The European Union's PHARE Programme for
Nuclear Safety for Lithuania

Safety culture and organisational issues specific to the transitional phase from operation to decommissioning of the Ignalina Nuclear Power Plant

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"Safety culture is that assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance."

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Support to VATESI for safety culture and organisational issues specific to the pre-shutdown phase of Ignalina Nuclear Power Plant

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Foreword by Head of VATESI

Recognising that decommissioning is one of the phases within the life cycle of a nuclear power plant, it is quite clear that during decommissioning it is necessary to devote as much attention to the plant as has been done so previously. In this way, it is possible to ensure that the efforts aimed at maintaining safety are adequate to any possible consequences of an accident. However, for those who had devoted all their knowledge and skills to the creation of the plant and operated it during a period of decades, it is difficult to overcome the psychological barrier and, with the same enthusiasm, to destroy the plant – especially when they can see no prospects either for themselves or their families.

The experience of other western countries has shown that one of the factors in making the pre-decommissioning stage successful is related to the assurance of safety culture. The transition period involving planning, the final shutdown of the reactor and removal of the nuclear fuel from the reactor, determines the specific conditions for the application of safety culture principles. Immense significance is attached to motivation, strategy and objectives of the decommissioning process and their economic substantiation.

To help overcome some of these problems, the European Commission funded a support project in the area of nuclear-power safety culture enhancement. The project, implemented at Ignalina Nuclear Power Plant, resulted in more professional technical documentation related with the decommissioning process, an improved psychological environment within the plant, and increased motivation of its personnel.

This project, which was aimed at improving the regulatory activities, provided extensive knowledge to the staff of the State Nuclear Power Safety Inspectorate (VATESI), revealed the specific characteristics of safety culture assurance issues specific to the transitional period and ways of improving the monitoring of a nuclear facility. We must be prepared to perform the safety assessment of new technologies that are applied during the dismantling process of nuclear facilities.

VATESI hopes that the application of recommendations provided by western experts will enable a more detailed examination of the processes now ongoing at Ignalina NPP and a more professional evaluation of safety-related documentation. The western experience should also contribute to more effective inspections, detection of the essential shortcomings, competence in formulating any corrective measures and ensuring the unconditional compliance with safety requirements.

The implementation of this project and mutual co-operation with the authorities and experts from other countries, especially Sweden, will definitely extend our potential in addressing the nuclear safety problems in Lithuania.

Saulius KUTAS

Introduction

The PHARE project *Support to VATESI for safety culture and organisational issues specific to the pre-shutdown phase of Ignalina Nuclear Power Plant* was aimed at providing assistance to VATESI in their task to oversee that the Ignalina Nuclear Power Plant's management and staff are able to provide an acceptable level of reactor safety taking into account possible safety culture related problems that may occur due to the decision of an early closure of both units.

Safety culture is used as a concept to characterise the attitudes, behaviour and perceptions of people that are important in ensuring the safety of nuclear power facility. Since the Chernobyl accident, the International Atomic Energy Agency (IAEA) has been active in creating guidance for ensuring that an adequate safety culture can be created and maintained.

The transition from operation to decommissioning introduces uncertainty for both the organisation and individuals. This creates new challenges that need to be dealt with. Although safety culture and organisational issues have to be addressed during the entire life cycle of a nuclear power plant, owing to these special challenges, it should be especially highlighted during the transitional period from operation to decommissioning.

Nuclear safety experts from Sweden, Finland, Italy, the UK and Germany, as well as Lithuanian specialists, participated in the project, and it proved to be a most effective way to share experience.

The aim of this brochure is to provide information about:

- the importance of safety culture issues during the transitional phase from operation to decommissioning of Ignalina Nuclear Power Plant;
- the purpose, activities and results of this PHARE project;
- recommendations that are provided by western experts concerning the management of safety culture issues specific to the pre-decommissioning phase of Ignalina Nuclear Power Plant.

Atomic energy in Lithuania

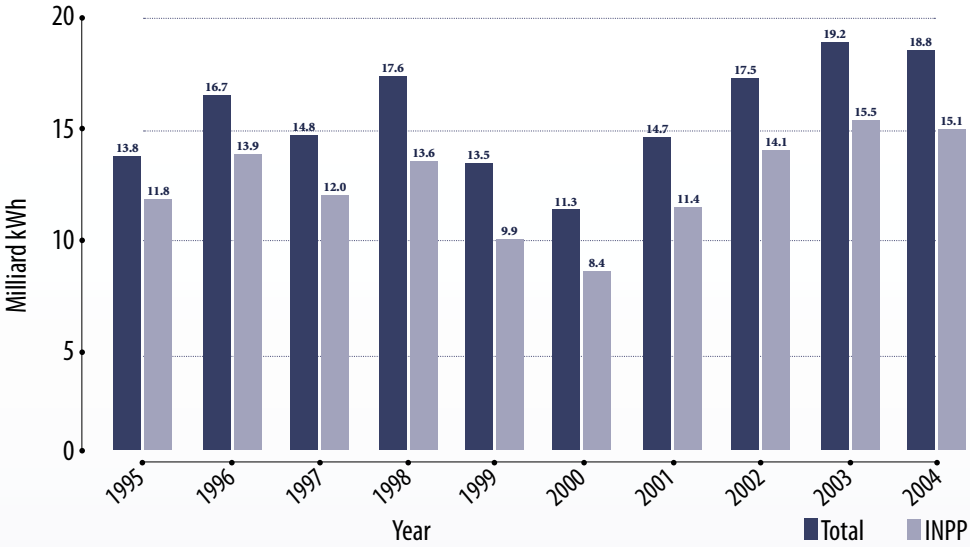
Ignalina Nuclear Power Plant was constructed to meet not only the electricity demand of Lithuania but also, and primarily, that of the Unified North-West Power System of the Soviet Union. The location chosen for the nuclear facility was near to the borders with Latvia and Belarus. After the selection of the site on the shore of Lake Drūkšiai, the preparatory construction work for the plant began in 1974. The following year construction began of the town Visaginas (known at that time as Sniečkus) 8 kilometres from the facility's construction site. Today the town has a population of over 30,000. Experienced personnel from other power facilities of the USSR were brought in to work at the new plant. Today, more than 80 per cent of Visaginas town citizens directly or indirectly depend on the activities of Ignalina NPP.

Visaginas town.

The reactors installed at Ignalina NPP are of the RBMK-1500 type. Unit 1 started operation in late December of 1983, and Unit 2 in August 1987. Four units were originally planned to be constructed at the site, the construction of Unit 3 was, however, discontinued in 1989.

Since the very beginning of operation Ignalina NPP has been a major supplier of electricity to Lithuania and neighbouring countries. The importance of the facility further increased after Lithuania regained independence. Over recent years Ignalina NPP has been supplying about 75-80 percent of electricity produced in Lithuania.

Electricity production in Lithuania



In the National Energy Strategy approved in 1999, the decision was taken to shut down Unit 1 of Ignalina NPP by 1 January 2005; in the revised National Energy Strategy of 2002, it was decided to shut down Unit 2 in 2009.

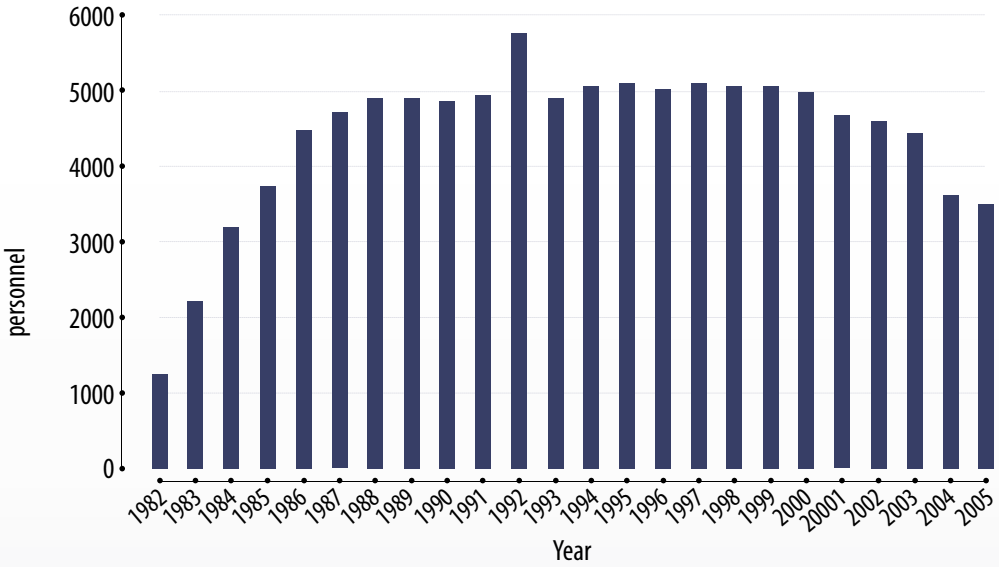
Since the decisions to shut down the plant were taken, there have been many concerns for the future among the people whose livelihood depends directly or indirectly on Ignalina NPP.

In assessing the situation it should be borne in mind that Lithuania inherited Ignalina NPP from the Soviet Union together with the responsibility to ensure safe operation of the plant. Since 1991 the personnel have conducted a large number of modifications and essential safety improvements at Ignalina NPP and many believed that it would be possible to operate the plant throughout its technical lifetime. When it became evident that this was not in line with political obligations, several problems had to be solved. One of the problems was the fact that a relatively small amount of money had been accumulated in Ignalina NPP Decommissioning Fund.

It was recognised that Lithuania would not be able to carry out the decommissioning on its own and therefore EU countries offered support. In addition to funds, experience is also generously being shared with Lithuania.

The restructuring of Ignalina NPP started more than a decade ago, when facilities not directly involved in power production, such as the schools, kindergartens, municipal

Fluctuation in Personnel at Ignalina NPP



utilities, sport facilities, etc., were separated from the Ignalina NPP organisation. This change is still ongoing in the process of preparing for the decommissioning of the plant. It is a difficult and time consuming process. Every step had to be carefully prepared for, both from a technical and an economic point of view. Most recently, the vehicle fleet, the printing service, as well as the construction and repair shops have been separated from Ignalina NPP.

In 1992, 5788 persons were employed by Ignalina NPP; by 2004 – shortly before Unit 1 closure – this had fallen to 3642. At present, 3517 persons are employed by Ignalina NPP. The number of staff will further decrease. However, it is expected that new jobs will be generated by decommissioning and radioactive waste management activities. The creation of new jobs in Visaginas is also expected to relieve the social impact of the change. In addition to the standard unemployment compensation available in Lithuania, a law concerning the social guarantees has been enacted specifically to support Ignalina NPP employees who will lose their jobs at the plant due to the closure of the plant.

The IAEA guidance has already been used by Ignalina NPP in the creation of the policy of safety and quality assurance that was adopted in 1995 and in enhancement of safety culture issues. In 2004 Ignalina NPP management also approved a strategy on providing social support to the personnel during decommissioning of the plant with the aim of improving the psychological climate of the staff, to ensure social support and sustain high level of safety culture.

Ignalina NPP prepares and implements yearly safety culture improvement plans. Additionally, in accordance with an agreement between VATESI and Ignalina NPP, the latter produces quarterly safety culture reports. The reports contain information on the current situation of safety culture at Ignalina NPP and changes related to the decommissioning.

Main events and activities related to the decommissioning of Ignalina NPP

- 6 October 1999: VATESI approves General Regulations for Decommissioning of Ignalina NPP.
- 2 May 2000: the Seimas of the Republic of Lithuania passes the Law on Decommissioning Unit 1 at Ignalina NPP.
- 19 February 2001: the Decommissioning Program of Unit 1 at Ignalina NPP is approved by the Lithuanian Government (the Program is already updated for Unit 1 and Unit 2 and it is foreseen to update it in the future).

In this Program, the legal, organizational, financial and technical measures that need to be implemented in order to safely discontinue the operation of Unit 1 are set forth.

Preparatory actions for Unit 1 decommissioning and with the approach to environmental, social and economic issues are concretised in the "Plan of Measures for Implementation of the Decommissioning Program".

- 5 April 2001: an agreement is signed in London by the Government of the Republic of Lithuania and the European Bank for Reconstruction & Development regarding the activities of the Ignalina International Decommissioning Support Fund.
- 26 November 2002: the Government of the Republic of Lithuania passes a resolution to the effect that Ignalina NPP is to be decommissioned through immediate dismantling. This is a continuous process in which dismantling begins after the plant is finally shut down, and ends in complete restoration of the site and disposal of radioactive waste.
- 29 April 2003: the Seimas of the Republic of Lithuania passes the Law on Additional Employment and Social Guarantees for the employees of the State Enterprise Ignalina NPP.
- 31 December 2004: Ignalina NPP Unit 1 shuts down.
- 25 February 2005: the "Plan of Measures for Implementation of the Decommissioning Program of Unit 1 and Unit 2 at Ignalina NPP" is approved by the Minister of Economy of the Republic of Lithuania; this plan is updated annually.

PHARE project – objectives, activities and results

Implementation of the PHARE project ***Support to VATESI for safety culture and organisational issues specific to the pre-shutdown phase of Ignalina Nuclear Power Plant*** began in June 2004.

Objectives

The project was aimed at providing support to VATESI in their task to oversee that the Ignalina Nuclear Power Plant's management and staff are able to provide an acceptable level of reactor safety taking into account all safety culture related problems that might occur due to the decision of early termination of both units. It is anticipated that the individual uncertainty known to arise from organisational change may affect the individuals' ability to maintain a good safety culture.

The following major tasks were foreseen in the project:

1. Providing western experience and knowledge on the regulatory approach to safety culture and organisational issues specific to the pre-decommissioning stage of nuclear power plant.

2. Identification of the critical safety culture areas that might be affected by the closure of the Units.

3. Monitoring of key safety culture and organisational issues during the pre-shutdown phase.

4. Preparation of a guide on the key safety culture and organisational issues critical for the pre-shutdown phase of Ignalina NPP.

Inception meeting at VATESI on 8 June 2004.

Activities within Task 1

The aim of this task was to accumulate and exchange existing experience and knowledge on the safety culture and organizational issues specific to the pre-decommissioning stage of nuclear power plants and the regulatory approach thereto.

A seminar for VATESI specialists and representatives from its technical support organisations was held at VATESI on 27 September 2004 to discuss with experts from Sweden and Finland the relevant safety culture issues.

An International Conference was held in Vilnius on 28 and 29 of September 2004, which provided the possibility to share experience and information among experts from Finland, Italy, Sweden, the UK, representatives of Ignalina NPP, independent trade unions of Ignalina NPP and specialists of VATESI.

The International Conference held in Vilnius on 29 September 2004.

Activities within Task 2

Safety culture and organisational issues specific to the transitional phase from operation to decommissioning of Ignalina NPP were discussed and identified. The activities were performed on the basis of knowledge received through the implementation of Task 1.

The Finnish expert Björn Wahlström is leading discussions about the critical safety culture areas.

Activities within Task 3

A **safety culture inspection** was organised by VATESI in November 2004. In the course of the inspection 10 non-compliances and 5 examples of good practice were identified. On the whole, the inspection proved that Ignalina NPP has initiated several useful activities in the field of safety culture. Some shortcomings were however also noticed in the area of quality management of the decommissioning activities. Mutual co-operation among Ignalina NPP divisions on decommissioning issues is another area for improvements. In the concluding remarks it was emphasised that Ignalina NPP personnel should be better informed about topical issues of decommissioning.

Experts from Italy and the UK participated in the safety culture inspection as observers. Other PHARE project experts provided their input during evaluation of the results of the inspection and through drawing appropriate conclusions.

Results of the inspection are being discussed with Director General of Ignalina NPP, V. Ševaldin, (first from left) participating.

Activities within Task 4

The ***Guide for Management of Safety Culture Issues Specific to the Pre-Decommissioning Phase of the Ignalina Nuclear Power Plant*** was prepared on the basis of knowledge received through the implementation of all previous tasks of the project.

The information presented in this guide has been collected from international guidance and from experience and lessons from decommissioning projects in several western countries. The experience gained from VATESI regulatory activities was another important source of information. The guide was based on the IAEA recommendations and it is focused on issues connected to management and organisation.

The preparation of the guide was oriented to the existing situation at Ignalina NPP. The information was assembled, discussed and assessed to extract the most relevant material for decommissioning of Ignalina NPP.

The guide consists of three main parts that provide:

- Conceptual underpinnings of the nuclear safety, safety management and safety culture concepts. It also describes the human behaviour and organisational aspects within the safety context.
- A description of main safety culture and organisational issues that need to be adequately addressed in order to maintain a good Safety Culture during the transition from operation to decommissioning.
- Recommendations about methods to monitor and manage safety culture during the transitional phase of the plant from operation to decommissioning.

Critical safety culture issues identified within the project

The main result of project is the ***Guide for Management of Safety Culture Issues Specific to the Pre-Decommissioning Phase of the Ignalina Nuclear Power Plant***. This document will be used as VATESI regulatory document.

Issues related to maintaining a high level of Safety Culture during the pre-decommissioning phase of Ignalina NPP are presented in the figure below:

Management commitment to safety is the basis for all safety management activities. A continuously demonstrated commitment by managers on all organisational levels is prerequisite for safety. Management commitment to safety has to be continuously and explicitly demonstrated both in words and deeds.

Monitoring of safety performance is a most important activity to ensure an alert and a proactive management style. **Safety oversight** involves continuation of safety assessment and improvement programmes that should be visible to the whole staff also in the final stage of Ignalina NPP operation.

One of the most difficult challenges in assessing the safety performance at a nuclear power plant is to recognise the early signs of declining safety performance. Weaknesses in safety culture are important precursors of declining safety performance.

Uncertainty about the future can be a major demotivator in the workplace. It is therefore important that the plant management uses all means to communicate to the employees what they know about decisions and plans that have an influence on plant personnel.

Effective and open communication is important both within the plant and with stakeholders outside the plant. The management has the prime responsibility for the establishment of effective internal communication in plant. One important part of the communication in the pre-decommissioning phase has to be devoted to responses to various worries that people may have.

Changes in **organisational structures** are necessary to cope with decommissioning challenges. It is important that this work is planned in advance. A good practice is to involve a large fraction of the plant personnel in the preparation connected to the new organisational solutions. Plans have been laid out in the Final Decommissioning Plan, which should be made concrete in the pre-decommissioning phase.

It is important that people find their work meaningful and interesting. When this is the case a high level of **motivation** can be maintained. Decreased motivation will often result in degraded safety performance, increasing absence due to sickness and quitting for other jobs. It is important also to be sensitive to social changes in the plant environment, especially because the local community is small and directly dependents on the wellbeing of the plant.

An ageing and or demotivated workforce may lead to the loss of important competencies. To ensure that this will not happen, competencies that will be required over time should be identified in advance. The first step is development of a **human resource management** plan based on assessments of necessary competencies and training needs. **Knowledge management** is used to address issues related to competency, which also includes systematic efforts towards capturing tacit knowledge and transferring it to a younger generation.

The ***Guide for Management of Safety Culture Issues Specific to the Pre-Decommissioning Phase of the Ignalina Nuclear Power Plant*** presents recommendations about methods and tools for assessment and effective management of the critical safety culture issues using: audits, employee surveys (questionnaires, interviews), incident reporting and evaluation, management methods (safety performance indicators, involvement of employees in safety planning, analysis of personnel statistics), external peer reviews and periodical reporting. The guide also presents examples of good practice.

The main conclusions can be summarised in the following way:
The safety culture and organisational issues should be addressed in a systematic way during the pre-decommissioning phase of Ignalina NPP. This can be achieved if and only if the senior management both in words and deeds demonstrate their full commitment to safety. This includes all activities of the plant, both operation and preparatory activities for decommissioning.

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