NUCLEAR SAFETY REPORT

IMPLEMENTATION OF THE OBLIGATIONS OF THE CONVENTION ON NUCLEAR SAFETYIN LITHUANIATHE FIRST LITHUANIAN REPORT IN ACCORDANCE WITH ARTICLE 5 OF THE CONVENTION (1998)

Article 6: EXISTING NUCLEAR INSTALLATIONS

Each Contracting Party shall take 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

Reported in Annex to 6.1

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

The same as in 6.1. Reported in Annex to 6.1

6.3. Overview of safety assessments performed for Ignalina NPP and the major results of those assessments

Safety and reliability assessment of the Ignalina NPP was made by the design organization and set forth in the Technical Justification of Safety. According to this document reliability of the safety systems complied with the established requirements, thus providing safety of the Ignalina NPP.

6.3.1. Barselina Project

The Barselina project was initiated early in 1992 and has been a vast engineering co-operation effort involving more than 35 man-years of work, about 40% of which has been performed by INPP staff. The main achievements of the project are the following:

- The first full scope probabilistic safety analysis of an RBMK reactor performed in accordance with IAEA Guidelines;
- The plant staff implemented the PSA recommendations to improve safety.

The PSA findings are taken as a basis:

- for several safety improvements already implemented within the SIP-1 Programme and indicating several of the proposals now also documented in the SAR and RSR reports;

- for development of Emergency Operating Procedures, EOP, already started and to be finished within the SIP-2 Programme;
- for development of the RMMS system, carried out in co-operation with US DoE and included in the SIP-2.

6.3.2. Grant Agreement

A Grant Agreement was signed on 10 February 1994 by the Lithuanian Government, the Ignalina Nuclear Power Plant (INPP) and the European Bank for Reconstruction and Development (EBRD), acting as administrator of grant funds provided by the Nuclear Safety Account. The grant was to fund a project of short term safety upgrades in support of the Safety Improvement Program (SIP) being implemented at INPP. Included in the Grant Agreement was a commitment by Lithuanian authorities that an „In-Depth Safety Assessment of the Ignalina NPP“ would be performed. The safety assessment was the responsibility of the INPP with the support of Western and Eastern nuclear safety experts and the reactor designer, NIKIET. Subject to budget and time constraints, the in-depth safety assessment was to be comparable to a Safety Analysis Report (SAR) produced in Western countries to demonstrate the adequacy of plant safety and to provide the major contribution for the regulator in the licensing process. In addition to production of the SAR, this particular project included the independent review of the safety analysis report (RSR) jointly by Western and Eastern experts. Unit 1 of INPP was the objective of this assessment. However, since no significant differences were identified between Units 1 and 2, the results apply to both units. Prior to project execution, Guidelines were developed and endorsed by the regulatory authority (VATESI). This endorsement required the examination of Lithuanian/Russian standards. The examination concluded that in general the current Lithuanian/Russian regulations constitute an adequate framework, but a number of specific areas were identified where the Western practice was to be taken as the basis for comparison for the plant.

A Panel of international nuclear safety experts, Ignalina Safety Panel (ISP), was established in accordance with the Grant Agreement. The objectives of the Panel were to define, monitor and supervise the scope and production of the Ignalina SAR and its review. The Panel was to make independent recommendations to the Lithuanian Government, which has ultimate responsibility for plant safety, regarding a decision for continued INPP operation and implementation strategies of the SAR and RSR recommendations and to the EBRD.

A complete set of SAR and RSR reports was presented to VATESI in the period from March till August 1997.

Ignalina Safety Panel recommendations were presented in written form to the Lithuanian Government in February 1997. In April 1997 ISP members have visited Lithuania to present their recommendations to and discuss them with Lithuanian Government and specialists.

All ISP recommendations were accepted and included into "INPP Safety Improvement Programme No 2" (SIP-2).

SAR has examined three areas that are equally important to the safe operation of a nuclear power plant: Systems Analysis, Accident Analyses and Operational Safety Management. Each area has different requirements and different methods of assessment. Differing degrees of non-compliances with Lithuanian/Russian requirements were found in each area. However none of the non-compliances were severe enough to require shutdown of the reactors while they are being remedied. The points summarising the major findings of SAR are given in Annex to 6.3.

In view of the results of the accident analysis, assessment of the capability of the existing safety systems and of safety management practices produced in SAR, and with expeditious implementation of all of the identified modifications, procedures and processes, the SAR team supported the INPP management conviction that:

i. an adequate safety case for continued operation of INPP has been demonstrated,
ii. the safety case is adequate to the point of first gap closure which is the life limiting factor, and
iii. the plant's safety standards and practices have been assessed and recommendations for improvement have been made and accepted.

The Ignalina Safety Panel has evaluated the SAR development and its independent review. ISP had stated that this project was the first attempt to produce a Western style SAR for any Soviet designed NPP. The Panel believed that it represented an impressive effort that achieved a high degree of success. The Panel made a summary on the major conclusions of SAR and RSR with regard to this project.

The SAR development process was very difficult because of a lack of properly documented information, disagreement on scope and differences in culture, interests and management approaches between Eastern and Western participants. Because of these difficulties the project was delayed approximately one year. During project planning the Panel recognised and accepted that the scope of the SAR was limited by time and available resources. The Panel realised that some issues could not be considered or could be considered only in less detail than would be expected in a Western SAR. However, the SAR represents a major contribution to the Lithuanian regulator to consider for the licensing decision of INPP. However, a limited set of important issues remained for resolution between INPP and VATESI prior to licensing.

The SAR and RSR have identified safety issues. The documents make many recommendations on necessary safety improvements in design, operation and safety culture required for a safety basis for plant operation. These recommendations were summarised.

The Panel reiterated that the Lithuanian Government as the owner of INPP is ultimately responsible for plant safety. The Panel held the view that the most important safety issues in design and operation had to be resolved without delay. Specifically the Panel recommended that neither unit should be restarted from its extended 1997 maintenance outage until the most important safety issues identified in the Panel's Recommendations are resolved to the satisfaction of the Lithuanian authorities.

The main ISP recommendations on improvement of the INPP safety level were the following:

General Recommendations

The INPP is in need of significant improvements in safety before its operation can be considered tolerable within the time defined by the Grant Agreement.

The Panel holds the view that the most important safety issues needing immediate resolution are as follows:

- The INPP should introduce an appropriate management structure to ensure safe operation of the plant, efficient implementation of necessary safety improvements and adequate support of the licensing process;
- The safety case for the reactor control and protection system should be completed by INPP;
- The safety case for the accident localisation system should be provided by INPP;
- The safety case for the structural integrity of the reactor cooling circuit should be provided by INPP;
- A fire hazard analysis for all safety systems should be carried out by INPP;
- INPP should develop and implement emergency operating procedures and the limits and conditions of safe operation.

For both units the plan must include action items covering the identified safety, management and organisational issues. In particular, the following measures have to be completed prior to restart after 1997 annual shutdown:

- commit to an appropriate management structure;
- complete a single failure analysis of the control and protection system;
- identify and implement design and procedural modifications required to compensate for control and protection system deficiencies;
- complete planning and start development of a safety case for the structural integrity of the reactor circuit; as part of this safety case the design analysis required by the SAR/RSR on critical reactor circuit components (drum separator and group distribution header nozzles) should be provided prior to restart;
- complete planning and start development of a safety case for the accident localisation system;
- complete the emergency operating procedures.

Important safety deficiencies discovered by analyses required above should be resolved before restart.

In addition an action plan and schedule for all safety issues must be prepared by INPP and approved by VATESI. It should cover all recommendations of the SAR/RSR and the Panel as well as safety issues identified by the plant and VATESI. Each identified safety issue should have resolution criterion which should be prepared by the plant and approved by the regulator. Implementation of the action plan requires immediate and aggressive action.

Specific Recommendations to the Donor Countries

The Panel recognises the urgent need for and supports an integrated international assistance program that builds upon the existing safety improvement program of INPP and includes guidance to VATESI and its TSO's.

Future assistance programs focused on RBMKs should use the experience gained from the „In-Depth Safety Assessment of Ignalina NPP" project . Similar plant specific safety assessments should be performed for all operating units to evaluate the current safety level. These assessments should be connected strongly to a definite licensing process to ensure a serious commitment to meet scope and schedule by all parties (NPP, designer, regulatory authority, TSO) involved.

The „In-Depth Safety Assessment of INPP" is the first attempt to provide a plant specific Western-style safety assessment for any Soviet designed NPP. The Ignalina SAR and RSR thus represent a unique multilateral project to use internationally recognised safety principles and practises for the safety assessment of Soviet designed NPPs. The transfer of methodologies and approaches from the Ignalina in-depth safety assessment to other Soviet designed NPPs would be highly valuable.

Because Ignalina NPP is of more recent design, and has higher power rating the Panel notes that the direct transfer of generic findings and recommendations does not replace the need for plant specific in-depth safety assessment by the plant operator. Every site has specific issues.

The Panel believes that the project management approach worked well. Specifically: The organisation of this project which separates the SAR production and the independent review is an excellent approach. It is important that the independent review be performed in parallel with the SAR production and provide interactive feedback thereby improving the final product. The use of a Western management team responsible for organisation and quality assurance is also effective.

In 1997 an independent review (ordered by VATESI) of documents presented that time by Ignalina NPP in support of its application for Unit 1 license (including translated and signed by INPP version of SAR, SIP-2, and different reports on SIP-2 measures implementation) was performed by Ignalina Safety Analysis Group of Lithuanian Energy Institute (one of the main VATESI's TSOs). This review included an independent assessment of safety related, supporting and auxiliary systems of INPP.

The main conclusion of this review is that safety of INPP is adequately demonstrated (at least till the closure of gas gap) with the condition that all SAR and RSR recommendations will be implemented. License to continue Unit 1 operation can be granted after implementation of all urgent ISP, SAR and RSR recommendations.

6.3.3. Analysis of Accident Localization System

An evaluation of the RBMK-1500 Accident Localization System has been done by Ignalina Safety Analysis Group (ISAG) personnel in colaboration with University of Maryland (USA). This is a first analysis that considers both short and long term responces of the ALS for full range of loss-of-coolant accidents (LOCAs) employing state-of-the-art codes. An adequate modelling of the RBMK-1500 ALS is performed using new C11AF version of CONTAIN code. The analysis employes mass and energy source from calculations performed using RELAP5 code. It is shown in this study that for the broad range of LOCA events analysed design loads on the ALS are approached or marginally exceeded only for those cases where multiple failure of safety systems is assumed.

6.4. Overview of Ignalina NPP safety improvement programmes

6.4.1. Post-Chernobyl Modifications

After the Chernobyl accident, technical and organisational changes were prepared and implemented in order to improve the operational safety of all NPP's with RBMK reactors. These changes had the following objectives:

- reduce the positive steam reactivity coefficient to less then 1b,
- redesign control rods in order to increase the prompt shut-down reactivity,
- install programs designed to calculate the effective reactivity reserves and to display the results at the operator's panel,
- eliminate the possibility of disconnecting the emergency protection system when the reactor is at power,
- modify technical specifications re pump operation to ensure that even at low power at low power a sub-cooling margin is maintained at the reactor inlet.

The reduction of the positive steam reactivity coefficient at the Ignalina NPP, from +4.5b; to +1b, was achieved by installing from no less than 52 additional absorber rods in the core, and increasing the effective reactivity reserve to from 53 to 58 manual control rods. In addition, replacement fuel enrichment has been increased to 2.4 %.

The increase in emergency protection system effectiveness was achieved by three independent means. In the first modification the old type of absorber rods were replaced by a re-designed type, in which the water column in the bottom part of the CPS channel has been eliminated.

Secondly, the modernisation of the CPS rods servodrive increased their speed of insertion into the core. This allowed a reduction of the insertion time from 18 seconds to 14 seconds. When these changes were implemented, the prompt effectiveness of the emergency protection system reached 0.9b/s, which is about 8 times higher than the value before the Chernobyl accident.

The third stage of increasing the control and protection system effectiveness was to install a new design of the fast-acting scram rod in all the operating RBMK reactors. This new design eliminated the water which used to slow down the rod movement. The channel walls are now cooled by a thin film of water, while the rod moves in a gaseous environment.

The new design was tested at the Ignalina and St. Petersburg NPPs in 1987-88. It was shown that as the 24 FAS rods are fully inserted in less than 2.5 s, achieving more than 2b of negative reactivity.

Besides the improvements mentioned above, several other important improvements were made which increased the CPS effectiveness:

- the number of shortened absorber rods was increased up to 40,
- automatic reactor shutdown was provided for when reactivity reserves fall below 30 manual control rods.

All of these mean to improve the neutronic characteristics of the reactor and increase the emergency protection system effectiveness and thus diminish the chances of uncontroled increase in reactor power.

6.4.2. Safety Improvement at INPP in 1993-1996

6.4.2.1. The Safety Improvement Programme No. 1 (SIP)

The first Safety Improvement Programme at INPP - called SIP - was carried out in the period 1993 to 1996. The Programme was of short-term nature. It was financed from INPP own funds, NSA/EBRD grants and grants from Western countries, mainly Sweden. Considerable support has also been provided outside SIP by the Swedish government through SWEDISH INTERNATIONAL PROJECTS Nuclear Safety (SIP).

The most important tasks of the first Safety Improvement Programme (SIP) were:

- Improvement of visual and non-destructive testing of equipment for reactor channels and primary system components;
- Installation of auxiliary devices for steam-gas mixture release from the reactor cavity in case of fuel channel rupture;
- Improvement of fire protection and alarm systems;
- Improvement of operating staff and environment radiation control;
- Engineering assessment and choice of reactor auxiliary protection system;
- Preparations for the installation of a full-scope simulator;
- Program development for the information and computer system TITAN and start of the setting up of the system;
- Improvement of the equipment maintenance procedure;
- Replacement of the hydrogen content control in the ALS instrumentation;
- Replacement of MSR valves;
- Development of a computer system for control of technical documentation.

The following tasks of the Safety Improvement Programme No. 1 which were not completed have been included in the Safety Improvement Programme No. 2 ("SIP-2"):

- Construction of the on-site interim spent fuel storage;
- Development of a cementation facility for spent ion exchange resins;
- Full-scope compact simulator;

- Development of the additional reactor scram system activated by a reduced flow rate through the group distribution headers of the primary coolant recirculation circuit;
- Development of the additional reactor protection meant to shut the reactor down in case of a reactivity margins reduced to 30 control rods;
- Redesign of the pipelines downstream the fast-acting pressure regulators with the purpose of preventing crack generation in the joint welds;
- Seismic investigations aimed at clarifying the necessity and organising plant seismic protection;
- Equipment for safety-related systems: replacement of shut-off valves in the CPS cooling circuit and the intermediate circuit;
- Improvement of the present Emergency Core Cooling System algorithms.

6.4.2.2. Other programmes

Lithuania has multilateral and bilateral projects, mostly concerning safety of nuclear power plant, with most highly developed Western countries, as Sweden, Germany, USA, UK, France, Belgium, Italy, Switzerland, Denmark, Canada, Finland and Japan. As the main multilateral projects TACIS-founded International RBMK Safety Review Consortium, Lord Marshall's Users Group for Soviet Designed Reactors, the IAEA extra budgetary program on RBMK reactors can be mentioned. One of the most important for Lithuania is the international project "Safety of Design Solutions and Operation of NPP's with RBMK Reactors" covering broad range of safety related topics in which Unit 2 of INPP is used as a reference plant.

There is a number of Lithuanian - USA projects financed by the Department of Energy and USAID in the frame of Nuclear Safety Assistance Program for Lithuania. INPP Source Book was prepared and printed in 1994 in the close co-operation with the University of Maryland. Brookhaven National Laboratory (BNL) and Science Application International Corporation (SAIC) from the USA together with ISAG developed RELAP5 model for INPP. BNL also took part in the development of INPP Analyser and University of Maryland in the assessment of Accident Confinement System using code CONTAIN. The team of American experts, led by Gilbert / Commonwealth International Inc., is preparing the project of improved reliability communication system between INPP and main interested bodies for emergency situations.

GRS (Germany) and Ignalina Safety Analysis Group (ISAG) are involved in the co-operative project of Analysis of Safety Aspects of INPP, including the studies of neutron dynamics and thermal-hydraulics. CORYS (France) and TRACTEBEL (Belgium) personnel training in normal and a number of accidental situations developed compact simulator for INPP.

Japan as well as Canada are mainly oriented to the improvement of safety management and safety design by providing educational and training courses in the formation of organisations, safety design, waste management, maintenance and inspection of NPPs. Lithuanian-Italian co-operative project of seismic evaluation of INPP is finished. In the frame of EBRD project a seismic network is to be placed in and 30 km round the plant. The British authority AEA has launched two INPP specific programs: checking the reliability of the INPP ultrasonic inspection devices on British mock-ups during the plant operation. A Swiss consortium of independent engineers evaluated the design conceptions for interim storage of spent fuel elements. Finland in association with Sweden is working on radiation control at INPP.

In parallel with the SIP-1 a number of other safety improvement activities were carried out, see below.

Safety Analysis Report (see section 6.3)

Implementation of the findings of Barselina Project

Four phases of joint Lithuanian - Swedish - Russian project "Barselina", level 1 probabilistic safety analysis of INPP Unit 2, are finished. This project provides a unified basis for assessment of severe accident risks for the RBMK type reactors and preparation of remedial measures. Some of improvements highlighted by the PSA have already been implemented at INPP, the project is going on.

Status of Suggestions for Plant Safety Improvements

No	Description	Status	Year/Comment
1	Redundancy and diversity of Unsalted Water supply	Implemented	1995
2	Change of normal operation valve settings between AFWS and drum separator	Implemented	1995
3	Closure of MCP bypass valve	Implemented	1996
4	ECCS/AFWS discharge valve power supply change	Implemented	1997
5	Increased relief capacity for relief of steam from the reactor cavity	Implemented at unit 1 and unit 2	1996
6	Flow measurement in each of the GDH loops including procedures, in order to support the operators in controlling injection flow in case of lack of drum separator level.	Not implemented	Expert are discussing the problem of measuring the flow in the GDH loops.
7	Exchange of the BRU-B valves to lower capacity per valve unit.:	Implemented	1994
8	Establishing Emergency Operating Procedures to establish emergency make up flow in the long term possibly combined with depressurization of the primary system.	Not implemented	EOP is in the process of development.
9	Extending the battery depletion time and making EOPs for external grid restoration	Partly implemented	Battery depletion time was assessed to be 30 minutes. VNIPIET analyses shows that the depletion time is approximately 1 hour with the old batteries. EOPs are under way, see no 8 above.
10	Diversification of emergency power supply	Rejected	Rejected due to small gain. This issue has also been raised by the SAR project.
11	Control power supply reconfiguration for BRU-D valves and Control bus HZ-18.	Not implemented	The finding from the Barselina project is verified and a HZ18 project is in progress.
12	Improving procedure and reducing test intervals for ECCS header check valve and MCP-ECCS header jumper valves.	Implemented.	
13	Improving ECCS logic to reduce need for operator intervention	Implemented.	1997. The improved ECCS logic is partly considered in the phase 4 model.
14	EDAF to ALS system valve configuration change	Not implemented	
15	Improving valve configuration in the Intermediate Cooling System	ICS change implemented	The design of the implementation has increased the dependency in an unfortunate way. Phase 4 suggests a redesign.

16	Establish procedures to use ALS upper pools to supply water to ECCS pumps	Not implemented	
17	Automatic DS level regulation.	Not implemented	Expert discussions indicate that there are some difficulties involved with automatic DS level regulation.

The results from phase 4 indicate some new recommendations in addition to the suggestions from before.

Phase 4 Additional Comments on Design Changes

No	Design change	Phase 4 comment
1	Replacement of MRVs.	The new model results in a smaller impact of this plant change than before.
2	Change of design for ICS cooling of MFWS, AFWS and ECCS.	The change was introduced because of findings from earlier phases in the project. However, the new design has some important drawbacks, because of the introduction of a dependency on a single cooling circuit for all primary system injection pumps.
3	Installation of automatic devices for DS level control.	This level control now rely on operators. It is difficult to justify low numbers for operators in carrying out this action (current human error probability used is 0.1.)
4	Possible residual cooling by DS area through spray and ventilation cooling.	This can be enough for RHR. Some preliminary analyses by NIKIET indicates that this could be possible after 4 hours.
5	Remove large dependencies on bus HZ19.	The dependency of bus HZ19 has increased as a result of the new design of the AFWSW cooling via ICC (see number 2 above).

Management and Organisation Development

During 1995 and 1996 INPP has carried out a Management and Organisation Development programme under the direction of the INPP Director General and with support by Swedish experts. INPP has started a process of developing safety culture, quality, organisation and management. The INPP upper management and parts of the management at lower levels have acquired new knowledge and new attitudes and started to apply these. Those changes in attitudes, work processes and organisation have undoubtedly had a safety enhancement effect.

The INPP programme for Management Development during 1995 and 1996 was directed towards three goals:

- Training and development of individuals and teams;
- Preparing managers for implementing a quality programme;
- Preparing managers for a process of change at INPP.

Training and development of individuals and teams have resulted in new skills and knowledge that have been noticeable in the daily work of the managers at INPP. Furthermore, management teams have been created and then strengthened with time.

QA Programme

A quality policy statement has been issued by the INPP Director General and an ambitious Quality Assurance programme has been initiated. A department for Quality and Safety, that reports directly to the Director General has been set up. Quality Assurance procedures at Level 1 have been developed in accordance with IAEA Guidelines and are approved.

Safety Committee

An independent Plant Safety Committee of Western kind was established in February 1996 and has started its work in a successful way. The Committee is composed by nine technical specialists in different fields having personal mandates from the Director General. It works as an independent body as advisor of the Director General, but has no executive function. It has been able to influence managers in the operating organisation to accept its proposals and to understand the distribution of roles and responsibilities between the Committee and themselves.

6.4.3. Safety Improvement at INPP in 1997-1999 (SIP-2)

The safety improvement activities during 1997-1999 are an integrated programme covering activities based on:

- SIP-1 experiences;
- SAR and RSR recommendations;
- EBRD Safety Panel Recommendations;
- Technical improvements identified within INPP or proposed by Western parties;
- The management and organisation development activities that were started during the SIP-1 period.

The integrated programme (SIP-2) will be continuously up-dated and revised. Funds will mainly come from INPP itself. Some funding might be found through bilateral and international co-operation. SIP-2 shall be completed in three years (1997 - 1999). All activities within the Programme are divided in three groups:

1. Design Modifications;
2. Management and Organisation Development (including QA issues);
3. Safety Analysis.

Each activity has been assigned a priority. Furthermore, each activity is given a time limit for completion.

All modifications will be implemented according to the established procedure for licensing modifications.

For each modification (safety issue) the Operating Utility has to develop implementation (solution) criteria subject to approval by VATESI.

The main activities (measures) of SIP-2 are presented in Annex to 6.4.

Implementation of SIP-2 will require about 500 MLt (125 MUSD) and additional 420 man-months of engineering expertise. The labour cost is not included in the provisional estimate of 500 MLt.

6.5. Position of Lithuania as to further operation of Ignalina NPP

Ignalina NPP is the most important utility in Lithuania with a very important role as a stabilizing factor during an extremely difficult period of fundamental changes in the country's economy. INPP's stable work allowed comparatively cheap energy supply for all Lithuanian customers as well as considerable power export to the neighboring states.

INPP enabled Lithuania to significantly reduce the consumption of crude oil and natural gas for electric power production and at the same time considerably facilitated uninterrupted supply of these products even during economic blockade period. INPP did not suffer any shortfalls in the fuel supply, which were quite frequent during the transition period. All this emphasizes the importance of INPP not only in the recent past, but also in the future, when a stable supply of reasonably cheap electricity to the growing industry becomes very significant. As moderated price power is one of the most relevant factors accelerating development of modern economy, the revival rate of Lithuanian economy depends on the ability to use it efficiently and also on the prospects of our industrial output and commodities to compete on the world markets.

For purely economical reasons over 80% of electric power in Lithuania today is produced by the nuclear power plant and its production cost is only about 50% in comparison with production cost of thermal power plants. Therefore Lithuanian Government dedicates extraordinary attention and efforts to essential improvement of safety and reliability of operation of the Ignalina NPP. It is urgent not only because of indisputable necessity to protect our citizens of any harmful effects. A generally approved safety level of the INPP will be one of principal preconditions on the Lithuania's way to the European Union.

Closure and decommissioning of one or both of the INPP units have not been financially prepared. When INPP was taken over from the former Soviet Union by the independent Republic of Lithuania there were no funds for future fuel back-end and decommissioning costs. Those funds are now being established and built up, but they will be entirely in-sufficient at the time of expected closure of Unit 1 around 2005.

In 1995 a preliminary assessment of costs for the nuclear back-end was performed. The estimated total cost at the date of the report was 9 BLitas, of which the largest parts were: encapsulation and disposal of spent fuel (6.3 BLitas), decommissioning of INPP (1.0 BLitas) and interim storage of spent fuel (0.9 BLitas).

Closure of one or both of the Ignalina units would have severe economic consequences for the Republic of Lithuania for many years thereafter. Economical support from outside, for instance in the form of grants, would therefore be a prerequisite for closure. The earlier the closure, the more serious would the consequences be, the more sensative would be the Lithuanian recovering economy to different unfavorable impacts.

Before start decommissioning of any unit a detailed plan with precise cost estimation must be prepared. CEC PHARE project "Technical Support to Lithuanian Authorities in Developing the Basic Tools and Methodologies for Preparing a Preliminary Decommissioning Plan for Ignalina NPP and for Assessing the Cost Estimates and Funding Needs" must be accomplished in 1998 and the real plan itself should be ready before July 2000.

The analysis of the impact of the increased price of electricity due to possible shut-down of INPP on the industry and infrastructure of Lithuania was recently completed in August 1998. Under the request of the Ministry of Economy of the Republic of Lithuania Swedish business consultancy firm Grufman Reje made a study “Cost of closure of Ignalina NPP in Lithuania, defined as opportunity loss”. Results of the study showed that premature closure and not rechanneling of Ignalina NPP’s reactors as it was designed for RBMK type reactors would cost the Lithuanian society 3.3 - 3.9 Billion USD (in 1998 prices) during 2005 – 2025. It amounts to approximately 50% of the Lithuanian GDP in 1996.

Therefore, in the case of closure of one or both of the Ignalina units the Lithuanian Government will need support to cover the costs of:

- the decommissioning and back-end costs;
- the investment into and operation of the alternative production facilities;
- the infrastructural and social problems in Visaginas (residence of INPP personnel);
- the impact on industry and the whole economy, increasing the price of electricity.

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:*

- *the establishment of applicable national safety requirements and regulations;*
- *a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;*
- *a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;*
- *the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.*

7.1 State regulation of nuclear power utilization

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

7.2. Summary of laws, regulations, licensing system, inspection, assessment and enforcement process to govern the safety of Nuclear Installations

The principal objectives of state regulation of nuclear energy safety is:

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

The main national law, which regulates use of nuclear energy, is Law on Nuclear Energy Seimas (Parliament) promulgated it on 14 November 1996. This law is not the only law regulating this area: the Law on State Enterprises (promulgated in 1990), Law on Energy (promulgated in 1995), Law concerning control of import, transit and export of strategic goods and technologies (promulgated in 1995) and other which also regulate usage of nuclear energy.

State control and supervision of nuclear facilities shall be effected during all the major stages of work: design and construction, commissioning, operation and decommissioning.

Lithuania has signed international conventions, which directly regulate the use of nuclear energy:

- The 1968 Treaty on the non-proliferation of Nuclear Weapons was ratified in 23 Sep 1991. The agreement with IAEA for Application of Safeguards in Connection with the Treaty on the non-proliferation of Nuclear Weapons was signed in 1992;
- In 1992, Lithuania acceded the 1963 Vienna Convention on Civil Liability for Nuclear Damage, the 1988 Joint Protocol Relating to the Application of the Vienna Convention and Paris Convention and, the 1997 Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage;
- The 1986 Convention on Early Notification of a Nuclear Accident was acceded in 16 Nov. 1994;
- The 1979 Convention on Physical Protection of Nuclear Materials was acceded in 7 Dec 1994;
- The 1994 Convention on Nuclear Safety was ratified in 12 June 1996;
- The 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was signed 30 September 1997;
- The 1997 Protocol to Ammend the Vienna Convention on Civil Liability for Nuclear Damage and Convention on Supplementary Compensation for Nuclear Damage were signed 30 September 1997.

Grant Agreement between EBRD, acting as administrator of grant funds provided by the Nuclear Safety Account, and the Government of Lithuania was very helpful in the resolution of most urgent safety issues. After the preparation of Ignalina NPP Safety Analysis Report by the team of Lithuanian and foreign specialists and evaluation of the necessary further investments for safety enhancement, Lithuanian Nuclear Power Safety Inspectorate (VATESI) should make a decision about the issuing (or not) the licence for the further operation of Unit 1.

VATESI has produced and issued in 1997 the Regulation: "Licensing for operation of INPP". VATESI has presented the guide for the INPP and requested time schedule from INPP regarding the delivery of all Application documents necessary to be included in the licence application. The response from the INPP concerning the time schedule was accepted by VATESI. VATESI developed it's own time schedule for licensing of INPP, nominated responsible personnel for reviewing and decision making process. VATESI also signed agreement with Lithuanian TSO for reviewing of application documents and participation in special inspections during licensing of INPP. Many of foreign countries are providing support to VATESI in this process. The NRC and DoE from US, the H&SE from UK, DG 1A and the RAMG chairman from the CEC and the Ministry of Environment and SiP from Sweden have declared willingness to provide resources for support to VATESI in licensing activities. In the licensing it was suggested that a parallel support project be organised between western industry and the INPP.

All this assistance for VATESI and their TSO will support the licensing INPP in accordance with prepared and agreed time schedule based on acceptable safety level of INPP.

The functions of safety and control of nuclear facilities, also the supervision of accounting of nuclear materials shall be performed by the State Nuclear Power Safety Inspectorate of the Republic of Lithuania (VATESI). The supervision and control of nuclear facilities shall also be carried out, within the framework of their respective competence, by other state institutions referred to in this Law, as well as by local authorities in the territories of their jurisdiction.

State control and supervision bodies act in accordance with the laws, subordinate legislation, the norms and rules of the Republic of Lithuania, regulating the procedure of operations in the sphere of nuclear energy. Decisions taken by officers of state control and supervision bodies within the framework of their competence shall be binding on all natural and legal entities and shall be implemented strictly within the established time limits and in accordance with the prescribed procedure. Licences for the activities referred to design, construct and reconstruct nuclear facilities, installations and equipment shall be issued by VATESI with the approval of the Ministry of Health, the Ministry of Environment, local authority whose territory or its part is within the sanitary protection zone of a nuclear facility.

Licences for the activities referred to operate nuclear facilities and repair their protection systems; to engage in any activity that might have an effect on a safe operation of nuclear facilities; to retire a nuclear facility from service; to store and dispose nuclear and radioactive materials and their waste; to acquire, possess and transport nuclear materials shall be issued by VATESI with the approval of the Ministry of Health and the Ministry of Environment.

The Ministry of Environment with the approval of VATESI and the Ministry of Health for the activities referred to acquire possess and transport radioactive materials shall issue licences.

Licences for the activities referred 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 shall be issued by the Ministry of Economy with the approval of VATESI, the Ministry of Environment and the Ministry of Health.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Ministry of National Economy shall:

1. perform the functions of the founder of operating organisations of nuclear facilities;
2. implement state policy in the sphere of nuclear energy;
3. organise bilateral and multilateral international co-operation in the area of nuclear energy;

4. organise nuclear accident prevention, accident management, investigation and elimination of the consequences of the accident in the nuclear facilities under its control;
5. within the scope of its competence represent the Republic of Lithuania in international nuclear energy organisations and conferences;
6. 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;
7. 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;
8. 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;
9. perform the functions established by this Law and those assigned by the Government.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the area of nuclear energy 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:

1. 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;
2. 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;
3. take part in decision making about the construction of nuclear facilities in their territory, the reconstruction of the facilities or their decommissioning;
4. obtain information from the facility operator about the failure, shut-down, release of radioactive materials and other incidents;
5. prepare the population protection plans, implement them in the event of nuclear accidents;
6. 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.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy the Ministry of Health:

1. 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;
2. undertake environmental health studies of radiation impact on people and their environment and establish health protection requirements;
3. co-ordinate the siting for nuclear facilities and undertake state environmental health analysis of their construction;
4. 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;
5. 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;
6. undertakes monitoring of the health of the nuclear facility personnel and the residents of the monitored zone of the facility;
7. ensure the preparedness of medical institutions for the elimination of the consequences of the accident;
8. establish the radiation protection norms for the population and control compliance with them;
9. 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;
10. determine occupational diseases for the personnel in the sphere of nuclear energy and study the causes of the diseases;

11. carry out population education on radiation protection.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the area of nuclear energy the Ministry of Environment:

1. together with VATESI and the Ministry of Health establish the procedure for the import, export, transit, transportation and disposal of radioactive materials, waste included, in the Republic of Lithuania;
2. 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;
3. jointly with the Ministry of Health establish radiation protection standards and monitor compliance with them;
4. assess the impact on the environment;
5. co-ordinate the projects for siting, reconstruction and expansion of nuclear facilities and facilities related to their operation, and issue licences for the use of natural resources;
6. organise and co-ordinate state radioecological monitoring within the monitoring
7. zone of a nuclear facility, and control radiological monitoring within the sanitary protection zone of the facility;
8. organise and co-ordinate scientific research of the impact of nuclear facilities on the environment;
9. prepare and approve methods of assessment of radiation damage to the environment and its compensation;
10. periodically inform the public, national and local authorities about the radiation situation in the country and in the environment of nuclear facilities.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Technical Supervision Service at the Ministry of Social Security and Labour shall supervise the 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:

1. take part in drafting laws and secondary legislation regulating transportation of nuclear and radioactive materials;
2. participate in training and certification of the personnel involved in transportation of nuclear and radioactive materials;
3. organise railway transport for the evacuation of the population from the danger zone in the event of a nuclear accident.

The Ministry of Environment:

1. together with VATESI approve technical regulations for the design and construction of nuclear facilities;
2. take part in state supervision of the design and construction of nuclear facilities(structures) in accordance with the procedure established by the Government of the Republic of Lithuania.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Ministry of National Defence:

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

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Department of Civil Defence of the Ministry of National Defence:

1. draw 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
2. in preparing their respective plans of nuclear accident prevention, accident management and elimination of accident consequences.
3. within the framework of its competence implement the measures for the elimination of the accident and its consequences;
4. jointly with other state institutions organise training sessions of population protection in the event of nuclear accidents.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Ministry of the Interior:

1. ensure 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;
2. 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;
3. promptly extinguish fires breaking out at nuclear facilities, participate in the management of a nuclear accident and its consequences, organise radiation monitoring of a contaminated area;
4. exercise and ensure physical safety of a nuclear power plant;
5. draft, co-ordinate and implement interdepartmental anti-terrorist and anti-penetration action plans;
6. analyse and control the crime situation in the regions with nuclear facilities;
7. investigate the cases of theft and illegal possession of nuclear and radioactive materials, also of other dual-purpose commodities;
8. provide assistance in ensuring the safety in transportation of nuclear and radioactive materials in the territory of the country.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The State Security Department:

1. exercise prevention of subversive, sabotage and terrorist acts as well as other offences aimed at damaging the interests of state security at nuclear facilities, in their environment, and on transportation routes of nuclear and radioactive materials;
2. in keeping with the state security interests, undertake operations and inquiries to detect and investigate actions constituting a threat to nuclear facilities, nuclear installations, equipment and technologies.
3. decide upon the credibility of persons working at nuclear facilities or those who are appointed to transport nuclear and radioactive materials;
4. control the effectiveness of physical safety and emergency preparedness of the nuclear power plant and other nuclear facilities;
5. take part in drafting and implementing the nuclear power plant and other nuclear facilities interdepartmental anti-terrorist and anti-subversive co-ordinated action plans.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy The Governmental Emergencies Commission:

1. direct the activities of management of a nuclear accident and elimination of its consequences;
2. mobilise material and other resources necessary for the containment of a nuclear accident;
3. perform other tasks and functions provided in its regulations.

In implementing state regulation of nuclear safety, radiation protection and accounting for nuclear materials in the sphere of nuclear energy VATESI shall:

1. together with the Ministry of Environment approve technical regulations of the design and construction of nuclear facilities, and of maintenance of the structures;
2. 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;
3. control the compliance with the requirements stipulated in licences and safety regulations;
4. draft the state regulatory system for the accounting for and control of nuclear materials and ensure its viability;
5. establish the procedures of accounting for and control of nuclear materials in the Republic of Lithuania and monitor compliance with them during the import, export, re-export, transport, use, storage and disposal of nuclear materials;
6. issue licences to legal and natural entities for the design, construction, operation, safety appraisal of nuclear facilities and their systems, and other work related to safe operation of nuclear facilities;
7. inform the mass media about the radiation and safety situation in nuclear facilities;
8. prepare surveys on the safety of nuclear facilities and submit them to the Government, local authorities and other authorities concerned;
9. organise and support research into and expert analysis of nuclear safety and radiation protection, independently carry out the analysis of incidents and occurrences;
10. 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;
11. impose sanctions established in statutory acts on violators of safety rules;
12. 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.

Standards and rules (guides and regulations) of nuclear safety and radiation protection approved by the Government or by the institutions authorised. It is mandatory for all public and local authorities, enterprises, institutions, organisations, their associations, the officials and other persons whose activities are related to the operation of nuclear facilities, to the use and management of nuclear and radioactive materials therein. Safety guarantees in nuclear energy based on the requirements of the laws and regulations of the Republic of Lithuania, on the requirements of the international treaties to which the Republic of Lithuania is a party, also on the recommendations of the IAEA and other international organisations and authorities.

VATESI confirmed the regulations on Physical Protection of Nuclear Facilities in 1997 and also confirmed part of regulation and guides on nuclear safety and development procedures. Licensing procedures, list of regulations and guides on nuclear safety has been prepared.

In addition VATESI together with other concerned institutions has prepared draft “Law on Radioactive Waste Management” and participated in drafting laws on radiological protection and on management of Ignalina power plant. According proposed draft law on management of INPP governing board will be established and organisation structure will be improved, responsibility clarified.

New Lithuanian regulations and guides

1. General Safety Rules of Nuclear Power Plants, VD-B-001-0-97, (OPB-97)
2. Nuclear Safety Rules on NPP Reactor Facilities, VD-T-001-0-97, (PBYa-97)
3. Regulations for Issuing a License for Unit Operation at Ignalina NPP, VD-L-001-0-97
4. Regulations for Development and Review of Nuclear Regulatory Documents, VD-B-002-0-97
5. General Regulations for Quality Assurance Systems at Nuclear Power Facilities, VD-KS-001-0-96
6. Nuclear Regulatory Regime in Lithuania. Policy Statement, January 1998
7. Regulation for Licensing of Nuclear Energy Related Activities, Governmental Decree
8. General requirements for Maintenance Programme for NPPs, VD-E-01, June 1998.

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.*

The Republic of Lithuania has undertaken an obligation to ensure safety at all nuclear installations under its jurisdiction, including Ignalina NPP, 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 Safety Inspectorate (VATESI) on 18 October, 1991. Such system to ensure nuclear safety is a must for any country, envisaging the development of nuclear energy. The basic guidelines for the regulatory institutions are formulated in the recommendations of IAEA.

The establishment of VATESI was complicated by the absence of experts, qualified in nuclear safety regulation and inspection.

At first VATESI consisted of a group of inspectors, working at Ignalina NPP.

On 21 October, 1992, the Government of Lithuania approved the statute of VATESI, regulating its activities and determining the basic objectives, functions, and rights of the inspection.

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 organisations.

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 or radiation related production or technologies;
- 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.

VATESI is an independent organisation, the head of VATESI is appointed by the Prime Minister. VATESI reports directly to the Government.

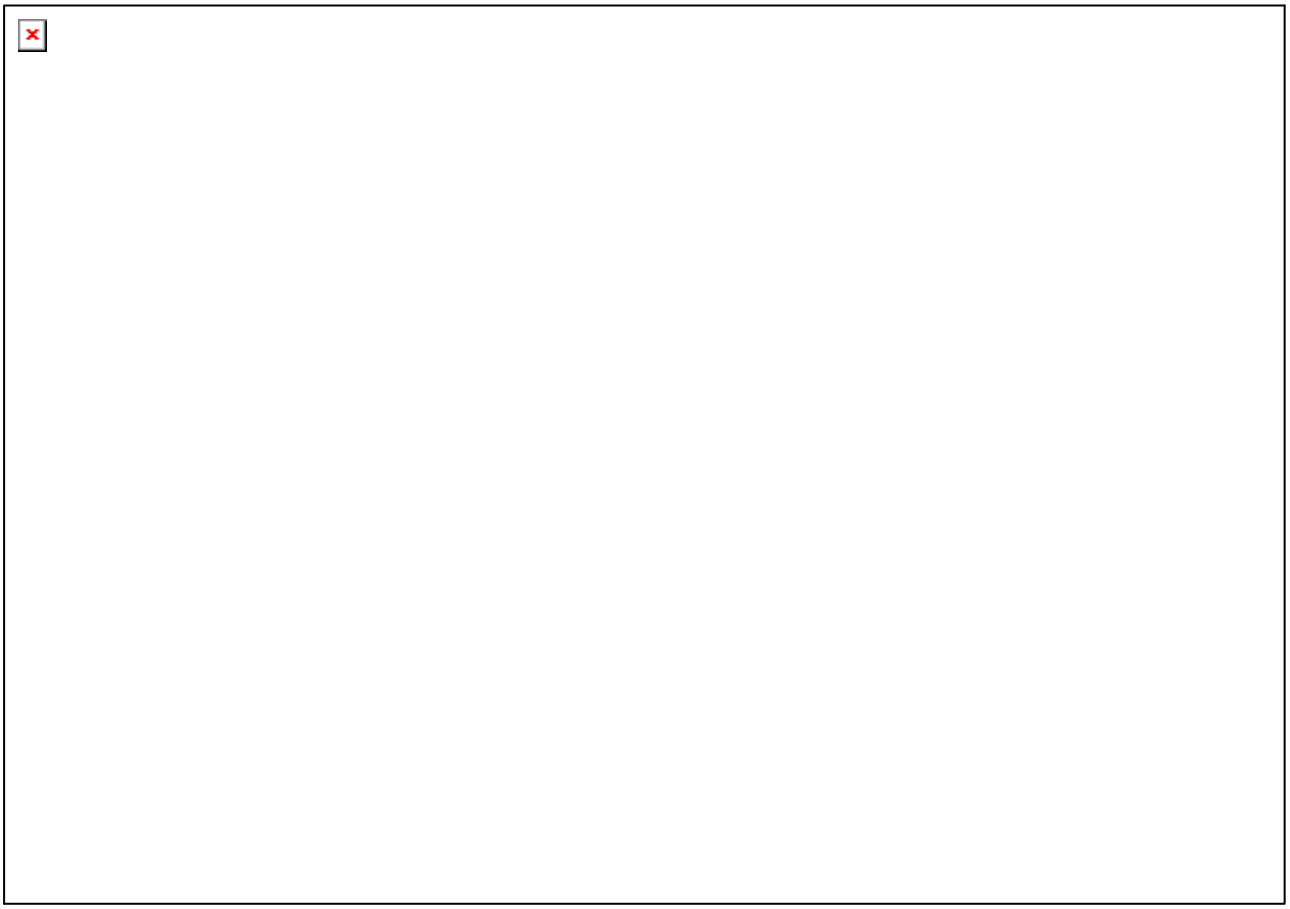
The internal structure of VATESI is presented on Fig. 8.

According the Resolution No.722 of 04 07 97 of Government of Lithuania the Statute of VATESI was expanded with the article “Board of the Inspectorate”. The Board shall assist the Government to formulate the nuclear energy safety strategy. Activities of the Board shall not limit independence and responsibilities of the inspectorate as the regulatory authority. The basic objectives for the Board shall be the following: to establish the basic guidelines for the inspection’s activities, to discuss and approve the strategic long-term development plans for the inspectorate, to approve annual reports of the inspectorate’s activities and analyse financial reports, to discuss annual work plans for the inspectorate

and proposals for the state budget of Lithuania, to approve principles for planing and ordering of scientific research and expertise, to improve co-operation between the inspectorate and other state institutions, to improve the provision of information on nuclear energy safety to Seimas, Government and the public, to monitor activities of the inspectorate, related to the implementation of its goals, policy and financing.

The Government of Lithuania in 07 11 97 appointed members of Board. Board consists of seven members: two members of Parliament, one member from the Ministry of Environment, one member from the Ministry of Health, head of VA TESI and two experts from nuclear energy.

Structure of VATESI



Today VATESI consists of 26 employees. Lack of qualified experts is one of the main problems faced by VATESI. The majority of them work in Vilnius, but VATESI also has a group working at INPP, which is an extremely important division of the regulatory authority, performing supervision functions at INPP, the "ears and eyes" of VATESI. Inspectors of the supervision group are involved in the direct monitoring of the technological process within a nuclear installation. They focus their attention on all of the safety-related activities at the nuclear power plant.

VATESI co-operates with technical support organisations in Lithuania, also foreign and international institutions.

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 licence and shall take the appropriate step to ensure that each such holder meets its responsibility.

In 1996 the Parliament of the Republic of Lithuania passed the Law on Nuclear Energy of the Republic of Lithuania. The Law states that licenses issued according to the established order of the Government of the Republic of Lithuania are necessary for those activities:

1. To design, construct and perform significant repair activities of nuclear facilities or nuclear installations;
2. To operate nuclear facilities and repair its safety systems;
3. To perform any other activities that can impact safe operation of the nuclear facilities;
4. To decommission the nuclear facility;
5. To store and to dispose nuclear materials and its waste;
6. To obtain, possess and transport nuclear materials;
7. To obtain, possess and transport radioactive materials;
8. To export, import and to convey as transit goods via territory of Lithuania nuclear, radioactive and other materials that are used in the nuclear energetic, nuclear equipment and also goods of dual purpose that can be used in nuclear technology.

The responsibilities and interrelations of different regulatory authorities in the area of licensing in the Law of Nuclear Energy of the Republic of Lithuania are stated as follows:

- Licences for the activities indicated in the paragraph 1 are issued by the State Nuclear Power Safety Inspectorate (VATESI) in co-ordination with the Ministry of Health, the Ministry of Environment and the institution of the local authority.
- Licences for the activities indicated in the paragraphs 2-6 is issued by the VATESI in co-ordination with the Ministry of Health and the Ministry of Environment.
- Licences for the activities indicated in the paragraph 7 issues the Ministry of Environment in co-ordination with the VATESI and the Ministry of Health.
- Licences for the activities indicated in the paragraph 8 issues the Ministry of Economy in co-ordination with the VATESI, the Ministry of Environment and the Ministry of Health.

According to the requirements and regulations stated in the Law on Nuclear Energy of the Republic of Lithuania it was prepared the Regulations for Licensing of Nuclear Power Related Activities. The document was approved by The Government of The Republic of Lithuania in January of 1998.

The Regulations for Licensing of Nuclear Power Related Activities determine two type license holders for the nuclear power safety related activities. The first type licence holders can be organisations/enterprises that have right to perform services and produce goods for nuclear facilities. And the second type licence holders can be organisations/enterprises that have right to construct, perform significant repair activities, operate or to decommission a specified nuclear facility (this type of licence is issued to the Nuclear Facility Operating Organisations only).

The Regulations for Licensing of Nuclear Power Related Activities determine these duties and responsibilities of license holders (licensees):

- A licensee holding the first type license:
    - must inform promptly the licensing authority and other institutions of regulatory authority about all deviations from the conditions of licence validity;
    - must ensure radiation protection of workers;

- must follow the requirements of the legislation of The Republic of Lithuania, regulations of nuclear power safety and general industrial regulations which are legalised in the established order in nuclear energetic;
- must inform the institutions of regulatory authority about all significant events, incidents, accidents, collapses or similar incidents related with its activity;
- is responsible for the quality of the licensed activity, proper maintenance of documentation, its storage, renewal in time and approval from the licensing authority when it is necessary;
- must ensure the priority of nuclear safety in its activity;
- 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;
- must fulfil the quality assurance program.

- A licensee holding the second type licence:
  - 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 licence 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 legalised 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 licensee is responsible for the submission of documents to the institution of regulatory authority promptly;
- The licensee supervises and is responsible for the quality of work, performed by the contractors, informs the institution of regulatory authority about the activity of the contractor when necessary;
- The contractor may present the information relating to the safety of the nuclear facility directly to the institution of regulatory authority however it doesn't release the licensee from the obligation to submit all important information relevant to the safety of the nuclear facility to the institution indicated above;
- By request of the regulatory authority, the licensee and its contractors must provide all necessary information relating to the licensed activity;
- In accordance with the legislation of The Republic of Lithuania the licensee is responsible for its activity and the activity of its contractors, that could hazard the safety of the nuclear facility or damage the nuclear facility, personnel, inhabitants and the environment.

After the independence of the Republic of Lithuania was declared, the order dated November 25 1991 of the Minister of Energy of the Republic of Lithuania delegated the rights and responsibilities of the Ignalina Nuclear Power Plant Operating Organisation to the Ignalina NPP itself. Ignalina NPP has status of state enterprise.

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 Law states that the Nuclear Facility Operating Organisation:

- is fully responsible for proper and safe operation of the Nuclear Facility;
- has to perform the accounting and control of the belonging to Operating Organisation nuclear materials;
- has to perform investigation of nuclear accidents and incidents;

- has to inform the VATESI and other concerned institutions about all violations of conditions and requirements for safe operation and all disorders of systems and elements that guarantee safety;
- has to ensure the preparedness to eliminate consequences of radioactive accident;
- under VATESI requirement has to present comprehensive information about technical status of nuclear facility or parts of it.

Additional responsibilities and duties for the Nuclear Facility Operating Organisation are specified during state nuclear power safety regulatory control and supervisory performance the responsible for that is the VATESI. It was created strong regulatory body during short period and it established effective regulatory control system in the Republic of Lithuania that obligated the Nuclear Facility Operating Organisation to perform extensive activities in order to increase nuclear power safety. In short period it allowed achieving good results through implementation of safety increasing technical as well as organisational measures.

Nuclear power plant licensing system in the Republic of Lithuania is also based on earlier accepted "practice of annual permissions". Each year after planned annual outage Ignalina Nuclear Power Plant Operating Organisation starts the operation of unit only after it is issued VATESI permission to restart the unit operation. The permission is valid till the next annual outage.

Before annual outage starts, VATESI presents to the Nuclear Power Plant Operating Organisation the list of requirements. Only after implementation of these requirements permission to restart the unit can be issued. The requirements include presentation of reports of annually performed routine safety related measures as well as reports of planned to implement additional safety increasing measures. Through this regulatory control activity VATESI can fully control satisfactory level of routine and additional safety increasing measures performed by NPP Operating Organisation.

Permission to restart the unit after annual outage issued by VATESI consists of three parts:

- General statement;
- Conditions for the validity of permission;
- Application base documents for the permission.

According to the requirements of the Law on Nuclear Energy of The Republic of Lithuania the Nuclear Facility Operating Organisation has to receive a license to operate nuclear facility. So even Ignalina Nuclear Power Plant first unit is under operation more than 14 years now, it was decided that the operation of the unit has to be re-licensed and this licensing process has to be based on a "western practice". VATESI carries on broad scope licensing activities for several years already. The Ignalina Nuclear Power Plant Operating Organisation is fully involved in the licensing process and performs extensive maintenance, safety evaluation activities. According to the plans of the licensing process, VATESI will finish assessment activities and will make a decision in 1999.

Article 10: PRIORITY TO SAFETY

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

10.1. Safety Policies

VATESI Policy Statement

In January 1998 VATESI has published its Policy Statement named "State System on Regulation of Nuclear Safety in the Republic of Lithuania". Purpose of the document was to describe the regulatory philosophy and policies that VATESI will follow in: regulating nuclear facilities in Lithuania, principally the Ignalina Nuclear Power Plant (INPP); cooperating between VATESI, operating organizations and state institutions in the development and implementation of new safety regulatory acts; solving issues related to licensing and change of the license conditions; inspecting nuclear installations in order to supervise the implementation of legal acts, rules, licensing conditions and obligations; using measures of enforcement of norms and regulations; describing criteria of evaluation and use by VATESI of the operational experience.

Policy Statement contains the following chapters: History and Background, Considerations for Development and Implementation of State System, Safety Principles and Standards of Protection, Responsibility, Licensing, Inspection Program, Enforcement Policy, Nuclear Safety Confirmation, Analysis and Reporting of Operating Experience, Shutdown and Decommissioning, Informing the Public.

It is stated that the first and so far the only nuclear installation in Lithuania, INPP was designed, constructed and commissioned in accordance with the system of safety supervision of the former USSR. Until 1991 INPP was operated under the regulatory supervision of that former system. A new regulatory system, adapted to the Lithuanian state conditions, is presently under development. The establishment of a new regulatory system in Lithuania must take into consideration its scientific and technological background as well as its cultural and historical background. The system must be appropriate for the Lithuanian nuclear energy program.

In nuclear safety regulation VATESI will use reasonable assurance of adequate protection of public health and safety and will rely on the internationally approved principles.

It is the responsibility of the operating organizations of nuclear facilities to ensure adequate and safe operations. It is VATESI's responsibility to oversee the activities at nuclear facilities to assess and confirm that the plant is operated safely.

On the basis of safety cases presented by applicants and which contain a safety analysis, VATESI will make decisions on issuing nuclear facility construction, operation or decommissioning licenses.

VATESI will exercise independent regulatory oversight of nuclear facilities and activities important to nuclear safety through an inspection program conducted by VATESI Inspectors.

When VATESI finds that a nuclear facility does not meet a regulation or license condition, it is the policy of VATESI to require the operating organization to bring the facility into compliance with the regulation or license condition.

It is the responsibility of the operating organization to conduct safety analyses, tests, and research needed to assure facility meets the regulations and license conditions and is safe to operate.

VATESI will require the operators of nuclear facilities to systematically collect and evaluate data from both their own experience and the experience of other similar nuclear facilities.

VATESI will issue regulations governing the decommissioning and final disposition of nuclear facilities. It is the responsibility of the facility operator to maintain the nuclear facility in a safe condition during all decommissioning activities according to the license conditions.

It is the VATESI policy to inform the public about radiation and nuclear safety in Lithuanian nuclear facilities and about the activities of VATESI by means of mass media.

A complete text of the VATESI Policy Statement see in the Annex to 10.1.1.

Ignalina NPP Policy Statement

Correspondent safety and quality policy statement of Ignalina NPP is given in Annex to 10.1.2.

10.2. Safety culture and its development

Safety Analysis Report (SAR) and Review of SAR that was performed at Ignalina NPP objectively indicated problems in Safety Culture area. The reasons were analysed in SAR chapter TG 9.2.1 and 7 recommendations were provided to improve the current situation. Within of Safety Improvement Program SIP-2 Ignalina NPP started activities aimed to improve safety culture. Ignalina NPP has developed the plan of Safety Culture Development including issues of high priority connected with Safety Culture. Director General approved this plan in June 1997.

Safety Culture Improvement includes such tasks as:

- Preparation of detail plan "Development plan of Safety Culture at Ignalina NPP in 1998";
- Continuing audit practice of Safety Culture conditions at Ignalina NPP departments;
- Safety Culture workshops for deputy managers, shift supervisors, technical engineering staff, operators, personnel of Nuclear safety department, Physical protection department, Maintenance department and other departments;
- Distribution of booklet among plant personnel "Appeal to INPP personnel" – high Safety Culture in atomic energy;
- Development and implementation of new system of personnel motivation;
- Informing of staff by means of Information centre about good and bad Safety Culture examples;
- Training centre activities to organise in the departments Safety Culture workshops using examples from practice of personnel work in the departments;
- Assessment by managers of the departments of personnel proposals received at the Safety Culture workshops;
- Training appliances containing IAEA report (75-INSAG-4 principles), components and elements of Safety Culture;
- Continuing work with INPP staff and within SIP-2 program with respect to the Safety Culture development at Ignalina NPP.

10.3. Commitment to safety

Ignalina NPP has developed INPP Nuclear Safety and Quality Policy that states objectives and commitments of INPP regarding Quality Assurance and Safety:

- The goal of INPP is to become the safest RBMK nuclear power plant and a competitive performer in the industry;
- 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 safety of INPP;
- INPP personnel clearly understand the requirements and objectives of the INPP owners, VATESI and the public;

- All employees take an active part in improving safety and quality. 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;
- All employees are properly qualified to perform their functions in accordance with plant objectives. A level of every employee's competence must 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. INPP and its personnel must make the use of their experience and that of others to improve the organization, operations and their competence.
- 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 to be implemented at INPP.
- If the INPP Director General can answer «YES» to all these items, the plant will operate to the required level of quality. If every employee can answer «YES» to all these items, he will perform his job to the required level of quality.

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 provides 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 in all persons and organisations employed in the nuclear power field through:

- appropriate selection, teaching and training of personnel in each sphere of activity, which has a bearing on safety;
- creation and maintenance of strict discipline with a clear distribution of personal responsibility among managers and executives;
- through the preparation and strict observation of instructions for the performance of work, as well as their periodical updating in the light of experience.

All persons 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 ensue from any failure to observe the rules or any deficient application of the prevailing norms and technical requirements.

The Operating Organisation shall be responsible for ensuring the safety of the nuclear plant and shall bear 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 Organisation shall remain intact despite the independent activities and responsibilities of companies - institutions, organisations 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 nuclear facility is issued, the Operating Organisation shall create the infrastructure (subdivisions) required for safe operation of the nuclear plant, endowing those subdivisions with the necessary rights as well as financial, material and human resources, imposing on them full responsibility for their activities, and monitoring the correct implementation thereof.

The Operating Organisation shall bear responsibility for creating the necessary organisational structures for safe nuclear plant operation. It shall ensure 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. It also has to organise physical protection and 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 shall ensure 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 Organisation to the State Control and Supervision Institutions.

VATESI in accordance with national regulations and its statute performs independent regulatory inspections of Ignalina NPP that include also assessment of safety culture.

10.5. Voluntary activities and good practices related to safety

Ignalina NPP performs audits of Safety Culture to define deficiencies in existing work practices and current procedures, which include following corrective measures and improvements:

- Analysis of operational procedures and incidents to define causes of non-compliance;
- Open and effective discussions with plant staff to emphasize the safety priority issues;
- Constant retraining of plan personnel with the demonstration of good examples of work practices.

The international IAEA workshop was organised in May 1997 with participation of six countries experts and ten Lithuanian organisation involved in nuclear industry activities that was aimed to consider improvements of Safety Culture at nuclear plants with RBMK reactors. INPP Management and personnel were introduced with experience of safety culture improvements in nuclear plants of Sweden, USA and Switzerland.

A booklet has been developed and distributed among plant personnel explaining the main policy statements in the area of Safety and Quality Assurance. The content of the booklet was analysed and discussed at workshops.

Director General appeal to INPP personnel about Open Policy in the area of errors and problems with safety. A special booklet was prepared and distributed among personnel. Content of the booklet that is of convenient format explains plant management approach to create atmosphere of openness and trusty. The booklet states about tasks of routine work and about behaviour of each worker at the plant.

Safety Culture workshops were organised at Ignalina NPP. The total number of workshops was 31 based on the month time schedule. Responsible persons were appointed for co-ordination of Safety Culture issues in each department. Swedish experts from ES-Konsult Company trained these specialists. Safety Culture topics were included in training programs of INPP staff.

“Form to present proposals for improvement” and appropriate procedure to present these proposals to Director General, to Directorate and Safety Committee has been developed. Special post-boxes have been installed at the entrance of the plant and changing rooms to collect the proposals from personnel.

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 resources of INPP

INPP is the largest electric power producer. INPP generates more than 80% of the total national electricity production. The remaining percent of electricity is produced by thermal and hydro power generating stations. In 1997 INPP generated 12 023, 9 mln kWh and sold 10.852,6 mln kWh. INPP sells its production to the only Purchaser - joint stock company Lietuvos Energija.

The electricity rate is 5,9 cent\kWh.

The electricity distribution is prorated as follows: Lithuania - 60,2%, Latvia - 13,6%, Belorussia - 26,2%.

INPP sold electricity to the amount of 620 646 000 Lt.

The prime cost is equal to 5,725 cent for 1kW\h.

In 1997 the INPP income came to 27 569 000 Lt.

In previous years safety improvement of Ignalina NPP was financed partially from the income of Ignalina NPP but mainly from the support provided by donor countries such as Sweden, USA. Another important source was Phare program of EC and Nuclear Safety Account administrated by EBRD. A grant of 34 MECU was provided by EBRD for implementation of safety improvement program SIP.

In 1998 20 000 000 Lt was allocated from the national state budget for improving INPP safety and quality assurance. The investments ensure both to upgrade the site equipment and to train the staff responsible for the plant operational excellence. In 1999 and 2000 it is planned to increase contribution from the state budget.

11.2. Staffing and training for safety-related activities at nuclear installations.

The operating organisation of INPP has quantitatively high number of staff in comparison with the other NNPs in the world (except the former Soviet plants). The thing is that operation and maintenance provision of INPP requires much efforts and manpower. The other reason that after Lithuania gained its independence, the former system ensuring maintenance and repair of the nuclear installations collapsed as well. In order not to lose the experienced staff recruited to conduct planned outages and other activities, INPP had to incorporate all these external organisations into its structure.

When INPP became a property of Lithuania, there was much work initiated to upgrade plant and improve safety by applying nuclear experience gained by Sweden, Germany, USA, Japan and other countries. Supported by the above countries, the INPP safety and reliability have been sufficiently upgraded so far today and this work is still ongoing. There are activities to make the current regulations, manuals, procedures fit for IAEA standards.

The above ongoing activities allow to evaluate INPP as the safest RBMK Nuclear Power Plant.

A lot of INPP experts have been trained and are currently being trained at the nuclear power plants of Sweden, USA, Canada, Japan and other countries. This activity is the brilliant tool to adopt the safety improvement experience.

The INPP staff are highly trained and educated. More than 30% have higher education, 24% of experts are specially educated, 19% of staff have professional education and the others have the general secondary education.

The staff change rate is very low about 1,5% and therefore there is no problem with staffing. But on the other hand, it leads to ageing the staff.

There is a Department of Thermal and Nuclear Power at University of Technology in Kaunas established for educating the nuclear specialists.

Taking into account the peculiarities of the RBMK reactor, INPP has concluded an agreement with the Obninsk Nuclear Power Energy Institute (Russia). Every year 5-7 nuclear engineers are being trained there to operate nuclear facilities.

In addition, in the residence of the INPP personnel there is a Vocational School which trains qualified workers to satisfy the INPP needs in electricians, welders and tool-makers.

The INPP Safety Culture Promotion Programme has been developed and being currently implemented to ensure encouraging an individual responsibility for the work performed, initiative, reliable and safe operation of plant.

Lithuania has not made yet any political decision concerning the nuclear power industry future. It results in the growing uncertainty in 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 there will be probably the moving of the highly experienced staff to the plants of the other countries. Finally, it could lead to negative consequences for the INPP safe and reliable operation.

11.3. Organisation and structure of training at INPP

The personnel recruited to qualified positions shall comply with the specified qualification levels to operate nuclear power plants and facilities, technical university degrees or high school technical diplomas. The nuclear experience is preferable. But for some positions it is mandatory.

Most technical positions require to undergo the additional in-house training including theoretical courses, practical special position training, taking examinations and getting an access to the positions before an employee is given the full responsibility.

The control room nuclear operators and operational managers are bound to have special education, training and nuclear experience. There are special training courses and seminar programmes for control room operators. In compliance with the staff retraining schedule for 1998 there was a set of training activities held from 19.01.1998 to 27.04.1998. These activities included delivering lectures, holding seminars, training by using technical tools and other available training resources required to maintain the nuclear competence of the staff.

The INPP Training Centre is responsible for generating detailed staff training and maintaining competence plans, arranging specific courses, inviting specialists, producing training material and organising evaluation of the training efforts in the form of exa minations and interviews.

There is annual medical examination held for the INPP staff.

For every position there is a special training programme which is officially approved and registrated. In the event of promotion, every employee has an individual promotion training programme. Before assigning to a new position, every employee is to undergo the required theoretical training, training at technical training facilities, simulators, fieldwork, successful examination and finally performing responsibilities under a supervisor's surveillance.

The training programme structure is identical for all INPP training programmes.

In addition to the training programmes, there are seminars held to improve the plant management, to develop QA Programme, Safety Culture programme, to train the staff from the point of human factor, to develop teamwork and leadership.

The mandatory training programmes typically include basic courses in nuclear technology and safety, plant knowledge including systems, processes and dynamics, technical specifications and emergency scenarios.

The staff undergo training, accident prevention induction training, nuclear safety and radiation protection training. The staff knowledge is constantly being updated.

The training is annually provided for:

- Managers and Specialists - 300 men;
- Operating personnel - 200 men;
- Maintenance personnel - 800.

Since April 1995 the Thermal -Hydraulic Simulator (CORYS) installed at the Senior Unit Engineer work place has been in operation. The training is conducted on a regular basis in compliance with the approved training schedule.

When the full-scope simulator is put into operation, the training scope for the operating staff will be sufficiently extended.

Full-scope simulator.

It is located at the Health Recreation Centre of INPP. At present the installation activities and tests for primary and auxiliary equipment are under way. The tests are scheduled to be completed in August 1998 and the simulator is to be put into operation in Quarter 4, 1998.

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 throught the life of a nuclear installation.

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" (Thereinafter called "General Regulations") (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)."

Formally the Human Factor activity at Ignalina NPP is regulated by "Personnel Management Regulations" (PORP-89) which have been in force since 1989. These Regulations do not include all fields of this activity which are given in IAEA recommendations and have been applied by international practice for the last 8 years why it was requested by VATESI to start the revision process of above mentioned regulation.

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

- Selection, training and retraining of staff;
- Developing teamwork;
- Procedure for co-operation 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.

The ASSET methodology is applied to identify, review and prevent human errors.

In compliance with this methodology the personnel action not defined in the instructions is subject to reviewing to identify contributors and direct and root causes of the event. To eliminate causes and prevent further recurrence the corrective actions are developed and taken.

The plant experts are currently reviewing the possible application of HPES method and its Swedish analogue MTO.

The procedure for self-checking and self-assessment is perfected in the course of induction, regular and special training of the plant staff. The system STAR is currently being introduced.

Different aspects of motivating are highlighted in "Policy" of the plant management and "Policy Content". These booklets have been distributed among all INPP staff. In addition, the motivation issues are included in a leaflet "INPP Personnel Regulations" and considered at the Safety Culture seminars to be held for all plant staff.

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 equipment 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".

The internal experience reports are distributed among all INPP departments and divisions where they are reviewed by the relevant staff and the satisfactory results are put into practice.

The external experience reports received from WANO, IAEA, Nuc Net and another RBMK NNPs are considered by plant managers and responsible personal among the departments. The acceptable experience is disseminated to the relevant personnel and then practically used.

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. The training forms are group and individual.

The Retraining Programs are developed on the basis of amendments incorporated into projects, processes, procedures and regulations. Any training or retraining program ends in an individual proficiency examination.

The computer simulator is used to train the nuclear control operators.

At present the installation of the full-scope simulator and staffing of the Training Center are close to completion

The responsibility for staffing rests with the INPP Personnel Management. There are procedures and requirements for staff recruitment in accordance with Lithuanian legislation considering physical conditions, 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.

Though the responsibilities of VATESI are described in previous chapters of this report, it would be relevant to mention that human performance questions has been always in the focus of the regulator control activities. In accordance with Lithuanian regulations all safety related activities are to be reviewed by the regulatory authority (VATESI). It means the inspection, monitoring and review of all nuclear safety aspects with particularly aim at elimination (reduction) of human errors or lessen their consequences during the all nuclear process stages.

Article 13: QUALITY ASSURANCE (QA)

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

13.1. Regulatory requirements

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 organisational measures, which includes also the implementation of quality assurance system at NPP. The Operating Organisation shall be responsible for developing and implementing a quality assurance system and implementing quality assurance measures at all stages of nuclear plant activities. The operating organisation shall prepare and maintain quality assurance program and control the activities of companies (organisations) 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). Organisations involved in design, construction, installation and adjustment work, as well as companies which manufacture nuclear plant equipment, shall have prepared their own quality assurance programs relating specifically to the activities in which they are engaged.

The General Requirements For Quality Assurance at Nuclear Power Plants, VD-KS 001-0-96, were issued by VATESI in 28th October 1996 based on the Statute of State Nuclear Power Safety Inspectorate approved by the Resolution of the Government of the Republic of Lithuania No736 of 21st October 1992. The Regulations VD-KS-001-0-96 establish regulatory requirements to the organisations operating nuclear power facilities with respect to theirs obligations to develop, implement and maintain the efficient QA system. Requirements are of general type and concern all types of activities, which have direct or indirect influence to the safety of nuclear power facility. Requirements are obligatory for organisations, operating nuclear facilities, carrying out transportation, treatment and storage of nuclear and radioactive materials and as well shall be considered by the organisations, which activities can influence the safety of nuclear facility. In accordance with VATESI requirements QA system at nuclear facilities shall comply with recommendations of IAEA safety guidance QA 50-C/SG-Q and shall follow the ISO 9000 standards. The following tasks have to be covered by implementation of QA system:

- All kinds of activities that determine safety of nuclear facility shall be considered in the QA concept;
- Appropriate management organisational structure shall be developed for administrative management of QA program implementation maintaining process;
- QA shall comply with and shall be based on the clearly defined QA and Safety policy declared by the Manager of Operating Organisation defining the commitments of management to achieve sufficient QA level and appropriate safety culture at nuclear power plant;
- QA Manager of NPP is responsible for development of efficient QA program, implementation of it and monitoring of QA system efficiency at NPP;
- QA shall ensure the compliance of NPP's activities to the legislation of the Republic of Lithuania;
- suppliers of services and equipment shall meet the requirements of QA at NPP, which shall be confirmed by quality surveillance department of NPP;
- QA personnel shall be sufficiently qualified to perform its functions in most efficient way;
- QA shall be documented in normative documents including the QA Policy, programs, procedures, manuals and other documents;
- Implementation of QA system at NPP shall be ensured by efficient management structure, clear distribution of responsibilities and duties;
- QA system at NPP shall ensure the continuous feed-back process, which has to be performed in systematical way and documented in accordance with appropriate procedures;

In order to implement the efficient QA system at Ignalina NPP operating organisation was obliged to establish the independent department with sufficient resources and authorisation for QA management

at NPP. The manager of above-mentioned department is subordinated directly to the General manager of NPP. QA department is responsible for performing of internal audits at Ignalina NPP as well as of auditing of organisations providing service to NPP. Results of audits must be documented in reports of audits. QA department shall regularly report to the General Manager of NPP about the status of QA management and its efficiency. Personnel of the QA department shall not be responsible for development of QA technical documentation in departments of NPP. Managers of departments shall regularly revise QA documentation in order to establish the status and adequacy of part of the QA program that departments are responsible for.

13.2. Development and Implementation of QA Program at Ignalina NPP

Following the national nuclear safety regulations Ignalina NPP has developed the INPP **Q**uality Assurance Manual, which includes following first level documentation:

- statements on INPP mission and objectives, legal framework for operational activities, regulations to be used for quality assurance and safety;
- organisation, policy and management principles;
- plant management organisation and responsibilities;
- safety performance and quality assurance policy;
- management and assessment of the plant;
- self assessment of management activities;
- description of the INPP QA system and purpose of the Quality Assurance Manual;
- definitions to be used in QA system;
- general requirements for document control and records, training and qualification of staff, safety, corrective actions and improvement program, audits, planning, procurement of items and services, design management, work process control, inspection and testing, management of non-conformances, other related documents.

At present Operating organisation of Ignalina NPP is developing and implementing the second level of QA Program - Management Procedures that consist of 20 documents covering main kinds of operational activities that are important with respect to safety of Ignalina NPP:

- operation;
- core and fuel management;
- maintenance;
- radiation protection;
- fire protection;
- industrial safety;
- personnel;
- document control;
- inspection and testing;
- plant modifications;
- procurement;
- storage of material and equipment;
- emergency preparedness;
- environment protection;
- physical protection;
- handling of radioactive waste;
- chemical control;
- design control;
- in-house fabrication;
- internal and external feedback;

The general QA Program Implementation Plan was developed at INPP and was considered by VATESI. In accordance with this Plan the implementation managers for each procedure of the plant performance are nominated. The detailed implementation plans for all activities are prepared. These

plans define the implementation team and human resources, the scope and time schedule of the plant personnel training, the work procedures revision and preparation schedule.

To ensure a successful QA Program implementation the internal QA audits of the above mentioned activities are planed.

13.3. Regulatory control activities

VATESI performs continuos monitoring and supervision of QA assurance program implementation at Ignalina NPP:

- Ignalina NPP QA program documentation of first and second levels is considered by VATESI before implementation;
- audit program and reports copies shall be presented to VATESI for consideration;
- VATESI inspectors participate in QA audits as regulatory observers in order to monitor the fulfilment of QA audit plan of INPP. VATESI has the right to perform its independent audits at INPP within inspection activities of regulatory body;

Development of INPP QA program is one of important issues to be considered within licensing process of Ignalina NPP Unit 1. VATESI continuously monitors the progress achieved by the operating organisation of Ignalina NPP through the review of progress reports submitted by Ignalina NPP and through the supervision of Ignalina NPP QA Project group activities. Licensing plan of Ignalina NPP includes the inspection of QA program implementation status, which has to be performed in September 1998. In accordance with newly issued licensing regulations VATESI conducts also the inspections of QA systems of organisations that intend to get the license to perform activities at nuclear facilities, which has to be licensed in accordance with Law on Nuclear Energy.

13.4. Development of QA system in VATESI

VATESI has developed the initial statements for implementation of internal QA system in its own organisation in order to ensure the effective management and performance of regulatory activities. QA system of VATESI based on the appropriate statements of ISO 9000 standards and IAEA Safety Series No 50-C/SG-Q. VATESI QA system shall consist from three levels of QA program documentation:

- first level shall include the document of National Regulatory Regime, VATESI QA policy and ethic rules of staff;
- second level shall include work process oriented procedures, which shall be used in order to perform regulatory activities;
- third level shall consist from internal manuals of departments, inspection procedures and other documents.

Main difficulty that VATESI meets during development and implementation of its QA system is related with lack of internal resources that mainly are allocated for supervision of Ignalina NPP safety and licensing process. Therefore VATESI expects efficient support from its Technical Support Organisations and trough the international co-operation projects.

Article 14: ASSESSMENT AND VERIFICATION OF SAFETY

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

- *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;*
- *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. siting, design, construction, operation)

Licensing Process

On 10 February 1994 the Grant Agreement was signed between Lithuania and the EBRD acting as administrator of grant funds provided by the Nuclear Safety Account. The Agreement includes the effort to produce and review a safety analysis report on western style and to use the results as a major input for safety improvement efforts and for licensing of the INPP unit 1 for continued operation. The deadline for the licence was set by Agreement at mid 1998, but later it was postponed to May 1999. Lithuanian Government had accepted recommendations and is obliged to fulfil them.

The following documents shall be submitted to VATESI by Ignalina NPP 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 updatingJustification 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 futureCompliance demonstration with the yearly permits conditions Operator position on international recommendations and status of their implementationPreliminary decommissioning program Commissioning program and test resultsDescription and verification of current plant stateHistory of safety performance and environmental impactOperating 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 ageingEquipment qualificationHuman 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 proceduresEmergency and accidents management's procedures Emergency planning Long term in-service inspection program Physical security provisions.

A CEC exploratory mission took place in Lithuania in September 1992. After this exploratory mission the Consortium of Western Regulators (CWR) was established and the assistance programme was

initiated. A contract was signed between the CEC and ANPA of Italy in 1994. ANPA was given the role of Lead Organisation for the First Year phase of the Programme. The CWR has the following members: ANPA (Italy), SiP (Sweden), STUK (Finland) and StMLU/TÜV EC (Germany).

Regulatory assistance to VATESI for assessment Application documents is at present given through several mechanisms:

CEC assistance (within the PHARE/ RAMG programme - assistance to regulatory authorities and their TSO's;

Bilateral agreements with European countries (Sweden, Germany, England, France, etc.);

Bilateral and regional programs with the IAEA;

Bilateral agreements with the United States;

Licensing Assistance Project – LAP - (Sweden, USA, UK, Germany, France and Finland).

Assistance for VATESI and their TSO's includes a follow-up of projects: PHARE/LI/RA/01, PHARE/LI/RA/02, PHARE/LI/TSO/02 and PHARE/LI/TSO/12.

CEC/PHARE/TSO project LI/TSO/02 - Assistance in the enhancement of Lithuanian TSO's capability to support the Nuclear Safety Authority. To build on the basic training provided under the project PHARE/LI/TSO/01 by developing the Lithuanian TSO capability in the following specific areas that are directly relevant to the Ignalina NPP:

- Non-destructive testing (NDT) methodologies,
- Structural Integrity (LBB concept),
- Welding issues.

PHARE/LI/TSO/12 "TSO Support to VATESI during application of SAR and RSR results in the licensing of Ignalina NPP" Objectives are reinforce VATESI by Lithuanian and EU TSO's in:

- utilising the results and conclusions of the Ignalina SAR, its review (RSR) and the recommendations of the ISP;
- providing assistance to VATESI in assessing plant proposals for safety improvements aimed at the granting of a licence.

The aim of the Licensing Assistance Project (LAP) is to assist VATESI in its work with the licensing.

An Ad-hoc meeting was held in Stockholm in October 1996 for exchange of information and discussions about bilateral support programmes assisting VATESI in the work with the review for licensing of INPP unit 1. It became obvious from the discussions that a programme of stronger co-ordinated activities was needed. The meeting was organised in response to concerns earlier raised in the G24 and in the NSA about the capability of VATESI to perform a licensing review of INPP unit 1 in accordance with agreements with the NSA. The purpose was to exchange information between countries having major bilateral co-operation programmes with VATESI to avoid program overlaps and to discuss actions to be proposed for VATESI in order to develop their procedures and strengthen their capability to perform a licensing process similar to the practice in western countries.

In the licensing it was suggested that a parallel support project be organised between western industry and the INPP.

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, it 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 have an independent expertise review, and to be approved by the Operating Organization and to be presented to VATESI for the regulatory review.

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 "The Reactor Plant Technical Safety Justification". "The Reactor Plant Technical Safety Justification” shall be prepared by competent organizations and approved by Operating Organization. The shape and content of the reactor plant Safety Justification Report should conform with the current normative technical document. The indicated regulations also set a number of specific requirements to the content of safety justification (safety analysis) reports.

Overview of the safety assessments performed for Ignalina NPP 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 Ignalina NPP using deterministic and probabilistic analyses

As to the deterministic safety assessment of Ignalina NPP, 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". An in-depth safety analysis of Ignalina NPP safety using Western methodology was completed in 1997. Main results of this analysis are presented in section 6.3. Principal message received from the analysis and from its independent review is that, in spite of numerous noncompliances with the modern norms and standards, further operation of Ignalina NPP could be considered as acceptably safe, with the condition of timely implementation of all recommended safety upgrading measures.

Probabilistic safety analysis of Ignalina are being performed in the frame of "Barselina" project with participation of Swedish, Russian and Lithuanian experts. Thus far the first full scope level-1 PSA for the RBMK reactors in accordance with IAEA Guidelines is performed. This analysis has demonstrated that probability of Ignalina reactors core damage is comparable with one of Western reactors and drew attention to several shortage in the design to be compensated. PSA level-2 study is now being started by Ignalina and its consultants.

14.3. In-service inspection of main components

Lithuanian Nuclear Power Safety Inspectorate VATESI performs the supervision of ISI program at Ignalina NPP 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. Regulatory supervision of ISI at Ignalina NPP includes:

- Review and approval of Standard ISI program of Ignalina NPP,
- Review of annual ISI programs of Ignalina NPP,
- Review and assessment of annual ISI results of Ignalina NPP,
- 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 standards.

ISI activities at nuclear power plant as well as regulatory supervision of it are performed in accordance with the Rules for Construction and Safe Operation of Equipment and Pipelines of NPPs PN AE G-7-008-89, which establishes the basic requirements for ISI at nuclear power plants with respect to the scope of ISI program. Acceptance standards for assessment of ISI results are established in the regulations for ISI of Welds and Cladding of NPP's Equipment and Pipelines - PN AE G-7-009-89.

Existing regulations providing normative basis for ISI activities in Lithuanian nuclear industry were accepted from former Soviet Union, reflecting the regulatory supervision system of ISI activities in accordance with infrastructure existed at that period. VATESI as Regulatory authority of Independent Lithuania is developing a national regulatory supervision system for ISI as well as its own supporting infrastructure, taking into account the international experience in this field. Introduction of modern western technical means aimed to improve ISI activities at Ignalina NPP requires also significant changes in existing regulations. One of objectives of CEC/PHARE/RAMG project "Transfer of Western European Regulatory Methodology and Practices to the Nuclear safety Authority of Lithuania" second year activities is improvements of regulatory supervision system of ISI at NPP that includes:

- Development of Lithuanian regulatory system in the field of ISI activities,
- Review of present regulations (mainly accepted from former Soviet Union) and development of new regulatory approaches and regulations based on international experience,
- Developments of an internal VATESI guide for supervision of ISI activities at Ignalina NPP.

At present day the draft of VATESI guide on In-service Inspection of Nuclear Plant Pressure Components is developed with support of experts from Germany, Italy, Finland and Sweden. VATESI has established the Infrastructure of Technical Support Organisations able to provide VATESI with expertise support during assessment of ISI results at Ignalina NPP. Enhancement of VATESI TSO's capabilities is provided through support of Swedish International Project for Nuclear Safety and will be continued within CEC/PHARE/TSO project LI/TS/02.

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. This is a basis for decision on reissuing the annual operating license for the Ignalina NPP units.

Regulatory control cover 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.

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. Regulatory bodies

According to the Law on Nuclear Safety of the Republic of Lithuania No I-1613 Article 15 of 6 June 1996, the Law on Health Institutions No I-1367 of 14 December 1994, the Order of Government of the Republic of Lithuania "The List of the Potentially Dangerous Equipment and Hazard Work" No 1251 of 5 September 1995, the Order of the Ministry of Health On Approval of the List of Potentially Dangerous Equipment Radiologically Supervised by the State Public Health Service No 455 and the Order of the Ministry of Health of Lithuania on Establishment of the Radiation Protection Centre No 625, the Radiation Protection Centre of the Ministry of Health is responsible for public supervision and control of radiation protection and safety of the workers working with the sources of ionization radiation.

The Ministry of Environment is responsible for the public protection of the environment against possible negative influence of the Ignalina Nuclear Power Plant (NPP) according to the Law on the Environmental Protection No I-2223 of 21 January 1992, the Law on the Amendment of the Law on the Environmental Protection No I-1352 of 28 May 1996 and the Law on Nuclear Energy No I-1613 of 14 November 1996.

15.2. Legislation

The protection of the population and the workers of the Ignalina NPP against possible influence of the Ignalina NPP is regulated by the following legislation:

- The Law on Nuclear Energy (No I-1613, 1996)
- The Law on Health System (1994)
- The Law on Health Institutions (No I-1367, 1996)
- The Law on Environmental Protection (No I-1352, 1992, 1996)
- The Law Environmental Monitoring (No VIII-529, 1997)
- The Law on the Influence of the Planned Economy on the Environment (No I-1495, 1996)
- The Law on Enterprises (No I-196, 1990, No I-888, 1995, No VIII-422, 1997)
- The approval of the list of types and objects of the planned economy with obligatory state examination (The Order of the Government of the Republic of Lithuania No 233, 1997)
- Basic Standards of Radiation Protection HN 73-1997
- Hygiene Rules on Design and Operation of Nuclear Power Plants, SP AS-88 (legalized in the Republic of Lithuania in 1994)
- The Rules on Radiation Safety in Operation of Nuclear Power Plants PRB AS-89
- The List of the Potentially dangerous Equipment and Hazard Work (The Order of Government of Lithuania No 1251 1994)
- On the Approval of the List of Potentially Dangerous Equipment Radiologically Supervised by the State Public Health Service (the Order of the Ministry of Health No 455, 1995)
- On the Approval of the Provisions on the State Hygienic Control (the Order of the Ministry of Health No 618, 1996)
- The Approval of the Aid for the District (City) Municipalities in the zones of Operation of the Ignalina NPP and the Means of Safety Assurance for the Population of the Zone (The order of the Government No 237, 1996)
- On the Monitoring of the Foodstuffs Contamination (the Order of the Ministry of Health No 219, 1997)
- General Provisions on Dosimetric Control in the Case of Radiation Accident (the order of the Government No 578, 1998)
- The Limits of Population Exposure Against by Natural Sources of Ionization HN 40-1994

- Industrial Radiography HN 52-1995
- On the Information Exchange in the Case of Usual Situations and at Emergencies (the Oder of the Ministry of Health, the Ministry of Defence, the Ministry of Internal Affairs, 1997)
- On the Order on Population Medical Surveillance (the law of the Ministry of Health No 561, 1995)

15.3. Radiation protection of workers and outside workers

In the estimation of the Ignalina NPP radiation protection and safety, most consideration is taken to:

- radiation protection of workers and outside workers;
- the Ignalina NPP influence on population and environment.

At the plant, the following radiation protection programme is established for radiation protection and safety, which includes:

- ALARA programme and its realization means;
- radiation protection insurance quality control;
- training;
- radiation protection and safety in cases of emergency.

In 1997, there were 4217 employees at the Ignalina NPP: 3232 persons were the employees of the Ignalina NPP and 985 outside workers. The number of workers is not stable.

During the last three years in the course of a wide-range operation relating to the insurance of protection and safety of the enterprise, the collective doses increased (in 1996 - 15.01 manSv., in 1997 - 18.5 manSv). The individual exposure of more than 200 workers is higher than 20 mSv. The outside workers are exposed by the highest exposure doses, but these do not exceed 50 mSv. The doses received during maintenance and prophylactics are approximately equal to 80%.

Exposure and collective dose dynamics of the workers of the Ignalina NPP 1994 - 1997

Year	Number of workers	Average/highest exposure dose mSv	Collective dose manSv
1994	2933	4.4/47.4	12.83
1995	3081	3.2/54.0	9.9
1996	3180	3.2/39.5	10.03
1997	3232	3.5/42.5	11.45

Exposure and collective dose dynamics of the outside workers 1994 - 1997

Year	Number of workers	Average/highest exposure dose mSv	Collective dose manSv
1994	464	7.3/49.7	3.41
1995	643	6.3/49.9	4.04
1996	1018	4.9/49.8	5.06

1997	985	7.2/44.8	7.05

The principle requirements on the decrease of occupational exposure and the protection of the population from negative influence of ionizing radiation are justified by the Lithuanian Hygienic Standard “Basic Standards of Radiation Protection” HN 73-1997. This hygienic standard was prepared according to the recommendations of IAEA and international organizations (International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Viena, IAEA, 1996, Safety series 115) and Council Directive 96/29/EUROATOM of 13 May 1996, Basic Safety Standards for the Protection of the Health of Workers and the General Publics against the Dangers arising from Ionizing Radiation, No L 159, vol. 39). HN 73-1997 gives the following basic dose limits:

Application	Dose limit	
	Occupational	Public
Effective dose	20 mSv per year averaged over defined periods of 5 years	1 mSv in a year
Annual equivalent dose in		
 the lens of the eye	150 mSv	15 mSv
 the skin	500 mSv	50 mSv
 the hands and feet	500 mSv	

The Basic Standards of Radiation Protection having come to force on 1 January 1998, and taking into consideration the current situation, i.e. in relation to the insurance of protection and safety of the enterprise, the Ignalina NPP having given the grounds that the protection and safety of workers are ensured by all reasonable efforts, but the occupational exposure during certain types of works will exceed a 20 mSv dose limit, the Ministry of Health allowed to change the requirements for the dose limits until the year 2000, thus the annual limit must not exceed 50 mSv.

In 1996 the ALARA programme was started at the Ignalina NPP. Its aim is to make the exposure of ionizing radiation sources as low as reasonably achievable. The ALARA principle is applied and adapted in all operation stages in relation to ionizing exposure. The ALARA programme was reviewed in 1998, the decrease of calculated output related to collective dose per 1 manSV is 4,000 Litas (1,000 US dollars).

The ALARA programme takes much consideration to the following:

- organization of the activities involving the potentially increased radiation of workers;
- the improvement of working conditions;
- the perfection of technologic processes;
- the implementation of quality programmes;
- the human factor influence on radiation protection and safety;
- the output related to the exposure decrease.

From 1997 the Ignalina NPP began the implementation of quality assurance programme. The procedures of the first and the second levels have been prepared, their aim was the implementation of The ALARA programme.

The general director of the plant is responsible for the radiation protection of workers. The technical director is responsible for the coordination of activities related to the radiation protection and safety, and for technical means enabling to improve the implementation the radiation protection and safety. He is responsible for the ALARA programme.

The staff is trained in the field of safety culture, the brochures are published. Only highly qualified specialists are allowed to work, that are trained in the field of radiation protection and safety. The training is carried out regularly once in three months making use of special training equipment. The staff fulfilling the duties with increased radiation exposure undergoes a special training course before starting their activities. The training takes from 10 to 20 hours, but not less than 10 hours.

The premises in a controlled zone are qualified according to hazard:

Colour	Service frequency	Control level mSv/h.	Permissible level mSv/h
Green	Permanent	0.0014	0.0029
Yelow	Periodic	0.05	0.059
Red	No service		

The entrance into premises coloured yellow and red is strictly regulated. Activities are allowed only after the presentation of a warrant - permission. The activities in strictly regulated places are carried out in the following order:

- persons responsible for the radiation protection and safety estimate the radiation state of the working places and design the principles of safety requirements;
- operation workers prepare the working place;
- the workers are instructed;
- the workers going to their working places are accompanied by a dosimeter, who estimates the radiation protection state of their working places.

In order to decrease the exposure, a deactivation is carried out before starting the activities of the increased exposure, e.g., after the deactivation of a repeated induced circulation contour, the exposure dose gets lower, which is achieved through a defectoscopy of the pipes. The activities, during which an increased exposure is likely to be received, are carried out using the following radiation protection means: lead screens, distance safety equipment, video-control systems.

The activities at the Ignalina NPP are carried out observing the requirements of internal instructions.

Once per year the workers undergo thorough medical surveilance according to the Order No 561 of the Ministry of Health. If contra-indications are discovered, the activities with the sources of ionization radiation are forbidden.

15.4. Internal control of radiation protection and safety

The work safety department of the plant, which is in direct subordination to the Technical director, 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 divisions of the department are laid down in the statute of the department. These are the main responsibilities of the department:

- classification of the working zones;
- control of the training on radiation protection and safety;
- monitoring of external and internal exposure;

- control of contamination of the working places by radioactive substances;
- ascertainment of the control levels of the discharge of radioactive substances into the atmosphere and water;
- organization and control of the works with increased exposure;
- technical maintenance and repairs of equipment and systems for dosimetric control;
- presentation of the reports on radiation protection and safety.

The monitoring of a discharge of radioactive substances and of the environmental pollution.

The individual dosimetric control is carried out by means of thermoluminescent dosimeters (ALNOR system). The individual dosimeters are changed not less than once per month. For those who are engaged in repair activities they are replaced every week, and in certain cases - every day. The electronic dosimeters are used.

In 1997, 890 workers working in the zone of strict operation conditions were examined for internal exposure.

15.5. Radiation protection of the population and environment

Taking caution against the influence of the Ignalina NPP on the exposure of population, the monitoring of environmental pollution by radionuclides is carried out. From the beginning of construction of the Ignalina NPP, the monitoring of the contamination of foodstuffs, drinking-water and soil by the radionuclides of technogenic nature is being carried out. The investigation works cover the space of the power plant equal to 30 kilometers. The aim of that monitoring is to observe the contamination of foodstuffs and drinking water by radionuclides, to determine the input of the Ignalina NPP to the pollution level. The investigation data show that the contamination of foodstuffs and drinking water by the radioactive isotopes of cesium and strontium in the area of the power plant and other places of Lithuania do not considerably differ from and exceed the activity levels laid out in the Lithuanian Hygienic Standard HN 54-1995 “Raw Materials and Foodstuffs. The largest permissible concentrations of contaminants and the permissible pollution levels by radioactive isotopes”.

Foodstuffs and soil pollution by ^{90}Sr, ^{137}Cs and b (average values of total activity) in Lithuania and in the zone of activity of the Ignalina NPP in 1997

Name of sample	Average values in Lithuania ($Bqkg^{-1}$, L^{-1})	Average values of the Ignalina NPP zone ($Bqkg^{-1}$, L^{-1})
Milk ^{90}Sr ^{137}Cs total b activity	 0.02 0.07 40.775	 0.05 0.09 40.82
Meat ^{90}Sr ^{137}Cs total b activity	 0.03 0.75 95.98	 0.03 0.18 110.32
Fish ^{90}Sr ^{137}Cs total b activity	 0.04 1.57 95.45	 0.04 2.76 104.16
Vegetable ^{90}Sr ^{137}Cs	 0.02 0.10	 0.05 0.08

total b activity	102.93	98.56
Grain ^{90}Sr ^{137}Cs total b activity	 0.09 0.17 122.42	 0.09 0.12 126.29
Soil ^{90}Sr ^{137}Cs	 1.77 11.91	 3.20 12.82

Total b -activity of the drinking water from artesian and dug wells in 1997

Place	Drinking water from artesian and dug wells BqL^{-1}	Drinking water from artesian wells BqL^{-1}	Drinking water from dug wells BqL^{-1}
Vilnius	0.17	0.19	0.17
Kaunas	0.35	0.13	0.43
Klaipeda	0.44	0.10	0.54
Panevezys	0.55	0.25	0.65
Siauliai	0.33	0.44	0.89
Utena region	0.61	0.14	0.76
Ignalina region	0.33	0.06	0.41
Zarasai region	0.14	0.10	0.15
Average of the country	0.36	0.22	0.53
Average of the INPP 30 km. zone	0.36	0.10	0.44

^{90}Sr and ^{137}Cs activity in the fish of the lake of Druksiai in 1997

Sample type	Analysis data	^{90}Sr activity (Bq/kg)	^{137}Cs activity (Bq/kg)	b total activity (Bq/kg)
Pike	06.06.	0.04± 0.01	7.85± 1.17	110.96± 7.30
Pike	08.26.	0.02± 0.01	7.01± 1.05	100.84± 6.4
Pike	11.26.	0.04± 0.01	3.46± 0.52	98.03± 8.2
Bream	06.06.	0.01± 0.01	1.65± 0.25	95.78± 6.59
Bream	11.26.	0.20± 0.01	1.78± 0.27	108.0± 10.20

Bream	08.26.	0.01± 0.01	1.89± 0.28	87.94± 7.09
Perch	06.06.	0.01± 0.01	6.94± 1.04	99.01± 6.98
Perch	11.26.	0.12± 0.01	4.42± 0.66	106.0± 7.60
Perch	08.26.	0.01± 0.01	7.08± 1.06	93.43± 6.04
Roach	06.06.	0.02± 0.01	1.59± 0.24	90.80± 6.72
Roach	08.26.	0.19± 0.01	1.17± 0.17	84.55± 5.65

The monitoring of the population exposure in the zone of 30 kilometers is carried out. It was determined that the external exposure dose of the population does not exceed 1 mSv.

All release pathways at the Ignalina NPP are monitored. The ventilation stacks of NPP are monitored (activities of noble gases, particles and I) continuously. The water is checked in tanks before the content is discharged and also the water from outlet channeld for laboratory measurements every day.

On the site and in the vicinity are TL dosimeters set out for measurements of accumulated dose. These are evaluated by power plant once year. Also, on- line monitors are set around the Ignalina NPP. The monitor readings immediaterly can by made available to the authority.

In order to control the influence to environment the Ignalina NPP performs sampling of aerosols and fallout (continuously), water, bottom sediments, grass and other vegetation (every 3 months). The results of measurements are reported to the authority.

15.6. Control by regulatory bodies

The regulatory institutions implement the state maintenance and control of the workers and outside workers in the field of radiation protection and safety, analyses the reports of the plant. The Ignalina NPP presents the data on the exposure doses of the workers, the discharged amounts to the atmosphere and to the Druksiai lake regularly (every month, once per quarter and at the end of the year). At the end of the year, the report on the influence of the Ignalina NPP on the environment is presented.

The amounts of the radioactive substances to be discharged to the atmosphere and to the Druksiai lake and the increased exposure doses are coordinated.

In order to ensure the accuracy of the measurements of individual exposure doses, circular measurements are carried out. The regulatory institutions implement the control of quality assurance of the measurements.

Article 16: EMERGENCY PREPAREDNESS

1. *Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.*
2. *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.*
3. *Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.*
4. *Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation 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

In Lithuania the operation of Ignalina nuclear power plant is the dominant nuclear activity. The plant is located on the north - east comer of Lithuania, close to the borders with Belarus and Latvia and is situated on the southern shore of Lake Druksiai, 39 km from the town of Ignalina. The nearest cities are the Lithuanian capital Vilnius (130 km away) with a population of approximately 575,000 and the city of Daugavpils, in Latvia (30 km away), population 126,000. The plant's closest neighbour is the town of Visaginas, the residence of the Ignalina nuclear power plant personnel. The town is located 6 km from the plant and has a population of about 32,600.

The main document that regulates development of defence and national security system of the Republic of Lithuania, is the Act on the Fundamentals of National Security accepted in Seimas (Parliament) on 19th 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 security tasks.

The Republic of Lithuania has not adopted yet the Law on Civil Protection. National system of civil protection currently is being governed by the governmental resolutions and decrees of Prime Minister.

Resolution No.151 of March 9, 1992 regarding approval of Provisional Regulations of the Civil Security Department of the Ministry of National Defence 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.

Regulations of the Lithuanian system of Civil Protection, approved by the Governmental Decree No. 957 on December 16, 1992 control the principles of arrangements within the Civil Protection System of the Republic of Lithuania, as well as structure of the system, setting up, usage and procedures of management of the forces of civil protection.

The procedure of stockpile, storage, renewal and usage of the national reserves of civil protection means is defined by the Regulations for State Reserve of Civil Protection Means, approved by the Governmental Decree No. 66 on February 8, 1993.

Resolution No.727 of the Government of the Republic of Lithuania of July 17, 1992 obliges the Civil Security Department notify the residents about the emergency situations through Lithuanian radio and television broadcasting.

There are other normative legislative acts concerning the civil protection issues adopted by the Government of the Republic of Lithuania. Numerous legitimate acts regulating specific fields exist at the district and local levels.

The responsibilities for various governmental or other institutions are stated in acts approved by the Government. At present the Law on Nuclear Energy was adopted in Seimas (Parliament) on 14th November, 1996 and Rescue Services Law is currently in a draft form. The Radiation Protection Law was prepared, but not adopted yet.

16.2 Implementation of emergency preparedness measures

Classification of emergency situations

A radiation accident at the Ignalina NPP is defined as an infringement of the normal operation in which release of radioactive materials and ionising radiation goes beyond the specified limits and which requires stopping the operation of the facility/equipment containing ionising radiation sources. Accidents are classified according to the spread of involved radiation materials or ionising radiation into three types: on-site or local, off-site or area and general accidents. To enable an early start-up of the emergency organisation, on-site as well as off-site, technical criteria are under the development that will identify the level of radiation accident at an early stage.

Local accident is an infringement of plant operation in which on-site release of radioactive materials and ionising radiation goes beyond the normal operation limits specified for equipment, process systems, facilities and buildings. Certain actions have to be taken to protect the plant personnel.

Area accident is an infringement of plant operation in which off-site release of radioactive materials and ionising radiation within the exclusion zone exceeds the specified normal operation limits. Radiation exposure of personnel and contamination of plant facilities, buildings and territory may occur and go beyond the permissible limits. Actions have to be taken to protect the plant personnel.

General accident is an infringement of plant operation in which off-site release of radioactive materials and ionising radiation outside the exclusion zone exceeds the specified normal operational limits. Radiation exposure of plant personnel and population may exceed the specified limits. Actions have to be taken to protect the plant personnel and population.

It was mentioned that the on site emergency plan defines three levels of emergencies based on radiological hazard. However, no alert status has been established to ensure early activation of emergency response. For example, situations that may degrade the safety of the plant, such as fire with potential damage of safety equipment or systems, may not cause activation of emergency plan. So alert status should be included in the emergency plan to ensure an adequate response to the events that threaten a radiological release but have not yet resulted in such release.

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 subjects 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 system for civil protection and emergency preparedness has been established. According to the level these institutions are responsible for civil protection and preparedness:

- At the state level - the Civil Security Department, the Emergency Management Centre, the Fire Prevention 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 structure of the Civil security and rescue system comprises of:

- The Civil Security 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 Civil Security Department (CSD) 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. CSD comprises of Central administration, Alarm and control service and Communication service. There were 10 civil security regional agencies in the structure of department up this year. According to the Governmental Resolution 92 issued on 26 of January, 1998 these Regional civil security agencies with material and financial resources are transferred to the Regional administration.

The Civil Security 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 country, 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 security 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 the need for 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 other related institutions.

State Emergency Management Centre organises the localisation of the state scope of 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 on specific 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

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 inside the territory limits of the object.

16.3 Off-site emergency plan

In case of emergency residences of Lithuania will be protected in accordance with the "Plan for the Protection of residents of the Republic of Lithuania in the Event of Accident at the Ignalina Nuclear Power Plant" adopted by the Prime Minister of the Republic of Lithuania on May 4, 1995.

This plan was developed by the Civil Security Department based on 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 and cattle, 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 security forces.

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

For forecast of radiological consequences and planning protection of residents three phases of accident are distinguished:

- ***Early phase*** – from the beginning of accident until finishing of radioactive substances release to the environment and formation of radioactive trail at the ground. This phase could last from several hours until several days. In this phase external exposure is caused by radioactive fallout from passing radioactive clouds and internal exposure is caused by inhaling of radioactive substances being in clouds;
- ***Intermediate phase*** – depending on scale and nature of accident this phase could last from several days until one year. In this phase external exposure is caused by radioactive substances, which fell from clouds on the ground and buildings, and formed radioactive trial. Radioactive substances are getting to the body by using contaminated food and water;
- ***Late phase*** – lasts until the time, when any protection measures are not necessary. All restrictions at the contaminated territory are recalled, dosymetric monitoring is fulfilled. External and internal exposures are caused by the same reasons as in the intermediate phase.

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.

To determine the level of radioactive contamination in the locality and specify doses of irradiation the radiation surveillance should be carried out by the reconnaissance teams of Fire Protection 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 in 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 the Convention on Early Notification of a Nuclear Accidents and bilateral agreements.

The Department of Communication of the Ministry of Municipalities and Management Reforms shall ensure the notification of population in due time and maintenance of stable conn,ection 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 dosymetric control for people, hygienic control of food and potable water and ect.

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 Department of Fire Protection shall carry out radiological, chemical, engineering and other special inspection besides fire extinguishing activities following the Operative Plan for Fire Extinguishing Operations in Ignalina NPP, approved by the Deputyuy Director for Fire Protection.

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

Measures for informing the public

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 698 centralised electric sirens and 446 thousand wire radio communication points. Centrally controlled sirens can be triggered by the Civil Security Department Operational Centre and to reach 54% of the population living in cities and district centres. The 545 local electric sirens supplement this system. If case of a major accident or large scale threat Civil Security Department shall notify the population through the wire radio communication network, as well as through the first and the second Lithuanian radio and TV channels. 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 sate is being provided permanently with information on civil protection issues via mass media, furthermore, special booklets including recommendations on behaviour during different emergency situations are being published.

16.4. Training and exercises

Seminars on civil preparedness and disaster assistance issues constantly are being organised by the Civil Security Department in districts and municipalities. Exercises are being organised at the Department, in districts, in municipalities and at the industry facilities as well. Reality and quality of population protection plans, preparedness, organisational skills and co-ordination of actions among management units and rescue brigades are being tested in these exercises. In such exercises participate authorities of appropriate level, rescue and specialised services, representatives of different organisations.

To improve education on civil preparedness issues employees of state and private enterprises, officials of governmental institutions are constantly trained at the Training Centre of the Ministry of Defence. Main task during lectures and group activities is considered to be training of the officials of how to arrange protection of employees of the enterprises and population in case of emergencies.

16.5. International arrangements

In 1994 Lithuania has joined to Convention on Early Notification of a Nuclear Accident and has signed bilateral agreements for early notification and information exchange with Poland, Norway and Denmark. As regards notification of Belarus and Latvia present arrangements provide only unofficial notification of civil defence organisations of these countries. At present an agreement on early notification and information exchange between responsible organisation of Lithuania and Latvia is under development.

VATESI is responsible as a contact point for IAEA convention and most of the bilateral agreements concerning early warning and information. For bilateral agreement with Denmark, regarding exchange of monitoring data and early notification, the Ministry of Environment is the contact point.

The Civil Security 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 Security 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. Agreements of mutual assistance and co-operation have been signed with Germany and Poland as well as bilateral agreements between Civil Protection organisations with Czech, Hungary and other countries.

16.6. On-site emergency plan of Ignalina NPP

On the base of the Law on Nuclear Energy of the Republic of Lithuania No 1-1613, dated 1996 11 14, article 53 paragraph 1, article 54 paragraph 1,2 and article 56 Ignalina Nuclear Power Plant carries responsibility for nuclear emergency prevention and emergency and its consequences elimination.

Nuclear emergency and its consequences elimination work is carried out in compliance with "INPP Emergency Preparedness Plan" and instructions. INPP Emergency Preparedness Plan (further "Plan...") is the main operative instruction to carry out organisational, technical, medical, evacuation and other activities to protect the plant personnel, the population, the plant and the environment from emergency consequences, catastrophes, natural calamities, the threat of attack and blackmail.

The requirements of this plan are applied to Emergency Preparedness Organisation Management and to the whole INPP personnel in case of an emergency at INPP. The plan using procedure, its execution, amendments in order to correspond to alternated situation and to reflect the real status are specified in the operative instruction "INPP Emergency Preparedness Plan Execution and Amendments to it".

"Plan..." consists of 3 parts:

- General Part ;
- Operative Part;
- Appendices.

General Part of " Plan..." contains:

- policy, goals, tasks set by INPP management for Emergency Preparedness Organisation;
- responsibility of INPP management for emergency preparedness planning and organisation;
- INPP Emergency Preparedness organisational chart;
- tasks of INPP Emergency Preparedness Organisation Services and Units;
- notification of INPP Emergency Preparedness Organisation and its preparedness;
- measures applied in case of an emergency at INPP;
- premises and technical means needed for executions of emergency preparedness functions;
- co-operation with other organisations rendering assistance in case of an emergency;
- resources kept at the plant in case of an emergency and additional resources of other organisations;
- radiation dose limits;
- personnel training organising and training.

Operative part of the Plan consists of:

- list of Heads of Emergency Preparedness Organisation Services;
- check-lists of Emergency Preparedness Organisation Headquarters personnel;
- decision taking scheme;
- Notification Instruction in Case of an Emergency at INPP;

- Emergency Preparedness Organisation Management Assembly and Making Ready Instruction in Case of an Emergency at INPP;
- log-books of Heads of Emergency Preparedness Organisation Services;
- Personnel Assembly Places and Activities Organising Instruction in Case of an Emergency at INPP;
- Emergency Preparedness Organisation Services Emergency Preparedness Instruction;
- information communication forms.

Appendices to the Plan contain:

- technical and emergency criteria of emergency states;
- radiation criteria of emergency states;
- Emergency Situations Elimination Instruction at INPP;
- Personnel Protection from Harmful Toxic Releases and Activities Instruction in Case of an Emergency at the Plant or any Neighbouring Facilities;
- Fire Prevention Measures Plan in Case of an Extreme Situation at INPP and Visaginas Town;
- Heads of Emergency Preparedness Organisation Services Training Instruction;
- numeration of Emergency Preparedness Organisation provision with individual protection means, dosimetric and monitoring devices;
- numeration of Emergency Preparedness Organisation Services provision with control and communication means, technical, chemical and medical stock;
- numeration of Emergency Preparedness Organisation Services provision with transport, special machinery, lubricants and fuel.

" Plan..." is applied to the INPP personnel, Special and Fire Brigade personnel, and also to other contractor organisations personnel carrying out works at INPP. Measures carried out at INPP controlled area on the basis of "Plan...". Personnel protection of other enterprises and organisations which are in the INPP controlled area is carried out according to Plans prepared by these organisations under agreement with INPP authority.

Population protection of Visaginas town is carried out according to "Population Protection Plan of Visaginas Town in Case of Extreme Situations", worked out by Visaginas town authority under agreement with INPP authority.

Population protection of settlements which belong to radiation affected zone in case of an emergency at INPP is carried out by Civil Defence Departments of Lithuania, Latvia, Belarus.

"Plan ..." is worked out under agreement with regulatory bodies:

- VATESI
- Ministry of Health;
- Ministry of Internal Affairs;
- Civil Defence Department of Ministry of National Defence;
- Ministry of Environment.

Classification of emergency intervention levels.

There are set emergency intervention levels at Ignalina Nuclear Power Plant for application of measures reducing consequences of plant work derangement which start functioning at the early stage when there are no technical or radiation indications of an emergency, but there is a supposition that they can arouse.

There are set the following classes of emergency states:

- accident;
- emergency situation;

- initial preparedness;
- on-site emergency;
- local emergency;
- general emergency.

Every class of emergency state corresponds to separate intervention level.

Accident - it is malfunction of power plant systems, exterior event or personnel mistakes because of which normal operation is disturbed and normal plant operation limits or conditions can break and it embraces:

- process malfunction;
- threat to physical safety;
- fire;
- natural calamity;
- chemical accident.

Accident is the I-st intervention level. Plant Shift Supervisor has to inform about the accident:

- Director General;
- Technical director;
- Director Deputy for Security;
- Head of Radiation Protection Division (in case of radiation or chemical accident);
- VATESI orderly-man;
- Deputy Technical Director for Operations;
- Head of Safety and Quality Assurance Group and in case of need render help to injured people and organise elimination of accident consequences.

Emergency situation - it is a disorder of design basis process parameters meanings leading to an emergency.

Emergency situation is the II-nd intervention level. Plant Shift Supervisor has to notify the same notified staff as in the I-st intervention level and additionally:

- Heads of Emergency Preparedness Organisation Services (according to circulating notification);
- chief dispatcher of “Lithuanian Energy”;
- shift personnel in case of conditions leading to unit shut down;
- Head of Fire Brigade.
- Head of Technical Support Centre notifies the personnel of the Service who are needed in this case and who are ready to act.
- In case of need individual protection means are used and help is rendered to the injured.

Initial preparedness - it is power plant state characterised by disorder of normal plant operation limits or conditions, but do not leading to an emergency.

Initial preparedness is the III-rd intervention level.

Plant Shift Supervisor notifies about this accident:

- Head of Fire Brigade;
- Heads of Emergency Preparedness Organisation Services;
- operating INPP personnel;
- Civil Defence Department;
- chief dispatcher of “Lithuanian Energy”;
- municipality of Visaginas town.

Director General notifies:

- Ministry of Economy;
- State Security Department;
- Ministry of Health;
- Ministry of Environment;
- VATESI;
- IAEA.

Heads of Emergency Services are notified and get ready to act. In case of need help is rendered to the injured, separate works are stopped and according to the instruction of Plant Shift Supervisor individual protection means are used.

On-site emergency - it is disorder of plant process leading to release of radioactive materials and ionising radiation beyond the bounds of equipment, process systems, premises, facilities into the plant area exceeding meanings set for normal plant operation. On-site emergency is the IV-th intervention level. Plant Shift Supervisor and Director General carry out notification about this accident. To localise and eliminate an emergency "INPP Emergency Preparedness Plan" is put into execution and corresponding emergency services and the personnel are ready to carry out emergency work. Measures for people protection are enumerated additionally partial evacuation of personnel from premises and buildings is carried out.

Local emergency - it is disorder of plant process leading to release of radioactive materials into the controlled area exceeding meanings set for normal plant operation. There is a possibility for personnel irradiation and contamination of premises, buildings and territories with radioactive materials exceeding the standards. Local emergency is the V-th intervention level. Plant Shift Supervisor and Director General carry out notification about this accident.

To localise and eliminate an emergency "INPP Emergency Preparedness Plan" is put into execution, additional units and machinery are made ready to act, evacuation of personnel do not performing emergency work is carried out, help is rendered to the injured, individual protection means are used, management and services personnel work is organized in shifts in compliance with The Standards of Lithuanian Hygiene HN 73-1997." Basic Radiation Safety Standards".

General emergency - it is disorder of plant process leading to release of radioactive materials beyond the controlled area exceeding meanings set for normal plant operation. There is a possibility of personnel and population irradiation exceeding the standards. General emergency is the VI-th intervention level. Plant Shift Supervisor and Director General carry out notification about this accident.

To carry out emergency work "INPP Emergency Preparedness Plan" and "Population Protection Plan of Lithuanian Republic in Case of an Emergency at INPP" are put into execution.

Policy and requirements of Director General.

INPP ensures safety of non-affected unit and leads the following policy:

- timely notifies the personnel, territorial and state institutions, without hiding and distortion of emergency facts, willingly gives information about the event at the plant;
- takes timely measures to protect the personnel and achieve safe operation state;
- evaluates actual situation, ensures unity of goals and tasks of all Emergency Preparedness Organisation Services personnel;
- analyses thoroughly the present emergency state and forecasts the development of the situation;
- organises emergency preparedness activity in compliance with the requirements of the plant documents orientating to better international experience;

- constantly improves emergency preparedness activity, implements new notification, communication, information accumulation and transmission technical means.

Requirements of Director General.

INPP Emergency Preparedness Plan should be drawn up beforehand and established Emergency Preparedness Organization. INPP Director General is personally responsible for Emergency Preparedness at INPP. Each Head of Emergency Preparedness Organization is responsible for the competence and necessary knowledge of the subordinate personnel.

Emergency Preparedness Organisation must be able to cope with emergency situations at INPP or threatening INPP in order to protect people, environment, INPP equipment and premises.

To assure the correct activities of Emergency Preparedness Organisation personnel in case of an emergency the following conditions should be observed and implemented:

- the whole INPP personnel must know the notification signals, assembly places and initial activities during these signals;
- Emergency Preparedness Organisation personnel should be instructed and must train regularly;
- regular exercises for personnel should be performed;
- to carry out Emergency Preparedness Organisation tasks special premises should be equipped, resources of first priority equipment, protection and measuring means should be founded;
- predictable emergencies and INPP work drawbacks should be analysed and predictable consequences should be foreseen taking into consideration unfavourable conditions;
- the computerised monitoring system should function constantly including environmental radiation and meteorological control in the controlled and 30 km. observed areas;
- the computerised radioactive releases monitoring system should function constantly;
- the plant personnel and the population of Visaginas town notification and communication system should be worked out;
- the individual external and internal dosimetric control of the plant personnel should be assured.
- Emergency Management Centres should be founded at the plant and in Visaginas town territory and equipped with necessary hardware;
- the computerised emergency prediction and evaluation system should be worked out.

Taken decisions and bases of these decisions should be registered in log-books.

Emergency Preparedness Plan should be drawn up according to the established order.

Notification in case of an emergency at INPP.

Notification systems, means, communicated signals, their content and personnel activities are provided in “Notification Instruction in Case of an Emergency at INPP” which is the part of general part of “Plan...”. The Instruction is replenished with the following Appendices:

- Notification and Operative Information Communication in Case of an Radiation Emergency at INPP (Appendix No 1);
- list of INPP management and their work telephone numbers from INPP ATS connected to Civil Defence and Emergency Situations (further CD and ES) stand of circulating call for communicating during work -hours (Appendix No 2);
- list of INPP management and their home telephone numbers connected to CD and ES stand of circulating call installed at Visaginas TELEKOMAS communications for communicating during non-work -hours (Appendix No 3);
- INPP and Fire Brigade personnel possessing means of pager communication (Appendix No 4);

- Structural chart. P-164 equipment functioning in civil defence information system (Appendix No 5);
- Means. Communications used in emergencies eliminating at INPP (Appendix No 6);
- Notifications of INPP personnel and population of Visaginas town about an emergency also used for training purposes (Appendices No 7-16).

Notification of state institutions and population.

In compliance with the policy of Director General (Information Centre is functioning at the plant which in case of an emergency has 30 employees and there is a possibility to organise work in three shifts. The information will be communicated to:

- VATESI, IAEA, Ministry of Economy and to other institutions (ref. "Information Centre Service Emergency Preparedness Instruction") - technical data;
- media, population - general information.

In case of an emergency Information Centre has permanently based place at Health Recreation Centre and necessary communication means. Detailed activity of Information Centre is presented in "Information Centre Service Emergency Preparedness Instruction".

INPP Management and personnel training.

More detailed information about training is presented in "INPP Management and Personnel Training Instruction".

Training comprises:

- initial training in compliance with requirements for held post while accepting to work;
- periodical annual training according to set subjects;
- practical skills improvement during training and exercises.

Director General and Technical Director are trained at Regional Training Centre once per three years according to the programme approved by Civil Defence Department (further CDD) of the Republic of Lithuania. Training is carried out by CDD Headquarters personnel and foreign experts.

Director General organises:

- full exercise - once per 3 years;
- drills for Heads of Emergency Preparedness Organisation Services - 1-2 times per year;
- periodical annual training of Group No 1 - Heads of Emergency Preparedness Organisation Services according to 8 hours length programme.

Technical Director organises:

- periodical annual training of Group No 2 - Heads of Technical Support Centre and Workshops according to 8 hours length programme.

Heads of Emergency Preparedness Organisation Services organise training for the subordinate personnel according to 8 hours length programme. The course of training ends up with annual functional exercises using individual protection means.

Documents necessary for Heads of EPO and personnel training are worked out by Emergency Preparedness Organisation Headquarters under agreement with Heads of Emergency Preparedness Organisation Services and INPP Director General.

While training it is necessary to pay attention to:

- understanding of personal duties in compliance with guiding documents (INPP Emergency Preparedness Plan and Emergency Preparedness Organisation Services Instructions);
- practical carrying out of emergency work using individual protection means.

Article 17: SITING

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

- *for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;*
- *for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;*
- *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;*
- *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 national laws, regulations and requirements related to siting of Nuclear Installations

In making a decision on the construction of a specific nuclear facility, the Government of the Republic of Lithuania shall take into consideration:

1. economic and public needs;
2. the principal characteristics of the use of natural resources and their impact on the environment;
3. nuclear safety and radiation protection guarantees;
4. the opinion of the local authority on whose territory the intended facility will be sited.

Information about the site of nuclear facility is presented as follows:

1. 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);
2. 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);
3. situation of other industrial facilities around the nuclear facility, consequences to the safety of the nuclear facility caused by possible accidents in these facilities;
4. other parameters of the site, which can be important to ensure the safety of the nuclear facility and minimise risk to the inhabitants from radiation;

General Provisions of the Activities of the Licence Issuing Authority

The institutions referred to in Article 26, issuing licences for a certain type of activity in the nuclear energy sector, are obliged to ensure that enterprises, which have been issued licences, shall guarantee:

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

Without prejudice to the principal provisions of this Law and its separate parts, the issuing institution may establish additional requirements for the licensed activity.

Issue of Licences

The activities listed in this Law shall be licensed for a limited period in a manner established by the laws and other statutory acts of the Republic of Lithuania.

The licensing institution have the right to establish at a later date additional conditions and requirements for the safe operation of a facility, and in the event of their disregard, to suspend the licence and to prohibit any further operation of the facility until all the established shortcomings have been rectified. The issuing institution may at any time cancel the validity of the licence when it establishes that the nuclear safety conditions have been breached.

The competent licensing authority shall establish the procedure for applying new safety standards and rules at the operating facilities.

The refusal to issue a licence, its suspension, cancellation or prohibition of the activity of a facility may be appealed against in court.

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

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 Energy.

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

1. 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;
2. the approval of a detailed plan of the territory;
3. taking over of the land intended for the construction site for public needs in a legally prescribed manner.

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 fulfilment 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. As it was described in section 6.3 and 14.2, an in-depth safety analysis of Ignalina NPP using Western methodology was completed in 1997. The site was originaly 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:

A. There were no such regulatory requirements at the time when the plants were developed and no such requirements were introduced by the regulatory bodies,
B. Such events are sufficiently unlikely, besides, the RBMK sites are situated reasonably far from airports,
C. 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-Rokiskis is ten km to the West of the Ignalina NPP. In 1990 a total number of flights along the Lithuanian air routes was 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), 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 need to be strengthened.

Some systems, equipment and structures of the Ignalina NPP do not fully comply with seismic stability standards. Measures aimed at reinforcing the existing building and equipment components are expensive, and are considered by plant experts as unfeasible. However, aftereffects of an earthquake will be diminished if the reactors are promptly shut down prior to the seismic wave approaching the plant. The implementation of the seismic monitoring system is under progress in accordance with Safety Improvement Program of Ignalina NPP.

Article 18: DESIGN AND CONSTRUCTION

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

- *the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defense 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;*
- *the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;*
- *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 permit for the construction of a nuclear facility shall be issued in a prescribed manner by the administration of the county governor. On the proposal of the Government, the Seimas adopt a law on the construction of a new nuclear plant and its site or on the mounting of a new nuclear reactor, also on the decommissioning of a nuclear facility. The law establishes the principal limits for a nuclear plant or a nuclear reactor also for the zones of sanitary protection and monitoring.

The Government of the Republic of Lithuania shall:

1. in the manner prescribed by law, adopt decisions on the construction of specified nuclear facilities;
2. form a commission for the commissioning of a nuclear facility;
3. prepare nuclear safety and radiation protection regulatory system and mechanism;
4. establish nuclear energy control and supervision institutions and approve their regulations;
5. approve statutory acts regulating the acquisition, storage, transport and disposal of nuclear and radioactive materials and submit them to the ministries the Government institutions for approval in cases listed in the above articles;
6. establish the procedure of licensing for nuclear activities';
7. establish the specific conditions and requirements for the zones of sanitary protection and monitoring and trends for their development;
8. co-ordinate the activities of ministries and other state institutions in drafting nuclear accident prevention and management plans.

An organisation operating a nuclear facility is responsible for conducting nuclear activities in compliance with the provisions of this Law and other statutory acts of the Republic of Lithuania.

A competent authority issuing licences for a specified activity in the sphere of nuclear energy must develop a system of requirements guaranteeing:

1. nuclear safety;
2. non-proliferation of nuclear weapons;
3. only a lawful use of nuclear materials and waste management.

During all the stages of work compliance with the conditions and requirements set forth in the nuclear safety, radiation protection and other statutory acts shall be controlled and supervised by the following institutions within the framework of their competence: the VATESI, the Ministry of Health, the Ministry of Environment, the Ministry of Social Security and Labour, the Ministry of the Interior, the State Security Department and the county governor.

Sanitary protection and monitoring zones shall be established around nuclear facilities. The size of the area shall depend on the purpose of the facility and the requirements of operation safety rules and standards. The boundaries of the sanitary and monitoring zones shall be fixed in the documentation of the facility construction design.

Prior to the commissioning of the facility, all the population shall be resettled from the sanitary protection zone in a manner established by the Government. Activities as well as construction of installations and buildings unrelated to the operation or service of the facility shall be prohibited therein. Land, woods and water bodies in the territory of the sanitary protection zone may be used only subject to an approval of the facility operator 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 shall be stipulated by law on a nuclear power plant or on a nuclear reactor.

Information about the design of nuclear facility is as follows:

1. layout of the nuclear facility buildings and systems (general plan);

2. reactor core:

2.1. description of the physical, thermal, mechanical and chemical processes in the reactor;
2.2. description of the main elements of reactor construction (static and dynamic loads are indicated);
2.3. comprehensive description of fuel design and physical parameters, operating parameters, limiting design indicators (parameters);

2.4. description of reactivity control system and justification of its reliability, taking into account the functional capability to maintain the design parameters of fuel in case of accident processes, analysis of systems operational reliability;

2.5. description of nuclear physics parameters of the reactor, analysis of thermal exchange processes, description of numerical methods for determination of reactor parameters, assessment of their accuracy and comparison with the experimental data;

2.6. description of the moderator and related systems, analysis of static and dynamic loads, analysis of moderator quantity sufficiency; taking into account its influence on the performance of reactor control and safety systems, accumulated radioactivity, systems for protection against radioactive contamination and for its monitoring;

2.7. other safety relevant information;

3. System of thermal exchange and reactor cooling:

3.1. comprehensive description of system design principles;

3.2. description of main elements of system design;

3.3. design calculations, analysis of stresses in main design elements;

3.4. comprehensive analysis of reactor cooling system and emergency core cooling system constructional reliability during operation, transient and accident processes.

3.5. description of system parameters control system;

3.6. other safety related information;

4. protective cover system of the reactor:

4.1. description of main principles of reactor design;

4.2. comprehensive description of the main functional elements by assessment of their interaction, control parameters, constructional reliability during performing of safety functions, energy supply for them;

4.3. comprehensive justification of leak tightness of reactor protective cover construction, taking into account the situation of constructional elements;

4.4. detailed description of the reactor cavity ventilation system, justification of its constructional reliability and leak tightness, analysis and justification of control, filtration means functional reliability;

4.5. description of systems for pressure relief and cooling in case of accidental processes, removal of fission products, justification of their constructional reliability and functional adequacy.

4.6. description of the methodologies and computer programs used for analysis;

5. control and protection systems, control and measuring devices:

5.1. comprehensive description of control and monitoring systems, and monitoring instruments;

5.2. comprehensive justification of the reliability of control system:

- requirements established for the system;
- analysis of reliability;
- analysis of supply systems reliability;
- analysis of systems separation and independence;
- analysis of possible failures;
- analysis of functional redundancy and analysis of alarm provisions;

5.3. comprehensive safety justification of the protection system, including:

- requirements established for the system;
- analysis of functional reliability;
- analysis of supplying systems reliability, control methods and means;
- analysis of systems and their functional independence from non safety (service) systems;
- analysis of systems redundancy, analysis of application of different control principles and physical separation;
- description of power supply systems, analysis of their reliability, ensuring continuous energy supply for safety relevant systems and emergency supply;

6. description of the energy production system, including:

6.1. elements of the design and performance principles of generators;

6.2. analysis of the constructional reliability of generator during operation and emergency processes;

6.3 analysis of the generator capacity control system;

7. description of the fuel management system, including:

7.1.loading and transportation equipment, requirements for its maintenance;

7.2. analysis of reactivity control systems reliability and adequacy of work procedures;

7.3. justification of protection systems reliability;

7.4. justification of distribution and handling systems of fuel with respect to safety assurance;

8. description of auxiliary systems, including:

8.1. ventilation systems;

8.2. fire protection systems;

8.3. communication systems;

8.4. pressurised air of technical gas supply systems;

8.5. technical water supply systems;

9. description of radiation protection system, including the main principles of radiation protection assurance, design of premises, separation of the security zones, biological shielding, materials used, filtration and cleaning systems and other safety relevant elements;

10. description of radioactive waste management system, including design of equipment, dosimeter control system;

11. description of measures foreseen in the design of the nuclear facility, which shall be applied after shut-down of the nuclear facility.

18.2. Implementation of the "defense-in-depth" concept and the fundamental reactor safety principles

A necessity to implement the "defense-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", point 1.2.3 of which reads:

"1.2.3. The safety of a nuclear plant shall be guaranteed by applying the principle of "defense-in-depth", i.e. by the sequential implementation of protection measures based on a system of barriers to prevent the spread of ionizing radiation and radioactive materials to the environment and a system of technical and organizational measures to protect these barriers and retain their effectiveness, and to provide direct protection for the population.

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 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 on the plant;
- nuclear plant operation in accordance with norms and technical requirements;
- maintenance of safety-related systems in good operating condition through the implementation of preventive maintenance measures and replacement of worn-out components;

- timely diagnosis of defects, detection of any departure from normal functioning, and implementation of measures to remove their causes;
- organization of an effective system for documenting the results of operational 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 "defense-in-depth" comes into play at all stages of safety-related activities in the competent departments of a nuclear plant.

During normal operation all barriers and all resources designed to protect them must be in good operating condition. If any of the barriers provided in the plant design or any of the resources intended to protect those barriers 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 and the manner in which this is done shall be specified in norms and technical requirements, and shall also be laid down and justified in the technical design for each individual plant."

The INPP safety is provided by engineering devices and organisational activities which ensure 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 an example of a maximum design accident.

In accordance with the General Requlations for Nuclear Power Plant Safety the safety systems are designed in the way which allows to ensure the plant safety in the event of any design accident because only one active element of the safety system fails to operate and this does depend on the accident type.

The key safety design principles appear as follows:

- Ensuring reliable core cooling both under normal and emergency conditions;
- Ensuring 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 full localisation of the active core releases in the event of primary circuit tube rupture which is regarded rather severe from the radiological point of view;
- Ensuring premise protection from collapse under emergency conditions in the event of overpressure in rooms and a primary circuit tube rupture;
- Ensuring equipment and tube protection from breaking under emergency conditions in the event of overpressure in the primary circuit.

The Plant safety is supported by:

- Primary Circuit composition which ensures the satisfactory conditions for natural coolant circulation;

- Designing the Primary 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 pipes and equipment with core coolant in protected rooms;
- Locating the Primary Circuit pipes in tight compartments which are designed to withstand overpressure in the event of a tube 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" (points 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 scope and forms of safety functions to be provided are stipulated in Code and Standard Programme applied to NPP, justified and incorporated into INPP engineering design.

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 to ensure safety at any single designed initial event with overlapping of one event which is independent on the initial event of the failure of any 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 (point 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 operating the reactor facilities at Leningrad, Kursk and Chernobyl NNPs and to meet the NPP safe operation requirements which lately have been tightened to satisfy the international nuclear excellency in general and to implement INPP SAR recommendations in particular.

The required quality of construction is provided by applying the proven technology while performing civil work which is to be supported by appropriate QA activities.

Article 19: OPERATION

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

- *the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;*
- *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;*
- *operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;*
- *procedures are established for responding to anticipated operational occurrences and to accidents;*
- *necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;*
- *incidents significant to safety are reported in a timely manner by the holder of the relevant license to the regulatory body;*
- *programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;*
- *the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.*

19.1. Description of licensing process, including summary of national laws, regulations and requirements related to operation of Nuclear Installations

After the completion of construction or reconstruction, the commissioning of a nuclear facility shall be executed by an act signed by a special commission appointed by the Government that together with the other documents shall be the basis for obtaining a licence from VATESI for the operation of the facility.

The safe operation of nuclear facilities shall be the responsibility of the organisations operating those facilities.

Operation of a nuclear power plant or any other nuclear facility may start only subject to the approval act from a commissioning authority and a licence issued by the State Nuclear Power Safety Inspectorate.

During the testing of a nuclear reactor, VATESI with the approval of the Ministry of Environmental Protection and the Ministry of Health, shall issue separate licences for:

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

A nuclear facility must be used only the purpose it has been intended.

The operating organisation of the nuclear facility fully responsible for the adequate and safe operation of the facility in accordance with the requirements set 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 operator of the facility is obliged:

1. to manage the accounting for nuclear materials belonging to the facility and exercise theircontrol in accordance with the requirements laid down in the safeguards agreement with the IAEA;
2. to analyse nuclear accidents and incidents in the manner prescribed by statutory acts;
3. 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;
4. to ensure preparedness for the elimination of the consequences of a radiological accident.

19.2. Description of the steps Contracting Parties have taken in implementing obligations under Article 19 of the Convention:

19.2.1. the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements

The commissioning program was developed before the start-up of the Ignalina NPP. The program was approved by the NPP General Designer, the Reactor Main Designer, the Research Manager and the Regulatory Authority, and then authorized by the Operating Utility.

Pre-commissioning tests gave the evidence that the whole INPP and its individual units, safety systems and components operate as designed. The plant was brought to first criticality and power in accordance with the statuary procedures.

When implementing each INPP unit commissioning program, the physical parameters of the reactor, safety systems and all components were determined, the operating parameters of the systems and components, and the limits and conditions of safe operation were improved, and the operating procedures were corrected.

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.

Then the Ignalina NPP had to obtain an annual permit for continued operation after each scheduled maintenance. Presently, according to the Nuclear Law of the Republic of Lithuania a licensing procedure is put in force. The Ignalina NPP is to be licensed for continued operation in 1999.

For Ignalina NPP, limits and conditions of safe operation was set and justified in the Safety Justification Reports prepared by the plant Main Designer (NIKIET, Moscow) Scientific Adviser (RNC KI, Moscow) and Main Architector (St. Peterburg, Russia). In the frames of in-depth safety assessment (SAR), these parameters were reviewed and in several places corrected. All relevant document was reviewed by competent organizations in former USSR (now is Russia). Commissioning programme was developed and reviewed by competent organizations, including of Regulatory Body.

Demonstrating that the Ignalina NPP, as constructed, is consistent with design and safety requirements was presented during commissioning tests: for systems, elements and units, accordingly. Test programmes was reviewed and approved by competent organizations, including of Regulatory Body.

Now, Ignalina NPP going for licensing of the Unit 1 based on Western style.

19.2.2. Operational limits and conditions

It is stated in point 5.1.2 of "General Regulations for Nuclear Power Plant Safety" that the principal document defining safe operation is the technological reglament (specification), which lays down main modes and functions of safe operation as well as general instructions for the performance of all operations related to plant safety, and also specifies the limits and conditions of safe operation. The

limits and conditions of safe operation shall be justified by design and/or other relevant documents. This statement is further specified in the point 2.1.14 of "Nuclear Safety Regulations for Reactor Plants": in the reactor plant Safety Justification Report, operational limits and conditions, limits and conditions for safe operation as well as design limits established for design-basis accidents - shall be justified and specified.

For Ignalina, limits and conditions of safe operation was set and justified in the Safety Justification Reports prepared by the plant Main Designer (NIKIET) and Scientific Adviser (RNC KI). In the frames of in-depth safety assessment, these parameters were reviewed and in several places corrected. Corrected set of operational and safety limits and conditions are included in the last version of Technological Reglament of Ignalina NPP, agreed on with VATESI and went in force from 1 May 1998. The limits and conditions are constantly being reviewed and, if necessary, corrected on the basis of operational experience and design modifications performed.

19.2.3. operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures

Operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures that developed and reviewed by competent organizations, including of Regulatory Body. All results of operation, maintenance, inspection and testing of a nuclear installation is efficiently documented. Procedures for information feedback and documentation are established. Records and reports are properly considered, used for planning of relevant activities and elaboration of corrective measures aimed at improving quality, and filed.

All plant activities are performed according to procedures. Each procedure has to be proved eligible and has to be filed before it can be used.

Management of operating records at the Ignalina NPP includes 4 kinds of activities:

- Elaborating a document;
- Proving it to be eligible: verification, accommodation, approval, validation (verification and validation procedures for the emergency and normal operating procedures are under development);
- Maintaining the records: record-keeping, copying and accessibility to the personnel, amending the existing records and making the personnel aware of amendments, replacing and voiding the outdated records, keeping the records safe;
- Procedurising the use of the records by the personnel during work performance.

All above-mentioned kinds of activities are set forth in the appropriate guidelines, which are elaborated in accordance with the Quality Program being currently introduced at the Ignalina NPP.

Normal and emergency operating procedures, as well as testing procedures are developed in the operation-by-operation manner. In addition to the current emergency procedures the symptom-based emergency procedures are being developed.

A computer documentation management system using electronic data bases is in place at the Ignalina NPP to maintain the record-keeping. It is one of the effective components of the INPP Configuration Management System. All personnel can access the data bases with the files of the valid records. At the moment implementation of the integral INPP Configuration Management System is underway.

19.2.4. Emergency operating procedures

Point 5.1.4 of the "General Regulations for Nuclear Power Plant Safety" requires that the Operating Organization and nuclear plant administration shall, on the basis of the norms and technical requirements, technological reglament and the technical safety justification for the reactor and the plant as a whole, prepare and issue special instructions defining the actions of personnel to maintain safety during design-basis and beyond-design-basis accidents. The actions prescribed for plant staff in these special instructions shall be based on the attributes of the events and the conditions of the reactor, as

well as on a forecast of conditions as they are expected to evolve during the accident. Actions shall be directed to restore essential safety functions and to limit the radiational consequences of the accident.

Existing event-based Emergency Operating Procedures at Ignalina were reviewed in the frames of in-depth safety assessment and were found to be corrected both from the point of view of their structure (to become more convenient for the operators) and to cover all necessary anticipated events. This work was recognized as very urgent and in accordance with Ignalina Safety Panel recommendations was done before restart of Ignalina Unit 1 in 1997.

In the frames of "Lisbon Initiative" a development of Symptom Based Emergency Operating Procedures for Ignalina is now underway. Experts from Lithuania, Russia, Sweden and the United States take part in this work that should be completed by the end of 1998.

19.2.5. Engineering and technical support infrastructure

In 1991, when Lithuania became independent, the country lacked the basic infrastructure (design and research institutions) to support the safe operation of nuclear installations. VATESI has made special efforts to create the national Technical Support Organisations (TSOs).

The first TSO established in 1992 was the Ignalina Safety Analysis Group (ISAG), formed by the resolution of the Government of Lithuania at the Lithuanian Energy Institute. The experts of ISAG perform modelling and analysis of thermal and hydraulic processes in the Main Reactor Circuit during transient and emergency situations, modelling of physical processes in the core, thermal and hydraulic calculations of the Accident Confinement System, assessment of the constructional reliability of INPP and other activities. Experts of Lithuanian TSO were involved in teams of RSR. At present ISAG is Lithuanian TSO with the deepest experience in the nuclear safety area.

VATESI started co-operation in 1992, with the Department of Mechanics at Kaunas University of Technology. By the request of VATESI, 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 material at Vilnius Gedimino Technical University.

In 1995, VATESI has granted license to the State Information Technology Institute (VITI) for the design of information systems, software, automatic control system elements, related to the modernisation of the TITAN computer system at INPP.

The Constructional Reliability Centre was established based on requirements of VATESI in 1994. The experts of the centre perform the assessment of the residual time resources of INPP equipment. Specialists of the Ultrasonic Laboratory have designed and produced devices to measure the 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’s capabilities in NDT, structural integrity and welding areas.

19.2.6. Incident reporting and feedback

System for reporting of unusual events at NPPs is established in Lithuania in accordance with international practice and is based on IAEA recommendations (safety guide N.93). It means that exists all necessary administrative and technical measures to fulfill this task. In accordance with the regulatory requirements all categorized events shall be reported to the regulatory body (VATESI) in a

timely manner . Orally regulatory body is informed as soon as possible, written information about the reportable event shall be transmitted to VATESI within 24 ours in special format, detail investigation reports should be transmitted to VATESI within 30 days.

Within Nuclear Power Plant is instituted measures to ensure that events significant for safety are detected and evaluated in depth, and that any necessary corrective measures are taken promptly and information on them is disseminated.

Plant management personnel use the safety information gained from the operating experience of other nuclear power plants as a source of lessons applicable at their own plant to improve plant safety. Main sources of this information are WANO and IAEA/NEA IRS database.

19.2.7. Radioactive waste handling

Co-operation program between Lithuania and Swedish SKB (Swedish Nuclear Fuel and Waste Management Company) prepared an Overall Plan for Radioactive Waste Management in Lithuania and presented to Lithuanian authorities for considerations. It became a practical guide for planing Radioactive Waste Management activities both in near term and long term perspective. At present the draft of General National Strategy for Waste Management together with detailed short term and long term plan is prepared. In nearest future this plan will be presented to the Government for approval. The first items of plan are establishment of organisational and financial system.

The radioactive waste at Ignalina NPP consists of solid and liquid waste, ion exchange resins and a small quantity off used lubricants. It was decided that the spent fuel from Ignalina NPP would not be re-processed and is considered as a radioactive waste.

According to existing requirements the solid waste generated at Ignalina NPP is divided into three groups depending on a surface dose rate. Presently the solid waste is dumped in reinforced vaults with removable roofs which are at Ignalina NPP site. There is no conditioning of solid waste before dumping.

The liquid waste at Ignalina NPP is collected in the special reservoirs, from where it is directed to evaporators. Then the concentrate is treated additionally and conditioned in bitumen lines, where the waste is mixed with bitumen. The bitumenized product is then by pumps transported and placed to a special storage. This storage facility is also located at Ignalina NPP site.

The spent ion exchange resins are not conditioned and are stored in special tanks. The remaining free space at the storage is small. At present an international tender for cementation facility for spent resins is announced.

Existing radwaste facilities for storing of low and intermediate level waste (LLW/ILW) at Ignalina NPP and Maisiogala have been intended originally to serve as final repositories. But well founded doubts have been expressed regarding the sufficiency of the long-term safety of the facilities in their present shape. In addition, they was not subjects of any formal license issued by regulatory authority as it is required in the Law on Nuclear Energy. It is necessary to investigate the situation more in depth and to examine possibilities to bring the long-term safety up to an acceptable level. Consequently, three new projects on long term safety assessment of existing storage for LLW/ILW in Ignalina NPP and Maisiogala storage started through bilateral co-operation programme with Sweden.

There are plans to improve LLW/ILW treatment technologies at Ignalina NPP. It is foreseen to design and construct the spent resins cementation facility also. Another project is related to the treatment technology for reducing of solid waste volume that is generated in Ignalina NPP. Compactation of solid waste has been implemented. The possibility to introduce incineration technology for combustible LLW is being examined in Ignalina NPP at present. Both projects are included into integrated safety improvement programme SIP-2. In nearest future the space of storage pools for spent fuel at Ignalina NPP will be fully exhausted. The design and construction of dry spent fuel storage facility at Ignalina NPP site have been accepted in Lithuania. After an international tender's announcement the Germany's company GNB proposals which was mostly suitable for Ignalina NPP is accepted. The metal casks

with spent fuel will be stored in the open- air storage facility designed by VNIPIET for 50 years. This project is underway now 20 casks are manufactured, and VATESI performs licensing procedures for this interim storage.

The alternatives of final disposal of HLW (High Level Waste) have to be resolved in Lithuania also. Repository for long term waste (spent fuel) will be needed after 50 years. Nevertheless it is necessary to initiate preparatory work and investigation of site for final disposal of spent fuel in a licensed deep geological repository. Lithuanian geological service started investigations for such repository. Of course, it is necessary initiate an investigation program with a goal to establish conditions and possibilities to build spent fuel repository with acceptable safety.

PLANNED ACTIVITIES TO IMPROVE SAFETY

Summary of safety issues of concern identified earlier, and planned future activities to address those issues, including, where appropriate, measures of international co-operation

The Republic of Lithuania has one nuclear power plant with two reactors of the RBMK-1500 type. In Lithuania, the laws regulating nuclear activities are in force. Lithuania is the contracting party of a number of conventions. The Government of the Republic of Lithuania has approved the order of licensing the nuclear activities, import-export and transportation of nuclear materials. The State Nuclear Power Safety Inspectorate (VATESI) has promulgated general requirements for the safety of nuclear power plants, safety rules for reactors and other documentation. The legal basis of nuclear safety have been created, therefore it is acknowledged that the requirements of the Convention are being observed in this respect.

In Lithuania, a clear delimitation between the responsibility of the operator and that of regulatory state institutions is observed. The state regulation and surveillance system of nuclear safety is created in compliance with the requirements of the Convention.

The Safety Analysis Report and the Review of Safety Analysis Report of the Ignalina Nuclear Power Plant have been elaborated. They recommend to implement safety improvement measures and confirm that no defects are observed currently at the Ignalina NPP that could lead to the necessity of its immediate shut-down or complete decommissioning. The system of issuing annual licences after repairs is applied. The requirements of the Convention to evaluate safety of nuclear facilities on a regular basis are being executed.

A simulator adequate to operating the plant is assembled and functioning at the Ignalina NPP. The simulator is used for training and examining operators. Engineers in nuclear energy are prepared at the Kaunas Technological University, therefore, it is acknowledged that the personnel is trained and requalified in compliance with the requirements of the Convention.

The Draft Law on Radiation Protection is prepared, norms for radiation protection are valid, efforts are laid to follow the ALARA principles. The plan for the emergency preparedness in Ignalina NPP has been elaborated in accordance with the new requirements. But the doze of collective irradiation of the personnel is rather large. Although there are no data, indicating that the requirements of the Convention in the field of radiation protection are being violated, still the activities in this field might be improved.

The Ignalina NPP Decommissioning Fund has been established in Lithuania, into which allocations are made, gained from the sales of electricity, the Draft Law on Radioactive Waste and Spent Nuclear Fuel Management has been prepared.

The material presented in the report allows to maintain that Lithuania considers its commitments, undertaken while signing the Convention on Nuclear Safety.

Still, the analysis carried out while preparing this report, showed that it is necessary to act more actively in order to constantly improve nuclear safety:

- it is necessary to unconditionally implement the Safety Improvement Program No.2 of Ignalina NPP (SIP-2);
- to strengthen institutions of state regulation and administration of nuclear safety;
- to further develop the scientific-technical infrastructure of nuclear energy;
- to ensure an unimpeded financing of production activities of Ignalina NPP.

ANNEXES

Annex to 6.1. LIST OF EXISTING NUCLEAR INSTALLATIONS.
Annex to 6.3. THE MAJOR FINDINGS OF IGNALINA NPP SAR.
Annex to 6.4. MAIN ACTIVITIES (MEASURES) OF SIP-2.
Annex to 7.1. CHART OF INTERACTION BETWEEN GOVERNMENTAL AND REGULATORY BODIES AND IGNALINA NPP.
Annex to 10.1.1. STATE SYSTEMS REGULATION OF NUCLEAR SAFETY IN THE REPUBLIC OF LITHUANIA (VATESI POLICY STATEMENT).
Annex to 10.1.2. INPP NUCLEAR SAFETY AND QUALITY POLICY.

Annex to 6 Annex to 6.1

LIST OF EXISTING NUCLEAR INSTALLATIONS

The Ignalina NPP is the only nuclear installation in Lithuania. It contains two RBMK-1500 reactors (Russian acronym for "Channelized Large Power Reactor"). This is the most advanced version of the RBMK reactor design series (actually the only two of this type that were built). The Ignalina NPP is provided with an improved ALS (Accident Localization System). In most other respects, the plants are quite similar to their predecessors. They have two cooling loops, a direct cycle, fuel clusters are loaded into individual channels. The neutron spectrum is thermalized by a massive graphite moderator block. The plant can be refueled on line and uses slightly enriched nuclear fuel. The power plants were built as part of the Soviet Union's North-West Unified Power System. The first unit of Ignalina NPP went into service at the end of 1983, the second unit in August, 1987. Their design lifetime is projected out to 2010-2015. A total of four units were originally planned on this site. Construction of the third unit was terminated in 1989 because of political pressure, and construction of the forth one was never started. The Ignalina NPP is located in the north-eastern part of Lithuania, near the borders of Latvia and Belarus. The Ignalina NPP belongs 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 feedwater pump to the water of the same drum-separator. 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 extensively used throughout the world, and is analogous to the cycle of thermal generating stations. However, compared to BWRs used in Western power plants, the Ignalina NPP and other plants with the RBMK-type reactors have a number of unique features. The most important features are discussed in the subsequent sections.

Table 6.1.1 presents several of the most important plant parameters.

Table 6.1.1

Coolant water (steam-water mixture)	
Heat cycle configuration	single circuit
Power, MW:	
thermal (design)	4800
thermal (actual)	4200
electrical (design)	1500
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
Initial fuel enrichment for 235U, %	2.0
Nuclear fuel burnup, MWday/kg	21.6
Temperatures, oC:	
maximum temperature at 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 separators6.38...6.87
- pressure in MCP pressure header8.6

Coolant flow rate through reactor at normal power, kg/s8700...10550
Steam produced in reactor at normal power, kg/s2361...2444
Void fraction at reactor outlet, %23...29
Maximum fuel channel parameters:
- fuel channel power, kW4250
- coolant flow rate through fuel channel, kg/s8.7
- void fraction at fuel channel outlet, %36.1

Number of main circulation pumps8
Capacity of main circulation pumps, kg/s1944...3056

The Ignalina NPP belongs to the RBMK-type of reactors designed and constructed by the former USSR's Ministry of Nuclear Power Industry. The development of the Ignalina NPP project was realized 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" (translation the Russian - " Leningradstalkonstrukcija "), St. Petersburg, Russia. The turbine hall and the open distributive system were developed by the Kiev branch of the Atomic Energy Design Institute (Russian abbreviation - "Atomenergoproekt"), Kiev, Ukraine. It had been proposed, that Ignalina NPP 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.

Annex to 6 Annex to 6.3

THE MAJOR FINDINGS OF IGNALINA NPP SAR

Post-Chernobyl modifications made to the reactor have reduced the void coefficient to the point that there is no longer a significant power pulse during large break LOCAs. This combined with relatively slow depressurisation rates means that the existing shutdown system is fast enough to cope with all design basis accidents. All potential mechanisms for CPS channel draining accidents result in slow draining rates easily handled by the existing system. The existing CPS is structured in a way which makes complete separation of the control and protection functions impossible. Furthermore instrumentation associated with the CPS does not meet accepted requirements for segregation. Loss of shutdown for some accidents leads to unacceptable consequences and therefore requires addition of a second diverse shutdown system. The probability of ATWS would be significantly lowered by this addition. Several required design and procedural modifications have been accepted by INPP relating to: additional reactor trips, early initiation of ECCS for all breaks, improved diversity in ECCS initiation logic, pressure relief in the steam compartments and in the reactor hall, drainage of radioactive pools in areas outside confinement, reduction in the number of allowable pre-existing fuel failures, and enhanced operator instructions and training for control of long term emergency cooling. There were no single failures identified in the primary safety systems which would prohibit their functioning. Many of the safety support systems are, however, susceptible to single failures but none have been identified that would invalidate the overall safety function. Improvements in fire detection systems, fire cell separation and creation of separate fire compartments for safety and safety related systems are needed. Equipment qualification requirements have been minimised by separation of critical equipment into areas of mild environment and actions to ensure integrity of these barriers must be emphasised. The potential for flooding of some safety equipment needs further investigation and remedial action if necessary. The lack of Western style containment at INPP is somewhat offset by the results discussed above for design basis accidents which show that all LOCAs where significant fuel failures could occur from fuel over-heating are located within confinement. Implementation of accepted design modifications will ensure that steam line breaks do not lead to fuel failures, and a lowering of the number of allowable pre-existing fuel failures in the core will ensure that doses to the public remain within limits for breaks which vent directly to the atmosphere. Programmes to reduce the current leakage and to pressure test the confinements for both units are required to demonstrate compliance with allowable release limits. The already low probability of multiple pressure tube rupture will be further reduced by several of the improvements currently being instituted (trip on low flow in multiple fuel channels, automatic trip on low ORM). Enhancements to ECCS initiation logic will preclude early, local temperature excursions following partial GDH breaks and some other initiators affecting a single core pass. Improved emergency procedures and operator training will ensure that any delayed local flow deterioration at elevated pressures is disrupted. The newly enhanced reactor cavity venting capacity (9 a 4 channel failures at the full system pressure, and 25a 12 at 4 MPa) will further reduce the potential for serious damage for cases involving a limited number of simultaneous failures. When the accident reduces pressure below about 4 MPa, the potential for channel rupture due to overheating rapidly diminishes because the graphite blocks are able to arrest pressure tube wall deformations thus preventing the channel failure.The fundamental design of this reactor relies heavily on the operator to undertake essential long term safety actions. The Accident Mitigation or Emergency Operating Procedures require substantial improvement in regard to content and reference material essential for response in accident situations. The essential actions must be reviewed in light of the results of this SAR since there are new issues and phenomena to deal with. The explicit dependence on memory for procedural details should be replaced with documented and accessible emergency operating procedures. The development of new Emergency Operating Procedures has begun under the "Lisbon Initiative" but the priority needs to be raised and the new procedures implemented stepwise as they are developed.The time of contact between the pressure tubes and the graphite moderator has been predicted to occur between 1999 and 2002 for Unit 1 but the actual time of closure can only reliably be determined from measurement. Programmes are currently underway at INPP to measure the diameters of the channels and new equipment is under development to measure the channel to graphite gap from within the channel.An indicative estimate of the cost of the modifications indicated above, and priorities for undertaking these modifications have been established. It should be emphasised that accurate estimates can only be produced when the details of each specific modification have been established, and in all likelihood the actual cost will be less than this value because of programmes already underway. In addition the number of person-years of operating staff time required to implement

all of the operational procedure and practices recommendations has been estimated. Western assistance is required for part of this work programme. The reviews undertaken in this SAR show that INPP has programmes which are just getting underway to tackle the many issues necessary to improve both the Safety Management and the Safety Culture at INPP. The fundamentals of good Business Processes exist but they need to be better structured and widely disseminated to staff to ensure a full understanding of safety issues by all staff. Safety culture improvements will follow when staff are given the authority, as well as the responsibility, to carry out safety tasks without the fear of punishment for errors. The station will be able to fulfil its proper role as the organisation responsible for the safety of INPP when the appropriate legislation is enacted to properly separate the roles of Operator and Regulator and INPP and VATESI jointly develop the necessary programmes for the transition. The solutions to existing problems lie in completing intended programs, and in an extensive and urgent rewrite of the EOP, "Accident Management", O-56, and in engaging the full capabilities and competencies that already exist in the staff of the plant: management, supervisors, and workers.

Annex to 6 Annex to 6.4

MAIN ACTIVITIES (MEASURES) OF SIP-2

1. Design Modifications

Operations

Feed-water regulation, TITAN instrumentation control system and AFWS system will be improved. Batteries and DC boards will be replaced, etc.

Waste Management

In this area a spent fuel handling storage and transport system will be considered.

Hazards

Improvements in the fire hazard protection involve activities to decrease the fire load and to improve fire detection. The work will be carried out mainly with Swedish assistance. Seismic Monitoring and alarm will be improved and piping be replaced.

Accident Prevention

Special attention has been paid to installation of a new diversified reactor shutdown system. The diversified shutdown system will cost approximately 132 MLt per Unit which would be a large part of the total programme cost. The Safety parameter Display System at Unit 2 will be implemented. Analog-relay modules at Unit 2 will be replaced.

Core Cooling: improvements in the ECCS actuation logic is covered. ECCS pump cooling reliability is covered and Support functions (improvement in control power supply).

Accident Mitigation

Improvements in the reactor hall over-pressure protection are covered. Other aspects of Design Modifications are covered.

Physical protection

The ambitious Physical Protection programme that was started during SIP-1 is continuing and is included in the SIP-2 programme.

2. Management and Organisation Development

0perational Procedures

Development and implementation of Emergency Operating procedures are on-going. This project will be completed and implemented. This project is carried out with support from US DoE and Sweden. Operational procedures will be improved or developed. Development of testing of ALS leak rate is covered, and improvements of 0-56 procedures. The development and installation of a full scope simulator for plant operator training is planned to be completed in 1998. Other issues related tooperator training are the use of the emergency control room. A programme for validation of procedures and to improve the technical specifications will be carried out.

Maintenance

A system for maintenance management and configuration control (RMMS) will be developed. This activity has been initiated in the Barselina project and is supported by US DoE and Sweden. Component diagnostic equipment for service and maintenance will be acquired.

Management and Organisation Development

The process of management and organisation development that was started in 1995 will continue in parallel with other activities of the Safety Improvement programme No. 2 with the aim, amongst others, of facilitating the SIP-2 work and the implementation of technical SIP-2 results.

The INPP programme for Management Development covers the following areas:

Training and development of individuals and teams;

Preparing managers for implementing a quality programme;

Preparing managers for a process of change at INPP.

Management development activities will continue with the involvement of managers at lower levels in the INPP organisation than during 1995 and 1996.

QA Programme

Quality Assurance procedures at Level 2, application of QA methods to different department procedures, are now being developed in co-operation between the QA Department and the different production departments. The implementation of these procedures, planned to be completed during 1997, will be an important step in improving the plant safety culture.

Safety Committee

The Safety Committee is still under continuous development and will be given an active role in assessing the activities and results of SIP-2.

Safety Culture

Safety culture is not an area of improvement on its own but linked to all activities of operating the plant. Specifically, the total social context of the plant, its staff and others depending on the plant will be of vital importance for what safety culture that will develop and be maintained. The development of management skills, the introduction of the Quality Assurance system, the work of the Safety Committee and the increased use of PSA will contribute to the safety culture level.

3. Safety Analysis and Design Review

Under this heading there are issues which have been identified to lack verification of safety and which may call for additional actions, but where the current knowledge or documentation is insufficient for pinpointing relevant actions.

Barselina project

The Barselina project is aiming towards improved safety management and plant performance at Ignalina. In the Barselina 2000 programme the initiatives and proposals for safety management development must come from inside the INPP. In response Sweden through Swedish International Projects will supply assistance such as expertise and co-ordination. The Barselina programme will hence continue as an "umbrella" for the split-off projects EOP and RMMS, but also perform confirmative analysis of the design changes under way and described above.Moreover, the PSA work will be expanded towards what is called Level Two analysis, i.e. taking into account the capability of mitigating systems and accident management procedures to limit radioactive releases from the plant in case of accidents. The Barselina programme will also take advantage of the experience gained during the design and implementation of the whole SIP-2 programme and hence feed back relevant adjustments of the programme.

Hazards

The Seismic restrains of the re-fuelling machine will be analysed. Water hammer analysis will be done. Flooding hazards and consequences will be analysed. There will be a development of the leak-before-break concept, and the Technical Specification will be reviewed. Fire hazards will be analysed. In-service inspection will continue and methodologies and staff competence in the area will be enhanced.

Accident Prevention

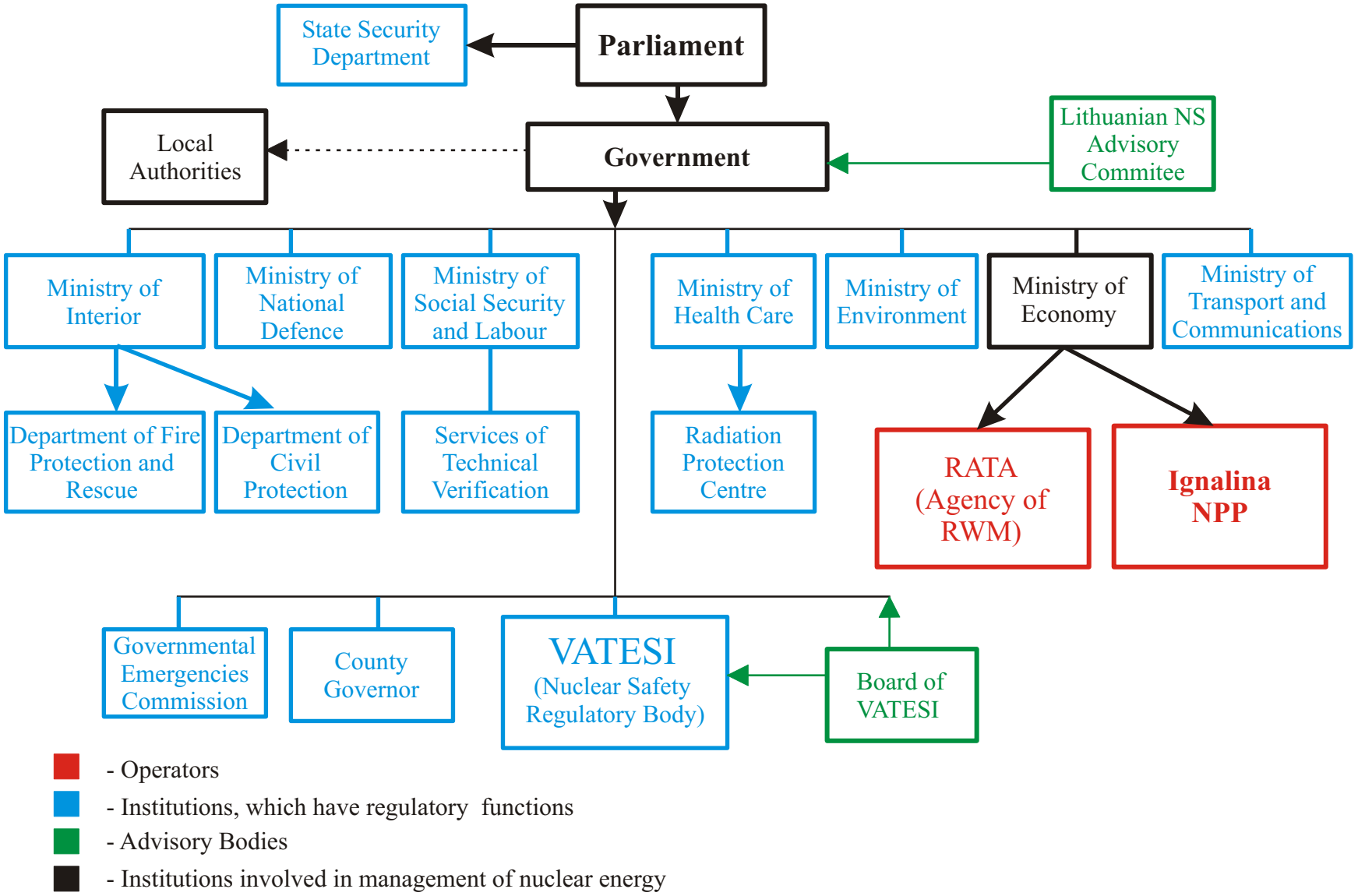
Additional inspection for reliability's investigation of flow's limiter on the water pipe from ECCS to GDH will be addressed.

Accident Mitigation

ALS Structural Integrity, drainage system's capacity in DS rooms and steam relief capacity in case of steam line breaks will be analysed. Single failure analysis of the CPS will be performed. Structural integrity safety case of RCS will be prepared

Annex to 7.1.

Chart of interaction between regulatory bodies and INPP



Annex to 10.1.1

STATE SYSTEM ON REGULATION OF NUCLEAR SAFETY IN THE REPUBLIC OF LITHUANIA

(VATESI Policy Statement)

1. Introduction

The Law on Nuclear Energy establishes the legal basis for nuclear safety in the Republic of Lithuania. It assigns the responsibility for safety to the operating organization of a nuclear facility and outlines the tasks of the operator and the regulatory authority.

According to this law, the State Nuclear Power Safety Inspectorate (VATESI) shall implement state regulation of nuclear safety, radiation protection, and accounting for nuclear materials in the sphere of nuclear energy. Rights and obligations of VATESI are described in the VATESI statute, which is approved by the Government. According to its statutory responsibilities VATESI should define regulatory policy, safety evaluation criteria, develop national nuclear safety regulations, and establish emergency response criteria and arrangements. VATESI will conduct its own activities in accordance with internationally accepted nuclear safety regulatory practices with the cooperation of its Technical Support Organizations (TSOs), the IAEA and the regulatory authorities of other countries. This document is a Policy Statement issued by VATESI with the purpose to describe the regulatory philosophy and policies that VATESI will follow in: regulating nuclear facilities in Lithuania, principally the Ignalina Nuclear Power Plant (INPP); cooperating between VATESI, operating organisations and state institutions in the development and implementation of new safety regulatory acts; solving issues related to licensing and change of the license conditions; inspecting nuclear installations in order to supervise the implementation of legal acts, rules, licensing conditions and obligations; using measures of enforcement of norms and regulations; describing criteria of evaluation and use by VATESI of the operational experience.

2. History and Background

The first and so far the only nuclear installation in Lithuania, INPP was designed, constructed and commissioned in accordance with the system of safety supervision of the former USSR. Until 1991 INPP was operated under the regulatory supervision of that former system.

VATESI was established in 1991 with the specific responsibility to oversee and regulate the safety of the INPP and other nuclear facilities. As an initial step, VATESI adopted the Norms and Standards, the inspection program, and the practice of annual reauthorization of INPP. In 1994 work was initiated on

the preparation of a new safety analysis report for the INPP. This analysis used, as a basis for safety assessment, the requirements which were valid at the time in the Republic of Lithuania and in some cases IAEA NUSS recommendations. A number of non-compliances with the valid rules and IAEA NUSS recommendations have been identified in the SAR. These non-compliances have to be dealt with in the process of the new INPP safety improvement program for 1997-1999.
At the same time, a new regulatory system, adapted to the Lithuanian state conditions, is presently under development.

3. Considerations for Development and Implementation of Nuclear Safety State Regulatory System in the Republic of Lithuania

The establishment of a new regulatory system in Lithuania must take into consideration its scientific and technological background as well as its cultural and historical background. The system must be appropriate for the Lithuanian nuclear energy program. Through the contacts that Lithuania has with other countries and international organizations, it will be possible for VATESI to obtain valuable assistance.

4. Nuclear Safety State Regulatory System in the Republic of Lithuania

A. Safety Principles and Standards of Protection

In nuclear safety regulation VATESI will use reasonable assurance of adequate protection of public health and safety. VATESI will rely on the following principles:

- Safety should be assured by relying on multiple safety barriers against serious accidents. There should be at least two barriers, and three where practical.

- The foremost level of protection must be focused on a high level of quality in the conduct of operations, the maintenance of plant equipment, manufacturing of equipment and the engineering support for operations.

- The level of safety at INPP should be steadily improved over time. The need and timing of safety improvements will generally be governed by the amount of added safety protection provided by the improvements.

- The operators of nuclear facilities shall be highly qualified, receive rigorous training, and participate in periodic requalification training.

  Guidelines of IAEA recommendations shall be followed in Lithuania.

B. Responsibility

It is the responsibility of the operating organizations of nuclear facilities to ensure adequate and safe operations. It is VATESI's responsibility to oversee the activities at nuclear facilities to assess and confirm that the plant is operated safely.

VATESI has the responsibility for regulating all aspects of nuclear safety at nuclear facilities. Where this responsibility for regulating nuclear safety interfaces with responsibility for other aspects of public safety or aspects which affect nuclear safety, such as fire protection, environmental protection, security and emergency planning, VATESI will develop formal Memoranda of Understanding with the other Lithuanian government agencies to ensure that VATESI nuclear safety responsibilities are clear and undiluted.

VATESI has the responsibility for regulating all aspects of nuclear materials safety and safeguards and regulating nuclear materials transport, storage, and disposal. VATESI is also responsible for establishing and operating the national system of nuclear materials accounting and control. This includes interfacing with international bodies such as the IAEA.

VATESI will develop a system of Lithuanian National Nuclear Regulations and Guidelines based on international practices that are best suited to Lithuania.

It is the intention of VATESI to implement its regulatory responsibilities by issuing regulations governing: the design, construction, operation, and regulatory oversight of nuclear power plants; provisions for nuclear materials safeguards and security; transport of nuclear materials; and the siting, design, construction, operation, and regulatory oversight of nuclear materials disposal facilities. The process for promulgating such nuclear regulations will be according to the laws of Lithuania and will allow participation and commenting by members of the public and the operating organizations.

C. Licensing

On the basis of safety cases presented by applicants and which contain a safety analysis, VATESI will make decisions on issuing nuclear facility construction operation or decommissioning licenses. Operating licenses will be issued for a fixed term. License conditions could contain a requirement to apply for annual authorization for continued operation. VATESI will perform a systematic examination of the safety analysis carried out by the applicant and of the other documentation submitted in the safety case in support of the license application. The purpose of the safety assessment by VATESI is to confirm safety requirements are met and to confirm no underlying design or operational weaknesses are present. In each licensing decision the basis for the decision will be presented in a Safety Evaluation Report.

It is the intention of VATESI that operators of nuclear facilities shall, as a condition of license, develop Technical Specifications that define the safety envelope for facility operation. Technical specifications should be approved by VATESI and used as a basis for development of operational and maintenance procedures by the operator. Moreover, for issuance of a license VATESI shall receive from the operator a Quality Assurance (QA) program, a Emergency Preparedness Program, and other documents defined by Lithuanian Law.

D. Inspection Program

VATESI will exercise independent regulatory oversight of nuclear facilities and activities important to nuclear safety through an inspection program conducted by VATESI Inspectors. In order to accomplish this oversight function, VATESI inspectors shall have provisions for unrestricted access to nuclear facilities, documents and records important to safety. VATESI may also organize special inspections by outside parties at its discretion or may require the operating organizations of the nuclear facilities to conduct special inspections which are monitored by VATESI.

E. Enforcement Policy

When VATESI finds that a nuclear facility does not meet a regulation or license condition, it is the policy of VATESI to require the operating organization to bring the facility into compliance with the regulation or license condition. In some cases, this may require the operating organization to submit a written Justification for Continued Operation until the facility can be brought into compliance. VATESI will evaluate the acceptability of a Justification with attention to the risks posed by interim non-compliance to regulations and/or license conditions and the benefits of compensatory actions. VATESI has the authority to take a number of enforcement actions, including administrative, up to ordering shut down of the facility. VATESI may also grant exemptions to regulations for good cause shown.

F. Nuclear Safety Confirmation

It is the responsibility of the operating organization to conduct safety analyses, tests, and research needed to assure facility meets the regulations and license conditions and is safe to operate. If the operating organization should identify a safety issue not previously considered in the safety analysis, or that a safety margin credited in the safety analysis has been degraded, it is their responsibility to take corrective actions and to bring this to VATESI's attention.

VATESI may sponsor its own research and analyses to confirm that adequate safety margins exist at the facility.

G. Analysis and Reporting of Operating Experience

VATESI will require the operators of nuclear facilities to systematically collect and evaluate data from both their own experience and the experience of other similar nuclear facilities. Operators of nuclear facilities will analyze this operational data to determine if any aspects of nuclear facilities operations should be changed, and will submit periodic and event based reports to VATESI documenting experience and lessons learned from that experience.

VATESI will review the operating experience data and lessons learned to determine the need to improve regulations or inspection activities.

H. Shutdown and Decommissioning

VATESI will issue regulations governing the decommissioning and final disposition of nuclear facilities.

The facility operator must seek from VATESI a separate license that authorizes decommissioning activities after final shutdown and cessation of operation. The operator should apply for this license 5 years prior to the envisaged final shutdown.

It is the responsibility of the facility operator to maintain the nuclear facility in a safe condition during all decommissioning activities according to the license conditions.

I. Informing the Public

It shall be VATESI policy to inform the public about radiation and nuclear safety in Lithuanian nuclear facilities and about the activities of VATESI by means of mass media.

Annex to 10Annex to 10.1.2

INPP NUCLEAR SAFETY AND QUALITY POLICY

Clearly realizing that the INPP management headed by Director General bears full and official responsibility for the safety of the plant, we state that: The goal of INPP is to become the safest RBMK nuclear power plant and a competitive performer in the industry.To that end, it is imperative 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 safety of INPP. INPP personnel clearly understand the requirements and objectives of the INPP owners, VATESI and the public. All employees take an active part in improving safety and quality. 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. All employees are properly qualified to perform their functions in accordance with plant objectives. A level of every employee's competence must 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. INPP and its personnel must make the use of their experience and that of others to improve the organization, operations and their competence. 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 implemented at INPP. If the INPP Director General can answer GYESg to all these items, the plant will operate to the required level of quality. If every employee can answer GYESg to all these items, he will perform his job to the required level of quality.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.