accommodation spaces acceptance into operation;
- Conducting of entrance training for persons, who are given an employment;
- Carrying out hygienic inspections of working places with the help of laboratory instrumental samples and ergonomic investigations for conformance reveal of working places to sanitation standards and measurement development in case of infringement.

To evaluate INPP impact to environment and population permanent radiation monitoring is carried out on the Ignalina NPP site and within a radius of 30 km. Radio nuclide concentration measurements in foodstuffs, drinking water and soil have been conducting since the moment the Ignalina NPP had been put into operation. The investigation data show that the Caesium and Strontium radio nuclide 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.

^{137}Cs radio nuclide concentration in fish and soil in the Ignalina NPP region in 2001

Name of sample	Average values of the Ignalina NPP region (Bqkg)
Fish	1,78
Soil	4,89

^{137}Cs radio nuclide concentration in fish and soil in the Ignalina NPP region in 2002

Name of sample	Average values of the Ignalina NPP region (Bqkg)
Fish	1,72
Soil	7,02

^{137}Cs radio nuclide concentration in fish and soil in the Ignalina NPP region in 2003

Name of sample	Average values of the Ignalina NPP region (Bqkg)
Fish	1,69
Soil	3,70

^{137}Cs radio nuclide concentration in fish and soil in the Ignalina NPP region in 2004*

Name of sample	Average values of the Ignalina NPP region (Bqkg)
Fish	1,46
Soil	4,95

* Data on 2004 06 30

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 Ignalina NPP 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 Ignalina NPP. The monitor readings permanently can by made available to the authority. In order to control the influence of the Ignalina NPP 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.

15.3. Regulatory control activities

According to the Law on Radiation Protection, the regulatory body co-ordinating 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 Radiation Protection Centre. Among other responsibilities of the Radiation Protection Centre is responsible for the radiation protection of workers and the general public from negative impact, which may cause the ionizing radiation.

State Nuclear Power Safety Inspectorate (VATESI), implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy, is performing surveillance over compliance with radiation protection regulations, standards and procedures during operation and maintenance. Ministry of Environment organizes and co-ordinates state radio ecological monitoring within the monitoring area of a nuclear facility and controls radiological monitoring within the sanitary protection area of the facility.

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 General description of laws, regulations and 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 citizens, 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 Governmental resolution No.343 of March 26, 2004, regarding approval of Provisional Regulations of the Civil Protection Department under the Ministry of Interior of the Republic of Lithuania provides tasks and functions of the Department in the field of civil protection, rights and work arrangements in the Department.

Resolution No.727 of the Government of the Republic of Lithuania of July 17, 1992 obliges the Civil Protection Department notify the residents about the emergency situations through Lithuanian radio and television broadcasting. The Government of the Republic of Lithuania in the year 2002 adopted the Regulations on public information in the case of nuclear or radiological emergency in fool compliance with the EU Directive 89/618/Euratom.

The General Requirements for the Emergency Plan of Nuclear Power Facilities were approved on 31 December 2003, by the order of the Head of State Nuclear Power Safety Inspectorate. The General Requirements for the Emergency Plan of Nuclear Power Facilities identify the principal requirements for the emergency preparedness plan of nuclear power facilities.

Emergency Response Plan of Municipality of Visaginas Town of Utena County, Resolution No.ĮV-189, approved by Head of Administration of Municipality of Visaginas Town, dated June 09, 2003;

Fire-Rescue Service Plan for protection of Town Visaginas and INPP on centralization of forces and resources for Emergency Situations Elimination at Ignalina Nuclear Power Plant and Visaginas Town, approved by the Head of Fire Protection Rescue department, dated March 28, 2003, Resolution Nr. 52.

A new Emergency Preparedness Plan of the Ignalina NPP was agreed upon and approved in 2002.

16.2 Implementation of emergency preparedness measures

16.2.1. Classification of emergency situations

A radiological accident is an infringement of planned operation due to the equipment damage, erroneous behaviour of the Plant's personnel, and transgression from the technological processes, natural disasters or other causes, during which an unforeseen irradiation of the personnel and inhabitants beyond the normal operation limit may occur.

In accordance with the requirements of the main documents on radiation protection and safety of the International Atomic Energy Agency (IAEA) and the legislation of the EU, levels of emergency interventions at Ignalina NPP are determined, during which mitigation measures of the plants operational disorders are taken and which are enabled while there are no technical or radiological indications of the accident, but its occurrence is forecasted.

Emergencies are classified into: alert, local accident and general accident.

Alert means an operational disorder of an NPP, during which the radiological danger for the personnel and population occurs. In such a case, the personnel and relevant institutions outside the sanitary protection zone are prepared to carry out radiation protection measures; an additional analysis of the occurrence is carried out.

Local accident occurs when the quantities of radionuclides and ionising radiation exceeding the normal operational limit values are released into the sanitary protection zone without spreading beyond its boundaries. Personnel exposure and contamination of facilities and buildings are possible. To localise and liquidate the accident, measures of the emergency preparedness plan are taken. Special-purpose units and technical equipment are concentrated; the personnel not involved in liquidation operations is evacuated, the first aid is provided to the victims, individual protective means are used, the work of emergency services and their commanders is arranged in shifts observing the specified normal operational limits of exposure level set down in Standards of Radiation Protections of the Republic of Lithuania HN 73-1997 "Basic Standards of Radiation Protections".

General nuclear power plant accident is an infringement of plant operation in which off-site release of radioactive materials outside of sanitary protection zone exceeds the specified normal operation limits. In this case not only the personnel but the population as well is exposed to the threat of radiation. Urgent safety and protection actions have to be taken. Emergency response actions are carried out according to the Ignalina NPP Emergency Response Plan and the National Emergency Response Plan in the Event of an Accident at Ignalina NPP.

16.2.2. Overall national emergency preparedness scheme

Civil emergency preparedness is one of the main state functions that includes the preparation of all governmental institutions, local authorities executive institutions, all economy entities and population for crisis situations and operational activities during them, utilisation of all state resources to provide its vitality, inhabitants survival, to protect property and environment from the consequences of the extreme situation, when inhabitants take active participation in these activities.

Civil emergency preparedness is the whole complex of activities and means of state executive bodies and Special Forces, it is a prior trend of the governmental activity, providing organised, directed and expedient utilisation of forces and resources, implementing effective liquidation of disaster consequences and solving war time problems.

Territory and publicity principles are the main principles according to which activities of civil protection and rescue institutions are organised. Civil protection is organised in the whole state territory according to its administrative division and covers all the population of the country and the foreigners who are in the territory of the Republic of Lithuania. All activities of governmental institutions connected with assuring safety of population are open for the society and its information means.

Three level organisational systems for civil protection and emergency preparedness have been established. According to the level these institutions are responsible for civil protection and preparedness:

- At the state level – the Civil Protection Department, the Emergency Management Centre, the Fire Protection and Rescue Department, supporting services of the ministries and other state institutions;
- At the regional level - the Regional Administration, the Regional Emergency Management Centre, other territorial warning, information and evacuation as well as supporting services;
- At the municipality (local) level - the executive institutions of local authorities, the Local Emergency Management Centre, fire and rescue services, warning, information and evacuation services as well as industrial brigades.

The Civil protection and rescue system comprises of:

- The Civil Protection Department;
- The Emergency Management Centres;
- The warning, information and evacuation, fire, search and rescue, other supporting services of the ministries, state and local authority institutions.

The Emergency Commission in case of emergency in the Ignalina NPP takes a leading role in rescue actions for the elimination of harmful consequences and accumulate available national forces and material resources, organise the concentration and co-ordination of assistance needed for all rescue and remedy actions.

The Civil Protection Department (CPD) in case of emergency in the Ignalina NPP becomes a part of the State Emergency Management Centre. It is appointed for co-ordination, planning and protection of population. CPD comprises of Central administration, Alarm and control service and Communication service. In addition to CPD there are 10 regional Civil Protection Departments at Regional administrations.

The Civil Protection Department shall implement the following objectives:

- To warn and inform the citizens of Lithuania and appropriate managing institutions about the state scope hazard to life, health, property and environment in case of emergencies.
- To plan and prepare measures for the state institutions, enterprises and citizens to be transferred from the regular work and living conditions into emergencies (or war) at the least possible damage, as well as to keep order, protect human life, health, and property;
- To prepare measures for the maximum implementation of the state resources to preserve and sustain economy of the county, localise emergency points and eliminate their consequences.
- To organise the preparedness of the authorities and society to emergencies.

To perform the tasks as prevention of population, to co-ordinate activities of ministries, state institutions and other supporting services in case of natural catastrophes or major technological accidents Department prepares Emergency response plans. These plans are designed to co-ordinate activities and response actions in emergencies. They give details of the technical and organisational procedures that are appropriate to reduce harmful effects on people, property and the environment in the event of an accident, as well as define the responsibilities and actions of all state institutions and departments in emergencies. The Plans also provides with details of possible means for evacuation, means of individual and collective protection, material and technical supply other civil preparedness means.

The Emergency Management Centres act as managing institutions of the civil protection and rescue system. The Emergency Management Centres have been established:

- Under the Government of the Republic of Lithuania;
- In the ministries;
- In the governmental institutions;
- In the regional administrations and local municipalities.

They perform preventive work from occurrence emergencies and technological disasters, prepare and analyse long-term projects of civil security strengthening, co-ordination and control activities in civil emergency preparedness. In case of emergency the Emergency Management Centres evaluate the situation, threats and danger to population, property and environment, according to their competence organise the search, rescue works and liquidation of consequences, co-ordinates the activity of all involved forces. In the case of a necessity in evaluation and investigation of the dangerous situation, as well as in advice how to eliminate consequences of accidents, Emergency Management Centres create the groups of specialists, consultants and experts appointed by the Higher education institutions, ministries and Governmental institutions.

State Emergency Management Centre organises the localisation of the state scope natural calamities, technological accidents or disasters, people and property rescue works, liquidation of consequences in case if regional and local authorities are not able to manage the situation.

The Emergency Management Centres of the ministries co-ordinate the activities of subjects attached to them, control the situation in large scale emergencies, organise specialised support in emergency and provides material supply to population, as well as help the state, regional and local Emergency Management Centres. Emergency Management Centres of the ministries also perform the supporting functions in emergencies appointed by the Government.

The Emergency Management Centres of the regions co-ordinate the search and rescue as well as localisation and liquidation of consequences of accidents in their municipalities. In case of necessity they provide support to local authorities.

The Emergency Management Centres of the local authorities guide and manage search and rescue works, localisation and liquidation of consequences in case of a local accident when the consequences of accident are spread over the territory limits of the object.

The Emergency Response Centre of State Nuclear Power Safety Inspectorate continuously collect the information, analyse and forecast the course of the accident, provide information to the Government and other institutions, consult Emergency Commission, inform the IAEA and neighbouring countries as required by 1986 Convention and bilateral agreements. In order to meet those functions, State Nuclear Power Safety Inspectorate is attaching great attention to strengthening of VATESI's Emergency Response Centre (ERC). ERC did a lot to implement requirements and recommendations of IAEA and EU. After Lithuania signed ECURIE agreement,

new requirements for the Competent Authority's links with ECURIE came into force. The IAEA procedure of arranging communication tests also changed. VATESI ERC, in effort to meet the set requirements, partially changed its duty system. Now the duty officer receives fax messages sent to the ERC without coming to the VATESI premises.

16.2.3. On-site and off-site emergency plans of nuclear installations, including supporting agencies and systems

16.2.3.1. Off-site emergency plan

In case of emergency residents of Lithuania will be protected in accordance with the National Emergency Response Plan in the Event of a Radiological Accident at the Ignalina Nuclear Power Plant, approved by the Minister of the National Defence of the Republic of Lithuania on April 11, 2000.

This plan was developed by the Civil Protection Department based on IAEA-TECDOC-953 "Method for the development of emergency response preparedness for nuclear or radiological accidents" and IAEA-TECDOC-955 "Generic assessment procedures for determining protective actions during a reactor accident", Lithuanian legislation and other regulations. Every year governmental authorities repeatedly approve this plan. This plan obliges ministries, governmental services and authorities, town and municipal authorities to take specific actions in case of accident. The plan provides means of protecting the population, their scope, terms, assignment of responsibilities and implementation procedure. The plan is needed for organisation and co-ordination of actions taken over by town and municipal authorities, ministries, governmental authorities and services for taking safety measures with regard to population and cattle, for arrangement of immediate response actions after the accident.

The immediate actions of civil protection in case of an accident include:

- Organisation of warning and communication;
- Management;
- Radiation protection;
- Evacuation;
- Medical aid;
- Protection of cattle and plants;
- Fire protection;
- Keeping the public order;
- Logistics;
- Civil protection forces.

In the co-ordination with the Civil Protection Department appropriate emergency response plans have been developed in all regional administration and municipalities.

For the accident types, emergency response takes place over two distinct areas: sanitary protection zone and the area beyond the sanitary protection zone. Sanitary protection zone (SPZ) means the area surrounding the facility, which is under the immediate control of Ignalina NPP. The area beyond the sanitary protection zone is divided into three zones: Precautionary action zone (PAZ), Urgent protective action planning zone (UPZ), and Longer-term protective action planning zone (LPZ).

Precautionary action zone (PAZ). Its goal is to substantially reduce the risk of deterministic health effects of ionising radiation before radionuclides emission into the environment.

Urgent protective action planning zone *(UPZ)* means a *predesignated* area around the facility where plan for urgent protective measures is made in advance.

Longer term protective action planning zone (LPZ) means a predesignated area around a facility farthest from the facility and including the urgent protective action planning zone. It is the area for the actions to reduce the long-term doses from deposition and ingestion should be developed in advance.

These zones should be roughly circular areas with Ignalina NPP in the centre. The size of the zones has been determined by an analysis of international practice.

The Size of Controlled Zones is as follows:

Name of the Zone	Sanitary protection zone	Precautionary action zone (PAZ)	Urgent protective action planning zone (UPZ)	Longer term protective action planning zone (LPZ)
Distance from Ignalina NPP	3 km	5 km	30 km	50 km

UPZ and LPZ are evenly divided into 16 sectors, with the starting point from the geographical co-ordinates of the first unit of Ignalina NPP. The angle of every sector is equal to 22,5 degrees. Each sector in its turn is further sub-divided into 6 segments: 3-5 km, 5-10 km, 10-15 km, 15-20 km, 20-30 km, 30-50 km from Ignalina NPP.

Presented in plan criteria of radiation protection for public are based on the recommendation of International Commission on Radiation Protection. Decisions on protection of population from radioactive irradiation in early and intermediate phases should be taken by comparing estimated doses with those of radiation effect criteria. Criteria for limiting consumption of contaminated food and drinking water are based on predicted doses, due to internal irradiation by radioactive nuclides.

The generic optimised intervention levels for urgent protective actions (sheltering, evacuation, iodine prophylaxis), generic optimised intervention levels for initiating and terminating temporary relocation and permanent resettlement, generic action levels for foodstuffs and drinking water are determined by the Hygiene Standard of the Republic of Lithuania HN 73-2001 “Basic Standards of Radiation Protection”. Operational intervention levels, administration of stabile iodine, clean-up procedures, foodstuffs, drinking water control, dosimetry of contaminated population are approved by Hygiene Standard HN 99:2000”Protective actions of public in case of radiological or nuclear accident”. Maximum permitted levels of radioactive contamination of foodstuffs and feedingstuffs following a nuclear or radiological emergency are approved by Hygiene Standard HN 84:1998. All the above mentioned Hygiene Standards meet the requirements of International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources (Safety Series No. 115), EC Council and Commission regulations, directives and decisions.

To determine the level of radioactive contamination in the locality and specify doses of irradiation the radiation surveillance should be carried out by the survey teams of Fire Protection and Rescue Department. The main tasks of radiation surveying are these: to determine the level of radioactive contamination in settlements and routes of evacuation, to take samples and to deliver them for testing.

In 30 km zone iodine preparations are handed to inhabitants, within 50km zone iodine preparations are stored in curative prophylactic institutions which are obliged when necessary to distribute preparations.

Evacuation of population should be performed by decision of Government. Proposals for evacuation are submitted by the State Emergency Management Centre on the basis of analysis of current situation and forecasts of potential event.

Decisions to carry out evacuation are accepted when predicted public irradiation levels exceed criteria of radiation protection of population. The roles and obligations of different institutions in case of an accident at Ignalina NPP are determined by numerous legislative deeds.

One of the main institutions is the Lithuanian Nuclear Power Safety Inspectorate (VATESI), which in case of an accident shall accumulate information on the situation at the Ignalina NPP, make analysis and advise the State Emergency Management Centre. VATESI also shall inform the Government of Lithuania and other relevant governmental institutions as well as the International Atomic Energy Agency (IAEA) and neighbouring countries as required by Convention and bilateral agreements.

The Ministry of Transport and Communications shall ensure the notification of management junctions and population in due time and maintenance of stable connection in organising and carrying out of immediate actions.

The Ministry of Health shall organise and render medical aid of all kinds, organise preventive activities of stabile iodine preparations, organise and carry out dosimetric control for people, hygienic control of food and potable water. The Ministry of Environment shall carry out radiological monitoring, make prognosis, evaluate threat and consequences for environment and transfer the summarised data to the State Emergency Management Centre.

The Ministry of Interior shall ensure protection of 30 km zone, organise provisional control points, ensure public order, protection of national and private property and provide information to the Address Informational Service. The Fire Protection and Rescue Department shall carry out radiological survey besides fire extinguishing activities following the Operative Plan for Fire Extinguishing Operations in Ignalina NPP, approved by the Director of Fire Protection and Rescue Department.

The Ministry of National Defence and Lithuanian Army should assist civil defence forces in making radiological survey from air and sanitary decontamination of people.

16.2.3.2. On-site emergency plan

Emergency planning process at the INPP includes:

- analysis of credible emergency situations and assessment of their consequences to the personnel, population, environment taking into account the worst conditions;
- establishment of Emergency Response Organization (further ERO) capable to eliminate potential emergency situations and their consequences;
- formation of Emergency Response Organization management structure capable to manage different emergency situations;
- concern for continuous operability of technical devices ensuring emergency prevention, limitation and elimination;
- accumulation of essential material assets, technical recourses allotted for functioning of Emergency Response Organization;
- keeping in constant readiness for functioning ERO Emergency Operation Centres ;

- training of ERO managers and personnel;
- drafting of documents prescribed by VATESI and recommended by IAEA;
- timely update of Emergency Response Plan considering results of tabletop drills and full scale exercises, conclusions of inspections performed by VATESI and INPP Safety and Quality Assurance Service.

Director General leads emergency planning process via Emergency Response Organization Staff.

INPP Emergency Response Organization Organizational Chart

INPP Emergency Response Organization (Heads of Emergency Response Organization Services and their subordinate personnel) is formed on the basis of production principle out of departments and divisions personnel considering the specific tasks that are dealt by the power plant divisions under the normal operation. In order to ensure constant preparedness of Emergency Response Organization to act it is necessary to have not less than 3 specially instructed persons for each position in Emergency Response Organization meeting the requirements of that position. Emergency Response Organization personnel should be adequately instructed and trained to meet the requirements of those positions.

INPP Emergency Response Plan

The new version of INPP Emergency Response Plan was agreed in 2002. INPP Emergency Response Plan is the main operative procedure to carry out organizational, technical, medical, evacuation and other activities related to protection of the plant personnel and the environment from accident consequences, natural calamities, and man made events.

The requirements of Emergency Response Plan (further ERP) are applied to Emergency Response Organization Management and personnel, also to all INPP personnel in case of an emergency at INPP. ERP is drafted on the basis of the following national legislation and international practices.

The General Part of the Plan contains:

- policy, objectives, tasks set by INPP management for Emergency Response Organization;
- responsibility of INPP management for emergency planning;
- INPP Emergency Response Organization organizational structure;
- tasks set for INPP Emergency Response Organization Services and subdivisions;
- notification and preparedness of INPP Emergency Response Organization;
- measures applied in the event of an emergency at INPP;
- premises and technical means necessary for executions of emergency preparedness functions;
- co-operation with local, regional, state authorities while rending assistance in the event of an emergency;
- resources available at the plant during an emergency;
- radiation dose limits;
- training of Emergency Response Organization managers and personnel, also INPP personnel in the field of emergency preparedness.

Operative part of the Plan contains:

- Emergency Planning Instruction;
- Notification Procedure in Case of an Emergency at INPP;
- Emergency Response Organization Management Assembly and Preparedness Procedure in Case of an Emergency at INPP;
- Personnel Assembly Places and Activities Organizing Procedure in Case of an Emergency at INPP;
- Emergency Operation Centre Staff Instruction;

- INPP Accident Classification Procedure;
- Instruction for Facility Personnel Protection and Activities against Impact of Harmful Toxic Materials in the Event of an Emergency at the Plant and Neighbouring Installations;
- Emergency Response Services Instructions.

INPP Emergency Response Plan is applied to:

- Emergency Response Organization management and personnel;
- INPP personnel (not involved in Emergency Response Organization);
- Staff of Fire Rescue Service for Visaginas Town and the INPP;
- INPP Protection Team Staff;
- Contractor organizations personnel carrying out works at INPP;
- Measures related to requirements of Emergency Response Plan carried out at the INPP Controlled Area.

Emergency intervention levels

Emergency intervention levels are pre-defined at the INPP involving application of mitigating measures to decrease impact of power plant operation derangement.
The following accident classes are defined at the INPP:

Alert – it is a nuclear power plant status involving failures resulting in significant or unknown decrease in the level of plant safety. At the emergency of this class ERO is put into the state of readiness and additional assessment of the situation is performed.

Site Emergency – failures in the operation of nuclear power plant resulting in:

- radioactive release into the controlled area in amounts greater than set for normal plant operation;
- considerable decrease in the level of protection provided to the core or spent fuel;
- any additional failures in the operation that could result in damage to the core or spent fuel.

At the emergency of this class measures should be taken to perform protective actions off-site and to limit exposure of on-site personnel.

General Emergency – failures resulting in release or substantial risk of radioactivity release beyond the controlled area requiring urgent protective actions.
The indicated 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 the urgent protective actions intervention levels.

In case of declaring this accident class urgent protective actions are recommended for the public residing in the vicinity of the plant. Each accident class is represented by respective emergency intervention level indicated in INPP Emergency Response Plan. Accident classification at the INPP is carried out on the basis of INPP Accident Classification Procedure.

Notification 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 activation INPP Emergency Response Plan Plant Shift Supervisor notifies:

- the plant management;
- the plant personnel;
- central dispatcher office of joint-stock company “Lithuanian Energy”;

- Fire Rescue Service for Visaginas town and INPP;
- VATESI officer on duty in Vilnius;
- VATESI Supervision group at INPP;
- INPP Protection Team;
- Municipality of Visaginas town;
- Officer on duty of Civil Protection Department of Utena County;
- Officer on duty of Civil Protection Department under the Ministry of National Defence.

After assembly of Heads of Emergency Response Organization Services at Emergency Operation Centre and approval of accident class INPP management makes further notification:

- Director General notifies Ministry of Economy, Director of Civil Protection Department under the Ministry of National Defence, SKI (Sweden), IAEA;
- Technical Director notifies Head of VATESI;
- Heads of Emergency Response Services notify Ministry of Environment, Ministry of Health Care, and State Security Department.

16.2.4. Measures for informing the public about emergency preparedness in the vicinity of nuclear installation

A central concern of civil protection is to warn and alert the population as quickly as possible. To warn and notify the population in case of an accident the state warning and notification system "Signalas" has been created as the network of 706 centralised electric sirens. Centrally controlled sirens can be triggered by the Civil Protection Department Operational Centre and to reach 2 million or 54% of the population living in cities and district centres. The 564 local electric sirens supplement this system. If case of a major accident or large scale threat Civil Protection Department shall notify the population through the first and the second Lithuanian radio and TV channels, most of commercial broadcasting companies (which work in FM), as well as through the wire radio communication network. For informing the public some additional means such as church bells, manual sirens, special cars with sound amplifying equipment and couriers can be used according to schemes prepared and approved with town and municipal boards in advance.

At the Operational Centre of the Department twenty-four hours duty officer gathers operative information concerning threats or accidents and keeps in touch with all managing units and key members of the community as well.

Population of the state is being provided permanently with information on civil protection issues via mass media; furthermore, special booklets including recommendations on behavior during different emergency situations are being published.

16.3 Training and exercises

16.3.1. General scheme

The following groups of persons involved in the civil protection training:

- Employees of the enterprises, institutions and organizations of all types (they are being trained without leaving their job duties);
- Kindergartners, students of the general education, higher and high schools (they get fundamental knowledge on the civil protection and practical actions in the mentioned schools);
- Civil Protection and Rescue System forces (they are being trained without leaving their job duties);

- Heads, deputy heads, subdivisions heads and civil protection specialists of the governmental and local authorities, enterprises and organizations, members of emergency management centre and specialists of other institutions (being trained in training sections of the civil protection departments in counties and Civil Protection Training Section at the Military Training Centre);
- The unemployed (discussions, lectures, TV, booklets, etc.).

The Civil Protection training is performed in the Civil Protection Training Section at the Advanced Military Training Centre and in civil protection departments training sections in 10 counties. A civil protection-training centre will be established in future.

The training for each selected person, depending on his/her position, is to be performed once in 3 - 5 years. The training courses adjusted to every specific purpose, last from 35 to 70 hours.
Officers of the fire-prevention service are trained in the Fire Protection Training centre in Vilnius.
Training sessions and exercises are organized at three levels.

Civil Protection Department at the Ministry of National Defence is responsible for the organization of training sessions and exercises at the national level. Governors of the regions organize training sessions and exercises at the regional level. Mayor of municipality organizes training sessions and exercises at the municipal level.

Civil Protection Department at the Ministry of National Defence controls planning, organization and implementation of all training and exercises at all levels:

- Training sessions at the national level are organized once a year, exercises – once in 3 years;
- Training sessions at the regional level are organized twice a year, exercise – once in 3 years;
- Training sessions at the municipal level are organized twice a year, exercise – once in 2 years.

In case of needs training sessions and exercise can be organized more frequently.

The main task of the training sessions and exercise is to check the procedures described in the "National Emergency Response Plan in the Event of a Radiological Accident at the Ignalina Nuclear Power Plant" and to continue to improve it. It would help counties; municipalities, ministries and other governmental institutions organize and coordinate all actions during an accident in the Ignalina NPP on appropriate way.

Implementing the Twinning project, in 2004 the Procedure of Training of RPC Emergency Preparedness Organization Workers was prepared. With the help of expert from the Finnish Nuclear and Radiation Safety Authority, the training material for civil protection and rescue system workers was prepared. The material covers the fundamentals of nuclear physics, biological impact of ionising radiation, protective measures of rescue personnel, actions in the accident centre etc. The Radiation Protection Centre organizes training courses and exercises for staff of the Radiation Protection Centre, public health care, civil protection and forces of rescue service, takes part at national and international level of exercises.

During the period from the last report Lithuanian authorities participating in preparedness to nuclear emergencies organized or took part in a number of national and international activities. The most successful activities were: Swedish-Lithuanian seminar, "Analysis of Responsibilities and Actions of Lithuanian Regulatory authorities Informing about Nuclear Accident and Eliminating the Consequences of the Accident" (2001), the training course related to questions in measuring methods of ionising radiation, work with equipment for civil protection system and rescue service specialists (2001), workshop "Preparation for Nuclear Accident" Visaginas municipality (2001), training course for personnel of civil protection and rescue system "Response to Radiation

Accidents. Search for Lost Source", national level exercise "Organization of Evacuation of General Public in Case of Accident at Ignalina NPP", "Actions of Public Health Care Institutions in the Case of Nuclear Accident" (2002), tabletop "Decision making process in case of an accident at Ignalina NPP" (2002 - national level, 2003- regional level), Baltic countries training course "Exercise preparation, conducting and evaluation" (2003- basics, 2004- advanced) and many others. Lithuania actively participated in international exercise, as "Barents Rescue", JINEX/INEXS and others, as well.

16.3.2. Training of heads and personnel of Emergency Response Organization to act in case of an emergency at the INPP

Director General as Site Emergency Director is trained once per three years at Training Centre of Civil Protection Department under the Ministry of National Defence.
Director General conducts:

- annual training for managers of subordinate group in accordance with 6-hours training programme;
- tabletop drills for heads of Emergency Response Organization Services not less than once per year;
- full scale exercises once per three years.

Technical Director as Plant Operation Manager is trained once per three years at Training Centre of Civil Protection Department under the Ministry of National Defence in accordance with the same training programme as for Director General. Technical Director conducts annual training for managers of subordinate group in accordance with 6-hours training programme.

Head of Civil Protection and Emergency Staff conducts annual training for managers of subordinate group in accordance with 6-hours training programme. Heads of structural divisions as Heads of Emergency Response Services conduct training for sub-heads of subordinate services, teams, groups.

All the INPP personnel should be trained to act in case of an emergency. The training of personnel includes:

- initial instructing in accordance with requirements for held position while assigning to work;
- improvement of practical skills during exercises and drills.

Training of Emergency Response Organization Services personnel is conducted by heads of corresponding teams and groups. After completion of theoretical course Emergency Response Organization Services personnel (part of personnel) participate in functional exercises for improvement of practical skills of carrying out the set tasks.

Once per three years Emergency Response Organization Services personnel (part of 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 set tasks.

16.3.3. Training and exercises of Regulatory Authorities staff

Main regulating institutions, such as VATESI, Radiation protection Centre, has established its own emergency staff training and exercising programs. In addition to national, key institutions are participating in the international exercises, for instance ALEX, JINEX – 1 etc.

16.4. International arrangements

The Civil Protection Department is responsible for the international level of civil protection and establishes contacts with the EU, NATO and other international organisations. Since April, 1994 the

Civil Protection Department joined the activities of NATO countries and partner nations within the framework of Partnership for Peace programme, participates actively in plenary sessions of NATO Senior Emergency Planning Committee, seminars and exercises.

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 and Civil Protection Department are responsible authorities respectively.

A great attention in Lithuania is paid to the development of bilateral co-operation with the neighbour countries. 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. Bilateral agreement between Lithuania and Germany on Mutual assistance in case of Natural Disasters and Large Scale Accidents has been signed on 15 March 1994. Bilateral agreement between Lithuania and Poland on Co-operation and Mutual Assistance in the field of Catastrophes, Natural Disasters and other Emergencies has been signed on 4 April 2000. Bilateral agreement between Lithuania and Hungary on Co-operation and Mutual Assistance to be provided in the event of Catastrophes and Severe Accidents was signed in May 2001. Bilateral agreement between Lithuania and Latvia on Mutual assistance in case of Natural Disasters and Large Scale Accidents has been signed in the beginning of June 2001. Memorandum of mutual assistance between the Civil Protection Department of Lithuania and the Civil Protection Department of Czech Republic has been signed on 17 June 1997. Agreement between the Government of the Republic of Lithuania and the Cabinet of Ministers of Ukraine on Co-operation and Mutual Assistance in the Field of Prevention of Emergencies and Elimination of their Consequences has been signed on 6 June, 2003. Bilateral agreement between Lithuania and Belarus on Co-operation in the Field of Prevention of Catastrophes, Natural Disasters and Severe Accidents, and Elimination on Consequences has been signed on 16 December, 2003.

In addition to bilateral agreements on 8 June 2001 Lithuania has joined the Agreement between Baltic Sea Countries Governments on radiological monitoring data exchange, which enables direct access to the radiological data in all Baltic Sea countries.

Article 17: SITTING

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. Description of licensing process, including summary of nationals laws, regulations and requirements relating to the sitting of nuclear installations

17.1.1. Criteria for evaluating all site-related factors affecting safety

In according with the Regulations for Licensing of Nuclear Power Related Activities the licensing procedure for construction of a new nuclear power plant, installation a of new reactor begins after the Seimas (Parliament) of the Republic of Lithuania passes a corresponding law on construction of a new nuclear power plant and its site, installation of a new reactor. Licensing procedures for other new nuclear facilities begin after the Government of the Republic of Lithuania passes a corresponding decision. Other nuclear facilities may be designed and the nuclear power plant may be reconstructed subject under the resolution adopted by the Government of the Republic of Lithuania on the recommendation of the Ministry of economy.

In order to get the licence, an applicant submits:

- to the State Nuclear Power Safety Inspectorate (VATESI) – all the application documents (the documents that the applicant submits for the other institutions of regulatory authority for review shall be identified in order to get agreement);
- to the other institutions of regulatory authority that are specified in the Law of the Republic of Lithuania on Nuclear Energy – documents for those shall be agreed with the institutions.

The State Nuclear Power Safety Inspectorate will not issue a licence until the applicant does submit corresponding agreements from the regulatory authority institutions that participate in the licensing process. Applicant submits to the State Nuclear Power Safety Inspectorate such information about the site of nuclear facility:

- geographical location of the nuclear facility, topographical and demographic situation on site area (taking into account the density of population and distribution in site area and its approaches);
- characteristics of site (data of meteorological research - prevailing winds, geological structures, seismic activity, status of radioecology, description of possible consequences in case of accident, possible effects on food production);
- situation of other industrial facilities around the nuclear facility, consequences to the safety of the nuclear facility caused by possible accidents in these facilities;
- other parameters of the site, which can be important to ensure the safety of the nuclear facility and minimise risk of radiation to the inhabitants.

The State Nuclear Power Safety Inspectorate has issued normative documents where has identified requirements for the site of nuclear facility, for instance, the General Regulations for Nuclear Power Plant Safety, the General Requirements for Dry Type Storage for Spent Nuclear Fuel, the Sitting Criteria for Near Surface Repository.

The assessment of environment impact is obligatory for each nuclear facility. The assessment of environment impact should be performed accordingly methodology approved by Ministry of Environment.

17.1.2. Criteria for evaluating the nuclear safety impact of the nuclear installation on the surrounding environment and population

According to the Law on Environmental Impact Assessment of the Republic of Lithuania, 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 Environmental Impact Assessment according to the Law on Environmental Impact Assessment of the Republic of Lithuania, it means that environmental impact assessment for such activities is obligatory.

Environmental impact assessment (EIA) is carried out according to the requirements of the following legal acts: Law on Environmental Impact Assessment of the Republic of Lithuania (Official Journal, 1996, No. 82-1965; 2000, No. 39 – 1092); Governmental Resolution No. 900 On Empowering the Ministry of Environment and the Subordinate Institutions (Official Journal, 2000, No. 57 – 1698); the Order of the Minister of Environment No. 262 On Approval of Regulations on Preparation of the Environmental Impact Assessment Program and Report (Official Journal, 2000, No. 57 – 1697); the Order of the Minister of Environment No. 277 On Informing the Public and Public Participation in the Process of Environmental Impact Assessment (Official Journal, 2000, No. 65 – 1970); the Order of the Minister of Environment No. 305 On Approval of Guidelines on the Quality Control of Environmental Impact Assessment of a Proposed Economic Activity (Official Journal, 2000, No. 65 – 1971); the Order of the Minister of Environment No.333 On Investigating the Environmental Impact Assessment Documents at the Ministry of the Environment and Subordinate Institutions (Official Journal, 2000, No. 69 – 2062).

Procedures of the Law on Environmental Impact Assessment of Proposed Economic Activities of the Republic of Lithuania take into account Council Directive 97/11 EC of 3 March 1997 amending Directive 85/337/EEC of June 1985 on the assessment of the effects of certain public and private projects on the environment and the 1991 United Nations Convention on Environmental Impact Assessment in a Tran boundary Context.

Participants of the environmental impact assessment shall be as follows:

- competent authority – Ministry of Environment;
- relevant parties of EIA – state institutions responsible for health protection, fire prevention, protection of cultural assets, development of economy and agriculture, and institutions of local self – government;
- organiser of the proposed nuclear activity (developer);
- preparer of EIA documentation that is obliged by organiser (developer);
- the public.

According to the Law on Environmental Impact Assessment of Proposed Economic Activities of the Republic of Lithuania, other state institutions may also act as relevant EIA parties, if they are interested in participating in EIA process and if the competent authority approves it.

The organiser of the proposed economic activity (developer) or preparer of EIA documentation obliged by the organiser (developer) shall carry out EIA procedures and prepare EIA documentation: the EIA program shall define the content of the report on EIA. The program shall include an outline of the main alternatives, including site selection and an indication of the reasons for their choise; - the EIA report, organiser of proposed economic activity shall organise public presentation of EIA report, shall submit EIA report to the relevant EIA parties, who check whether the issues, which fall within their competence and are provided for in program are sufficiently examined in the report, and forward their conclusions to the organiser (developer). Informing and public participation in the process of EIA of a proposed economic activity shall be organised and financed by the organiser (developer) of the proposed economic activity.

Upon the examination of the report, the conclusions of relevant parties of EIA regarding the report and the possibilities to carry out the proposed economic activity as well as justified evaluation of the public proposals, the competent authority shall make a justified decision if the proposed economic activity by virtue of its nature and environmental impacts may be carried out on the chosen site.

A positive decision adopted by the competent authority regarding the possibilities of carrying out a proposed economic activity shall be valid for 5 years following its adoption. If the competent authority decides that the proposed economic activity cannot be carried out on the chosen site because of its potential negative environmental impacts, the proposed economic activity may not be carried out.

In May 2000, the Ministry of Environment made a decision regarding the Installation of a Cement Solidification Facility for treatment of Liquid Radioactive Waste and Erection of a Temporary Storage Building for Ignalina Nuclear Power Plant from environmental point of view: „To approve building of the Installation of a Cement Solidification Facility for treatment of Liquid Radioactive Waste and Erection of a Temporary Storage Building for Ignalina Nuclear Power Plant according to the presented EIA Report“.

In May 2004, Ministry of Environment adopted the EIA program for the Decommissioning of Ignalina Nuclear Power Plant provided that EIA program corrected if environmental conditions changed or if the Final Decommissioning Plan have corrected.

17.2. Special conditions for the design and construction of nuclear facilities

17.2.1. Legal Prerequisites for the Design of Nuclear Facilities

A nuclear power plant or a nuclear reactor may be designed only subject to a resolution adopted by the Government of the Republic of Lithuania on the basis of the law on the construction of such a power plant or a nuclear reactor.
Other nuclear facilities may be designed, and the nuclear power plant may be reconstructed subject to a resolution adopted by the Government of the Republic of Lithuania on the recommendation of the Ministry of Economy.

A particular design of a nuclear facility shall be prepared subject to:

- the drafting and approval of a special site selection scheme after consideration of several alternative construction sites in a manner prescribed by Law on Territorial Planning;

- the approval of a detailed plan of the territory;
- taking over of the land intended for the construction site for public needs in a legally prescribed manner.

17.2.2. Design Co-ordination Procedure

The construction or reconstruction design of a nuclear facility shall be co-ordinated in a manner prescribed by the Government of the Republic of Lithuania with the following state institutions:
1) the Ministry of Environment;
2) the Ministry of Economy;
3) the Ministry of National Defence;
4) the Ministry of Social Security and Labour;
5) the Ministry of Construction and Urban Planning;
6) the Ministry of Health;
7) the Ministry of the Interior;
8) the State Security Department;
9) State Nuclear Power Safety Inspectorate (VATESI);
10) local authority whose territory or its part is within the sanitary protection zone of the facility.

17.3. Implementing provisions for fulfillment of the above mentioned criteria and activities related to maintaining the continued safety acceptability of the Nuclear Installation, taking account of site-related factors

The structural components of the Ignalina Nuclear Power Plant are designed in accordance with the specification set forth in "Design Safety Regulations of Nuclear Power Plants (OPB-83)". The generic requirement of this document is that safety-related systems and elements of nuclear power plants have to be able to fulfill their functions under all conditions. This implies that they have to accommodate stresses imposed by natural phenomena as well as mechanical, thermal, chemical and other impacts which may arise during design basis accidents.

The term "external events" (relative to a nuclear power plant) covers such natural phenomena as a earthquakes, flooding, strong winds, lightning, snow and ice, and such man-made events as aircraft crashes, industrial explosion, sabotage and terrorist action. On site fire and flooding are usually also considered as external events.

The mentioned site-related factors likely to affect the safety of nuclear installation were evaluated partly during the design stage of Ignalina NPP in accordance with existed requirements. The site was originally selected taking into account relevant factors like the above-mentioned and the population density at various distances. Present legal provisions to maintain the environmental conditions of the sites include restrictions for building activities close to the site. There are no chemical installations, gas pipelines and other facilities and human activities that might endanger the plant safety.

Safety analysis of nuclear power plants requires the consideration of an "Aircraft crash on the reactor hall". The consideration of this event is proposed in a list of hypothetical accidents defined in 1990 by the Kurchatov Atomic Energy Institute, Moscow, Russia. This requirement was imposed after completion of the Ignalina NPP.

The requirements for considering an aircraft crash therefore were not imposed on any RBMK plant. This was due mainly to three major considerations:

- There were no such regulatory requirements at the time when the plants were developed and no such requirements were introduced by the regulatory bodies;
- Such events are sufficiently unlikely, besides, the RBMK sites are situated reasonably far from airports;

- Until recently, there were no reliable statistics on flight incidents and fatal accidents involving both civil and military aircraft, which could be used when considering such events regarding nuclear power plants.

Note, that the nearest air route Svir-Rokiškis is ten km to the West of the Ignalina NPP. In 1990 a total number of flights along the Lithuanian air routes were 65000. During the last 30-year period there were no commercial aircraft crash accidents in Lithuania. Nevertheless, there are administrative restrictions for flights over Ignalina NPP in 3km range.

Seismic stability is the ability of equipment and structures to maintain integrity during seismic loading. This implies the maintenance of strength, tightness, maintainability, nuclear and radiological safety and the absence of residual deformation, which encumber normal operation. Depending on the need for functionality during and after the earthquake, all systems, equipment and structures of NPPs with RBMK-type reactors, are designed according the "Code for designing of seismic-resistant nuclear power plants".

Calculations of seismic stability criteria for the Ignalina NPP structures, equipment and pipelines were conducted by the Research and Development Institute for Energy Technology, St. Petersburg (at that time Leningrad), and Russia. These calculations were performed using a linear spectral theory of seismic stability. The seismic stability of buildings is given according to the above mentioned MSK-64 scale.

For the Ignalina NPP area the design earthquake magnitude is 6 forces and the maximum possible calculated earthquake magnitude is force 7 according to the MSK-64 scale. This requirement implies that some structures of the IGNALINA NPP needed to be strengthened. Because of that unfastening and installation of additional supports for the systems and equipment such as Hydraulic cylinders of ESSC (HC ESSC), Oil tanks of Diesel Generator (DG) and Logic Cabinets of CPS was performed. Also, sophisticated seismic monitoring system has been put into operation in order to examine its reliability and possibility of its affection on the reactor shut down.

Recently performed reassessment of the Ignalina NPP shows that additional measures and more detailed seismic analysis is not required in general, but the seismic requirements, in particular for modifications such as the DSS, should be considered on a case-by-case basis.

17.4. Internationals arrangements, including those with neighboring countries, as necessary

Information about nuclear facilities and activities on territory of Lithuania shall be submitted to neighboring countries according the bilateral agreements (as in paragraph 16.4.) and The Regulation on Providing of General Data Concerning Plans for the Disposal of Radioactive Waste to the Commission of the European Communities (as in paragraph 15.1.).

Article 18: DESIGN AND CONSTRUCTION

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

i. *the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;*
ii. *the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;*
iii. *the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.*

18.1. Description of licensing process, including summary of national laws, regulations and requirements related to design and construction of Nuclear Installations

A nuclear power plant or a nuclear reactor may be designed only subject to a resolution adopted by the Government of the Republic of Lithuania on the basis of the law on the construction of such a power plant or a nuclear reactor. Other nuclear facilities may be designed, and the nuclear power plant may be reconstructed subject to a resolution adopted by the Government of the Republic of Lithuania on the recommendation of the Ministry of Economy. A particular design of a nuclear facility is prepared subject to:

- the drafting and approval of a special site selection scheme after consideration of several alternative construction sites in a manner prescribed by the Law on Territorial Planning;
- the approval of a detailed plan of the territory;
- legally effected in a prescribed manner taking over of the land intended for the construction site for public needs.

In the manner prescribed by the Government of the Republic of Lithuania, the construction or reconstruction design of a nuclear facility is co-ordinated with the following state institutions: the Ministry of the Environment; the Ministry of Economy; the Ministry of National Defence; the Ministry of Social Security and Labour; the Ministry of Economy; the Ministry of the Interior; the State Security Department; the State Atomic Energy Safety Inspectorate (VATESI); the local authority whose territory or its part is within the sanitary protection zone of the facility.

Designs for the construction, reconstruction, upgrading, expansion, dismantling and decommissioning of nuclear facilities is subject to a comprehensive state expert evaluation. The expert evaluation is organised by the Ministry of the Environment upon receiving the design submitted by the client. The construction designs of nuclear power plants and nuclear reactors may be submitted for additional international expert evaluation organised by the client. The findings of the expert evaluation are incorporated into the comprehensive state expert evaluation findings. The evaluation expenses are borne by the client.

The Government or an institution authorised by it issues an authorisation for the construction or reconstruction of a nuclear facility in the prescribed manner. The builder/client seeking to obtain an authorisation to construct or reconstruct a nuclear facility must submit:

- an application of the prescribed form;
- a licence issued by VATESI to construct a nuclear facility;
- a document certifying the builder's/client's title or other rights to the plot of land;

- the design of the nuclear facility with the prior official approval following the established procedure;
- findings of expert examination of the nuclear facility design;
- a decision of a competent institution that the intended economic activity is permitted on the chosen site from the point of view of environmental impact;
- a document on the appointment of the chief technical supervision officer of the construction of the nuclear facility;
- a certificate of cadastral measurements of the nuclear facility and its formal registration (in the event of reconstruction of the nuclear facility).

An authorisation for construction or reconstruction of a nuclear facility is issued within 20 days after the day of filing of the documents, at the latest, after examining them and ascertaining that construction of the nuclear facility conforms to the requirements of the regime of the building site as laid down by the document of territorial planning.

Where an authorisation for the construction or reconstruction of a nuclear facility is not issued the Government or an institution authorised by it within 20 days informs the builder/client about it in writing, by giving a reasoned justification for refusal to issue an authorisation. An authorisation for construction or reconstruction of a nuclear facility becomes invalid:

- by a court decision;
- by a decision of the Ministry of the Environment when it is discovered that it was issued unlawfully;
- where, within 10 years after the date of issue of the authorisation the nuclear facility was not commissioned.

The rules for issuing authorisations for construction or reconstruction of a nuclear facility are defined by the Government. The institution authorised by the Government manages records of issue of authorisations for the construction or reconstruction of nuclear facilities, their list and statistical reports.

State control and supervision of the construction of nuclear facilities is exercised during all the major stages of work - design and construction, commissioning, operation and decommissioning. During all the stages of work, compliance with the conditions and requirements set forth in the nuclear safety, radiation protection regulations and other statutory acts is controlled and supervised by the following institutions within the framework of their competence: VATESI, the Ministry of Health, the Ministry of the Environment, the Ministry of Social Security and Labour, the Ministry of the Interior, the State Security Department, the Radiation Protection Centre and the county governor.

Sanitary protection and monitoring zones are established around nuclear facilities. The size of the area depends on the purpose of the facility and the requirements of operation safety rules and standards. The boundaries of the sanitary and monitoring zones are fixed in the documentation of the facility construction design.

Prior to the commissioning of the facility, all the populations are resettled from the sanitary protection zone in a manner established by the Government. Any activities as well as construction of installations and buildings unrelated to the operation or service of the facility are prohibited therein. Land, woods and water bodies on the territory of the sanitary protection zone may be used only subject to an approval of the Operating Organization and permits of the Ministry of Environment and the Ministry of Health. The basic requirements for the sanitary protection and monitoring zones of a nuclear power plant or a nuclear reactor, and the conditions for

decommissioning conditions are stipulated by the law on nuclear power plants or on nuclear reactors.

Organizations involved in design, construction, installation and adjustment work, as well as companies which manufacture nuclear plant equipment, has prepared quality assurance programmes of their own relating specifically to the activities in which they are engaged.

18.2. Implementation of the "defense-in-depth" concept

A necessity to implement the "defence-in-depth" concept at all stages of safety related activities (including design and construction) is stated in the "General Regulations for Nuclear Power Plant Safety", item 1.2.3 of which reads: "1.2.3. 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 ionising 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 1.2.3).

The INPP safety is provided by engineering devices and organisational 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.

The immediate cross rupture of Dy 900 pressure header resulted in a primary circuit leakage is taken as a maximum design accident. In accordance with the General Regulations for Nuclear Power Plant Safety the safety systems are designed in such way, which allows ensuring the plant safety in the event of any design accident.

The key safety design principles appear as follows:

- Ensuring of reliable core cooling both under normal and emergency conditions;
- Ensuring of full localisation of the coolant released from the circuit in the event of the accidents resulted in disconnecting or putting the process equipment out of order;
- Ensuring of full localisation of the active core releases in the event of primary circuit tube rupture which is regarded as the most severe from the radiological point of view;
- Ensuring of premise protection from collapse under emergency conditions in the event of overpressure in rooms and a primary circuit tube rupture;
- Ensuring of equipment and pipelines protection from breaking in emergency conditions in the event of overpressure in the primary circuit.

The Plant safety is provided by:

- Primary Circuit design, which ensures the satisfactory conditions for natural coolant circulation;
- Designing of the Circulation Pump with additional excursion, which ensures the availability of extra pump force in the event of disconnection for the time required to change over to the reactor core cooling mode with natural circulation;
- Locating pipelines and equipment with core coolant in protected rooms;
- Locating the Primary Circuit pipelines in the tight compartments, which are designed to withstand the overpressure in the event of a pipeline rupture;
- Using hermetically sealed pipe ducts which penetrate the rooms with different design pressure;
- Installing leakage belts on pipes which enable to reduce the coolant flow rate in the event of a pipe rupture;
- Backing up safety devices and equipment for normal operation;
- Implementing activities to ensure integrity of ECCS pipes in the event of Primary Circuit pipe rupture;
- Installing the required number of process control devices;
- Supplying reliable amount of power to the users who provide reactor control, operation and cooling;
- Inspecting metal state and welds of pipes and equipment first while installing and then regularly while operating;
- Providing activities to improve quality of normal operation and safety devices while manufacturing.

18.3. Prevention of accidents and their mitigation

In accordance with the "General Regulations for Nuclear Power Plant Safety" (items 1.2.12 and 1.2.14) the following measures should be taken for prevention of accidents and their mitigation: 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.

In addition to the single failure (independent of the initiating event) of one of the elements mentioned above, account must be taken of undetected failures among elements which are not monitored during plant operation and which can also lead to a violation of safe operating conditions, thereby influencing the development of the accident.

Reactor and nuclear plant designs shall provide measures to control beyond-design-basis accidents, if such accidents are not excluded by virtue of the fail-safe characteristics of the reactor installation and the principles of its construction.

The design of the reactor facility and NPP includes engineering arrangements and organisational measures to prevent design accidents and to mitigate their consequences. The design allows ensuring safety at any single designed initial event with overlapping of one event which is independent on the initial event of the failure of any of the following safety system element: an active or passive element having mechanical moveable parts or caused by a human error which does not depend on the initial event.

In addition, the design allows to account not only the failure of one of the above elements which does not depend on the initial event, but a number of unidentified failures of the elements which are not controlled in the course of operation but the failure of which has some impact on the accident generation.

18.4. Measures for ensuring the application of technologies proven by experience or qualified by testing or analysis

"General Regulations for Nuclear Power Plant Safety" require (item 1.2.4) 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.

The engineering and organisational decisions taken to ensure INNP safety have been proven and checked by previous practice or tests, appropriate studies, operational experience of the prototypes. It means that they are in full conformity to the nuclear codes and regulations as defined in the Feasibility Report for Reactor Facility.

When the first plants with RBMK-1000 were being designed, the initial emergency events were listed. Besides, the most dangerous ways of their generation were considered.

The original list of initial events has been sufficiently extended on the basis of experience gained from the reactor facilities operated at Leningrad, Kursk and Chernobyl NNPs and to meet the NPP safe operation requirements which lately have been tightened to meet the international nuclear excellence requirements in general and to implement INPP SAR recommendations in particular.

Applying the proven technology while performing civil work, which is to be supported by appropriate QA activities, provides the required quality of construction.

18.5. Requirements on reliable, stable and easily manageable operation with specific consideration of human factors and man-machine interface

In the above mentioned “The General Regulations for Nuclear Power Plant Safety" (VD-B-001-0-97) is stated that NPP design should provide means to eliminate single personnel errors or lessen their consequences, including those during the maintenance.

The “Nuclear Safety Regulations for the Reactor’s of Nuclear Power Plants” (VD-T-001-0-97) define in detail the requirements of the "General Regulations for Nuclear Power Plant Safety" as to ensuring nuclear safety. In general terms the above mentioned regulations require that design of the NPP’s (their systems and structures) shall be optimal for operator performance.
It is required 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.

Summary of the regulations and requirements relating to the design and construction of nuclear installation:

1.	General Safety Regulations for Nuclear Power Plants
2.	Nuclear Safety Regulations for Nuclear Power Plant Reactor Installations
3.	General Regulations for the Development of Regulatory Documents on Nuclear Power Safety
4.	Regulations for the Organization Operating Ignalina Nuclear Power Plant
5.	Regulations for Licensing of Nuclear Power Related Activities.
6.	Requirements for Licensing of Ignalina Nuclear Power Plant Unit
7.	Constructions of Exceptional Significance the Design and Construction Process of which can be Performed by the Design and Construction Enterprises which have Received a Qualification Certificate for such Activities from the Ministry of Environment
8.	Attesting of Design and Construction Enterprises
9.	Procedure for the Construction Design Process
10.	Structure of a Construction Project
11.	Procedure for the Establishment of Construction Works Design Conditions, Co-Ordination and Approval of Construction Projects
12.	Expert Examination of the Construction Project and of the Construction
13.	Procedure for the State Supervision over the Compliance with Special Requirements for Construction Works
14.	Procedure for the Acceptance of Constructions as Fit for Use
15.	Estimation of the Failure Conditions in Construction Works
16.	Justification of Construction Process
17.	The Issues of Environmental Protection in the Construction Design Project
18.	Procedure for Issuing of Permissions to Build and Demolish Constructions
19.	The Essential Requirements Pertaining to Construction Works. Mechanical Steadiness and Strength
20.	The Essential Requirements Pertaining to Construction Works. Safety in Case of Fire
21.	The Essential Requirements Pertaining to Construction Works. Hygiene, Health, Environmental Protection
22.	The Essential Requirements Pertaining to Construction Works. Safety in Use
23.	The Essential Requirements Pertaining to Construction Works. Protection Against Noise
24.	The Essential Requirements Pertaining to Construction Works. Energy Economy and Heat Retention
25.	Seismic Design Standards for Nuclear Power Plants
26.	Technical Safety Justification for Nuclear Power Plants
27.	Technical Justification of Reactor Installation RBMK-1500

Article 19: OPERATION

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

i. *The initial authorisation to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;*
ii. *Operational limits and conditions derived from the safety 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. *Programmes to collect and analyse 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 organisations 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. Description of licensing process, including summary of national laws, regulations and requirements related to operation of Nuclear Installations.

According to the laws and regulations acting in the Lithuanian Republic any activity relating to the nuclear energy is allowed if the state control and surveillance authorities have issued the relevant license (Law of the Republic of Lithuania on Nuclear Energy; General Regulation on Safety of Nuclear Power Plants; Rules of Nuclear Safety of Reactor Facilities at Nuclear Power Plants; NPP Operating Organisation. General Requirements; Standing Order on INPP Operating Organisation; General Requirements for Nuclear Power Plants Maintenance; Provision on Licensing of Nuclear Related Activities in Energy Sector; Requirements on Procedure of Issue of License for Operation of INPP; Provision on State Nuclear Power Safety Inspectorate - VATESI).

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 surveillance authorities.

Nuclear Power Plant is put to operation in accordance with the programmes of physical, energy start-up and commissioning of NPP. The state control and surveillance authorities shall endorse the programmes. The license for industrial operation of each Unit of NPP can be granted to the NPP operating organisation by the State Inspectorate of nuclear energy safety on the basis of positive results of commissioning works, availability of updated technical safety justification of reactor

facility and NPP and statement on NPP Unit acceptance to industrial operation and endorsement of other state control and surveillance authorities. License for operation of Unit 1 meeting the Western practice was granted to Ignalina NPP in 1999, which valid until July 2004. On 29 July 2004 the License was reviewed and extended for unlimited time. Currently works on receiving of a license for operation of Unit 2 are under way. Licensing of Unit 2 operation is planned to take place within 2004.

Operational organisation bears complete responsibility for safe operation of Ignalina NPP in accordance with the requirements established by the corresponding legislation of the Lithuanian Republic, regulations and standards of nuclear safety and radiation protection, operational organisation procedures, discipline and organisational norms, as well as License for operation including measures towards accident prevention and reduction of accident consequences, recording and storage of the nuclear materials and radioactive substance, environment protection and environmental monitoring in the sanitary-protective zone and surveillance zone and monitoring of the Ignalina NPP operation purpose, i.e. its operation shall meet the objectives it was designed and constructed for.

Operational organisation responsibility can not be reduced due to the independent activity and responsibility of enterprises, institutions, organisations and their co-operations, officials and other persons performing works or providing services to the Operational organisation (designers, suppliers, civil organisations, commissioning and repair organisations, etc.), as well as due to the independent activity and responsibility of state control and surveillance authorities.

19.2 Description of steps undertaken by the Contracting Parties to perform their obligations under Article 19 of Convention:

19.2.1. The initial authorisation to operate a nuclear installation

The commissioning programme was developed prior to Ignalina NPP start-up. The Programme 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 organisation. Pre-commissioning tests gave the evidence that the whole INPP and its individual units, safety systems and components, normal operation systems, safety-related systems operate as designed. Each Unit of Ignalina NPP 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. The Regulatory Authority granted an operating permit for each plant unit. In accordance with the Operation Licenses conditions, annual permits shall be obtained after each outage.

19.2.2. Operational limits and conditions

It is stated in clause 5.1.2 of "General Regulations for Nuclear Power Plant Safety Provision" that the principal document defining safe operation is the technical specifications, which lays down main modes and functions of safe operation as well as general sequence of 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".

For Ignalina, limits and conditions of safe operation was set and justified in the Technical Safety Justification prepared by the plant Main Designer (NIKIET, Moscow) and Scientific Adviser (RNC KI, Moscow) and the General Designer (St-Petersburg, Russia). In the frames of in-depth safety assessment (Safety Analysis Reports for Unit-1 and Unit-2) the limits and conditions of safe operation were reviewed and their correctness was confirmed.

Technical Specifications - the basic document specifying the safety of Ignalina NPP and determining the limits and conditions of safe operation – is being reviewed every three years. If necessary (in case the norms, standards and regulations have changed, in course of system and equipment modifications or on the basis of operational experience), the relevant corrections are incorporated to the Technical Specifications. Each new issue of the Technical Specifications or after each update of the Technical Specifications they shall be agreed on with VATESI. The last version of the Technical Specifications entered into force on 4 April 2001. In case the established limits and conditions of safe operation of any Unit of INPP can not be met for reactor power operation it shall be shutdown.

19.2.3. Operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures

In compliance with the Quality Assurance Programme and Documentation control system acting at INPP all works relating 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.

Any testing at Ignalina NPP not covered by the Technical Specification and operation procedures shall be performed in accordance with the special programmes presenting measurers to provide testing safety.

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

All documents and records are registered in special electronic system (ARKI). These systems, on one hand, provide storage of documentation electronic copies and, on the other hand, access of all INPP users to the corresponding documents.

In course of preparation and registration of the documents each document shall be provided with the relevant identification according to the priority of each document with regard to safety. Plant personnel use only the documents passed review, approval and registration. All key personnel are provided with access to ARKI system purposed to search of any necessary document.

Results of all works, first of all relating to the safety shall be recorded (reports, check-lists, statements, logs, etc.). Records are made on the material providing their safe storage within the

required time. Records relating to the safety shall be kept 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 at Ignalina NPP 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.

Documents developed by external organisations (design, etc.) are subject to review and their applicability is subject to approval prior to their using at Ignalina NPP. 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. 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.

Documentation with the expired validity term of storage at INPP and which considers having scientific and practical value for the Lithuanian Republic shall be handed over to the State archive. As a rule, these are safety-related documents and records. Selection of documentation to be handed over to the State archive shall be performed by the expert committee in accordance with the acting regulation on Expert Committee of scientific and technical documentation at INPP.

19.2.4. Emergency operating procedures

According to item 5.1.4 of “General Regulations for Nuclear Power Plant Safety”, an operating organization and NPP administrative management shall develop and issue special symptom-based emergency operating procedures. According to the procedures mentioned, the actions of the plant personnel shall be based on criteria of events, condition of the reactor as well as on forecast of conditions as they are expected to evolve during the accident. The actions shall be aimed to restore essential safety functions of NPP and limit the radiation consequences of the accident. Symptom-based emergency operating procedures sufficiently compensate the drawbacks of the event-based emergency operating procedures providing maximum achievable safety of the plant within the project.

Efficiency of symptom based emergency operating procedures is defined through fail-safety of the main safety systems. It shall be done by development of special emergency procedures like Emergency Procedures of Support and Procedures of Support.

The documents have been developed under international safety improvement project “Lisbon Initiative” with participation of experts from Lithuania, Russia, Sweden and the USA. These are the basic materials used for symptom based emergency operating procedures development:

- The standards of the Republic of Lithuania;
- IAEA Guidelines;
- Reports from NIKIET;
- USA standards, series NUREG, NUREG/CR, as well as INPO and DOE Guidelines (Institute Nuclear Power Operations, Department of Energy).

The complete package of documents including symptom-based emergency operating procedures, emergency procedures of support and procedures of support was developed, verified and validated in 2000, and after the personnel had a training on the full-scale simulator, it was put in force in 2001.

Maximum efficiency while operation of an emergency situation (accident) can be achieved by integrated application of event-based and symptom-based Emergency Operating Procedures. In order to prevent development of any deviations from normal operation into emergency situation Ignalina NPP has developed and implemented special procedures for an operator's actions in case of alarm (reaction to alarm signal).

These documents define the high priority actions of an operator after the deviation has been revealed. The documents are located on alarm panels that inform the operator about deviation from normal operation. All instructions and procedures including emergency operating procedures and "reaction to alarm signal" procedures are periodically reviewed. After any systems or equipment has been modified the procedures are changed without delay.

On the basis of the item 1.2.14 of "General Regulations for Nuclear Power Plant Safety Provision", works on the project "Development of a guidance to control accidents beyond design basis in Ignalina NPP" by the organizations JEL, VOLIAN enterprises (England), Lithuanian Energy Institute with the participation of INPP were started in 2003. Works performed under the mentioned project are divided into 5 tasks:

- Development of the list of accidents beyond design basis for INPP;
- To carry out the analysis of the accidents beyond design basis;
- Selection of high level management strategies and determination of necessary changes in instrumentation and equipment of the plant;
- Determination of strategies of accidents beyond design basis management and development/validation of accidents beyond design basis management manual;
- Preparation of personnel training specialists and carrying out of training of the personnel to work with the accidents beyond design basis management manual.

The works on the project are planned to be finished in 2005.

19.2.5. Necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation

In 1991, when Lithuania gained its independence, the country lacked the national infrastructure (design and research institutes) to support safe operation of nuclear facilities. VATESI has made special efforts to establish the national Technical Support Organisations (TSO).

The first TSO was established in 1992. It was the Ignalina Safety Analysis Group (ISAG), formed by the Resolution of the Government of Lithuania at the Lithuanian Energy Institute. The experts from ISAG performed modelling and analysis of thermal and hydraulic processes in the Primary Circuit during transient and emergency situations, modelling of physical processes in the core, thermal and hydraulic calculations of the Accident Confinement System, assessment of INPP constructions reliability and other activities. Experts of Lithuanian TSO were involved in RSR teams. At present ISAG is a Lithuanian TSO with great experience in the area of nuclear safety.

In 1992 VATESI initiated co-operation with the Department of Mechanics at Kaunas University of Technology. On VATESI request the experts of the department together with Lithuanian Energy Institute have prepared a safety analysis report for the spent fuel storage casks and provided their conclusions.

VATESI sought advice from the specialists of the Department of Welding and Materials in Vilnius Gedimino Technical University. In 1995 VATESI granted to the State Information Technology Institute (VITI) for design of information systems, software, automatic control system elements related to updating of the TITAN computer system at INPP.

The Construction Reliability Center was established according to VATESI requirements in 1994. The experts of the Center deal with assessment of remaining life of INPP equipment. The specialists of Ultrasonic Test Laboratory have designed and manufactured devices for measurement of thickness of the fuel channel walls.

To co-ordinate TSOs activities and to promote the growth of nuclear safety infrastructure in Lithuania, special TSOs' Council for co-ordination was founded in 1997. PHARE/LI/TSO/02 project "Assistance in the enhancement of Lithuanian TSO's capabilities to support the Nuclear Safety Regulatory Authority" started in 1998. The project is aimed to improve Lithuanian TSO capabilities in NDT, structural integrity and welding areas.

At the same time technical and scientific support is provided by INPP designers (INPP General Designer, St' Petersburg, Russia) and by the designers of the reactor (reactor General Designer – NIKIET and Research Manager – Kurchatov Institute, Moscow).

There are several special departments at Ignalina NPP that provide engineering support to the plant departments:

- Nuclear Safety Department that curates all issues related to nuclear safety, fuel and the reactor core;
- Engineering Support Department provides assistance to the plant departments in the area of thermal and hydraulic processes, PSA (Probabilistic Safety Analysis) calculations, reliability and diagnostics and monitoring of rotating machinery vibration, solving of engineering problems related to operation and repair of technological systems, spent nuclear fuel and radioactive waste management, preparation for decommissioning and decommissioning of the INPP;
- Design Department supports the plant departments in the area of equipment repair technologies development and design works;
- Planned Preventive Maintenance Department ensures the support of the departments of the station during preparation and planning of maintenance of the Units and main facilities of the plant, co-ordination of preparation and planning of maintenance and technical reorganisation of the equipment and constructions;
- Production Department provides support to the plant department in the area of technical documentation management.

19.2.6-7 Incidents significant to safety are reported in a timely manner by the holder of the relevant license to the regulatory body and programmes to collect and analyse 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 organisations and regulatory bodies

System for reporting of unusual events at INPP is established in Lithuania in accordance with international practice and based on IAEA recommendations. INPP has all necessary administrative and technical measures to fulfil the task.

In accordance with the requirements of Lithuanian Regulatory Authority VATESI all categorised events that happen at INPP shall be reported to VATESI in a timely manner. The information shall be delivered in accordance with the procedure, which is now in force and is approved by VATESI. VATESI shall be informed about the events verbally as soon as possible, and not later than in an hour after the event has happened. Written reports about the event shall be delivered to VATESI in a special format within 24 hours.

The events are being investigated according to ASSET technique developed by IAEA. The investigation considers all possible causes including the root ones and defines activities that will prevent the causes in future. The detailed reports that include event investigation and preventive actions are transferred to VATESI and operators-members of WANO within 30 days. If an event leads to the unit shut down, then the unit cannot be put in operation until the causes of the event have been revealed and eliminated.

INPP personnel gains and uses information related to safety, operating experience and valuable practice either from the plant departments or from other NPPs and international organisations. Main sources of such information are event investigation reports from NPPs with RBMK reactors as well as WANO and IAEA/NEA IRS database.

19.2.8. 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

Radioactive Waste Management Strategy was approved by the government 6 Feb 2002 that includes detailed plans for short-term and long-term perspectives. It encompasses management of all types of radioactive waste, taking into account a new radioactive waste classification, introduced by VATESI at the end of July 2001. Radioactive waste at INPP consists of solid and liquid waste, ion-exchange resins and a small amount of spent lubricant materials. Spent nuclear fuel is considered as 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. Liquid radioactive waste at Ignalina NPP 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 (build. 158). The building is also located on INPP site. According to the Plan of Transfer of Bitumenised Waste Storage Facility (build. 158) to Final Disposal Facility INPP shall perform long term safety assessment by the end of 2006. 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.

Safety analysis reports for current INPP storage facilities of solid radioactive waste and bitumen compound were issued in March 2001. According to the reports the storage facilities can be used as intermediate ones for 10 years starting from the date of the reports issue. VATESI has reviewed the reports and within license for Ignalina NPP Unit 1 licensed them for operation up to 2010.

Following the recommendations of these reports, a list of activities was implemented to increase the safety of the radioactive waste storage in the INPP site, including:

- Installing of the building sinking monitoring systems in buildings 157, 157/1, 158;
- Installation of drainage systems in buildings 157, 157/1 to remove water from the solid radioactive waste compartments;
- Putting into operation of television control system of the status of the compartments with waste of group 3 in building 157.

Spent ion-exchange resins are not processed and stored in special tanks. The tanks are almost full. In 2001 Ignalina NPP and Framatom/Siemens Company have concluded a contract for design and delivery of cement solidification facility for spent ion-exchange resins. At present moment installation of the cementation facility and construction of storage facility for cemented waste and is coming to an end. Putting of the facility into operation is planned to be in the end of 2004.

New Lithuanian requirements for radioactive waste management were issued by VATESI at the end of July in 2001. At present INPP has developed and approved in VATESI activities on implementation of the new regulations at the plant. 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.

Hence, radioactive waste disposal requirements shall be considered in waste processing phase. It is assumed that the modification of radioactive waste management system will be completed in 2008. Within the limits of this modernization, a new system (satisfying all contemporary requirements and developed taking into consideration the transfer to the new classification of waste in accordance with new Lithuanian requirements) of registration and calculation of solid radioactive waste was introduced.

19.2.8.1. Waste minimization

In 2003 there was a decision made to modify the industrial waster sorting system allowing for selection of obviously “clean” waste which can be stored in ordinary refuse tip for non-hazardous waste. At present it is developed the design for modification of the system and plan to commission it in 2005.

19.2.8.2. Spent fuel

Due to the fact that the issue of spent nuclear fuel reprocessing had been closed, it was decided to build an interim spent nuclear fuel storage facility at INPP. After announcement of international tender the bid presented by GNB Company (Germany) was approved as the most appropriate design for INPP. Russian Institute VNIPIET has designed an interim open-air storage facility for 50 years storage in metal type CASTOR casks and metal concrete type CONSTOR casks. The spent fuel storage site and the casks have been licensed and commissioned in 2000.

Since that time 20 CASTOR and 49 CONSTOR casks have been loaded with spent nuclear fuel and transported to the storage site. At first the storage site was planned to hold 20 CASTOR casks and 52 CONSTOR casks. Modernization performed in 2003 allowed the site to store 8 more CONSTOR casks. It is assumed that the capacity of the storage site is enough until 2007. By this time a new spent fuel storage facility will be constructed and put in operation within the frame of decommissioning program for unit No.1.

19.2.8.3. Monitoring of radionuclides concentrations at INPP

Monitoring of radionuclides concentration in ground water at INPP site is carried out in accordance with the “Program of INPP Environment Monitoring” approved by the Ministry of Environment. There are 69 boreholes for this aim at the plant site, spent fuel storage site and around the LRW reprocessing system. Radiation monitoring of ground water includes measurement of gamma-

nuclide composition, measurement of Sr^{90} concentration (with radiochemical division) and tritium measurement. Monitoring frequency is twice a year.

Long-tem observations of radionuclide concentration showed that groundwater in boreholes mainly contain natural radionuclide K^{40} with 1Bq/l activity. Concentration of gamma-nuclides (Co^{60}, Cs^{137}) and Sr^{90} is within background level, i.e. 0,002-0,003 Bq/l. Tritium concentration is in the range from 2 to 50 Bq/l. Sampling of ground water from the boreholes is carried out with the help of a drowned pump after preliminary pumping, i.e. complete evacuation of water from the boreholes.

19.2.8.4. Monitoring of radioactive emissions at INPP

The most "productive" radioactive emission sources, namely the ventilation lines in building 101/1 (Unit No. 1), 101/2 (Unit No. 2) and 150 (building for utilization of liquid radioactive waste), are monitored continuously. Monitoring of buildings 101/1 and 101/2 is provided with the help of the automatic radiation safety monitoring system (AKRB) "GORBACH" and the emissions radiometer RKS-03. Radioactive emissions into the ventilation lines of building 150 are monitored with radiometer RKS-03. The indication of the systems is sent to the radiation monitoring board.

All sources of radioactive emissions at INPP are assessed by means of laboratory monitoring. The samples are usually taken manually. The samples are analyzed and the results are recorded in the log and on the radiation monitoring board.

19.2.8.5. Purification of radioactive emissions

Purification of radioactive emissions is carried out at special filter plants. Ventilation systems are equipped with purification facilities absorbing aerosols by special filters.

The technology of cleaning gaseous and aerosol effluents from the reactor core and the turbine condensers is based on their natural decay when they are kept in the hold-up chambers, purified by aerosol filters and subjected to dynamic sorption with absorbent carbon SKT-3 in radiochromatographis char columns. Each cell of the filter plant designed for cleaning from radioactive aerosols contains four filters. The filter efficiency shall be at least 98,8%. The char absorbers effectiveness shall be at least 98%.

In the Laboratory of Radiation Safety the Radiation Protection Department monitors the effectiveness of all gas purification facilities in accordance with the monitoring schedule. If the effectiveness is less than normal, the RPD sends the measurement results to the Reactor Department, which is in charge of the gas purification system maintenance. The Reactor Department replaces the filter elements (aerosol filters and coal) and installs additional purifying columns. The replaced filters and coal is discharged as solid radioactive waste.

19.2.8.6. Licensing of emissions

In the end of each year basing on the results of discharged gaseous radioactive emissions INPP prepare the report and calculate the population dose caused by this waste. In 2003 the dose for a critical group caused by gaseous aerosol emissions was by 1538 less than 0,1 mSv (limit according Lithuanian regulation).

To operate INPP has to obtain the permission to use natural resources. With the permission we agree the ultimate gaseous radioactive emission. In order to obtain the permission to discharge radioactive substances into the air INPP has to submit the application for radioactive emissions into the environment and if the application is approved INPP can do it.

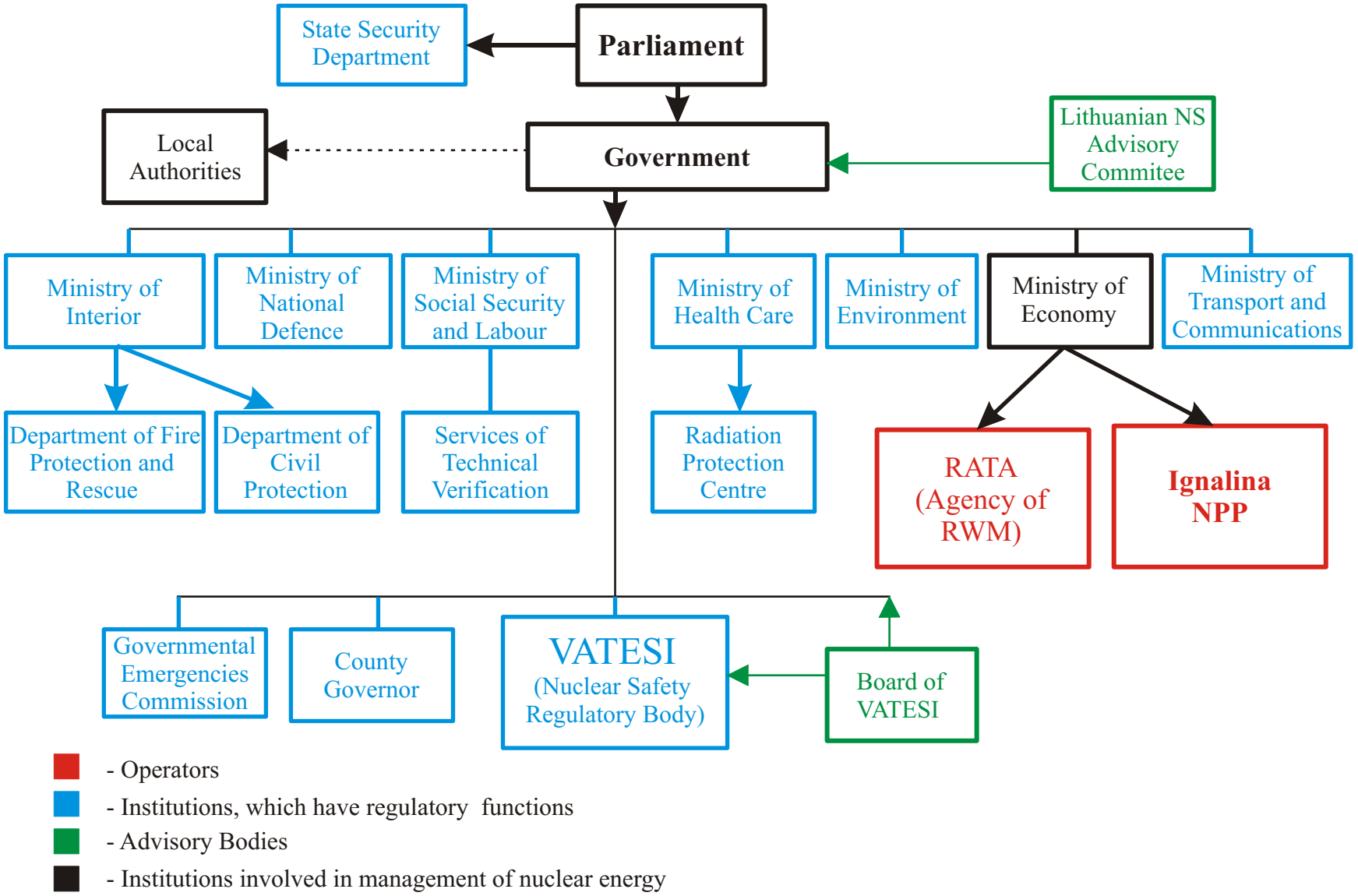
The operating procedure on emissions monitoring specifies the limits and if these limits are exceeded INPP starts to search for the source. There is a schedule of radiation condition monitoring

at the plant and it also has to be approved by appropriate authorities in Lithuania. The monitoring is carried out in accordance with appropriate procedures of laboratory analysis and on-line monitoring. The reports on emissions are submitted to all authorities involved. In case the emission limits are exceeded during the day or just once, VATESI and the Ministry of Environment shall be notified.

ANNEXES

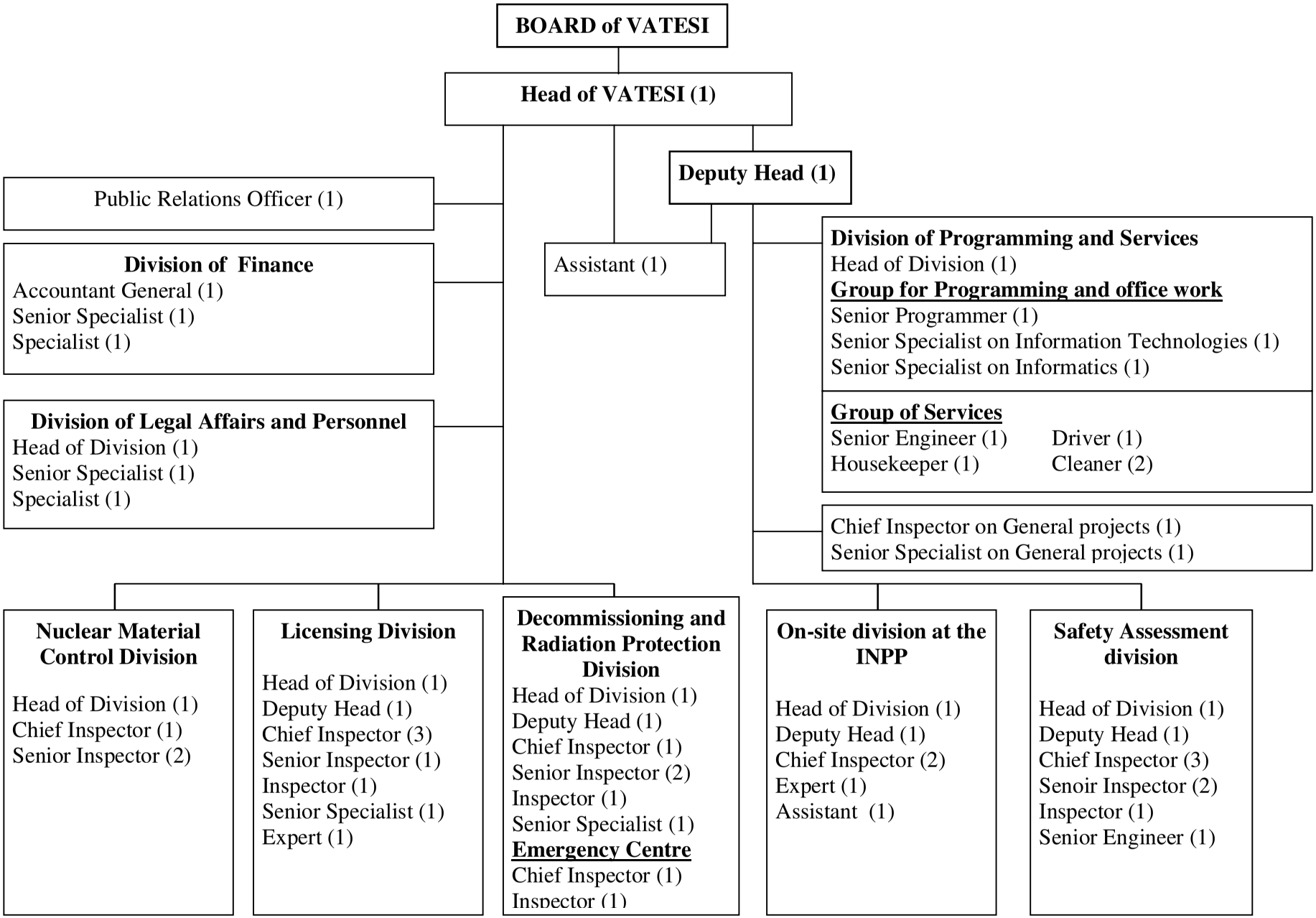
Annex to 7.1.

Chart of interaction between regulatory bodies and INPP



THE STRUCTURE OF VATESI

Annex to 8.3.



Annex to 8.4.

GOVERNMENTAL STRUCTURE – AUTHORITIES FOR NUCLEAR SAFETY AND RADIATION PROTECTION