

Republic of Croatia

NATIONAL REPORT

on

**THE IMPLEMENTATION
OF OBLIGATIONS UNDER THE
CONVENTION ON NUCLEAR
SAFETY**

ZAGREB, 12 SEPTEMBER 1998

INTRODUCTION

After gaining its independence from the Socialist Federal Republic of Yugoslavia, Croatia became a member of the United Nations on 22 May 1992 and of the International Atomic Energy Agency on 21 September 1992.

The Republic of Croatia promotes a strong non-proliferation policy and as a country became party to the Non-Proliferation Treaty by the notification of succession on 29 June 1992. Croatia was among those countries which strongly advocated the extensive application of this treaty because of its significance for international peace and stability.

Based on its non-proliferation policy, Croatia has ratified the Comprehensive Safeguards Agreement of 1995. As an active participant in the negotiations on the Additional Protocol for the Safeguards Agreements with the IAEA, Croatia signed the Additional Protocol with the IAEA during the 1998 General Conference. Since 1995 Croatia has also participated in the Agency's reporting scheme for nuclear material and specified equipment and non-nuclear material as a means of strengthening the Agency's safeguards system.

Croatia does not have nuclear power plants in its territory nor any other nuclear fuel cycle facility. However, Croatia is a joint owner of the nuclear power plant Krško in the neighboring state of Slovenia which operates under a special agreement between the two states.

Croatia attaches great importance to nuclear safety and commends the work of the International Atomic Energy Agency in this field. The legal regime on nuclear safety, which is comprised of internationally binding documents, was effectively established with the acceptance of the Convention on Nuclear Safety and the Joint Convention on Spent Fuel and Radioactive Waste Management. We signed the latter in 1995. By the virtue of succession, Croatia became a country party to the Convention on Physical Protection of Nuclear Material, Convention on Early Notification in Case of Nuclear Accident and the Convention on Assistance in Case of Nuclear Accident or Radiological Emergency.

One should keep in mind that safety of nuclear installations is not only of local interest, since consequences could have transboundary effects. With this in mind one can understand wide international interest in this issue, as well as the interest of so called non-nuclear power states to actively participate in various international instruments which are aimed to regulate or coordinate it means that tasks regarding safety policies and their detailed implementation obtained high priority practically in all Member States. Active participation of a Member State in internationally agreed nuclear safety conventions, treaties, protocols and agreements is also a kind of guarantee that the country will automatically receive the necessary data regarding technical developments, operational experience, informations on incidents and accidents, as well as a possibility to participate in preparation of safety standards and mutual training of professionals.

Although the Republic of Croatia does not have a nuclear power plant in its territory, and it is not obliged to report under each and every article of the Convention, we will present, article-by-article, all the legislative and administrative measures which have been undertaken in connection with nuclear safety. Long-term development plans of the Republic of Croatia contain a nuclear power option and this is, among others, the reason that the modern nuclear infrastructure is in the process of being set up. However, as a state without a nuclear power plant, we have paid special attention in our Report to the provisions of the Convention dealing with radiation protection and emergency preparedness.

ARTICLE-BY-ARTICLE REPORT

Article 4. Implementing measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

Comment:

The Republic of Croatia signed the Convention on Nuclear Safety in April 1995, and the instrument of ratification was deposited with the Depository on 18 April 1996.

According to the Constitution of the Republic of Croatia, Art. 134, "international treaties, signed and ratified in accordance with the Constitution... are part of the national legislation of the Republic of Croatia..." By this article of the Constitution, all legislative, regulatory and administrative measures which are requirements of the Convention will be implemented as part of the national laws. By further development of national nuclear safety legislation the measures and obligations defined by the Convention will be directly included in new laws and corresponding regulations.

Article 5. Reporting

Each Contracting Party shall submit for review, prior to each meeting referred to in Article 20, a report on the measures it has taken to implement each of the obligations of this Convention.

Comment:

Submission of this National Report fulfils the obligation from this article.

Article 6. Existing Nuclear Installations

Each Contracting Party shall take the 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 possible. The timing of the shut down must take into account the whole energy context and possible alternatives as well as the social, environmental and economic impacts.

Comment:

The Republic of Croatia presently does not have nuclear installations in its territory.

Article 7. Legislative and regulatory framework

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

The legislative and regulatory framework shall provide for:

- (i) the establishment of applicable national safety requirements and regulations;*

- (ii) *a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license;*
- (iii) *a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses;*
- (iv) *the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.*

Comment:

In 1991, after the dissolution of the SFRY and the proclamation of independence, the Republic of Croatia passed the Constitutional Decision on Sovereignty and Independence in whose part III, it was stated that all the laws concluded by the SFRY, would be valid in the territory of the Republic of Croatia if they were not in contradiction with the Constitution of the Republic of Croatia and its legal system. In this regard, in the Republic of Croatia, two laws dealing with nuclear safety are still in force, both taken from the former Yugoslav legal system: Act on Ionizing Radiation Protection and the Safe Use of Nuclear Energy, issued in 1984 (Act of 84), and the Act on Ionizing Radiation Protection and the Safety Measures for Nuclear Plants and Facilities, issued in 1981 (Act of 81).

A draft of the new nuclear safety law, which is supposed to replace the two existing laws, is based on the latest international safety recommendations, and was reviewed by IAEA experts. It is expected to be considered by the Croatian Parliament in due course.

The existing two laws define the main components of the legislative and regulatory framework for the safety of nuclear installations. Safety measures envisaged in the Act of 84 are split into two groups: general measures for protection against ionizing radiation and special safety measures applied to nuclear facilities and nuclear materials.

Special safety measures applied to nuclear facilities and nuclear materials encompass measures for siting, construction licensing and operation of nuclear facilities, trade of nuclear materials and accounting for and control of nuclear materials.

Details of the implementation of each of these measures are given in the subsequent articles of this report.

On the basis of the Act of 84, several regulations of this Act were adopted.

- ◆ Regulation on siting, construction, commissioning, start up and operation of nuclear facilities (with appendix on quality assurance), (Off.Gaz.SFRY,52/88), - Regulation E-1;
- ◆ Regulation on preparation and content of safety analysis report and other documentation relevant to the assessment of the safety of nuclear facilities (Off.Gaz.SFRY,68/88), Regulation E-2;
- ◆ Regulation on education, experience, examination and certification of personnel conducting specific work at the nuclear installation (Off.Gaz.SFRY,86/87), Regulation E-3;
- ◆ Regulation on material balance areas and the mode of keeping records accounting for nuclear raw materials and nuclear materials as well as to the submission of data contained in such records (Off.Gaz.SFRY,9/88), Regulation E-4;
- ◆ Regulation on places, methods and frequencies of monitoring contamination with radioactive materials (Off.Gaz.SFRY,40/86), Regulation Z-1;

- ◆ Regulation on mode, extent, and frequencies of monitoring radioactive contamination in the surroundings of nuclear facilities (Off.Gaz.SFRY,51/86), Regulation Z-2;
- ◆ Regulation on mode of collecting, accounting, processing, storing, final disposal and release of radioactive waste into the environment (Off.Gaz.SFRY,40/86), Regulation Z-3;
- ◆ Regulation on trading and utilisation of radioactive materials exceeding certain limits, X-ray machines and other apparatus producing ionizing radiations as well as measures for the protection from radiation of such sources (Off.Gaz.SFRY,40/86,45/89), Regulation Z-4;
- ◆ Regulation on education, health condition and medical examination for the personnel working with ionizing radiation sources (Off.Gaz.SFRY,40/86), Regulation Z-5;
- ◆ Regulation on dose limits for members of the public and for occupational exposure, on measurements of occupational exposure and on monitoring the working environment (Off.Gaz.SFRY,31/89,63/89), Regulation Z-6;
- ◆ Regulation on conditions for the application of sources of ionizing radiation for medical purposes (Off.Gaz.SFRY,40/86,10/87), Regulation Z-7;
- ◆ Regulation on terms under which drinking water, foodstuffs and articles in common use may be traded if they contain radioactive materials exceeding the prescribed limits of activity (Off.Gaz.SFRY,23/86), Regulation Z-8;
- ◆ Regulation on maximum established limits for radioactive contamination of the environment and on decontamination (Off.Gaz.SFRY,8/87,27/90), Regulation Z-9;
- ◆ Regulation on mode of keeping records accounting for sources of ionizing radiation and irradiation of the population and workers (Off.Gaz.SFRY,40/86), Regulation Z-10;

The licensing system is generally defined in the Act of 84. The system can be divided into four steps:

- ◆ application for the site license - (Art. 28, 29)
- ◆ application for the construction license - (Art. 30, 31,32)
- ◆ application for the license for commissioning - (Art. 33)
- ◆ application for the start of operation - (Art. 34).

Licensing requirements are more precisely defined in Regulation E-1 in the following parts:

- ◆ Conditions for the siting of a nuclear facility,
- ◆ Conditions for the construction of a nuclear facility,
- ◆ Conditions for the commissioning of a nuclear facility,
- ◆ Conditions for the commencement of operation and the operation of a nuclear facility,

- ◆ Methodology for the preparation of a Quality Assurance programme.

It is important to point out that, of course, all safety related modifications in a nuclear facility during construction or operation require a license amendment.

With regard to the licensing of the NPP design modifications and consequently the Safety Analysis Report (SAR) changes, the following laws and regulations are applicable:

1. Act of 84

The law requires a preliminary SAR for a construction permit and a final SAR for an operating permit. More specifically, it states that national regulations must be applied and, when not available, regulations of the country of origin of the imported installation can be applied, subject to the approval of the regulatory organisation.

2. Regulation E-2

This regulation provides that the SAR is the basic licensing document for nuclear installation with respect to nuclear safety. The SAR shall be supplemented during the life-time of the plant with data and analysis of all the changes which were done at the nuclear plant. This regulation establishes three categories of changes to the SAR. The first category requires a notification to the regulatory authority after the completion of modifications. The second category requires a notification to the regulatory authority before implementation. The third category requires an approval by the regulatory authority before implementation.

3. Regulation E-1

This regulation requires that a licensee monitors and analyses the level of nuclear safety, whereby he must take into account the experience of other nuclear facilities and new technological developments. Any changes of Technical Specification (TS) should be subject to independent evaluation, and approved by a regulatory authority.

The enforcement of safety regulations as stated in the licence as well as the inspection of the nuclear installation are provided by the existing legislative framework. The Act of 84 contains a chapter on inspection and enforcement.

The Act of 84 gives specific competence to the inspectors: they can order the operator of the plant to remedy the deficiencies found, they can also stop the construction or operation of the NPP if all legal prerequisites are not met.

There are several other legislative acts related to broad nuclear safety areas:

- ◆ Act on Third Party Liability for Nuclear Damage (from 1978 and 1979),
- ◆ Act on Sanitary Inspection (from 1986),
- ◆ Act on Protection against Natural Disasters (from 1997),
- ◆ Act on Organisation and Field of Activities of the Ministries and Other Governmental Bodies (from 1992 and 1993),
- ◆ Act on General Administrative Procedures (from 1986),
- ◆ Criminal Act (from 1993),
- ◆ Act on Transport of Hazardous Material (from 1993)
- ◆ Act on Internal Affairs (from 1991, 1992, 1994).

Furthermore, based on the Croatian Constitution, all announced and ratified international treaties also constitute an integral part of Croatian legislation and can be applied directly, so the following international treaties, to which Croatia is a party, should be mentioned:

- ◆ Statute of the International Atomic Energy Agency,
- ◆ Agreement on the Privileges and Immunities of the International Atomic Energy Agency,
- ◆ Vienna Convention on Civil Liability for Nuclear Damage,
- ◆ Convention on the Physical Protection of Nuclear Material,
- ◆ Convention on Early Notification of a Nuclear Accident,
- ◆ Convention on Assistance in the Case of a Nuclear Accident of Radiological Emergency,
- ◆ Convention on Nuclear Safety,
- ◆ Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention,

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was signed in April 1998 and is now in the ratification procedure by Parliament.

The Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and the Convention on Supplementary Compensation for Nuclear Damage are in the internal process of authorisation for signature.

Bilateral agreements:

- ◆ Agreement Between the Republic of Croatia and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-proliferation of Nuclear Weapons,
- ◆ Agreement Between the Republic of Croatia and the Republic of Slovenia on the Early Exchange of Information in the Event of a Radiological Emergency (waiting for ratification in Slovenia).
- ◆ The Protocol Additional to the Agreement Between the Republic of Croatia and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-proliferation of Nuclear Weapons was signed on 22 September 1998 and has entered the ratification procedure.

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 be 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 organisation concerned with the promotion or utilisation of nuclear energy.*

Comment:

Based on the provision of Article 60 of the Act of 84 and on the provision of Article 20 of the Act of 81 and the provisions of the Act on Organisation on Field of Activities of Ministries and Other Governmental Bodies, the Ministry of Economy is the designated regulatory authority entrusted with the implementation of nuclear safety legislative and regulatory framework and provided with authority to fulfil its assigned responsibility. The Nuclear Safety Department inside the Ministry of Economy is provided with adequate financial/human resources to the extent and scope of nuclear safety problems in Croatia and to play the role of a regulatory body.

Since the Ministry of Economy is also responsible for energy, separation between the functions of the regulatory body and those bodies concerned with the promotion of nuclear energy has not been fully achieved yet. It is expected to make a complete and effective separation once the national nuclear energy program is clearly defined and established.

Other relevant governmental bodies are the Ministry of Health – Sanitary Inspectorate (for general radiation protection meters) and the Ministry of Internal Affairs – Civil Protection (for emergency preparedness).

Article 9. Responsibility of the licence holder

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

Comment:

Based on legislation (Act of 81: Articles 10, 12, 30; Act of 84: Articles 43, 44, 45) the holder of the licence is responsible for the safe operation of the nuclear facility, for the security of the facility and radioactive materials, emergency preparedness, environmental monitoring, education of personnel, radioactive waste treatment as well as for the adequate and safe storage of radioactive waste and spent fuel. All these requirements are specified in more detail in the regulations.

The holder of the licence is also liable for any nuclear damage according to the Act on Third Part Liability for Nuclear Damage.

It is the responsibility of the regulatory body to ensure that the licensee fulfils these regulations.

Article 10. Priority to safety

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

Comment:

Croatian legislation gives general framework for priority to safety (safety culture) practise.

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 a sufficient number of qualified staff with the appropriate education, training and retraining are available for all safety-related activities, in or for each nuclear installation, throughout its life.*

Comment:

There is no direct provision dealing with the availability of financial resources to support the safety of a nuclear installation throughout its life. Indirectly, it is assured through the responsibility of the licence holder.

There are regulatory provisions for the education of the personnel employed in the nuclear power plant. Art. 17 of the Act of 84 determines that "Sources of ionizing radiation may be operated by persons who have adequate professional qualifications..." Art. 41 of the same Act provides that "Tasks and duties related to the management of the production process within the nuclear facility and the tasks and duties of surveying such processes may be carried out by workers who, in addition to the requirements referred to in Article 17 of this Act, also have specialised knowledge and physical, psychological, working and other capabilities to perform the specific tasks and duties ..."

This requirement is worked out in detail in the regulations on education, experience examination and certification of personnel conducting specific work at a nuclear installation (Regulation E-3). These regulations define the requirements on professional education, working experience and obligatory training for nuclear power plant personnel whose task and duties are safety related (Art. 1).

Regulation Z-5 deals with the requirements on education, health conditions and medical examinations for the personnel working with ionizing radiation sources.

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 throughout the life of a nuclear installation.

Comment:

Although there is no direct provision dealing with the human factor, the Croatian legislation, in general, gives enough space for ensuring human factor performance to be taken into account throughout the life of the nuclear installation.

Article 13. Quality assurance

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

Comment:

Regulation E-1 in Article 5 determines that:

“Works that have an impact on the safety of a nuclear facility and which are being used to prove that the conditions for the siting, construction, commissioning, commencement of operation and operation of a nuclear facility are met, shall be performed according to the system of quality assurance”.

Regulation E-1 requires that: “planned and systematic measures and actions are understood, necessary to assure and prove the required quality by which the prescribed safety of a nuclear facility or its components be achieved”.

Article 6 of Regulation E-1 requires that a system of quality assurance be established based on the classification of products and services according to their importance for the safety of the nuclear facility quality assurance system adopted by the owner or the operating organization of the nuclear facility on the basis of Regulation E-1 and other regulations. These programmes, in respect to the function, obligation, structure and surveillance, regulate: organization, documentation control, design control, procurement control, material control, work process control, testing and inspection control, non-conformance control, corrective actions, documenting and records, as well as an audit (Art. 7).

Methodology for the development of such a program, given in the appendix of Regulation E-1, is in full compliance with 50-C-QA Safety Standard of IAEA.

Article 14. Assessment and verification of safety

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

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

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

Comment:

Requirements for the safety assessment and the verification of the physical state of nuclear installations are covered by existing nuclear safety legislation as follows:

Article 32 of the Act of 84 requires the following:

The application for the construction license for a nuclear facility shall have the following attachments: the site license, the technical documentation for construction, the safety report, including relevant evaluations, as well as other prescribed documentation which can prove that the required safety is secured.

The safety report shall contain: technical data regarding the nuclear facility and its impact on the environment, the facility description, an analysis of the possible accidents and the measures required to eliminate or reduce risk for the population and personnel of the nuclear facility, arrangements for the storage and safety of radioactive waste as well as other required data.

The safety report shall be amended in accordance with the changes which are made in the project design during construction, commissioning, start-up, operation and decommissioning of the nuclear facility.

Article 36 of Regulation E-1 requires the following:

During the operational phase, the licensee has to review and assess the safety of the nuclear power plant taking into account the operational experience of other nuclear industries and of technology development.

The design of the facility is described in the Preliminary Safety Analysis Report (PSAR) and in the Final Safety Analysis Report (FSAR). Reports are submitted to the regulatory authority for approval in connection with the applications for construction and for operational licenses. Transient and accident analyses and assessments are a part of PSAR and FSAR.

Separate safety analyses are also subject to approval by the regulatory authority. Transient and accident analyses as well as the PSAR should be updated according to Article 7 of Regulation E-2. The review of these safety assessments by the regulatory authority requires independent exercise.

The Act of 84 includes several requirements which concern the verification of the physical state of a nuclear power plant. For instance, Article 43 of the Act of 84 sets forth as follows:

The operation of a nuclear facility must be carried out according to operating and other technical instructions related to: all operating regimes, handling of nuclear materials, transportation of such materials, maintenance and surveillance of the systems, internal control and to procedures in the event of a nuclear accident.

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 the prescribed national dose limits.

Comment:

As described previously in this report, in the Republic of Croatia two laws concerning radiation protection are in force: Act of 81, Act of 84.

In Article 10 of the Act of 84 it states:

“A nuclear facility may be constructed and operated only according to such technical and other conditions which provide for the protection of the lives and health of the population as well as for environmental protection from ionizing radiation within the prescribed limits”.

The Act of 84 prescribes that all the radiation protection measures determined by this Act should be worked out in detail in special regulations. The regulations which were issued on the basis of this Act are as follows:

- ◆ Regulation on the principle of environmental monitoring programme (Z2)
- ◆ Regulation on the conditions for releasing radioactive material (Z3)
- ◆ Regulation on technical education, health requirements, and medical surveillance of workers ... (Z5)
- ◆ Regulation on exposure limits (Z6)
- ◆ Regulation on environmental contamination limits (Z9)
- ◆ Regulation on the registry of radiation sources (Z10)
- ◆ Regulation on siting, constructing, operation,...and the use of nuclear installations (E1)

Prescribed exposure limits are established in such a way that the share of exposure produced by a nuclear facility, together with exposure originating from other sources of ionizing radiation to which the population of the same area is exposed, does not exceed the limits prescribed pursuant to the Radiation Protection Act.

Regulation Z-6 states a system of dose limits which is based on ICRP Publication No. 26 and IAEA SS No. 9, Basic Safety Standards for Radiation Protection, 1982 Edition. The exposure limits provided within this Regulation are the basis for planning and deduction of all organisational, technical, medical and other measures, which are necessary for the radiation protection of occupationally exposed persons and members of the general public. The doses of workers and members of the general public exposed to a single radiation source or to all radiation sources together shall be restricted by a system of dose limitation which shall include justification of the practice, optimization of radiation protection and annual equivalent dose limits.

The limit for the annual effective equivalent dose for workers is 50 mSv; the annual equivalent dose limit for the individual organs and tissues of workers is 500 mSv except in eye lenses and blood-forming organs, where the limit is 150 mSv.

Planned special exposures are expected only in exceptional situations during normal operations when alternative procedures not involving such exposures cannot be used. Equivalent dose incurred in the course of planned special exposures shall not exceed twice the relevant annual limit in any single event (100 mSv) and, in a lifetime, five times this limit (250 mSv).

The limit for an annual effective equivalent dose for a member of the public is 1 mSv. For a limited period of a few years, the limit for the annual effective dose equivalent for a member of the public can be 5 mSv, if the average life time effective dose equivalent does not exceed 1 mSv per year.

In Regulation Z-9 the contamination limits of the human environment are defined through annual limits on intakes and derived concentrations of radionuclides in the water and air as well as with activity concentrations of natural radionuclides in building materials for housing.

Regulation Z-3 sets the conditions under which radioactive material could be released into the human environment.

Regulation Z-2 provides the basis for an environmental monitoring programme at the nuclear installations. The monitoring of radioactivity levels in the vicinity of nuclear installations is carried out at the source and off site.

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.
For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.*
2. *Each 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 the appropriate information for emergency planning and response.*
3. *Contracting Parties which do not have a nuclear installation in their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.*

Comment:

Introduction

Croatia has no nuclear installations in its territory, but two nuclear power plants are located in the vicinity. These are Krško NPP in Slovenia (10 km from the border) and Pakš NPP in Hungary (80 km from the border). Therefore, paragraph 3 of Article 16 is applicable.

The Ministry of Economy, i.e. Department on Nuclear Safety (DNS) has therefore initiated several activities in order to improve the existing Off-site Emergency Response Plan (OERP) in the case of a nuclear accident, which was established during the early 80s. This plan is based on an organizational structure which includes the so-called Operational Group of Experts (OGE) and various expert organizations. The OERP has mostly focused on the Krško NPP (it was originally developed as a part of the Krško NPP licensing procedure), and does not cover

activities which should be taken in the case of a potential nuclear accident at the Pak{ NPP.

Development and improvement of the OERP has been based on the following general requirements:

- ◆ set up the new organization structure in such a way as to introduce a Technical Support Center (TSC), instead of OGE, as the lead technical agency in the case of a nuclear accident, with clearly defined roles, obligations and responsibilities,
- ◆ complement the plan so that it includes all the necessary specific elements of preparedness in the event of a nuclear accident at the Pak{ NPP,
- ◆ adapt the plan to the existing structure and level of the organization of Civil Protection, but also define additional requirements which Civil Protection should meet,
- ◆ make a plan and operational procedures that will, to the greatest possible extent, be compatible with the plans and procedures in Slovenia and Hungary.

Organization Structure

The new organization structure is based on the introduction of the TSC, which should comprise all the functions that in the existing OERP were divided into OGE and other institutions such as the Meteorological and Hydrological Service of Croatia (MHSC), Ruđer Bošković Institute (IRB), Institute for Medical Research and Occupational Health (IMI), etc. The new organization structure (Figure 1) recognizes four major participants in the new OERP. These are: National Center for Notification and Monitoring (NCNM), Technical Support Center (TSC), Civil Protection Crisis Headquarters (CPCH) and Governmental Crisis Center (GCC).

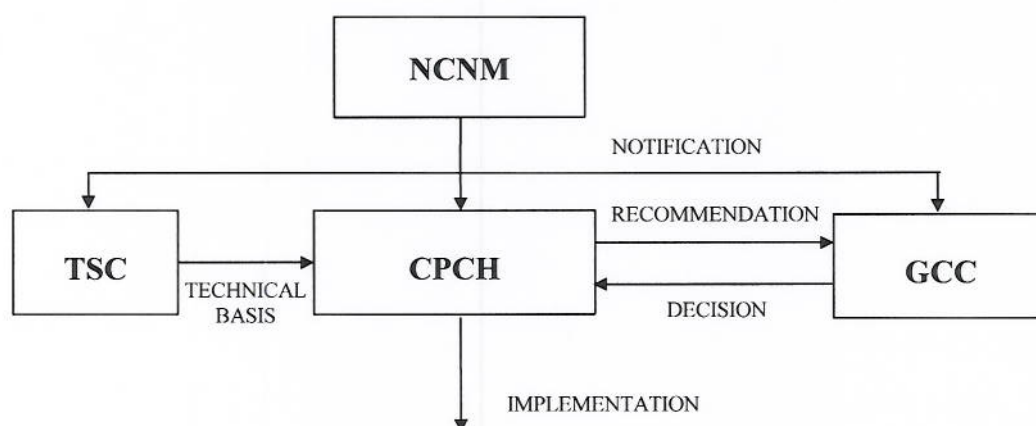


Figure 1 - New Organization Structure

National Center for Notification and Monitoring

The major obligation of the NCNM as the national contact point is to collect the first information about the nuclear accident and immediately inform and summon the members of TSC, CPCH and GCC according to a certain procedure. Also, during the accident, the NCNM is obliged to pass on, in the same way, all the relevant

information and data which have in the meantime been submitted by the different parties involved.

Technical Support Center

TSC as a new element in the structure deserves a more detailed explanation. Its responsibility includes collecting data and information on the nuclear accident, analyzing and estimating the possible consequences and performing technical basis for making decisions on protective actions which should be taken. In order to satisfy these obligations TSC is organized into the following three groups:

- ◆ group for environmental monitoring (national early warning system with the Center in Zagreb, collector stations, measuring stations with thermoluminescent dosimeters, Central Laboratory in Zagreb, mobile units, monitoring and weather forecasts),
- ◆ group for risk analysis and assessment of potential consequences, and
- ◆ group for preparation of technical basis.

TSC is located at the Ruđer Bošković Institute which is the most suitable option since it is equipped with the monitoring system for early notification which is one of the most important links in the chain of requirements for sound functioning of the TSC.

Organization of the TSC requires a high level of formalization of functioning, meaning that it is necessary to elaborate a number of documents which would define in detail the obligations and responsibilities of the TSC as a whole, and thus each of the groups it is comprised of. The manual and operational procedures for the members of the TSC are developed in accordance with IAEA document TECDOC-955. The basic philosophy introduced within these documents is based on the idea to keep the process simple and effective. This approach allows data to be quickly collected and evaluated, and recommendations for decisions on protective measures to be promptly made.

The TSC is comprised of 7 experts including a manager. All staff members must have alternates, meaning that by a special order 14 experts must be engaged, who, besides their regular duties and jobs in their respective institutions, should be educated and trained to work in the TSC. Outside expert support is assured specially from the Faculty of Electrical Engineering and Computing (for sophisticated computer programs), IRB (for laboratories work), IMI (for mobile measuring unit) and MHSC (for meteorological evaluation).

Civil Protection Crisis Headquarters

The role of the CPCH is to, based on the information provided by the TSC and based on its own emergency response plans, recommend the protective actions which should be implemented. CPCH is responsible for the protective actions implementation as well. In respect to protective action implementation, the CPCH has at its disposal people and equipment from local Civil Protection organizations, police, special brigades and other resources which are commonly engaged in the case of any kind of natural disasters. Within its scope of activities, the CPCH is also responsible to inform the general public about the accident by keeping links with the television, radio, newspapers, teletext, internet and to organize press conferences as well.

Governmental Crisis Center

The structure of the GCC is taken from the Law on Protection from Natural Disasters (National Gazette 73/97). According to this Law, if a natural disaster affects two or more counties the GCC must be convened. In Croatia's case it is very likely that a nuclear accident may affect two or more counties, therefore the convening of the GCC is obligatory. When it is convened the responsibility of the GCC is to, based on the recommendations provided by the CPCH, make decisions on the protective actions which must be implemented.

3) Emergency Planning Zones

The general approach related to Emergency Planning Zones recognizes the Urgent Protective Action Planning Zone (UPZ) and the Longer Term Protective Action Planning Zone (LPZ). The UPZ is defined as an area within the radius of 25 km around the NPP and the LPZ is defined as an area within the radius of 100 km around the NPP. The LPZ includes the UPZ.

The western part of Croatian territory is within the UPZ and the LPZ in regards to the Krško NPP. The Krško NPP is located 10 km north-west of the Slovenian-Croatian border on the left bank of the Sava River. The UPZ of Croatian territory covers a 550 km² area and it has about 66.000 inhabitants, so that the average population density is quite high (120 inhabitants/km²). The LPZ includes big population centers such as Zagreb, Karlovac, etc.

The eastern part of Croatian territory is within the LPZ in regards to the Pakš NPP. The Pakš NPP is located 80 km north of the Hungarian-Croatian border on the left bank of the Dunav River. The LPZ covers a big part of the Osijek-Baranja County, which is a well known corn-producing region and agriculturally one of the most outstanding parts of Croatia.

Based on the way the Emergency Planning Zones are defined, the national OERP in Croatia, according to IAEA document TECDOC-953, belongs to Emergency Planning Category I, which is the most demanding category. Actually, in this case it means that the national OERP should be developed in the same manner as it is developed in the countries which own nuclear facilities.

4) Emergency Classification

Emergency classification is based on an assessment of plant conditions, and according to IAEA document TECDOC-955, three possible levels of emergency are defined. These are:

- ◆ Alert,
- ◆ Site Area Emergency, and
- ◆ General Emergency.

The Croatian OERP is based on the assumption that in the case of a nuclear accident the relevant authorities in Slovenia and Hungary are supposed to provide the appropriate information to the NCNM (national contact point for this purpose), immediately after an alert is declared in their NPPs. Only this approach will save time and make us able to start our nuclear emergency response system properly. This point

will be especially underlined from the Croatian side during negotiations on bilateral agreements between parties in the field.

5) Intervention Levels

The Croatian approach related to the Generic Intervention Levels (GILs), Generic Action Levels (GALs) and Operational Intervention Levels (OILs) presently is as follows:

- ◆ Adoption of GILs and GALs values recommended by IAEA (BSS, 1996),
- ◆ Adoption of OILs default values recommended by IAEA (TECDOC-955), and
- ◆ Updated values during an accident will be calculated in accordance with IAEA recommendations (TECDOC-955 by using procedures F1-F5).

It is clear that the values for GILs, GALs and OILs are country specific. Among others, these values depend upon the UPZ and LPZ definitions, land shapes, roads, vicinity of settlements and towns, economic conditions in the area, etc. In order to establish specific national and local values for GILs, GALs and OILs as well, a separate project on a longer-term basis will be initiated.

6) Protective Measures

Protective measures are divided into three groups: Preventive protective Measures (PM), Urgent protective Measures (UM) and Longer-term protective Measures (LM). The PM includes activities such as checking communication and other equipment, controlling of iodine pills distribution, checking facilities for sheltering, informing and educating the public about the accident, etc. The UM includes evacuation, iodine pills administration and sheltering, while the LM includes relocation, food restriction and other measures such as decontamination, etc. In respect to the protective measures, the Croatian OERP is based on the assumptions that all of the mentioned protective measures are supposed to be implemented within the UPZ area and that evacuation and iodine pills administration are not concerned within the LPZ area.

The type of protective measures which should be implemented depends on the emergency class declared. The emergency class which will be declared in Croatia depends on our own projection about further accident development (this is what the TSC is responsible for), but also on the emergency class declared in the neighboring countries, particularly in Slovenia and Hungary. The following table explains interface between the emergency class declared in a neighboring country, the emergency class in Croatia and the actions to be taken associated with the protective measures which should be implemented according to the Croatian OERP.

Table 1 - Interface between emergency class and actions to be taken

NEIGHBORING COUNTRY	CROATIA	ACTIONS TO BE TAKEN
ALERT	ALERT	◆ Summon members of the TSC
SITE AREA EMERGENCY	SITE AREA EMERGENCY	◆ Convene members of the CPCH and GCC ◆ Possible PM implementation

GENERAL EMERGENCY	POSSIBLE GENERAL EMERGENCY	♦ UM and LM implementation
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Improvement of the protective measures implementation plans for the previously defined emergency planning zones is within the responsibility of the CPCH as the national co-ordinator in the field, Ministry of Internal Affairs, Ministry of Health, Ministry of Agriculture, Ministry of Defense and other supporting institutions. The Department of Nuclear Safety, as the National Nuclear Authority responsible for establishing the TSC, will be involved in this activity as well.

7) Public Information

As it is previously written, the Croatian OERP anticipates public relations. There are at least two important questions related to this issue and both are very sensitive. The first one is related to public education and the second one is related to public information during an accident.

According to the Croatian OERP, the CPCH is responsible for providing information to the public about the accident and for recommending activities which should be taken. So, the plan for public education and information and implementation of this plan, procedures and standard forms should be developed in advance. However, the responsibility to develop and introduce a consistent system of public education and information is shared between the CPCH and the Department of Nuclear Safety.

8) Workshops and Exercises

The Croatian OERP recognizes three national workshops which are going to be organized every year. The main objective of the first workshop is to introduce experts involved in the OERP and a wide range of others (including the media), to the new organization structure, the purpose of the TSC and to elaborate further potential improvements. This type of workshop or seminar will be organized at the beginning of every year with the main idea being to introduce as many different participants as possible to the OERP.

The National Workshop on Nuclear Emergency Response, as a second workshop, will be organized by the Department of Nuclear Safety. Participants will be the members of the Technical Support Center (7 experts and their replacements) and additional experts from the Ministry of Health, Civil Protection and other supporting institutions. The workshop program will be focused on introduction, understanding and application of IAEA document TECDOC-955 procedures and table top exercises. So, the main workshop objective is to train the TSC staff.

The third workshop should be on the implementation of protective measures. The target groups will be from the Civil Protection structure and supporting institutions. The workshop program is not yet developed in detail.

Regarding the exercises, the OERP noted that they should be organized periodically. In the first stage the exercises will be designed in such a way as to train the NCNM, TSC and CPCH staff, their communication and co-ordination. Exercises related to the implementation of particular protective measures would be more appropriate to organize in the next stage of OERP validation. It is noted that participation in international exercises is very important and highly recommended.

Article 17. Siting

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

- (i) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;*
- (ii) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;*
- (iii) for re-evaluating, as necessary, all the relevant factors referred to in subparagraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;*
- (iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the 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.*

Comment:

As per Article 28 of the Act of 84, a nuclear facility may be constructed only on a site for which the urban plan was prepared by a competent authority. Such a plan must be brought before the public and remain disclosed for a certain period of time (at least 14 days). After receiving comments, proposals and suggestions the same is revised and incorporated (as appropriate) in the final urban plan.

As per Article 29 of the Act of 84, the technical and other requirements for the siting and construction of a nuclear facility must be evaluated on the basis of an analysis of all the data relevant for an assessment of the potential impact of the planned nuclear facility to the environment and possible effects of events occurring in the environment upon such a facility. The analysis shall address:

- ◆ dangerous natural and artificial phenomena which exist or may occur in the area of the anticipated site (earthquake, flood, landslide, explosion, fire, etc.);
- ◆ critical pathways of radioactivities of the population by radioactive material, and the design bases required for the prevention of both such dangers and consequences thereof.

The application for the site license shall be accompanied by the evidence and analysis mentioned in Article 29 as well as other prescribed documentation which can be used in the evaluation process (Article 31). Other prescribed documentation include reports on meteorology, hydrology, density and habits, use of land, etc.

Per Article 32 of the Act of 84, the application for the construction license of a nuclear facility shall have the following attachments:

- ◆ site license,
- ◆ technical documentation for construction,
- ◆ safety report including relevant evaluations,
- ◆ other prescribed documentation which can be used to establish that the prescribed safety has been secured.

The safety report shall be amended in accordance with the changes which arise in the design of the facility during construction, commissioning, start of operation, operation and decommissioning of the nuclear facility.

Once constructed, a nuclear facility cannot be operated until the commissioning has proved that the measures anticipated by the Act and regulations passed on the bases of the Act have been complied with.

During the operation of the nuclear facility, a Final Safety Analysis Report (FSAR), including the descriptions of its site-specific parts, has to be periodically updated (Article 32).

Article 18. Design and construction

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

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

Comment:

Croatia did not developed specific standards and regulations for the design and construction of nuclear installations. The Act of 84 (Article 37) provided that during the construction and operation of a nuclear facility the rules established by international or other technical organizations as well as international and foreign standards may be applied under certain circumstances.

Article 19. Operation

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

- (i) the initial authorisation to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;*
- (ii) operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;*
- (iii) operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;*
- (iv) procedures are established for responding to anticipated operational occurrences and to accidents;*
- (v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;*
- (vi) incidents significant to safety are reported in a timely manner by the holder of the relevant license to the regulatory body;*
- (vii) programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;*

(viii) the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as the nuclear installation must take into consideration conditioning and disposal.

Comment:

In accordance with the Act of 84, Regulation E-1, and Regulation E-2 the FSAR has to be submitted to the Regulatory Body when applying for constructing and operating licenses. In the same documents the requirements for the commissioning programme as well as for testing and operating procedures are defined.

Regulation E-1 in Art. 29 defines the steps of the commissioning: fuel load, first criticality, synchronisation, testing on different power, full power testing.

In accordance with Art. 33 of the Act of 84 and Art. 34 of Regulation E-1, the technical specifications have to be submitted to regulatory body as a part of the application for test operation and for start-up and normal operation.

In Art. 35 of Regulation E-1 and in Appendix 1 of Regulation E-2, the content of technical specification is defined.

Regulation E-1, Art. 43, states that the Operating License includes the limiting conditions for operation.

In Art. 7 of Regulation E-2, the procedure for FSAR text change implementation as well as modification implementation is described and defines the three change categories of the FSAR.

In accordance with Art. 43 of the Act of 84, nuclear facilities have to operate according to the appropriately approved procedures and guidelines.

In accordance with Art. 16 of Regulation E-2 and Art. 34 of Regulation E-1, the other documentation necessary for nuclear safety determination is defined and part of that documentation are the operating procedures.

In accordance to Art. 37 of Regulation E-1 the nuclear facility have to operate the plant in accordant to this Regulation and to procedures related to plant operation. In Art. 38 of Regulation E-1 the types of procedures are defined.

In accordance with Art. 38 of Regulation E-1, the nuclear facility has to prepare procedures for all operational and accidental modes.

In accordance with Art. 44 of the Act of 84, the nuclear facility has to report to the regulatory bodies any incidents significant to safety.

In accordance with Art. 36 of Regulation E-1, the operator of a nuclear facility has to continuously follow and analyse the safety status of the nuclear facility.

In Regulation Z-3, the waste types are specified, giving the description and main characteristics in respect to the safety for each category of waste to be disposed of. Regulation Z-3 (Art. 8) calls for the minimisation of waste production (as small as possible).