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REPUBLIC OF SLOVENIA

NATIONAL REPORT
ON
FULFILMENT OF THE OBLIGATIONS
OF THE CONVENTION ON NUCLEAR SAFETY

The first Slovenian report in accordance with article 5

Ljubljana, August 1998

TABLE OF CONTENTS

INTRODUCTION

Slovenia signed on the 20th September 1994 the Convention on Nuclear Safety (in the following text - Convention) and ratified it on October 1996 in Parliament. The Convention entered into force for Slovenia in February 1997.

The fulfilment of the obligation is evaluated in this first report.

Nuclear Program

Slovenia has one nuclear power plant, one nuclear research reactor and one uranium mine in a decommissioning stage.

Krško Nuclear Power Plant is the only nuclear installation according to this Convention, it is situated on the Sava river in the south-eastern part of Slovenia. It is a Westinghouse 632 MWe two loop PWR. The basic safety features of the plant are typical for a two-loop Westinghouse plant. Construction started in 1974, after a special permit the first fuel loading was accomplished in May 1981 and the plant was synchronised to the grid in October of the same year. After an authorised trial operation, full power was reached in August 1982. A special permit for the beginning of commercial operation was granted to the Krško NPP in February 1984 by the Slovenian Committee of Energy, which at that time was responsible for the licensing of nuclear facilities. Licensing was done on the basis of preliminary and final safety reports following vendor country regulations, with the assistance of several missions from the IAEA. The Krško NPP was built as a joint project of the electric utilities of Slovenia and those of neighbouring Croatia. Energy production of the Krško NPP is shared 50:50 between electrical utilities of both the countries. The Krško NPP is one of the main pillars of the Slovenian power system, generating base load electricity. The total installed generating capacity in Slovenia during1997 was 2401 MW, the thermal share was 42%, with hydro at 32% and nuclear 26%. In terms of electricity generation, the nuclear contribution was 40% of the total production in Slovenia. Therefore the Slovenian share covered about 20 % of the country's consumption.

The safety features of Krško NPP design are based on the requirements of the US Nuclear Regulatory Commission (NRC) of 1973. Westinghouse as the main contractor, was responsible for the implementation of these requirements during the design, construction and testing phases. Krško NPP is also one of two projects in the world of the International Atomic Energy Agency (IAEA) and therefore has been closely following its recommendations. Krško NPP has been the subject of IAEA scrutiny from the very beginning of the project. The commitment of the plant and of the regulatory body - Slovenian Nuclear Safety Administration (SNSA) has been to follow international experience in the field of nuclear safety, and to fulfil western safety standards. Several software/hardware modifications and improvements of the plant have been implemented. These were based on experience from the TMI and Chernobyl accidents, recommendations of the OSART, ASSET and ICISA missions, NRC requirements, the experience of the nuclear industry (INPO, WANO, Westinghouse Owners Group), experience gained from Phare - RAMG program

and from bilateral co-operation of the regulators.

As a part of the technological process of electricity production, solid radioactive waste and spent nuclear fuel are stored within the plant area. Solid radioactive waste is treated and then packed into steel drums, which are then stored in the Solid Waste Storage. Spent nuclear fuel is stored under water in the Spent Fuel Pit.

The Research Reactor TRIGA Mark II of the Jožef Stefan Institute is situated in the vicinity of Ljubljana and has a 250 kWth General Atomic pool reactor. TRIGA was initially licensed in 1966 as an IAEA project and was re-licensed for steady state and pulse operation after refurbishment and reconstruction in 1992.

Žirovski Vrh Uranium Mine and Mill was in operation in the period of 1985 to 1990. Its lifetime production was 607,700 tons of ore corresponding to 452.5 tons (Uranium equivalent) of yellow cake. Both the mine and the mill is undergoing decommissioning and re-mediation of one surface disposal of 1,548,000 tons of mine waste and red mud, and another 593,000 tons of mill tailings.

Nuclear Legislation

Comprehensive nuclear legislation is in place in Slovenia comprising of international agreements, domestic laws and regulations.

Regulatory Body

SNSA is the competent regulatory body for all nuclear safety issues, it was established back in 1987. Before that time the function of regulatory body was within the Committee of Energy.

Governmental Policies

The Government energy policy for nuclear power is outlined in »A Strategy of Energy Use and Supply of Slovenia«, adopted by the Parliament in 1996. The highlights of the policy are:

- The long-term aim is to abandon electricity generation based on nuclear power in a safe, ecological, as well as economically acceptable way. Based on this it is not foreseen to construct any new nuclear power plants.
- The strategic objective is to maintain a high operational safety level at the Krško NPP during its planned operation until 2023, including a high level of safety after shut down, as well as to gradually establish conditions for its safe decommissioning.
- Prior to deciding on the shutting down of the plant, energy supply reliability has to be ensured. This decision needs to be taken at least ten years in advance, accompanied by measures to replace its energy contribution. The implementation of these measures should be regularly monitored and in the case of changed circumstances, the date of shutdown should be adjusted

accordingly.

- To ensure the highest level of nuclear safety and plant availability during the plant's operation, the projects recommended by international review missions need to be implemented.

In September 1996 the Government adopted »A Strategy for Long-Term Spent Fuel Management«. The preparation of a long-term spent fuel management program for the Krško NPP's fuel was strongly influenced by the specific situation in Slovenia:

- a small nuclear program (only one NPP).
- the planned phasing out of nuclear energy after 2023 (at the end of the scheduled lifetime of the Krško NPP).
- the unresolved question of co-ownership with neighbouring Croatia (this is still the subject of negotiations between the two Governments): sharing the spent fuel and other radioactive waste is an open possibility.

On the basis of these facts it is clear that any final disposal solution will be extremely expensive.

In the strategy of long-term spent fuel management a deferred final decision is recommended as the only reasonable solution in the present situation. A deferred decision does not only delay the final solution but also gives negotiators sufficient time to reach an agreement between the co-owners without additional pressures. It also gives the possibility to reconsider different options including the possibility of the reprocessing of spent fuel, as well as new technological developments. This provides the opportunity of responding to and joining the project of a regional repository, if this idea, which seems so attractive to countries with small nuclear programs, is realised.

In this strategy the short-term solutions for spent fuel storing are also included. In the first stage an increase of the existing capacity of the spent fuel pool at Krško NPP is proposed. If such an increase in pool capacity will not be sufficient, interim dry storage in casks on-site is proposed as an additional option.

»The Decommissioning Plan for Krško NPP« was adopted by the Government on September 1996. Three decommissioning strategies for the Krško NPP are analyzed:

Immediate dismantling, later dismantling and entombment.

For the purpose of cost assessment for the decommissioning of NPP Krško and the estimation of the contribution to the decommissioning fund, the above options were evaluated from radiological, safety, financial and political aspects. The results have shown that the option, with immediate dismantling is most appropriate.

Due to many variables in the Plan, the Government requested regular updating of the Plan every three years.

Peer review of the decommissioning plan by the IAEA will be done in 1998 upon the request of the SNSA.

Act on Fund for Financing the Decommissioning of the Nuclear Power Plant Krško and for the Disposal of Radioactive Waste from Nuclear Power Plant Krško (Off.Gaz.RS,75/94), established the fund for financing the decommissioning of the Krško NPP and for the disposal of its radioactive waste which would be filled from the contributions of each produced kWh at the plant (in the amount of 0.61 Slovenian tolar/kWh). However, due to the unresolved legal and ownership status of Krško NPP, required funds are only partially collected.

Internet Resources

The following Internet home pages are available for additional information:
Slovenian Nuclear Safety Administration:
http://www.sigov.si/cgi-bin/spl/ursjv/uvod.html
Krško NPP: http://www.ne-krsko.si/
Milan Èopiè Nuclear Training Centre: http://www2.ijs.si/~icjt/
Agency for Radwaste Management: http://www.sigov.si/arao/aarao.html

In the following fulfilment each of the articles 4 - 19 of the Convention are evaluated separately. Based on the evaluation it can be concluded that Slovenian regulations and practices are in compliance with the obligations of the Convention.

ARTICLE-BY-ARTICLE REVIEW

(A) GENERAL PROVISIONS

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.

The legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under the Convention on Nuclear Safety are discussed in this report.

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.

This is the first report that the Republic of Slovenia has issued in accordance with Article 5 of the Convention.

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 reasonable 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.

The Krško NPP is the only nuclear installation in Slovenia as defined in Article 2 in the Convention. Technical Information about the plant is reported in Annex G of this report.

There were no formal significant corrective actions in the installation - Krško NPP as relevant under Article 10 through 19.

The Krško NPP operates with an operating licence issued in 1984 as amended for each Technical Specifications or FSAR change.

The Krško NPP has experienced in the last 6 years (1991-1997) a major safety analysis review and assessment. All these activities can be divided into five different categories:

1. International missions; four different missions have visited Krško since 1991 (ICISA, OSART, WANO and ASSET).
2. PSA analysis which included Level 1, Level 2, External events and the PSA assessment of the shutdown modes.
3. A systematic compliance review and the creation of a list of NRC regulatory requirements issued from 1975 to 1995, applicable to the Krško NPP.
4. A review from the safety view point of all modifications, which were performed at the Krško NPP.
5. A detailed analysis of important safety issues.

All five categories included, at different levels of detail, a safety review of all areas in design, operation and maintenance. All these activities in the last 6 years resulted in different lists of issues, which are now under implementation, many of them have already been resolved and completed. If all these activities are integrated into one single systematic and comprehensive effort, they represent an important part of the periodic safety review.

The principal aims of this safety assessment were the following:

a. To confirm that the plant is atleast safe as originally intended i.e. that no degradation of the safety has taken place and to re-assess the plant status by referring to its operating experience, with emphasis on those structures, systems or components susceptible to ageing or wearing out.

b. To justify the current levels of safety at the plant by comparing it with current safety standards and practices, and identify areas where improvements would be beneficial and the risks reduced at a justifiable expense. One further factor was to ensure a balanced approach to safety across the whole plant.

c. To perform detailed probabilistic safety assessment. The assessment includes the core melt frequency determination (Level 1), containment performance (Level 2), evaluation of external events, the risk assessment/reduction for shutdown modes and accident management database development.

International Missions

ICISA - International Commission for Independent Safety Analysis of the Krško NPP.
The Slovenian Government established on April 1992 an international commission for the Krško NPP review and invited Governments of neighbouring countries to participate in its work. The Austrian and Italian Governments responded positively.

The work of the ICISA, to which many professional experts from Europe and the USA
contributed, was concentrated on the safety aspects related to the site, the environment, the plant and its operation. The objective was the assessment of the adequacy of plant safety and its back fitting from the beginning of operation until now. This was in comparison with the current US applicable rules.

The institutional and organizational structures of the utility which operates Krško NPP and the SNSA, were also studied.

During the 18-months of the ICISA mandate plant inspections, documentation reviews and safety assessments were made.

The ICISA mission issued their recommendations on 15 main areas. Among them, the most important are; geology and seismology, external events important to plant safety, plant safety systems, electrical systems, instrumentation and control, containment systems, fire protection, plant modifications, emergency preparedness and spent fuel and radiological waste management. A total of 74 recommendations were addressed to Krško NPP and 3 to the SNSA.

The most important recommendations - establishing a training centre with a full scope (plant specific) simulator and steam generator replacements were accepted, the purchase and contracts are in progress. The full scope simulator enforced is under construction and has to be in function by the end of 1999.

The achievement of the necessary safety improvement has required considerable effort on the side of Krško NPP.

SNSA followed this up carefully and reviewed all mission findings and recommendations with the Krško NPP personnel. After the last review at the end of 1997 it was concluded, that almost all findings and recommendations were resolved.

The IAEA OSART Mission

On the request of SNSA, the IAEA Operational Safety Review Team (OSART) mission visited Krško NPP for the second time in July 1993. The IAEA OSART follow up visit was in October 1994. An OSART mission is carried out only at the request of the relevant Member State and it is directed towards a review of items essential to operational safety. A full scope review covers eight operational areas; management, organization and administration, training and qualification, operations, maintenance, technical support, radiation protection, chemistry and emergency planning and preparedness.

The essential features of the work of the experts and their plant counterparts are the comparison of a plant's operational practices with best international practices, and the joint search for ways in which operational safety can be enhanced. The IAEA Safety Series documents, including the Nuclear Safety Standards (NUSS) program, the Basic Safety Standards for Radiation Protection and the expertise of the OSART team members form the basis for the evaluation. The OSART methods not only involve the examination of documents and the interviewing of staff, but also reviewing the quality of performance.

An important aspect of the OSART review is the identification of areas that should be improved and the formulation of corresponding proposals. In developing its view, the OSART team discusses its findings with the operating organization and considers additional comments made by plant counterparts.

Some of the most important recommendations/suggestions are; establishing a training centre with a full scope (plant specific) simulator and steam generator replacements.

SNSA carefully reviewed all follow-up mission recommendations and suggestions with the power plant personnel. After a discussion and the review it was concluded that almost all suggestions and recommendations were accepted, and the majority

of them realised too. Non-realised suggestions and recommendations were those not very important to nuclear safety or not actual any more.

SNSA concluded that both the missions carried out in Krško NPP (ICISA and OSART) were beneficial for SNSA and for the further implementation of safety measures in Krško NPP. It can be concluded that all relevant recommendations and suggestions were implemented as soon as all necessary conditions and circumstances were met.

IAEA ASSET Mission

The SNSA requested an ASSET mission to be held at Krško NPP during September 1996. This was the 114th mission of the IAEA ASSET services which took place coincidentally, ten years after the first ever ASSET mission, which was also held at Krško NPP.

The mission has reviewed the self assessment report of the operational events over the period January 1991 to December 1995. Krško NPP wanted to benefit from an international perspective on its self assessment of safety performance, and on possible ways of further enhancing incident prevention (operational safety).

The self assessment of operational safety performance carried out by Krško NPP has thoroughly answered the seven basic questions, and therefore provides a sound technical basis to the Krško NPP Action Plan.

Plant defence-in-depth provisions made by Krško NPP management in the hardware, highlighted the vulnerability of the plant's software provisions. Particularly with respect to the timely detection of possible quality degradation in the areas of personnel qualification, and guidance for maintenance work .

Systematic root cause analysis could have led to comprehensive measures in the area of maintenance staff training and of maintenance activities, thus helping to prevent the recurrence of similar failures.

Plant Safety Culture has been developing since the first ASSET visit in 1986. The self assessment carried out by Krško NPP, provides evidence of the consciousness of plant management regarding the need for the further development of the plant capabilities to identify its safety issues, of assessing their importance and learning the lessons as an overriding priority (Safety Culture definition, INSAG-4, 1991).

The ASSET has offered recommendations to complement the Krško NPP Action Plan in the areas of maintenance personnel training, foreign materials exclusion and review of past transients events.

These recommendations are expected to draw to the attention of plant management interim measures that would contribute to elimination and prevention of the recurrence of safety issues encountered at Krško NPP.

The Krško NPP is exhibiting a steadily increasing ratio of events resulting from deficiencies discovered by routine surveillance to those resulting from failures during operation. This positive trend in prevention of operational failures is confirmed by the low safety significance of the few incidents that have occurred, highlighting the current dedication of plant management to the enhancement of the Krško NPP operational safety performance.

WANO Peer Review

In addition to an international mission imitted by SNSA or the Government, a WANO team conducted a peer review at the Krško NPP in November 1995 at the invitation of the Krško NPP.

The goal of WANO peer reviews is to assist stations in achieving the highest standards of excellence in nuclear plant operation. The areas for improvement are based on the best practices, rather than minimum acceptable standards or requirements, and are not necessarily indicative of unsatisfactory performance.

Krško NPP-PSA Study

In response to a licensing amendment issued by SNSA in 1991, Krško NPP performed a Probabilistic Safety Analysis (PSA) study from 1992 to 1997. The Krško NPP PSA study contains Internal Initiating Events Level 1 and Level 2, Seismic Level 1 and Level 2, Internal Fire Level 1 and Level 2, PSA for internal flooding and other external events as well as a PSA for shutdown modes based on EPRI-ORAM methodology.

Listed below is a table on power core damage frequency (CDF) at the Krško NPP due to the variant initiator categories as described above.

Initiator category	CDF (per year)	% of total
Internal events	5.4×10^{-5}	22.8
Seismic events	6.0×10^{-5}	25.3
Internal fire	1.0×10^{-4}	42.2
Internal flooding	1.0×10^{-5}	4.2
Other external events	1.3×10^{-5}	5.5
Total	2.37×10^{-4}	100

Table: On power Krško NPP CDF

The CDF of the Krško NPP during the shutdown modes was calculated to be 3×10^{-5} per year. Thus the overall CDF for power operation and shutdown modes at the Krško NPP is assessed to be 2.67×10^{-4} events per year. As it can be seen from the table, the highest contribution by far comes from the internal fire. With respect to PSA results and insights, the Fire Protection Action Plan has been developed towards elimination of those design weaknesses which would reduce the risk from fire at Krško NPP significantly. It was assessed that the fire induced CDF by implementation of these modifications would be reduced by almost one order of magnitude. Thus, the total power operation CDF would be reduced by almost 40 %.

The Krško NPP Level 2 PSA showed that around 78 % of core damage events lead to a fission product release which can be described as very small or small. The remaining 22 % of core damage events lead to "large release". Large releases include early containment failures, containment isolation failures and containment bypass events. Early containment failure contributes a negligible 0.03 % of CDF. On the other hand, containment isolation failure events (9.8 %) and bypass events (12.6 %) both contribute significantly to the large release frequency, and are important contributors to a total risk of radioactive release to the environment.

With respect to Level 2 findings, Krško NPP is considering a design change from dry to wet reactor cavity. Level 2 PSA demonstrated that wet cavity design may increase the contribution of sequences with "no containment failure" for about 15 %. The Krško NPP response to Level 2 PSA results will also come in the form of formalized guidance for recovery actions after core damage has occurred, the Severe Accident Management Guidelines (SAMGs). One of the conclusions of Level 2 analysis is that implementation of such guidance could bring significant benefit in the overall risk.

There is also a number of other activities and considerations by which the Krško NPP will respond or already has responded to insights gained from PSA (level 1 and 2). Such as, a number of fixes in the plant with respect to seismic resistance, shielding of important components against sprinkling, possibilities of the introduction of dominant accident sequences into operator training programs, development of the Krško NPP Shutdown Operation Protection Plan (SOPP), various Living PSA applications which are under preparation, etc.

The Krško NPP PSA is an exhaustive and comprehensive study which has contributed to a greatly improved understanding of the likely response of the Krško NPP to a spectrum of accident initiators, and of the accident sequences which dominate the risk profile. It is being thoroughly reviewed by the SNSA with the assistance of TSO's and peer reviews of the IAEA missions.

Regulatory Conformance Program

The Krško NPP established an internal Regulatory Conformance Program as a process by which it can demonstrate continuous compliance with US regulatory requirements. These requirements have evolved over a period greater than twenty

years. It is intended to be a living document and updated annually.

Each of the requirements identified in the first phase have been reviewed against the current as-built and as-operated Krško NPP. Following this review a compliance conclusion was reached for each item. As a result of a compliance review more than 80 % of the overall items evaluated are resolved, and additional items greater than 10 % are under implementation.

Review/Evaluation of Previously Implemented Plant Design Modifications

The purpose and scope of the project conducted by Krško NPP included the following activities:

1. Identify all Design Modification packages issued prior October 1., 1992 (approximately 250).
2. Perform the reviews and evaluations necessary to determine if the plant design bases have been met and plant configuration control maintained.
3. Specifically identify follow-up actions required to meet the plant design bases and to restore plant configuration control as necessary.
4. Track the completion of the assigned action items.

There were approximately 1300 action items identified from review. About 1200 items are associated with revision and issuance of the design drawings, about 40 are design criteria documents and about 50 items required further engineering evaluations. The implementation of these action items started in June 1994 and is largely completed.

Detailed Analysis of Important Safety Issues

Detailed investigations, analysis and assessments were conducted for some important safety issues requested by the regulatory body. The following ones are the most important and comprehensive:

1. Fire Hazard and Appendix R to 10 CFR 50 analysis and assessments in 1991.
2. Station Blackout analysis in 1991.
3. Seismological and geological investigations and evaluations from 1993 onwards.
4. Plant physical security analysis and evaluations in 1991.
5. Control Room Design Review in 1996.
6. Anticipated Transient Without Scram (ATWS) analysis (1993).
7. Post TMI (Three Mile Island) requirements, recommendations and action plan evaluation including periodical survey of action plan implementation (1985-1997).
8. Pressurized Thermal Shock (PTS) analysis (1991).
9. Analysis of 18% steam generator tube plugging criteria (1989).
etc.

All these analysis assessment and evaluations resulted in findings and were followed by detailed action plans, which are based in their priority already under implementation.

There was no significant safety issue which may require plant shutdown. Some of the action plans are been continuously updated and when necessary new provisions for safety improvements are put into place.

The following conclusions of safety assessment at the Krško NPP are:

- Many of these reviews and analysis were requested or initiated by the regulatory body.
- Most of the results were directly or indirectly reviewed by the regulatory body and comments incorporated.
- These safety assessments represent the largest safety review since the beginning of operation and includes human error, common cause failures and severe accidents analysis.
- Many important recommendations based on its regulatory importance, risk significance and cost benefit analysis are implemented or under implementation.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 6.

(B) LEGISLATION AND REGULATION

Article 7. Legislative and Regulatory Framework

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

2. The legislative and regulatory framework shall provide for:

(I) the establishment of applicable national safety requirements and regulations;

(II) a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license;

(III) a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses;

(IV) the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.

7.1 Description of the Legislative and Regulatory Framework

For historical reasons the legislation currently in place in Slovenia has evolved from the federal legislation of the former Yugoslavia, and the legislation of Slovenia as a former member of that Federation. Since 1991 the Republic of Slovenia has been an independent sovereign state and legislation at the time of its independence ensured a continuity of the legal system by adopting all federal laws in so far as they could be said to apply to Slovenia.

The Constitutional Act on Enforcement of the Basic Constitutional Charter on the Autonomy and Independence of the Republic of Slovenia adopted on 23 June 1991 (Off.Gaz.RS1/91) provides, that all the laws adopted by the Yugoslav (federal) authorities in the past which are not incompatible with the Slovene legal system, will remain in force in the Republic of Slovenia pending the adoption of appropriate legislation by its Parliament.

Accordingly, legislation on nuclear energy (and safety) in Slovenia is made up of the following laws and regulations:

Nuclear and Radiological Safety, Physical Protection, Safeguards, Quality Assurance

- Act on Radiation Protection and the Safe Use of Nuclear Energy (Off.Gaz. SFRY,62/84), 1984 Act;
- Act on Implementing Protection Against Ionizing Radiation and Measures for the Safety of Nuclear Facilities (Off.Gaz.SRS,28/80 and 32/80), 1980 Act;
- Act on Sanitary Inspection (Off.Gaz.SRS, 8/73 and 9/85).

On the basis of the 1984 Act, several important regulations for carrying into effect the radiation protection and nuclear safety provisions are in force:

- On siting, construction, commissioning, startup and exploitation of nuclear facilities (with appendix on quality assurance), (Off.Gaz.SFRY,52/88), - Regulation E-1;
- On preparation and content of safety analysis report and other documentation relevant for the assessment of safety of nuclear facilities (Off.Gaz.SFRY,68/88), Regulation E-2;
- On education, experience, examination and certification of personnel conducting specific work at the nuclear installation (Off.Gaz.SFRY,86/87), Regulation E-3;
- 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;
- On places, methods and frequencies of monitoring of the contamination with radioactive materials (Off.Gaz.SFRY,40/86), Regulation Z-1;
- On mode, extent, and frequencies of monitoring of radioactive contamination in the surroundings of nuclear facilities (Off.Gaz.SFRY,51/86), Regulation Z-2;
- 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;
- On trading and utilization 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 and 45/89), Regulation Z-4;
- On education, health condition and medical examination for the personnel working with ionizing radiation sources (Off.Gaz.SFRY,40/86), Regulation Z-

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- On dose limits for members of the public and for occupational exposure, on measurements of occupational exposure and on monitoring of the working environment (Off.Gaz.SFRY,31/89 and 63/89), Regulation Z-6;
- On conditions for the application of sources of ionizing radiation for medical purposes (Off.Gaz.SFRY,40/86 and10/87), Regulation Z-7;
- 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;
- On maximum established limits for radioactive contamination of the environment and on decontamination (Off.Gaz.SFRY,8/87 and 27/90), Regulation Z-9;
- 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;
- On trade of fodder (Off Gaz.SFRY,6/88).

Based on the 1980 Act these regulations are in force:

- On mode and frequencies for keeping records and for reporting to the regulatory body by the authorized TSOs and by the organizations operating nuclear facilities (Off.Gaz.SRS,12/81);
- On education, experience and compulsory qualification and training of personnel working with ionizing radiation sources or in radiation protection services and on the procedure of verifying their qualification (Off.Gaz.SRS,9/81).

There are several other regulations related to broad nuclear area.

Third Party Nuclear Liability

- Act on Third Party Liability for Nuclear Damage (Off.Gaz.SFRY, 22/78 and 34/79);
- Act on Insurance of Liability for Nuclear Damage (Off.Gaz.SRS, 12/80),
- Decree to Amend Decree on the Insurance Amount for Liability (Off.Gaz.RS, 22/91-I);
- Decree to Amend Decree on the Limitation of the Liability (Off.Gaz.RS, 22/91-I);

Decommissioning of Nuclear Power Plant Krško

- Act on the Fund for Financing Decommissioning of the Krško NPP and Disposal of Radioactive Waste from the Krško NPP (Off.Gaz.RS,75/94).

Radioactive Waste

- Act on Cessation of Exploration off the Uranium Mine (Off.Gaz.RS,36/92),
- Act on Mining (Off.Gaz.SRS, 17/75; 29/86; 24/89).

Civil Protection and Disaster Relief

- Act on Protection against Natural and Other Disasters (Off.Gaz.RS,64/94),
- Ordinance on Writing the Civil Protection and Disaster Relief Plans (Off.Gaz.RS, 48/93).

Administrative

- Act on Organisation and Field of Activities of the Ministries (Off.Gaz.RS,71/94 and 47/97);
- Act on Administration (Off.Gaz.RS,67/94);
- Act on Administrative Procedures (Off.Gaz.SFRY,47/86);
- Act on Posts for which the Pension Insurance is Benefited (Off.Gaz.SFRY, 17/68; 20/69; 29/71)
- Act on Local Autonomy (Off. Gaz. RS, 72/93),
- Act on Standardization (Off. Gaz. RS, 1/95).

Energy

- Act on Energy Economy (Off.Gaz.SRS,33/81,29/86);
- Act on the Postponement of Construction of Nuclear Power Plants until the Year 2000 (Off.Gaz.SRS,45/87).

General

- Act on Environmental Protection (Off.Gaz.RS,32/93,1/96);
- Penal Code (Off.Gaz.RS, 63/94 and 70/94);
- Act on Minor Offences (Off.Gaz. RS, 87/97);
- Act on Transport of Hazardous Material (Off.Gaz.SFRY,27/90 and 45/90);
- Decree on Export and Import Regime of Specific Goods (Off.Gaz.RS, 75/95, 7/96, 73/96, 45/97, 86/97, 56/98).

Based on the Slovenian Constitution all announced and ratified international treaties also constitute an integral part of Slovenian legislation and can be applied directly. The following international instruments, to which Slovenia 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,
- Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention,

- 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,
- Treaty Banning Nuclear Weapon Tests in the Atmosphere in Outer Space and Under Water,
- Treaty on the Non-Proliferation of Nuclear Weapons,
- Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction in the Sea-Bed and the Ocean Floor and in the Subsoil Treaty,
- European Agreement Concerning the International Carriage of Dangerous goods by Road (ADR),
- Convention on International Railway Carriage (COTIF) including Appendix B (RID).

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, was signed during the session of the IAEA General Conference in 1997. It is now undergoing the procedure of ratification by the Parliament. The Protocol to Amend Vienna Convention on Civil Liability for Nuclear Damage and Convention on Supplementary Compensation for Nuclear Damage are in the process of internal decision making. The government took the decision in 1997 to approach the Paris convention with Brussels protocol to enhance liability regime.

Bilateral agreements concluded since the independence of the Republic of Slovenia are:

- Agreement with IAEA for the Application of Safeguards in Connection with the Treaty on the Non-proliferation of Nuclear Weapons,
- Agreement between the US NRC and the SNSA on Exchange of Technical Information and Co-operation in the Nuclear Safety Matters,
- Agreement between the Governments of the Republic of Slovenia and the Government of Canada on Co-operation in the Peaceful Uses of Nuclear Energy with an Arrangement between SNSA and AECB,
- Agreement between the Governments of the Republic of Slovenia and the Republic of Hungary on Early Exchange of Information in the Event of a Radiological Emergency,
- Agreement between the Governments of the Republic of Slovenia and the Republic of Austria on Early Exchange of Information in the Event of a Radiological Emergency and on Questions of Mutual Interest in the Field of Nuclear Safety and Radiation Protection (signed in October 1996, ratified by Slovenian Parliament in July 1997, waiting ratification by Austrian Parliament)
- Agreement between the Governments of the Republic of Slovenia and the Republic of Croatia on Early Exchange of Information in the Event of a Radiological Emergency (signed in April 1998, in the process of ratification).

Additional Protocol to the Safeguards Agreement is now facing a debate in the

Slovenian Parliament.

It should also be mentioned that based on our legislation during specific licensing activities for the Krško NPP, because of the non-existence of domestic codes and standards, the United States of America's (as a vendor country) are used.

7.2 Summary of Laws, Regulations and Requirements

NUCLEAR AND RADIATION SAFETY LEGISLATION

From the aspect of nuclear safety, the 1984 Act is the most important, stipulating the protection requirements from the effects of ionising radiation, and nuclear safety measures.
The definition on "safety of nuclear installation" is given in Section 5 of the 1984 Act.

"Safety of the nuclear facility, for the purposes of this Act, means all technical and organizational measures anticipated by the project design, implemented in the course of construction, tested during commissioning and applied in operation as well as upon decommissioning which, in all circumstances, provide for the environment protection from contamination by radioactive materials and prevent irradiation of the population and persons employed in such facilities in excess of the prescribed limits."

The 1984 Act addresses a number of areas:
- Introductory provisions including definitions,
- General measures for protection against ionizing radiation,
- Special safety measures applied to nuclear facilities and nuclear materials,
- Surveillance and competent authorities,
- Inspection provisions, penalties and transitional provisions.

The 1984 Act includes specific provisions related to:
- Function, assignment and responsibilities of the different regulatory bodies,
- Requirement to posses license,
- The responsibility of the license holder,
- Quality assurance,
- Assessment and verification of safety (during site selection, constructing, commissioning and throughout life of nuclear installation),
- Emergency preparedness plans,
- Physical protection and safeguards,
- Operator licensing,
- Radwaste,
- Decommissioning,
- Dose limits, etc.

Generally speaking, the license holder is responsible for nuclear and radiological safety. SNSA is responsible for the preparation of legislative measures and their

implementation on nuclear facilities concerning nuclear and radiological safety.

Some specific responsibilities in this field are also given to the Ministry of Health (Health Inspectorate), Ministry of Defence (Administration for Civil Protection and Disaster Relief) and Ministry of Interior.

LICENSING SYSTEM

The licensing system is generally defined in the 1984 Act. The system can be divided into four steps:

- application for the site license – the competent body is the Ministry of Environment and Physical Planning,
- application for the construction license – the competent body is the Ministry of Environment and Physical Planning,
- application for the license for commissioning – the competent body is SNSA at the Ministry of Environment and Physical Planning,
- application for the start of operation – the competent body is the SNSA at the Ministry of Environment and Physical Planning.

Relevant are the following sections:

Section 28:
A nuclear facility may be constructed only at a site covered by a physical and urban plan of the competent body of the Republic of Slovenia or by a decree in substitution of such plan.

Section 29:
The technical and other requirements for the siting and construction of a nuclear facility shall be evaluated on the basis of, an analysis of all 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, as well as, on evidence that all requirements related to the country's security and nationwide defence system have been met.

Section 30:
The analysis referred to in Selection 29 of this Act as a special document of the applicant, shall in particular establish: dangerous natural and artificial phenomena which exist or may occur in the area of the anticipated site (earthquake, flood, landslide, explosion, fire, etc.), critical path of irradiation of the population by radioactive materials, the danger emanating from the consequences of certain phenomena and the design bases required for the prevention of both such dangers and consequences thereof.

Section 31:
The application for a site license shall be accompanied by the evidence and analysis referred to prior Section of this Act, as well as by other prescribed documentation, which can be used to establish that the prescribed safety of the

nuclear facility at a particular site has been secured.

Section 32:
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 be used to establish that the prescribed safety has been secured.

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

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

Section 33:
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 basis of the Act have been complied with.

The investor of the nuclear facility shall, together with the application for the commissioning license, supply the following documentation:

1. the safety report, including information on modifications and amendments made at the stage of the construction of the nuclear facility;
2. the results of successfully performed pre-operational tests;
3. evidence of the quality of the installed equipment and materials;
4. the results of the meteorological measurements completed at the site and of measurements of radiation emitted by natural and artificial sources in the vicinity of the nuclear facility;
5. the commissioning schedule;
6. information on professional qualifications, capabilities and operating experiences, as well as, health conditions of the operating personnel managing the production process in the nuclear facility and licensed for such operation pursuant to the provisions of this Act;
7. information on the organizational structure of the department and devices for protection from ionizing radiations;
8. plans and measures for prevention of possible nuclear accidents as well as procedures to be applied in the event of such accidents;
9. the operational limits and conditions at the commissioning stage;
10. information on the ensured physical protection of nuclear facilities and nuclear materials.

Section 34:
The license for commissioning of the nuclear facility shall be issued on the basis of the quality control of the works performed, of the pre-operational testing and of the documentation referred to previous Selection of this Act, assessed that the conditions prescribed for the safety of nuclear facility have been met.

Section 35:
The license for the start of operation of the nuclear facility may be issued, if the operator of the nuclear facility supplies documentation which proves that the prescribed conditions have been met, and if it is, due to the commissioning stage and the technical take-over, establish that the nuclear facility conforms to the prescribed safety conditions.

The body competent to issue the license for the start of operation of the nuclear facility, determines the operational limits and conditions for the nuclear facility. Licensing requirements are more precisely defined in Regulation E-1 in 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 operation of a nuclear facility,
- Methodology for the preparation of Quality Assurance program.

In the licensing procedure, the SNSA has overall control over nuclear safety in all stages. This task however is implemented in two main forms:

1. The form of a prior consent; the site license and the construction license are granted by the Ministry of Environment and Physical Planning; the SNSA in these two stages reviews and evaluates only questions related to nuclear safety. Accordingly, it issues a prior consent to the license of the originally authorized body.
2. The form of a license; the licenses for commissioning, operation and decommissioning are granted by the SNSA itself.

CONTROL OF MODIFICATIONS

All safety related modifications in a nuclear facility during construction or operation require a license amendment issued by the SNSA. The operator may file a complaint against the license amendment. In this case the Ministry of Environment and Physical Planning makes the decision based on an outside expert opinion. This decision may be challenged at the Supreme Court by the operator or by the Attorney General.

According to Slovenian legislation, nuclear facilities are obliged to notify the SNSA on modifications and changes of Final Safety Analysis Report (FSAR).

In the legislation, the criteria and procedures for each type of modifications are not defined.

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

1. 1984 Act
   The law requires Preliminary SAR for a construction permit and final SAR for an operating permit. The law provides general statements on the safe operation of the plant. More specifically it states that national regulations must be applied and, when not available, regulations of the country of origin can be applied, subject to the approval of the regulatory body.

2. Regulation E-2
   This regulation provides detailed statements that the SAR is the basic licensing document for nuclear installation with respect to nuclear safety. The SAR shall be supplemented during the plant life with data and analysis on all changes, which were done at a nuclear plant. This regulation establishes 3 categories of changes to the SAR. The first category requires a notification to the SNSA after the completion of modifications. The second category requires a notification to the SNSA before implementation. The third category requires an approval by the SNSA before implementation.

3. Regulation E-1
   This regulation requires that the 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. This regulation establishes beside others, that for Technical Specification (TS) changes a third party independent evaluation, performed by organizations authorized by the SNSA, is mandatory. The arrangements to perform this independent evaluation are implicitly under the responsibility of the licensee.

4. Act on Administrative Procedures (Off.Gaz.SFRY,47/86)
   This Act establishes the general licensing procedure adopted in Slovenia and also establishes the procedure to manage complains of the licensee against the SNSA decisions.

At present the operating license in Slovenia is not explicitly limited in time. The life-time of Krško NPP is however implicitly limited by the design life-time of the reactor vessel as 35 effective full power years (FSAR). There are no formal requirements for Periodic Safety Review (PSR).

7.3 Inspection and Enforcement

Legal basis represents the Act on Administration (Off.Gaz.RS,67/94) which has a

part on Inspection and Enforcement. In the law requirements for formal education, additional skills and experience and for keeping proprietary information are given, and duties and competencies of the inspectors (in general) are determined. The 1984 Act also has a part on Inspection and Competencies. The main task of a nuclear safety inspector is to perform inspections in compliance with the regulations, and to determine the scope and depth of the inspection. The legislation gives the inspectors full power to perform inspections. This law gives specific competence to the nuclear and radiation safety inspectors; they can enter a nuclear facility at any time, 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 pre-requisites were not met. If in the course of their supervision they establish non-compliance with regulations, which are sanctioned according to the provisions of this law and other regulations, the inspector has to submit a request for legal action against the licensee.

The Criminal Code

In the case of more serious unlawful activities, omissions or negligence the SNSA is bound (by the Code of Criminal Procedure as well as by the 1984 Act) to report the criminal offence to a public prosecutor. Penal Code qualities as a criminal offence:

- causing public danger (also by means of ionizing radiation)
- causing danger through Nuclear materials
- bringing of dangerous substances (also radioactive) into the country
- un-law-full dumping of dangerous substances (also radioactive)
- terrorism (also by means of nuclear materials)

If a person is found responsible he could be sentenced to fines or imprisonment from 6 months up to 15 years for special gross crimes.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 7.

Article 8. Regulatory Body

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

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

8.1 Slovenian Nuclear Safety Administration

The SNSA was established at the end of 1987 by the Act on Changes and Supplements of the Act on Organisation and Field of Activities of the Republic

Regulatory Bodies, Organizations and Services within the Executive Council of the Republic of Slovenia (Off.Gaz.SRS,37/87). Before 1988 the Energy Inspectorate, which was part of the Ministry of Energy and Industry had main regulatory and inspection functions relying heavily on the opinion of the Expert Commission on Nuclear Safety. As many other countries Slovenia has also recognized the need for separating the "promotion" of nuclear energy from "regulation". This was also in accordance with the IAEA Safety Standards. So the SNSA was established as an independent, functionally autonomous body dealing with all matters concerning nuclear safety. It had two organizational divisions, the Safety Analysis and Legislative Division and the Division of Inspections. The SNSA was directly responsible to the Government and to the Parliament of the Republic of Slovenia. In 1991 a new Act on Organization in the Working Field of the State Administration was adopted. According to this act, the SNSA came under the Ministry of Environment and Physical Planning and lost some of its independence and autonomy. It is also no longer responsible directly to the Government and to the Parliament but to the Ministry of Environmental and Physical Planning. SNSA's decrees can be appealed to the Ministry of Environment and Physical Planning. The Director of SNSA is the head of the body and also represents the SNSA. On a Governmental and Parliamental level SNSA is represented by the Minister. The Director is responsible to the Minister for his work and for work carried out by the SNSA. He is appointed and discharged by the Government on the motion of the Minister. The organization of the SNSA is prepared by the Director and approved by the Government on the motion of the Minister.

Senior civil servants are also appointed by the Government on the motion of the Director, with the consent of the Minister, while others are appointed by the Director himself.

Competencies

The legal framework of the SNSA is defined in the Act on Organisation and Field of Activities of the Ministries. The SNSA is dealing with regulatory, inspection and technical tasks, related to:

- nuclear and radiation safety of nuclear facilities;
- trade, transport and handling of nuclear and radioactive materials;
- accounting for and control of all nuclear facilities and materials (safeguards);
- physical protection of nuclear facilities and materials;
- liability for nuclear damage;
- qualification of NPP's personnel;
- quality assurance;
- radiation monitoring;
- early exchange of information in case of nuclear or radiation emergencies;
- international co-operation in the field of nuclear safety;
- other tasks defined in "nuclear" and other legislation.

For the nuclear emergency, the Ministry of Defence - Administration for Civil

Protection and Disaster Relief has certain responsibility. Although for the physical protection of nuclear material the responsibilities are divided between the SNSA and Ministry of Interior.

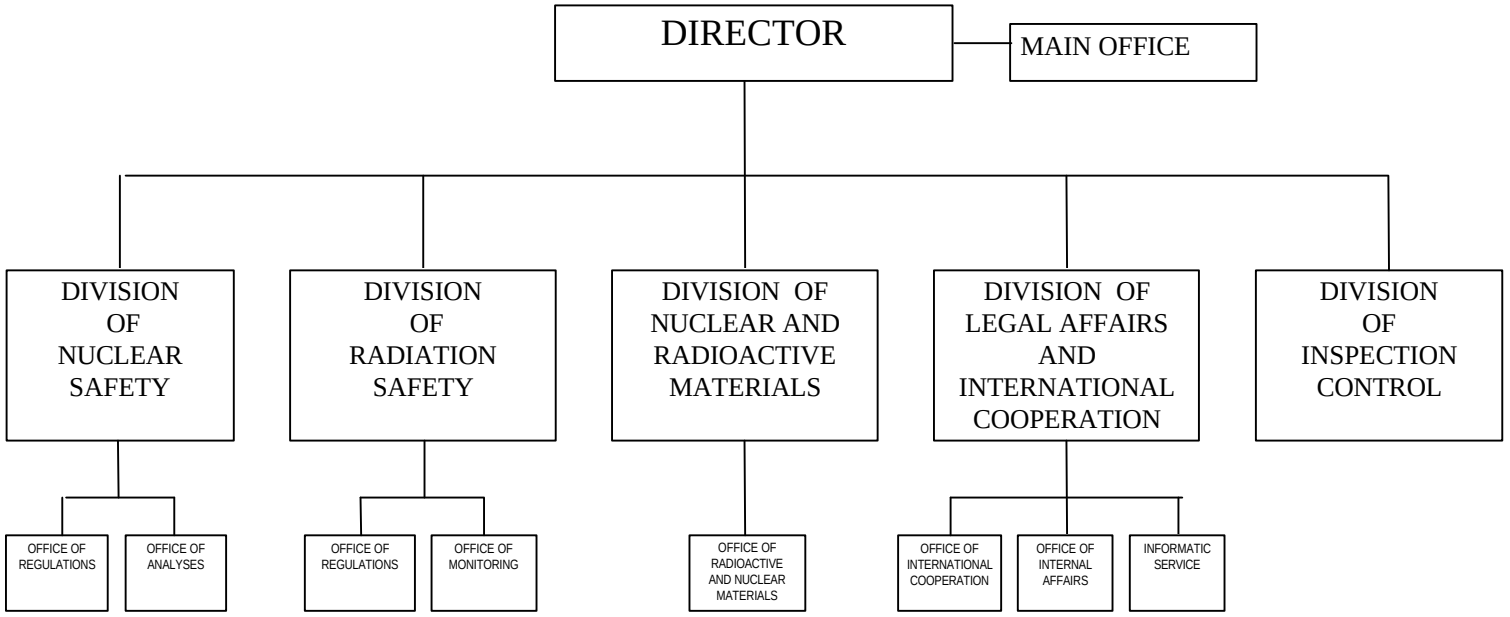
Organization

The SNSA is organized into five divisions corresponding to main. These are:

- Inspection,
- Nuclear safety,
- Radiation safety,
- Nuclear and radioactive materials,
- Legal affairs and international co-operation.

According to the current organizational chart approved by the Government in 1997 48 permanent staff positions and six interns are foreseen. At the moment 33 positions are occupied.

SLOVENIAN NUCLEAR SAFETY ADMINISTRATION



An overview of the SNAS's Manpower Development

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. of Employees	5	7	9	11	16	18	20	26	30	32	33

The staff of SNSA is interdisciplinary consisting of employees with different educational backgrounds; physicists, mechanical, electrical, chemistry and mining engineers, metallurgists, geologists, biologists, health physicists, lawyers, sociologists and administration workers.

The SNSA has 12 masters of science, 19 University graduates and 2 employees with high school. Out of 33 employees, 9 are women.

The Slovenian Nuclear Safety Administration invests a lot of time and money in the training of its staff. Roughly speaking, all together in 1997 there were 90 man - weeks dedicated to the training of personnel abroad and in Slovenia. Training courses, seminars and workshops were organized by the IAEA, EU through PHARE RAMG, OECD/NEA, US NRC and by other professional organizations and institutions. The following is a list of those which are of special importance for the SNSA staff. In the last ten years many employees have participated in these courses and seminars:

- a nine-month nuclear technology training - 3 employees,
- a nine-weeks nuclear technology training - 10 employees,
- Westinghouse Technology Course Including PWR Simulator Course, a nine week training - 10 employees,
- Regional Basic Professional Training Course on Radiation Protection, a five-week training - 2 employees,
- NPRB, Radiation Protection course, a four-week training - 2 employees,
- IAEA Nuclear Safety course, a five/nine-week training - 6 employees,
- Emergency Planning, a one-week training - 6 employees,
- IAEA PSA courses - 5 employees.

The main task of the Division of Inspection Control is to perform an inspection of nuclear facilities in compliance with the regulations and to determine scope and depth of the inspection. The inspections can be organized as a single or as a

planned series of inspections in order to determine whether the licensee's actions meet regulatory requirements. The inspections can be (a) planned or (b) non-planned (e.g. inspections which cover reactor trips, abnormal events). Planned inspections can be announced or unannounced.

The inspections are planned in accordance with the general annual program of inspections, which is divided into four three-month periods. More detailed plans are prepared at the beginning of each three-month period, and after the end of each three-month period the inspection reports are reviewed, and the compliance of the objectives and the scope of the inspections with the general annual program is established. The new three-month plan is then amended according to the findings given in the review of the inspection reports.

There are no resident inspectors who have an office on site, but the continuous monitoring of the nuclear power plant’s performance is performed through the planned inspections twice a week by two inspectors (there are about 100 such inspection per year). The report about the inspection findings is written on the spot at each visit and a copy of this report is handed over to the plant staff.

In 1997, the inspectors of the SNSA carried out 103 regular inspections of the Krško NPP, 5 unplanned inspections and 5 joint inspections with the TSO's regarding the yearly outage.

The Division of Nuclear Safety has two main functions. The office of regulations is responsible for tasks which are directly related to the licensing of plant changes and the review of corresponding licensing documents (FSAR, TS); the priority is given to the steam generator replacements and power uprating. The office for analysis is supporting the licensing by performing analyses; the priority is given to PSA applications, events analyses, operating experience evaluation, and maintenance of emergency preparedness ability and quality assurance. Since the manpower of the SNSA as well as this division is limited, many analysis are performed by the Technical Support Organizations (TSO).

The Division of Radiation Safety covers all matter related to radiation safety in nuclear facilities connected with radiation safety, on-site and off-site radiation monitoring, early notification in the case of a nuclear or radiological accident, dosimetry etc. In some areas for example, such as dose exposures of workers and the population, the responsibilities are overlapping with the Ministry of Health. The division co-ordinates the licensing of the environment radiation monitoring program, and TS's radiation protection area.

The Division of Nuclear and Radioactive Materials has responsibilities regarding trade, transport and handling of nuclear and radioactive materials, accounting for and control of nuclear facilities and materials (safeguards), physical protection of nuclear facilities and materials etc. This division also deals with questions related to treatment (conditioning), intermediate storage and the final disposal of radioactive waste. Besides this, the division also deals with the siting of nuclear installations. The Division of Legal Affairs and International Co-operation has the duties and

responsibilities which are not always necessarily related to the nuclear field but which are in a close connection with organizational matters for example, linkage with other ministries, servicing of the Government and Parliament, budget, employment policy etc. This division is also engaged in the licensing process and preparation of new legislation in the field of nuclear and radiological safety, and third party liability. Its responsibility is also the licensing of NPP's shift personnel. Regarding international co-operation the SNSA fosters and implements international relations for the purpose of gathering information on the state-of-the-art nuclear technology world-wide, and of exchanging experience. The division handles contacts established by bilateral agreements as well. The SNSA has been appointed as a contact liaison office with the IAEA (for technical questions). Good relations have been established with the OECD/NEA and the European Commission regarding PHARE program (RAMG assistance).

Also there are two expert commissions attached to the SNSA:

- The Nuclear Safety Expert Commission which has an advisory role for different questions (for example, the yearly report of the SNSA, important licenses issued to the nuclear facilities, drafts of the laws and regulations, draft measures for the physical protection of nuclear materials and facilities etc.).

- The Expert Commission for Operators Exams sets the exams and proposes the SNSA to grant (or extend) the licenses to shift personnel.

8.2 Other Relevant Organizations

The Ministry of Health - Health Inspectorate

The Health Inspectorate of the Ministry of Health has competencies based on three laws: the1984 Act, the Act on Sanitary Inspection and the Act on Transport of Hazardous Material (Off.Gaz.SFRY,27/90), and several regulations concerning radiation safety in Slovenia (Regulation Z-1 to Regulation Z-10). The work of the Health Inspectorate is strongly connected to TSO's which perform the expert and technical support to the Inspectorate. The Institute of Occupational Safety and Jožef Stefan Institute were appointed by decrees from the Ministry of Health in 1981 for performing the support related to protection against ionizing radiation and for the safety of radiation sources.

The Health Inspectorate inspects the Krško NPP regularly in order to assure the safe use, transport and storing of radioactive sources and materials.
The Health Inspectorate examines the fulfilment of medical conditions and the requirements related to the education of personnel working with ionizing radiation in Krško NPP. Special emphasis is given to the education of the people who are involved in the radiation protection program at Krško NPP. The inspectors of the Health Inspectorate regularly examine the doses received by the workers at the NPP and the dosimetry quality assurance program. The inspections are also

dedicated to the on-site and off-site radiation monitoring program, to the hygienic conditions at the Krško NPP and to the emergency medical facility. Usually the inspections are announced in advance.

According to its competencies the Health Inspectorate co-operates with the SNSA and takes part in the work of the Nuclear Safety Expert Commission. Besides these activities, the Inspectorate plays an active role in programs related to the preparedness for nuclear and radiation accidents in Slovenia, which were prepared by the Administration for Civil Protection and Disaster Relief.

The Administration for Civil Protection and Disaster Relief

Administrative and professional duties relating to protection against natural and other disasters are performed by the Administration for Civil Protection and the Disaster Relief of the Republic of Slovenia (ACPDR).

The ACPDR competencies include:

- planning and development of projects and research activities,
- risk assessment and national plans of protection and rescue,
- organization and equipment of national forces for protection, rescue and relief,
- organization and management of protection, rescue and relief in the event of major disasters,
- organization and implementation of the unified system of observation, notification and warning in the country,
- assessment of damage caused by disasters,
- assistance to local communities in mitigation of the consequences of disasters,
- preparation of the programs and organization of education and training,
- planning and sustaining state reserves of materials and equipment for emergencies.

According to the Act on Local Autonomy some of the responsibilities had been transferred to the local communities.

National Notification Centre (CO RS), which performs its duties in the framework of ACPDR, is responsible for notification procedures in the event of a radiological emergency, this is in accordance with the National Plan for Protection and Disaster Relief in the Case of a Nuclear Accident at Krško NPP. The notification procedure depends on the level of the emergency, but in all cases the RCO should notify the SNSA and the Administration for Civil Protection and Disaster Relief.

The Milan Èopiè Nuclear Training Centre

The Milan Èopiè Nuclear Training Centre, ICJT in short, is part of the Jožef Stefan Institute (IJS), the leading research institution in Slovenia. The main objective of the Nuclear Training Centre is a promotion of knowledge on the use of nuclear energy.

Since ICJT is the biggest and the best equipped centre of its kind in Slovenia, its intention is to cover all aspects of the human use of nuclear power and ionizing radiation.

Activities of the ICJT can be divided into the following four areas:

- Training of Krško NPP personnel,
- Public information about nuclear technologies and safety,
- Organization of international training courses,
- Training in the area of radiation protection.

Training of Krško NPP personnel is the main activity of ICJT. It is performed in close co-operation with the Training department of Krško NPP. The three main courses are:

- Basics of the Power Reactor Technology (225 hours of lectures which is intended for NPP general personnel),
- Power Reactor Technology (694 hours of lectures which is the initial training for the future main control room operators) and,
- Refresher course (for the operators before the re-licensing exam).

ICJT keeps in close contact with the development of nuclear technology in the world, and is transferring that knowledge to nuclear experts in Slovenia. With the help of the International Atomic Energy Agency regional training courses are organized with lectures from the most developed nuclear countries. The typical length of each course is one week. Usually the subject is very specialized, from some of the newest areas of nuclear technology and safety.

In 1997 a total of 29 training courses in duration from 1 day to 12 weeks were organized.

The Agency for Radwaste Management

The Agency for Radwaste Management (ARAO) was established in 1991 by the Slovenian Government with the basic intention of ensuring the permanent and safe disposal of radioactive waste in Slovenia.

The Agency's mandate was extended by the Government in 1996 to include, inter alia operating the interim storage of the radioactive waste from medicine, industry and other small users.
The Agency is fully owned by the Republic of Slovenia, and is financed by the state budget. Although in the future further sources of finance are also foreseen, i.e. decommisioning fund payments by users of the storage and repository of radioactive waste.

With regards to third party nuclear insurance liability, Slovenian insurers established in March 1994 the Nuclear Insurance and Reinsurance Pool. This consists of specialised insurance and reinsurance companies. The Pool, which is located in

Ljubljana, is based on the fundamental principles common to all nuclear pools.

Technical Support Organizations

The 1980 Act empowers in Section 14 the appointment of organizations by the Regulatory Body to be its technical support organizations. Qualification criteria were at that time defined as having qualified staff and appropriate technical means. On the basis of this Section the Regulatory Body for Nuclear Safety can appoint organizations for:

- reviewing the Safety Reports and other documentation connected with nuclear safety;
- performing expert surveillance of nuclear facilities during constructions and operation;
- permanent follow-up status and development of nuclear safety in Slovenia and in the world;
- preparation measures and participation in emergency planning with the consent of a regulatory body responsible for national defence;
- education and training of workers performing safety related activities and of civil defence teams operating organizations and surrounding communities;
- other activities necessary based on experience and actual findings.

With the decrees the following organizations were appointed:

- Jožef Stefan Institute, Ljubljana for:
  - analysis of events in nuclear facilities,
  - reviewing the results of siting investigations for nuclear facilities,
  - analysis of abnormal events in nuclear facilities,
  - verification of operational status of the safety systems in a nuclear facility and of physical security,
  - testing and verification of operability of nuclear, in-core and radiation instrumentation as well as the reactor control system,
  - verification of design documentation and review of the safety report,
  - verification of test results of the safety systems during trial operation,
  - preparation and execution of emergency measures during an accident related to radiation protection, the labelling of radioactive contamination and decontamination and risk assessment to the environment,
  - training of workers in basics of reactor technology, nuclear power plant systems descriptions, and radiation protection.

- Electric Institute "Milan Vidmar", Ljubljana for
  - quality assurance, performance of measurements and the quality control of electrical equipment during construction, trial operation and the operation of nuclear power plants,
  - verification of operability, reliability and quality of the systems for

control and automation of nuclear installations,
- training of technical staff in the area of expertise of the Institute,
- performance of acceptance tests on electrical equipment.

- IBE Consulting Engineers, Ljubljana for
  - preparation of investment and technical documentation for nuclear facilities,
  - organizing the construction of nuclear facilities, installations and surveillance during construction, pre-operational tests and trial operation, including the organization of quality assurance in nuclear facilities and installations during construction,
  - control of investment and technical documentation for nuclear facilities and installations,
  - preparation of physical plans and siting documentation.

- Institute for Metal Constructions, Ljubljana for
  - quality assurance activities, carrying out measurements and control of quality and functioning including, non-destructive testing and quality assurance for metal structures and metal parts of equipment, pressure piping and vessels during construction, trial operation and the operation of nuclear facilities and installations,
  - training of technical staff in the area of expertise of the Institute.

- Faculty of Mechanical Engineering, University of Ljubljana for
  - quality assurance and control of mechanical equipment in nuclear facilities and installations during production, installation, pre-operational tests, trial operation and the operation of a nuclear facility,
  - training of technical staff in the area of expertise of the Institute,

- Welding Institute, Ljubljana for
  - quality assurance activities related to welding,
  - quality control of welding,
  - evaluation of welding procedures, base metal and filler material,
  - verification of welders qualification, suitability of welding equipment and instruments,
  - verification of welding-engineering concepts for welded constructions, design and statistics,
  - inspection of welds, including non-destructive testing, consulting in the use of welding technology at new installations and in maintenance.

- High Voltage and Energy Department, Faculty of Electrical Engineering, University of Zagreb, Croatia for
  - safety analysis of installations, components and systems of nuclear facilities,
  - safety analysis for qualification of safety class electrical equipment.

- EKONERG, Zagreb, Croatia for
  - quality assurance and quality control of mechanical equipment in nuclear facilities during production, installation, pre-operational tests, trial operation and operation,
  - performance of acceptance and functional tests of mechanical equipment in nuclear facilities,
  - verification of base line condition of the mechanical equipment which is especially important for the safety of a nuclear facility, in-service inspection and the impact of ageing on its availability.

- Energy Institute Ltd., Zagreb, Croatia for
  - quality assurance and quality control of measuring and control systems and verification of its operability and reliability during construction, pre-operational tests, trial operation and the operation of a nuclear facility.

- Institute of Metals and Technologies, Ljubljana for
  - quality assurance and control of metals based on investigations of their chemical, mechanical, micro structural and corrosion properties,
  - assurance of quality and adequacy of metals used for metal constructions, piping and pressure vessels during construction, pre-operational tests, trial operation and the operation of a nuclear facility.

- ENCONET Consulting Ges.m.b.H. Vienna, Austria for
  - verification and review of safety reports and other documentation connected with nuclear safety,
  - performance of safety analyses as a support to the Regulatory Body's decisions in the licensing process.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 8.

Article 9. Responsibility of the License Holder

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

There is no explicit statement in the legislation giving prime responsibility for the safety of a nuclear installation to the holder of the relevant license, except for the liability for nuclear damage. This legislation however determines the system requirements of the license holder which gives him prime responsibility for the safety of a nuclear installation.

The relationships among the authorities, expert commissions and operators as well as their duties and competencies are regulated by the 1980 Act.

The system of licenses is set up to assure that the facility has been designed, constructed, commissioned and prepared for the operation in accordance with the national or international codes, standards and experience.

The license holder is responsible to operate the facility, analysed in the Safety Analysis Report, within the limits and conditions spelled out in the Technical Specifications and Operating License. He has also to perform all the activities based on written procedures, instructions and manuals. The license holder is also responsible for the physical protection of the facility and radioactive materials, emergency preparedness, environmental monitoring, the training of personnel, radioactive waste treatment and storage. All these requirements are specifically detailed in the regulations. Furthermore, the license holder is responsible for the adequate and safe storage of radioactive waste as well as for the storage of spent fuel.

Section 43 of the 1984 Act requires that the operation of a nuclear facility must be carried out in accordance with operating and other technical instructions. When listing the required activities to be covered by the instructions, a special mention is given to the "Quality Assurance program for the services and the equipment required for safe operation of the nuclear facility".

The licence holder is obliged to assure that the funds for the decommissioning and final disposal of radioactive waste and spent nuclear fuel are in accordance with the Act on Fund for Financing the Decommissioning of Nuclear Power Plant Krško and for the Disposal of Radioactive Waste from Nuclear Power Plant Krško.

It is the regulatory body's responsibility to ensure that the licensee fulfils the requirements of the legislation. The SNSA executes continuous surveillance (inspection, reporting, licensing, audits - see more under Article 8 of this report) in order to assess the effectiveness of the activities of the license holders needed for the safe operation of the facilities.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 9.

(C) GENERAL SAFETY CONSIDERATIONS

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.

Priority to safety are defined and impacted on several levels and by different ways. Below are described the main influencing categories in the framework of providing nuclear safety impacts on setting safety priority and what is the practice in Slovenia.

Existence of the regulatory authority which is separate from the state energy production responsibility line ensures that the safety regulation and inspection are treated with minimal influence of energy production interest. This gives the basic precondition for proper separation of safety from other interests.

National Policy

The basic requirements when addressing priority to nuclear safety is given in section 10 of the 1984 Act by which a nuclear installation can only be used under such technical and other conditions which ensure the safety of human lives, and the health and protection of the environment against ionizing radiation.

In the Strategy of Energy Use and Supply of Slovenia adopted by the Parliament it is outlined that a strategic objective of Slovenia is to maintain a high operational safety level at Krško NPP during its operation.

SNSA Practice

Although the SNSA has no specific written safety policy statement the "priority to safety" philosophy can be seen in:

- transparency of nuclear safety issues towards national/international professionals and the general public as well as national/international organizations (two OSART, two ASSET, ICISA, WAMAP missions, several IPERS missions for PSA review, IPPAS mission),
- priorities given between different (re)licensing procedures and other regulatory activities,
- allocation of available funds,
- independent regulatory request for safety improvements ,
- periodic top management (SNSA and Krško NPP) meetings,
- striving to achieve and maintain high international safety standards,
- enforcing nuclear safety also by ordering plant shut-down or prohibited re-start if and when all safety measures requested by the SNSA are not met,
- event investigations review of the licensees to check the quality of the investigations and follow up on the implementation of corrective measures,
- review of safety analyses and a follow up on the measures taken as a result of the analyses,
- regular inspections and assessments of the planning for and the conduct of refuelling outages including the work of contractors.

Measures taken by the Krško NPP

The Krško NPP policy is that all individuals concerned shall constantly be alert to opportunities to reduce the risks to the lowest practicable level and to achieve an excellence in plant safety. One of the most important objectives is to protect individuals, society and the environment by establishing and maintaining in the nuclear power plant an effective defence against radiological hazard. Accident

prevention is the first safety priority at the Krško NPP. It is achieved through the use of reliable structures, components, systems, procedures and plant personnel who are committed to safety culture.

The management commitment to safety is referenced to in a number of top tier documents with a clear statement of the Krško NPP policy on safety, production and responsibilities. This policy is defined in various documents like: the Quality Assurance Program, the Plant Management Manual, Krško NPP Policies and Goals, the Company General Employee Training Handbook, the Operating Experience Assessment Program etc. Within these documents clear statements are made about the Krško NPP objectives, mission statement, fitness for duty policies, nuclear and industry safety, personal protective equipment, safe working practices, training, operating experience, resources and finance. Each of the objectives in the previously mentioned documents are developed into goals and objectives for the separate divisions within the Krško NPP and a monitoring system is established.

Monitoring of the routine plant operation is achieved by the line management through daily meetings. A nuclear safety overview is achieved through the function of the different committees and departments such as, the Krško Operating Committee (KOC), the Krško Safety Committee (KSC) and the Independent Safety Engineering Group (ISEG).

The plant operation is carefully controlled by trained personnel who operate through approved procedures. A maintenance, test or modification requirement is processed through detailed planning and a scheduling system. Throughout this process all nuclear safety receives careful consideration based on Standard Technical Specification parameters, supported by PSA and Outage Risk Assessment Management (ORAM).

According to requirements stated in the legislation the following documents are prepared and reported to the SNSA, in a time period prescribed by the regulations: Technical Specifications, the internal procedure Guidance for Reporting and the prompt and accurate information on safety issues in the form of a Licensee Event Reports.

In order to achieve the safety, which is the primary point of preventing accidents, high quality in design, construction, tests, start-up and operation is required at the Krško NPP. Systems and components are conservatively designed, constructed and tested to quality standards that are in accordance with the safety objectives. The safety assessment and verification were made before construction and beginning of operation, this was issued in the form of a Preliminary Safety Analysis Report (PSAR). This report was followed by the Final Safety Analysis Report (FSAR) and at the present time by the Updated Safety Analysis Report (USAR).

The FSAR as a minimum complies with Revision 1 to the "Standard Format and Content of Safety Analysis Report for Nuclear Power Plants", issued by the Atomic Energy Commission in October 1972 and designated as Regulatory Guide 1.70. Chapter 15.0 has been upgraded to the format (and certain sections related to the

SG tube plugging analysis have been upgraded to the content) of Revision 3 to Regulatory Guide 1.70.

Voluntary activities and good practices related to safety are achieved by self-assessments (ASSET), international missions (WANO, INPO, IAEA, ICISA) and operating experience exchange programs through international organizations.

Through the operating experience exchange program an in-depth analysis of nuclear operating experience is provided, that allows applying lessons learned in the industry for the Krško NPP benefit, regarding nuclear safety improvement.

Permanent improvements to safety are made by a number of modifications. If the opportunities for advancement or improvement over existing practices are available, and seem appropriate, such changes are applied cautiously. All changes are evaluated for safety according to 10 CFR 50.59. For that purpose an administrative procedure the Authorization of Changes, Tests and Experiments, was developed.

The role of training in contributing to plant safety is fully accepted by the Krško NPP management and is reflected by the number of training programs. The Systematic Approach to Training (SAT) is accepted as the best currently available method. From similar power plants in the United States, the Job and Task Analysis (JTA) is being used as a basis to determine many of the training requirements for personnel at Krško NPP.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 10.

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

The current nuclear legislation does not have an explicit provision for the financial qualification of the applicant or the license holder.

The formal status of the Krško NPP was not adjusted to a free market economy in Slovenia but to a situation where since 1991 two owners exist in two different states. Upon the independence of both the Republic of Slovenia and the Republic of Croatia, it was difficult to implement all necessary steps for a long-

term stability in financial resources until a new legal status and ownership agreement is adopted. In such a situation there is an unnecessary burden to Krško NPP management in activities to assure stable long-term financial resources for the safe operation of the plant. Recently the Government adopted a decree by which Krško NPP was transformed into a public utility (the same had been done earlier to the whole electric sector in Slovenia), recognizing the shares from two original investors - the electric utilities of Slovenia and the electric utilities of Croatia. In addition, the Government took the decision to guarantee the loans to finish the modernization at Krško NPP, which is still in process (steam generator replacement, power up-rating and full scope simulator).

The license holder is obliged to assure the funds for the decommissioning, and the final disposal of radioactive waste and spent nuclear fuel.

The Act on Fund for Financing the Decommissioning of Nuclear Power Plant Krško and for the Disposal of Radioactive Waste from Nuclear Power Plant Krško, provides detailed provisions for the financial arrangements when taking care of decommissioning and nuclear waste management. However, due to the unresolved legal and ownership status required funds are only partially collected.

In the case of a nuclear accident financial resources to compensate the claim are provided through a Slovenian third party liability legislation, taking into account that Slovenia is a party to the Vienna Convention.

Although up until now nuclear safety was never a challenge due to financial problems, the long term financial resources of the licence holder need to be strengthened.

As a conclusion, Slovenian regulations and practices are not in compliance with Article 11, paragraph 1.

11.2. Human Resources Training and Qualification

The total staff at Krško NPP as per January 1998 is 612, which adequately covers all necessary functions of the operation including QA and training and engineering. There are 7 shifts of licensed operators with a minimum shift composition of 5 licensed operators per shift, which includes an on duty shift engineer. Shift supervisors typically have a university engineering degree.

Training and qualification activities at Krško NPP are governed by the 1984 Act, Regulation E3, the plant Safety Analysis Report, plant procedures and a yearly training program approved by the SNSA .

Krško NPP Guides

The education and training requirements are outlined in FSAR, Chapter 13.2. The process is further detailed in the administrative procedure Training and Qualification of the Krško NPP Personnel. Further administrative procedures cover specific areas like the Licensed Operator Training Program, the Non-licensed Operator training Program, the Health Physics Training Program etc. In addition to the above mentioned Krško NPP personnel are trained and examined using other relevant standard industry guides in areas like welding, specific equipment and machinery operation, safety at work etc.

Training Programs

In general, training programs are divided into initial training and continuous training. In addition to the training of Krško NPP personnel specific training is conducted for subcontractors, specifically in the area of site access and radiation protection.

The Licensed Operator Training consists of the initial training and continuous training (retraining).

The licensed operator initial training consists of classroom training covering engineering fundamentals, plant systems and procedures, on-the-job training and simulator training. The entire program takes approximately 2.5 years.

The Simulator Initial Training is conducted using a PWR simulator of similar design (Westinghouse PWR). This part of the program takes 17 weeks and typically includes also the operation of refuelling equipment.

After the completion of the simulator initial training, on-site training (mostly guided self study) is conducted thoroughly covering plant systems, plant technical documentation, operating procedures, administrative procedures, etc. This part of the program concludes with on-the-job training in the main control room.

After the completion of the training program an examination is conducted by the SNSA's Expert Commission for Operators Exams. The license is issued to the candidates who successfully pass the exam for the duration of 4 years, except for the initial license which is valid for only one year.

The continuing training for licensed personnel consists of 2 weekly sessions per year. This is a classroom presentation covering domestic events, industry event, plant modifications, safety at work, procedure changes and other relevant selected topics.

The annual simulator retraining is a duration of 7 days, it is conducted using a simulator of the Westinghouse PWR plant. The training program is yearly prepared. The main focus of this training is on emergency procedures. The training on normal operation procedures is limited because the simulator is not

Krško NPP plant specific. The simulator is adjusted as close as possible to the Krško NPP configuration. This training is concluded with an exam in accordance with the NRC Examiner Standard and occasionally witnessed by SNSA staff.

There are other types of training for specific needs:

- Refuelling Operations Training
- Operations Support Training
- Maintenance and Engineering Training
- Radiation Protection and Chemistry Training
- Security Training

Future Development

The Krško NPP ordered a plant specific full scope simulator as a response to the SNSA license requirement from 1995. This simulator will be delivered at the end of 1999. Preparations have started to adjust the training program and training materials to enable full conduction of training with Krško NPP resources in the year 2000.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 11, paragraph 2.

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.

Slovenian legislation covers a human factor issue with respect to fitness for duty in the 1984 Act, requiring in section 41 adequate physical and psychological abilities for the licensed operator, and other important parts in nuclear installations. Regulation E-3 further elaborates the same requirements.

Personnel engaged in activities on nuclear power plant safety are trained and qualified to perform their duties. The possibility of human error is taken into account by facilitating the correct decision by operators and by inhibiting a wrong decision, and by providing a means for detecting and correcting, or compensating for the error.

Although NPP Krško personnel are strongly aware of the responsibilities they have regarding nuclear safety, a number of different minor abnormal events were recognized as human error. Therefore, Krško NPP recognized the high technological aspect of the nuclear power plant and it is assuring that its staff are able to manage it satisfactorily. Because of that, the methods for preventing, detecting and correcting human errors, are implemented through the Operating Experience Assessment Program (OEAP), including analysis, operational

aspects and experience feedback (NUREG-0737 Clarification of TMI Action Plan Requirement). Both "in-house" and "industry" events are covered by this program.

The basic procedure is the Operating Experience Assessment Program, and is supported by other procedures like the Deviation Report, Root Cause Analysis etc. Program and associate procedures encourage personnel to report all "in-house" deviations from normal operation, and the condition of the equipment, system or plant, as well as deviations from optimal human performance, no matter how low in importance these deviations could seem at first sight. According to the program, personnel are encouraged to report potential problems as well as ideas for improvement, primarily in human performance.

Once Root Cause is defined actions are taken to prevent the recurrence of such events or to improve human reliability. Actions are approved by the Krško Operating Committee and are assigned to responsible superintendents for implementation.

The OEAP Program is of a great help for the management staff in order to define goals in safety improvement. The information gained from both, on-site events as well as the operating experience of other nuclear power plants, is used as the source of lessons applicable at the Krško NPP. Therefore a good interface between management and the OEAP Program personnel requires effective management practices and policies. These are implemented, monitored for effectiveness and continually improved. Issues such as communication between the levels of the personnel structure demonstrates that the OEAP Program is well supported by the plant management.

Man-machine interface improvement is achieved according to the administrative procedure Human factors engineering design guidelines. This procedure provides a design guidance for the incorporation of human factor engineering principles into the design changes. All engineering and design disciplines during design change development are followed according to this procedure. The procedure basically refers to the American National Standard for Human Factors Engineering of Visual Display Terminal Workstations, ANSI/HFS 100-1988, Guidelines for Control Room Design Reviews, NUREG 0700 as well as numerous other documents.

Managerial and organizational issues regarding human performance improvement are provided by the management and supervisors indoctrination down through the organization. The role of training in contributing to plant safety is fully accepted by the Krško NPP management and is reflected by the number of training programs.

Training activities are conducted in a manner that supports a safe and reliable plant operation, by preventing human errors due to insufficient training. Station engineers attend two system training courses to improve the overall knowledge of station operation.

In addition, a large contribution to human factor improvement is also represented by three different analyses which were done recently:

- Analysis of typical working conditions for all jobs which might impact nuclear safety.
- Control room design review, the results of this review have already been reflected in changes in the control room alarm displaces, lighting and air conditioning.
- As a part of PSA analysis the extensive error assessment was performed. The PSA analysis allocated the most critical human actions. The personnel training takes this into account, modifying the plans or the way the training is performed giving priority to the critical ones.

The SNSA required by a decision the construction of the plant specific full scope simulator. In having the simulator the extent of exercise will be enlarged and will have a positive impact on the skill of the operators to cope with anticipated plant accidents and transients.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 12.

Article 13. Quality Assurance

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programs 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.

The 1984 Act requires explicitly quality assurance measures to be taken for all activities related to nuclear facilities from the design stage to operation and then to the decommissioning stage (Section 33 and 43). The required measures are specified and detailed in section 5, 6 and 7 of the Regulation E-1 and Appendix 1 to this regulation.

Krško NPP as the license holder, is responsible for the overall quality of design, construction, operation, maintenance and modification of the nuclear power plant.

The plant was designed, built and tested in accordance with US AEC design and safety criteria in effect as 1st October, 1973.

The Westinghouse Electric Corporation was contracted for the design and construction of the nuclear steam supply system, and the balance of the plant. Westinghouse had the primary responsibility for the Quality Assurance of the

Krško Nuclear Power Plant during the design and construction phases. The quality assurance program was implemented in full compliance with; US AEC Appendix B to 10CFR50 Quality Assurance Criteria for NPP and Fuel Reprocessing Plant and QA guidance provided in WASH 12833 Guidance on QA Requirements During Design and Procurement Phase of Nuclear Power Plants and WASH 1309 Guidance on QA Requirements During the Construction Phase of Nuclear Power Plants, both issued in 1974.

Krško NPP QA policies

The Statement of Policy and Authority which is a part of the Krško NPP QA plan, includes the following statements:

It is a policy of Krško NPP to operate Krško NPP in a manner which ensures the safety and health of the public, and the personnel on site. It is also the policy of Krško NPP to comply with the requirements of Appendix B to 10CFR50 of the United States Code of Federal Regulations; the operating license (OL); applicable codes, standards and guides.

Krško NPP QA program

The Quality Assurance Program includes all planned and systematic actions taken by Krško NPP, including the suppliers, contractors and consultants, which provide adequate confidence that structures, systems and components shall perform the intended safety function satisfactorily in service. The program consists of, the Quality Assurance Program and applicable procedures, and is mandatory for all activities affecting the safety related functions of the nuclear power plant structures, systems and equipment. This may also be applied to non-safety-related items as deemed appropriate by the plant management.

The QA Program includes in its Appendices the List of NPP Krško Structures, Systems and Components.

The Krško NPP Quality Assurance Program is implemented and maintained to comply with the following codes and standards:

- 10CFR50, Appendix B,
- ANSI N 18.7-1976,
- ASME B&PV Code, Section III, NCA-4000;
- ANSI/ASME NQA-1,
- IAEA 50 C QA,
- Regulation E-1 .

The QA Program has 18 chapters and is addressing each criteria of Appendix B to CFR, Part 50. Each chapter defines; its purpose and references, the requirements of the relating criterion, authority and responsibilities of persons and organization, procedures for implementation of quality assurance functions and performing functions of attaining quality objectives.

The QA Program is a top-level quality document for operational phase activities. The requirements identified by the QA Program are implemented according to management directives, programs, plans, procedures or instructions, grouped in plant level manuals, division level manuals and department level manuals and programs.

The Quality Systems Division is responsible for executing and reporting on the effectiveness of the QA Program implementation to the Director General.

Changes to the description of the QA Program in section 17 of FSAR and the QA program which represents the changes in commitment, are subject to notification of the SNSA, and the review and approval by SNSA prior to implementation.

Regulatory control of QA is reflected through then following activities:

- Plant QA program review and approval
- Inspection of QA program implementation in the Plant
- Joint QA audits of third parties (plant supplies, TSO's, etc.)

The Krško NPP Quality Assurance Program is basically composed of three functional levels:

Level One-Quality Control and Inspection

Equipment manufacturers, suppliers and contractors are responsible for providing appropriate quality control procedures, systems and inspections for assuring and demonstrating that the end product has the specified degree of quality as defined in the specifications, drawings, and/or purchase documents. The actual quality control is executed by the equipment manufacturers, suppliers and contractors. This is supplemented with Receiving Inspection activities performed by the QC department of the Krško NPP Quality Systems Division.

The Quality Control and Inspection of maintenance and modification activities performed by Krško NPP personnel is executed by the QC department of the Krško NPP Quality Systems Division.

Level Two-Surveillance

The Krško NPP Quality Assurance department has the responsibility for surveying and monitoring the quality systems and activities of equipment manufacturers, suppliers and contractors. Two major Quality Assurance functions are accomplished at this level. The first is during the design phase where the various drawings, specifications and procurement documents are reviewed for the proper inclusion of applicable codes and standards, and the quality requirements including acceptance criteria. The second function occurs during the actual fabrication and services performance. During this phase the

component manufacturers, and the construction quality control procedures, programs and practices are reviewed to conform to the requirements of the specifications and procurement documents. A physical surveillance action is performed to ensure that the quality requirements are in fact being met.

The plant's personnel activities regarding the periodical testing of safety related systems and components are surveyed by the personnel of the Quality Assurance department.

All work orders of plant activities that are related to components identified in the Appendix to the QA Program, are reviewed by Quality Assurance, and requirements for Inspection points are specified. The QA performs surveillance on a sample of those activities to verify that quality requirements are in fact being met.

Level Three-Audits

To insure that the overall Quality Assurance Program is functioning as planned, periodic audits are performed. The Audit Program includes internal audits of activities at the Krško NPP, and external audits of manufacturers, suppliers and contractors.
The Quality Assurance System of suppliers, manufacturers and subcontractors is audited to verify conformance to requirements and proper implementation on activities within the contractual scope. Since most of the suppliers are from the US, Krško NPP is participating with other licensed US utilities in the Nuclear Procurement Issues Committee (NUPIC) joint audit program of suppliers. Supplier audits are reviewed during a review and approval of suppliers for placement on the Approved Supplier List (ASL). The Krško NPP purchases items and services from the suppliers on the ASL.

As a conclusions, Slovenian regulations and practices are in compliance with the obligations of Article 13.

Article 14. Assessment and Verification of Safety

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

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

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

Safety Assessment

Section 32 of the 1984 Act 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 be used to establish that prescribed safety has been secured.

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

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

14. Assessment and Verification of Safety

The licensing process and licensing requirements are defined in the national regulation (the 1984 Act and Regulations E-1 and E-2) covering the aspects of siting, design, construction and operation. The missing requirements are covered by the regulation from the countries of technology origin.

Section 36 of Regulation E-1 requires the following:

During the operational phase the licensee has to review and analyse the safety of the nuclear power plant, and has to take into account the operational experience of other nuclear industry and technology development.

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

Separate probabilistic safety analyses are also subject to approval by the SNSA. Transient and accident analyses as well as PSA are updated according to Section 7 of Regulation E-2. The review of these safety assessments by the SNSA includes independent safety analyses.

According to regulation during the design and construction phase the licensee

shall prepare and submit to the authority the Preliminary Safety Analysis Report (PSAR). Although the Final Safety Analysis Report (FSAR) is necessary to get and maintain an operational license. Safety Analyses (deterministic) are performed as the basis for Chapter 15 and 16 (Technical Specifications) of FSAR. During the operation phase the safety analyses are performed to support plant changes, plant specific resolution of generic issues or as a result of new knowledge, approaches or information. The recent examples are ATWS analyses which were performed according to the RG 1.70, Rev.3., analyses of the Boron Injection Tank (BIT) removal, mechanical study of Reactor Coolant Pump casing to avoid inner visual inspection, mechanical study of CRDM casings on reactor vessel head etc.

The PSA analysis which was required by SNSA in the early nineties is now concluded (Level 1 and 2 for internal and external analysis, PSA for shutdown modes). Beside the pure probabilistic approach, part of the PSA analysis involved or initiated some deterministic safety analyses to support the probabilistic part (success criteria determination, severe accident analysis, analysis of seismic impacts etc). The results are comparable to the similar type and age of western plants.

The PSA study initiated in some areas quite extensive plant improvements and program developments (areas of Fire protection, Severe accident, Power supply reliability etc).

The analysis of the impact of site seismic activity on nuclear safety is undergoing (not only as a part of the PSA study).

Additionally, the continuous development work in the areas of severe accident (using Contain and Melcor codes), DBA analyses (RELAP), structural nad mechanical analyses etc, is taking place. All three parties, licensee, authority and TSOs are involved in these programs.

Verification

The 1984 Act includes several requirements which concern the verification of the physical state of a nuclear power plant. For instance, Section 43 of the 1984 Act 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, treatment 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".

Main programs used for the verification of the state of a nuclear power plant are:

- periodical testing according to Technical Specifications
- preventive maintenance program

- in-service inspection program
- periodical inspections of pressure vessels and piping
- surveillance program of reactor pressure vessel material
- specific programs due to accident analyses and PSA analyses.

Activities for verifying the physical state of a power plant are carried out in connection with normal daily routines and with scheduled inspections, testing, preventive maintenance etc. Activities are performed by the licensee personnel, and in the case of certain inspections by subcontractors separately approved.

Detailed programs and procedures are established and approved by the licensee and reviewed, and to some extent, approved by the SNSA. The operational limits and conditions are provided in Technical Specifications, which is subject to approval by the SNSA. In general, the role of SNSA is to ensure that the licensees follow the obligations imposed on them, and carry out all activities scheduled in verification programs.

Operation plant inspections are performed regularly by 4 inspectors, both on power and during refueling modes of operation. During the refueling period TSOs are engaged to cover (inspect and evaluate) the different but quite substantial parts of plant maintenance and testing. All activities and findings are described on TSOs reports and inspection reports.

The verification and monitoring programs such as, ISI and radiation protection take place based on a periodic basis which is defined in corresponding programs and procedures.

The Periodic Safety Review (PSR) is not adopted yet. In spite of this, many activities (analysis and reassessments) are performed either due to authority requirements or due to the licensee initiatives, a systematic approach was not followed. Due to that, there is no comprehensive verification that all the important safety aspects are completely, regularly and adequately addressed.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 14.

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. Regulations and requirements related to radiation protection that apply to Nuclear Installations.

Radiation protection as applied to Nuclear Installations is regulated by the 1984

Act and Regulations Z-2 to Z-6, Z-9, Z-10 and E-1(see report under Article 7).

In section 10 of the 1984 Act it is stated:

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

Prescribed exposure limits in paragraph 1 of this Section are, limits established in such a way that the share of exposure produced by 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 in regulations based on this Act.

15.2. Implementation of national laws, regulations and requirements related to radiation protection

Dose Limits

Regulation Z-6 sets the system of the 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 with this Regulation are the basis for planning and deduction of all organizational, technical, medical and other measures, which are necessary for the radiation protection of occupationally exposed persons and 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 practice involving exposure to ionizing radiation is justified if it produces a positive net benefit, radiation detriment being taken into account.

The design, planning and subsequent use and operation of sources and practices shall be performed in a manner to ensure the exposure is as low as reasonably achievable (ALARA), economic and social factors being taken into account.

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

The operating dose limits for personnel at the Krško NPP are more restrictive than those set in the regulation. These operative dose limits are the following;

the quarterly limit of effective equivalent dose is 25 mSv, the annual limit of effective equivalent dose is 40 mSv and the quinqueanial effective equivalent dose limit is 100 mSv (derived annual average limit to effective equivalent dose is 20 mSv) .

Equivalent doses incurred in the course of planned special exposures (intervention in emergency situation only) 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 the annual effective equivalent dose for a member of the public is 1 mSv. The annual equivalent dose limit for individual organs and tissue of members of the public is 50 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 water and air, as well as with activity concentrations of natural radionuclides in building materials used for housing.

Radioactive Materials Release

In Regulation Z-3 conditions for radioactive material releasing into human environment are prescribed.

In Regulation Z-2 the basis for an environmental monitoring program at the nuclear installations is prescribed. The monitoring of the presence of radioactive material in the vicinity of nuclear installations is carried out at source and with off-site monitoring.

By the operating license the radioactive material in effluents to be released to the environment outside a 0.5 km radius during the normal operation at Krško NPP, shall not result to members of the general public in an annual effective equivalent dose from all pathways of exposure in excess of 50 microSv.

Steps taken to ensure that Exposure is kept ALARA

The Krško NPP decided to use to an extent practicable, procedures and engineering controls based upon sound radiation protection principles, to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA).
The Krško NPP participates actively with the internal dosimetry system in the OECD/ISOE dose reporting system.

Environmental Surveillance

The radiation monitoring network that is in the surroundings of the Krško Nuclear

Power Plant (mainly within a radius within 12 km around the installation), consists of a complex monitoring program according to the regulations, and includes radioactivity measurements of surface and ground water, sediments and water biota, precipitations, air particulate and iodine, soil, crops and vegetation, and external radiation. It is partially executed by Krško NPP staff and mainly by four independent outside laboratories. The radiation warning system-CROSS (gamma dose-rate) has been installed and operated by the SNSA after the Chernobyl accident. It receives on-line data from different networks in Slovenia. In progress is an expansion of the system to on-line aerosol measurements. Examples of monitoring results can be found in the Addendum: Annual Report 1997.

15.3. Regulatory Control Activities

The SNSA and the Health Inspectorate of the Republic of Slovenia are the regulatory bodies which carry out their inspection function of radiation protection through weekly inspections and ad hoc inspections. The objectives of inspections are to verify if the Krško NPP is in compliance with its legislative obligations related to the radiation protection area.

The SNSA reviews and approves a yearly program of meteorological and radiation monitoring in the vicinity of Krško NPP.

As a conclusion, Slovenian regulations and practices are in compliance with Article 15 of the Convention on Nuclear Safety.

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 appropriate information for emergency planning and response.*
3. *Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be 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.

16.1 Regulatory Requirements

According to the Act on Organisation and Field of Activities of the Ministries there are two authorities with the responsibilities and the competencies to regulate and supervise the Krško NPP emergency preparedness. The Administration for Civil Protection and Disaster Relief from the aspect of population protection during the nuclear accident and the organization of civil protection forces in the nuclear installations, and SNS A from the aspect of on-site procedures and measures related to the on-site emergency plan.

The national concept of civil protection and disaster relief is regulated by the Act on Protection against Natural and Other Disasters. The law requires that the enterprises, institutions and other organizations (includes also nuclear power plant) who in their working process use, produce, transport and store dangerous materials or perform activities which pose some danger to the public and the environment, must provide the basis for emergency planning and have an emergency response plan. The law also requires that the state and the municipalities provide the basis for emergency planning and have an emergency response plan.

From the aspect of nuclear safety the most important laws are the 1980 Act and the 1984 Act. The first determines that the decision on an evacuation of the population in the case of a nuclear accident is made by the Government of Slovenia on the proposal of the National Civil Protection Headquarters. The second law stipulates that every applicant must submit the request for a trial operation of a nuclear facility, and the procedures and protection measures in the event of a nuclear accident. During operation the utility must adopt and use valid instructions, including an emergency plan and a program of measures in the event of nuclear accidents and other emergencies in a nuclear facility. The information from the on-site Radiological Emergency Response Plan (RERP) must be the part of the FSAR. According to the Act on Protection against Natural and Other Disasters the order on evacuation can be given by the government, mayor, or in emergency cases the on duty commander of Civil Protection.

16.2 On-site and Off-site Emergency Plans

The responsibilities and competencies for emergency planning and maintaining emergency preparedness for an accident at the Krško NPP are specified on three levels: plant, local and state level. The Krško NPP is responsible for on-site emergency planning and maintaining the on-site RERP. The contents of the RERP are given in Annex D. The two municipalities, which lie in the second Emergency Planning Zone (EPZ), are responsible for emergency planning in their territories at local level and maintaining their own RERP. The state is responsible for the regional and state radiological emergency response planning, and the maintaining of both the RERPs. The main objective of the

regional emergency response planning is to co-ordinate the activities between state and local level, and to support and co-ordinate the emergency managing efforts between municipalities. The on-site, local, regional and state emergency response plans must be harmonized between each other.

On the request of SNSA in 1992, Krško NPP updated and upgraded its on-site emergency plan. Because of the lack of domestic regulations specific for the nuclear emergency planning, Krško NPP decided to follow the international recommendations (the IAEA guides and standards) and foreign practice - especially the US NRC regulations and guides as much as it was applicable, suitable and appropriate to the off-site interface in the overall organizational concept of the civil protection and disaster relief in the Republic of Slovenia. The Krško NPP radiological emergency response plan (RERP) was revised to a new format and new adequate emergency implementing procedures (EIP) were written.

From 1992 to 1997 the implementation of the new concept of the emergency preparedness in the Krško NPP was reflected in five revisions of the Krško NPP RERP.

The Krško NPP has the following important responsibilities regarding the off-site emergency control:

- classification and declaration of the emergency;
- notification of the off-site authorities about the declaration and status of the on-site emergency;
- recommendation of protective actions for the public to the off-site authorities.

The Krško NPP notifies the regional and state notification centre about the emergency. The notifications must be performed in 15 minutes after the declaration of the emergency level, or after the recommendation of the new protective actions for the public. For this reason a special notification form is used. The notification is done by facsimile or by alternate communications (notification radio system) if a facsimile is not available. The regional and state notification centres perform further local and state notifications.

The Krško NPP according to Section 26 and 44 of the 1984 Act also notifies the SNSA. This notification is performed with the special notification form, immediately and no later than 1 hour after the announcement of level of the emergency.

Regardless of the level of the emergency the adequate state and local authorities, and forces responsible for disaster relief and protection are notified. In the case of an unusual event they are notified for their attention, in an alert they are notified for their readiness and in a site or general emergency they are activated in accordance with the state and local emergency response plan.

16.3 Emergency Planning Zones and Emergency Classification

For the purpose of emergency planning, and to assure that prompt and effective actions can be taken to protect the public in the event of a nuclear accident at Krško NPP, three EPZ's are defined around the nuclear power plant. The first EPZ covers the area three kilometre in radius around the plant (so called the Precautionary Action Zone - PAZ). In this zone the urgent protective actions have been planned in advance and will be implemented immediately upon the declaration of a general emergency. The second one - the EPZ for immediate protective measures, includes the two municipalities within a 10 kilometre radius around the plant. Protective measures in this zone will be implemented immediately after the decision. This decision will be based on projected doses or measurements in the environment. The third one - the EPZ for the ingestion exposure pathway protective measures, includes the area of the local communities within a 25 kilometre radius around the plant. Also for the purpose of general emergency planning, the general emergency preparedness zone is specified. The general emergency preparedness zone includes the whole territory of the Republic of Slovenia. The area within a 500 metre radius around the reactor is the exclusion area. This area is under the control of the nuclear power plant.

The nuclear emergency classification system is based on four levels of emergency (unusual event, alert, site area emergency and general emergency), ranging from events where the effect on the plant to the environment is negligible, to the highly unlikely severe accidents, which could seriously affect the environment. The classification system is based on site specific action levels for each class of the emergency according to the recommendations given in NUREG-0654 "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants", App.1. The classification system enables the gradual activation of the on-site and off-site emergency response organization. In an unusual event the emergency is controlled by an on-site normal shift organization. In an alert the emergency is controlled by a full on-site emergency response organization, and in the case of a site or general emergency the full on-site and off-site emergency response organizations are activated.

In the Krško NPP RERP the following protective actions are pre-planned:

Emergency Class	Protective Action
Unusual Event	None
Alert	None
Site Emergency	Alarming of the population in the vicinity,

Emergency Class	Protective Action
	Sheltering in the vicinity of the NPP, Grazing animals should be placed inside and fed by stored food-stuff in a radius of 3 km from the NPP.

Emergency Class	Protective Action
General Emergency	Alarming of the population, Sheltering in a 3 km radius from the NPP and in the sector of wind direction up to 8 km. Iodine profilaxis Grazing animals should be placed inside and fed by stored food-stuff in a radius of 10 km from the NPP. Evacuation in a radius of 3 km and more if the projected whole body dose at 500 m is 10 mSv in one hour, or 50 mSv to the thyroid in one hour. If the activity in the reactor building is more than the activity in the gap of the fuel elements; evacuation in a radius of 3 km and 8 km in the downwind sector; sheltering for the rest of the area of a 8 km radius and 10 km downwind. If the case of a core melt: evacuation in a radius of 8 km and 10 km in the downwind sector;

16.4 SNSA Emergency Plan

The SNSA Emergency Plan (SEP) contains information which is needed to support the SNSA staff when performing specific activities, which are required during an emergency at a nuclear facility.

The SEP covers the following:

1. Responsibilities of the SNSA in an emergency, and relations to other governmental institutions

2. Organization
3. Activation and notification of the SNSA
4. Assessment of the emergency and the emergency classification
5. Emergency facilities and equipment
6. Training and maintaining emergency preparedness

In the case of an emergency the SNSA acts as the independent expert governmental organization whose main activities are related to:

a) National Civil Protection Headquarters (NCPH):
These headquarters are responsible for the co-ordinating of activities to protect the public health and property in the case of an emergency. The SNSA supports the work of the NCPH with the necessary data which is important for the NCPH to accurately and timely execute planned protective actions for the public.

b) Nuclear Facility:
The SNSA communicates with the nuclear facility via on-line systems (e.g. meteorological and radiological data transfer system, ERDS-Emergency Response Data System), facsimile, telex or telephone messages from the control room (or Technical Support Centre), and with the SNSA representatives on the site to obtain information on the status of the emergency. All this information is provided to the expert group for the plant status, whose duty it is to project the progress of the emergency from the information provided by the nuclear facility (e. g. core status, safety systems status, planned actions, safety parameter values). The projection of the emergency, along with the meteorological data is provided to the dose assessment group to calculate the projected doses. The results of both expert groups are a valuable source of information for the NCPH.

c) The SNSA provides neighbouring countries and the IAEA with information on the emergency, according to the Convention on Early Notification in Case of a Nuclear or Radiological Accident. From December 1997, SNSA has been sending data from the CROSS to the Emercom system EURDEP on a weekly basis.

d) The SNSA assists the NCPH in the preparation of information for the public.

The SNSA emergency plan is considered as the integral part of the National Radiological Emergency Response Plan.

It is important that the interfaces between the Radiological Emergency Response Plan of the nuclear facility (Krško NPP RERP) and SEP are identified:

a) notification about the emergency and emergency classification,
b) communication lines to transfer information from the nuclear facility to the

SNSA.

The knowledge of Krško NPP RERP by the SNSA management is essential to co-ordinate activities going on at the Krško NPP and the SNSA Emergency Centre (SEC).

The organization of the SNSA during an emergency consists of the SEC Director, two expert groups, information/support group and SNSA representatives at the nuclear facility.

Responsibilities and Duties of the SNSA Staff:

Position	Responsibility
SEC Director	responsible for all the activities of the SEC, co-ordinates the work in the SEC and reports to the NCPH
Head of the group for the forecast of accident progression	responsible for the group performance, regularly reports to the SEC Director and provides the information to the dose assessment group (mainly source term),
Head of dose assessment group	responsible for the groups performance, regularly reports to the SEC Director
Head of Information/ Support group	responsible to disseminate information to the neighbouring countries and the IAEA, for the preparation of information for the public, to support the SNSA information (computer) system and to assure an undisturbed operation of communications
Group members	perform the assigned work by the group leaders or according to procedure
Inspectors	independent observers at the nuclear facility, provide the information if necessary to SNSA

The Director of SNSA appoints the expert group leaders and expert group members.

16.5 Exercises

The first emergency preparedness exercise was conducted at Krško NPP 1982 with participation of observes from IAEA, who positively assessed the actions taken by the Krško NPP, as well as the cooperation of local authorities and the population in the protective and rescuing actions.

The adequacy of the new concept of emergency preparedness was tested by exercises in 1993 (national exercise), 1994, 1995 and 1997 (table-top exercise) and evaluated by the IAEA OSART mission in 1993.

In October 1995 Slovenia was invited to take part in the second cycle of the four INEX-2 exercises, which were promoted by the OECD/NEA. Slovenia participated as the far field country in both exercises, in November 1996 a INEX-2 exercise was organized in Switzerland and in April 1997 the exercise took place in Finland.

16.6 International Agreements and International Projects

Slovenia is a party to the Convention on the Early Notification of a Nuclear Accident and to the Convention on the Assistance in the Case of a Nuclear Accident or Radiological Emergency. Slovenia has a bilateral agreement with Hungary on the early exchange of information in the event of a radiological emergency. This was signed in 1995 and ratified by the Slovenian Parliament that same year. A bilateral agreement similar to that with Hungary was signed with Austria and with Croatia. The negotiations to sign a bilateral agreement on the early notification in the case of a nuclear accident are underway with Italy. Slovenia agreed bilateral agreements on the protection against natural and other disasters with Austria, Croatia and Hungary.

International projects related to emergency preparedness, in which Slovenia decided to take part, are:

- in 1995 the ECHO (European Commission Humanitarian Organization) started a project to provide assistance in Off-Site Emergency Preparedness (OSEP project) for East and Central European countries. The first phase of this project, which was finished by the end of 1995, was to perform a study to assess the level of off-site emergency preparedness in the countries which expressed the readiness to accept the assistance. Some of the countries received the assistance in equipment, but for most of the participating countries, the training of personnel responsible for the emergency preparedness is foreseen. The project is still under way and its duration is not known yet.

- the IAEA project RER/9/050 "Harmonization of Emergency Preparedness in Countries of Central and Eastern Europe" is an extensive program to improve and harmonize the emergency preparedness in the aforementioned countries. The Memorandum of Understanding was used to launch this IAEA project. The purposes of this project are to define a means of notification and communication, determine a joint approach for the classification of nuclear accidents, develop detailed procedures or methods for assessing reactor accidents and coherent approach to public information. To address the purposes of the project a "Project steering group" composed of representatives of national competent authorities was established. The "Project steering group" and the IAEA secretariat will monitor the

implementation of "Work Plan". The "Work Plan" comprises: evaluation of existing national plans, implementation of accident classification based on plant conditions in national emergency plans, establishment of effective communication between the countries, review and revision of procedures for environmental monitoring, strategy and mechanisms for public information.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 16.

(D) SAFETY OF INSTALLATIONS

Article 17. Siting

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

(I) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

(II) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

(III) for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (I) and (II) so as to 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.

Particularities regarding environmental assessment and public participation/review of new sites in licensing procedure for nuclear installation can be found in the 1984 Act and Regulation E-1.

As per Section 28 of the 1984 Act a nuclear facility may be constructed only on a site for which a regional and urban plan was prepared by the competent authority. Section 8 of the Regulation E-1 gives a list of data which an applicant for a site license has to provide in order to incorporate a nuclear facility into the regional and urban plan:

- the natural characteristics of the region which could have an impact on the safety of the nuclear facility;
- the characteristics of industrial and other facilities in the region which could have an impact on the safety of the nuclear facility;
- the characteristics of the nuclear facility which are of relevance for the assessment of its impact on regional planning and environmental protection.

Such a plan must be revealed for public comments 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 regional and urban plan.

As per Section 29 of the 1984 Act technical and other requirements for the siting and construction of a nuclear facility must be evaluated, on the basis of an analysis of all data relevant for an assessment of the potential impact of the planned nuclear facility to the environment, and the 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 paths of irradiation of the population by radioactive material and
- the design bases required for the prevention of both such dangers and consequences thereof.

The application for a site license shall be accompanied by the evidence and analysis mentioned in Section 29 of the 1984 Act as well as other prescribed documentation which can be used in the evaluation process (Section 31). Other prescribed documentation includes reports such as meteorology, hydrology, population, use of land etc.

Chapter II. of the Regulation E-1 "Conditions for the Siting of a Nuclear Facility" determine in more details the investigations and analyses of the site and of the impact of the nuclear facility on the environment, required for the application for site license.

A law banning the construction of NPP until the year of 2000, prevents design and construction of new any NPPs in the Republic of Slovenia and excludes any kind of participation in similar activities.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 17.

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 a reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

As per Section 32 of the 1984 Act the application for a construction license for 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.

Chapter III. of the Regulation E-1 "Conditions for the Construction of a Nuclear Facility" sets requirements for:

- analyses and input data for the preparation of the design documentation,
- equipment and facilities necessary for the physical protection of the nuclear facility and materials,
- the design of process, safety, protection, containment and other systems;
- radiation protection criteria.

Once constructed a nuclear facility cannot operate until the commissioning has proved that the measures anticipated by the 1984 Act, and regulations passed on the bases of the Act have been complied with.

As per Section 37 paragraphs 2 and 3 of the 1984 Act, in the case that a particular product, process or services have not been regulated by domestic standards, technical criteria or quality norms, rules established by international or foreign technical regulations or international and foreign standards may be applied. Slovenia has not developed specific codes and standards for the design and construction of nuclear facilities. In the case of Krško NPP US codes and standards (10CFR50 codes and US NRC requirements) were applied.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 18.

Article 19. Operation

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

(I) the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning program demonstrating that the installation, as constructed, is consistent with design and safety requirements;

(II) operational limits and conditions derived from the safety 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) programs 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 that of the nuclear installation take into consideration conditioning and disposal.

19.1 Initial Authorization

In Section 33 of the 1984 Act the requirements for the commissioning are defined:
"Once constructed, a nuclear facility cannot be operated until the commissioning has proved that the measures anticipated by the Act and regulation passed on the basis of the Act have been complied with."

The documentation which the applicant has to present to the regulatory body together with the application for the commissioning license, is listed:

- The safety report, including information on modifications and amendments made at the stage of the construction;
- The results of successfully performed pre-operational tests;
- Evidence of the quality of the installed equipment and materials;
- The results of meteorological measurements completed at the site, and of measurements of radiation emitted by natural and artificial sources in the vicinity of the nuclear facility;
- The commissioning schedule;
- Information on professional qualifications, capabilities and operating experience, as well as health conditions of the operating personnel controlling the production process in the nuclear facility and licensed for such operation pursuant to the provision of this Act;
- Information on the organizational structure of the health physics department and its equipment for protection from ionizing radiation;
- Plan and measures for protection against possible nuclear accidents as well as procedures to be applied in the event of such accident;
- The operational limits and conditions at the commissioning stage;
- Information on the physical protection of the nuclear facility and nuclear materials.

If on the basis of this documentation (quality control of the works performed and pre-operational testing) it is assessed that the conditions prescribed for the safety of nuclear facilities have been met, the license for commissioning shall be issued (Section 34).

The operating license shall be issued only if the applicant supplies documentation which proves that the prescribed conditions have been met, and if during the commissioning stage the acceptance tests proved, that the nuclear facility conforms to the prescribed conditions concerning safety.

Chapter V. of the Regulation E-1 "Conditions for the Commencement of Operation and Operation of a Nuclear Facility" sets more detailed requirements for documentation which shall be submitted as an attachment to the application for the operating license, which would prove that the required safety has been met.

19.2 Operational Limits and Conditions

In accordance with Section 33 of the 1984 Act and Section 34 of the Regulation E-1, the proposed operational limits and conditions (Technical Specifications) have to be submitted to the regulatory body as a part of license application for commissioning operation, and for start-up and normal operation.

Section 35 of the Regulation E-1 and Appendix 1 of the Regulation E-2 define the contents of the Technical Specifications: Operational limits and condition for operation of nuclear facility include:

1. safety limits,
2. limiting settings for safety systems,
3. limiting conditions for normal operations,
4. surveillance requirements,
5. requirements for operator of nuclear facility related to the reporting.

There is also a requirement that the operating staff have to be familiar with the contents and objectives of the TS.

Section 43 of the 1984 Act defines that Operating License shall include the operational limits and conditions.

Section 36 of the Regulation E-1 and Section 7 of the Regulation E-2 outline the procedure for making changes to the FSAR. The procedure defines three categories of changes depending on the safety relevance:

1. changes which may be implemented without prior approval of the regulatory body; the regulatory body has to be informed after its completion;
2. changes which require prior notification of the regulatory body;
3. changes which require application to the regulatory body and licensing process.

Technical specifications, as part of FSAR, are changed in accordance with the above described category 3.

Each change of the FSAR has to be supplemented by an analysis of the impact of the change on the input data, and on the analyses in other chapters of FSAR.

There is no criteria given for categorisation, therefore Krško NPP is implementing the 10 CFR 50.59 rule. For that purpose, the internal procedure ESP-2.303 "Authorization of Changes, Tests and Experiments" (10 CFR 50.59 reviews) is in use. Never the less, all plant modifications are sent to the SNSA to choose those modifications which require a formal application and licensing change.

19.3 Operating Procedures

In accordance with Section 43 of the 1984 Act the operation of a nuclear facility must be carried out according to operating and other technical procedures relating to; all operating regimes, treatment of nuclear materials, transportation of such materials, maintenance and surveillance of the systems, internal controls and the procedures in the event of nuclear accident.

The operating organization has to, pursuant to the provisions of this Act, pass and apply procedures and other acts related to the operation of the nuclear facility. These procedures and other acts have to be periodically reviewed and updated, at least once per two years, in accordance with written procedures.

In accordance with Section 34 of the Regulation E-1 part of the documentation submitted with the operating license application is a list of prepared operating procedures and rules. In the process of reviewing the FSAR for licensing purposes, operating procedures are used as additional referenced documentation (Section 16 of the Regulation E-2).

The Krško NPP has issued two procedures which cover the issuance of new and revised procedures. A list of the Krško NPP Plant Procedure Categories is given in Annex E.

19.4 Anticipated operational occurrences and accidents

In accordance with Section 38 of the Regulation E-1 the organization operating the nuclear facility has to prepare procedures for all operational modes and accident conditions.

The Krško NPP has developed and applied the full set of Abnormal Operating Procedures (AOP) and Emergency Operating Procedures (EOP). These sets of procedures have been verified during the operator's simulator training.

Preparedness for accidents is covered by the response to Article 16 of this report.

19.5 Engineering and technical support

The Krško NPP has organized its own basic engineering and technical support. It is performed within the Engineering Services Division and partially within the Technical Operation Division.

In-house capabilities were developed to perform deterministic (MAAP, RELAP) as well as probabilistic (Risk Spectrum) analyses, PSA applications, shutdown risk assessment, reactor core design verification, analysis of reportable events, erosion and corrosion program and radiation shielding assessment. Krško NPP is capable of processing small design changes in-house.

Highly qualified and time-consuming expertise is not available at the Krško NPP, however, a capability of preparing an ordering specification, reviewing the bids and bidder selection, QA, QC and engineering follow-up of the projects and review and/or acceptance testing of the product are within the plant.

The Krško NPP engineering and technical support has support in Slovenian research and engineering organizations. However major projects require open bid invitation.

The Ministry of Science and Technology through the research fund, with the participation of nuclear industry and SNSA, is financially supporting research and development projects in the field of nuclear safety in Slovenia.

19.6 Incident reports

In accordance with Section 44 of the 1984 Act the operating organization of the nuclear facility has to submit to the competent regulatory body, reports on incidents significant to safety. Regulation on mode and frequencies for keeping records, for reporting to the regulatory body by the authorized TSO's and by the organizations operating nuclear facilities (Off.Gaz.SRS,12/81), prescribes detailed requirements for reporting and notification of the regulatory body by the operator of a nuclear facility. The regulation distinguishes between routine reporting and notification, and the reporting in the case of an abnormal event . It specifies the time period for each report. Reporting criteria is also given and abnormal events are specified.

Reporting in Krško NPP is organized in accordance with the internal procedure Reporting guidelines. Also Technical Specifications, Chapter 5.9 Reporting Requirements defines reporting criteria and requirements for different types of reports.

19.7 Incident Analysis

In accordance with Section 36 of *Regulation E-1*, the operator of a nuclear facility has to continuously follow and analyse the safety status of a nuclear facility, and has to take into account the operating experiences of other nuclear facilities and technological development.

The Assessment of Operation Experience is covered by plant program Operating Experience Assessment Program as well as by procedure Operating Experience Assessment Program and provides detailed requirements and procedures for systematic analysis of operating experience. The additional procedure are developed as follows: Deviation Report, Post-Trip Review and Root Cause Analysis.
Experience gained from the Krško NPP operation is shared with other utilities through WOG and WANO organizations.

19.8 Radioactive waste

Regulation Z-3 gives definition of the solid, liquid and gaseous radioactive wastes based on type of radiation, specific activity and/or concentration of radionuclides. Wastes are also categorized into high, intermediate and low-level wastes. Based on this regulation the licensees are responsible for collecting and classifying the wastes, keeping records and accounting for the wastes and for processing, transporting and storing them. All the activities should be performed in such a manner that the lowest possible quantities of radioactive wastes are generated.

The Krško NPP has implemented regulatory requirements in the plant documents as follows; Radioactive Waste Management Program, Fuel Integrity Program, procedures Radioactive Waste Conditioning for Interim Storage, Radioactive Waste Drums Interim Storage and Handling of Damaged Drums.

Limitations for fuel damages are specified through RCS activities in plant Technical Specifications.

As a conclusion, Slovenian regulations and practices are in compliance with the obligations of Article 19.

PLANNED ACTIVITIES TO IMPROVE SAFETY

To assure and further improve the safety at Krško NPP it is necessary to continuously monitor equipment, industry developments and improvements, regulatory requirements and invest in equipment replacements, new systems and features, programs and procedures improvements, and enhance training programs.

Major safety improvements implemented in Krško NPP:

Three Mile Island program modifications: Reactor vessel head vent system, post accident instrumentation for pressures and radiation, post accident sampling system, safety parameter display system, main control room environment improvements, hydrogen monitoring system, safety valves indication.

Instrumentation improvements: N-16 radiation monitors on main steam lines, C14

monitors on exhaust, new area monitors, new release monitors, replaced and improved seismic instrumentation with on line analysis capabilities, replacement and upgrade of process computer, shut down core cooling instrumentation upgrade - mid loop level indication, pumps current monitoring, inverters replacement, vibration monitoring instrumentation, reactor protection system upgraded with AMSAC system installation, Chlorine and CO monitors installation.

Black out study action plan improvements: Safety battery replacement and capacity increase, N2 supply for main steam power relief valves and other valves control, emergency lighting system, improved communication system.

Probabilistic safety assessment driven improvements: Instrument air isolation valves control air separation, reinforcement of many cabinets, redesign of some valve support systems, reinforcement of fire equipment, pressurizer pressure control valves control air separation, shut down safety program.

Fire hazard study related improvements: fire detecting system improvements on cabinets and safety related rooms and equipment, fire door replacements and improvements, fire protection program implementation.

Major equipment exchange and upgrade: main condenser tubes and sealing replacement, moisture separator re-heaters, tube bundles and separator replacements - improve secondary chemistry, de-mineralised water additional capacity for storage, condenser polishing system, screen wash strainers replacement, essential service water filters and ball cleaning system installation, condenser cleaning system, reactor control rods replacement, re-racking of portion of spent fuel pit, new additional instrument air compressor, new wider control area entrance building, new spare parts storage building, upgrade of main entrance building, in drum drying system installation, waste super-compaction, in-core instrumentation guide tubes and sealing system replacement, refuelling machine and tools upgrades, cranes remote controls and maintainability improvements.

Safety Improvements in Preparation or Planning to be Implemented in Krško NPP

A major investment in modernisation project is under design and manufacturing phase. This project include; full scope replica simulator for operators training including engineering simulator, building for this installation and training purpose, new steam generators manufacturing and supply, safety analysis to support licensing of new steam generators, replacement and power increase and replacement activities with related modifications. Replacement is planed for planed outage in year 2000. All subproject are in intensive preparation verification and manufacturing phase.

Other important planed improvements include: inadequate core cooling

monitoring instrumentation, reactor vessel level indication, environment qualification program finalisation, motor operated valves program finalisation, fire hazard analysis action plan phase two improvements, replacement of safety batteries, security system upgrade and replacements, process instrumentation replacement.

The most important future investments in Krško NPP involve:

- *Steam Generator Replacement and Power Uprating:*
  Due to excessive degradation of steam generator tubes, the appropriate decisions and action plan, including power up-rate for approximately 6%, was approved by the Government based on the resolution of energy use and supply.

- *Full Scope Plant Specific Simulator:*

Necessary funds for supporting these two activities are estimated at 128 mil. US$. (without financing costs).

Total funds at approximately 0.60 US Cents/KWh one foreseen for investments into safety and availability of the plant in the next ten years.

ANNEXES

ANNEX A. Glossary

ACPDR	Administration for Civil Protection and Disaster Relief of the Republic of Slovenia
ADP	Administrative Procedure
ALARA	As Low as Reasonably Achievable
AOP	Abnormal Operating Procedure
ASME	American Society of Mechanical Engineers
ASSET	Assessment of Safety Significant Event Team
ATWS	Anticipated Transient Without Scram
CDF	Core Damage Frequency
CFR	US Code of Federal Regulations
CRDM	Control Rod Drive Mechanism
DBA	Design Basis Accident
ECHO	European Commission Humanitarian Organization
EIP	Emergency Implementing Procedures
EOP	Emergency Operating Procedure
EPRI	Electric Power Research Institute
EPZ	Emergency Planning Zone
ERDS	Emergency Response Data System
FSAR	Final Safety Analysis Report
IAEA	International Atomic Energy Agency
ICISA	International Commission for Independent Safety Analysis of the KrÓko NPP
ICRP	International Commission on Radiation Protection
INPO	Institute of Nuclear Power Operations
KOC	Krško Operating Committee
KSC	Krško Safety Committee
LCO	Limiting Conditions for Operation
LILW	Low and Intermediate Level Waste
NCPH	National Civilian Protection Headquarters
RCO	National Notification Centre
NPP	Nuclear Power Plant
NUPIC	Nuclear Procurement Issues Committee
NUSS	Nuclear Safety Standards
OEAP	Operating Experience Assessment Program
OECD/NEA	OECD - Nuclear Energy Agency
OL	Operating License
ORAM	Outage Risk Assessment Management
OSART	IAEA Operational Safety Review Team
PAZ	Precautionary Action Zone
PHARE	European Community Program
PSA	Probabilistic Safety Assessment
PSAR	Preliminary Safety Analysis Report
PSR	Periodic Safety Review

PWR	Pressurized Water Reactor
QA	Quality Assurance
QC	Quality Control
RAMG	Regulatory Assistance Management Group
RERP	Radiological Emergency Response Plan
RG	Regulatory Guide
SAMG	Severe Accident Management Guideline
SEC	SNSA Emergency Centre
SLD	Strategy Later Dismantling
SNSA	Slovenian Nuclear Safety Administration
SS	Safety Series
TMI	Three Mile Island
TS	Technical Specifications
TSO	Technical Support Organization
USAEC	US Atomic Energy Commission
US NRC	US Nuclear Regulatory Commission
WANO	World Association of Nuclear Operators
WOG	Westinghouse Owner's Group

ANNEX B. Contents of the Krško NPP Final Safety Analysis Report (FSAR)

1.0 INTRODUCTION AND GENERAL DESCRIPTION OF PLANT
1.1 Introduction
1.2 General Plant Description
1.3 Comparison Tables
1.4 Identification of Agents and Contractors
1.5 Requirements for Further Technical Information
1.6 Material Incorporated by Reference

2.0 SITE CHARACTERISTICS
2.1 Geography and Demography
2.2 Nearby Industrial, Transportation and Military Facilities
2.3 Meteorology
2.4 Hydrology
2.5 Geology and Seismology
2.6 Ecology

3.0 DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT AND SYSTEMS
3.1 Conformance with NRC General Design Criteria
3.2 Classification of Structures, Components and Systems
3.3 Wind and Tornado Loadings
3.4 Water Level (Flood) Design
3.5 Missile Protection
3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping
3.7 Seismic Design
3.8 Design of Category I Structures
3.9 Mechanical Systems and Components
3.10 Seismic Design of Category I Instrumentation and Electrical Equipment
3.11 Environmental Design of Mechanical and Electrical Equipment
3a Appendix 3a; Conformance with Regulatory Guides
3b Appendix 3b; Dynamic Incident Design Report

4.0 REACTOR
4.1 Summary Description
4.2 Fuel System Design
4.3 Nuclear Design
4.4 Thermal and Hydraulic Design
4.5 Reactor Materials
4.6 Functional Design of Reactivity Control Systems

5.0 REACTOR COOLANT SYSTEM
5.1 Summary Description
5.2 Integrity of the Reactor Coolant System Boundary
5.3 Thermal Hydraulic System Design
5.4 Reactor Vessel and Appurtenances
5.5 Component and Subsystem Design
5.6 Instrumentation Application
5.7 Reactor Vessel Head Vent System

6.0 ENGINEERED SAFETY FEATURES
6.1 General
6.2 Containment Systems
6.2-a Appendix 6.2-a; Iodine Removal Effectiveness Evaluation of Containment Spray System
6.2-b Appendix 6.2-b; Hydrogen Production and Accumulation
6.3 Emergency Core Cooling System
6.4 Habitability Systems
6.5 Containment Annulus Negative Pressure Control System

7.0 INSTRUMENTATION AND CONTROLS
7.1 Introduction
7.2 Reactor Trip System
7.3 Engineered Safety Features Actuation System
7.4 Systems Required for Safe Shutdown
7.5 Safety Related Display Instrumentation
7.6 All Other Systems Required for Safety
7.7 Control Systems not Required for Safety
7.8 ATWS Mitigation System Actuation Circuitry (AMSAC)

8.0 ELECTRICAL POWER
8.1 Introduction
8.2 Offsite Power System
8.3 Onsite Power Systems

9.0 AUXILIARY SYSTEMS
9.1 Fuel Storage and Handling
9.2 Water Systems
9.3 Process Auxiliaries
9.4 Air Conditioning, Heating, Cooling and Ventilation Systems
9.5 Other Auxiliary Systems

10.0 STEAM AND POWER CONVERSION SYSTEM
10.1 Summary Description
10.2 Turbine Generator
10.3 Main Steam Supply System
10.4 Other Features of Steam and Power Conversion System

11.0 RADIOACTIVE WASTE MANAGEMENT

11.1 Source Terms
11.2 Liquid Waste Processing System
11.3 Gaseous Waste Processing System
11.4 Process and Effluent Radiological Monitoring System
11.5 Solid Waste Processing System
11.6 Offsite Radiological Monitoring Program

12.0 RADIATION PROTECTION
12.1 Shielding
12.2 Ventilation
12.3 Health Physics Program

13.0 CONDUCT OF OPERATIONS
13.1 Organizational Structure of Applicant
13.2 Training
13.3 Emergency Planning
13.4 Review and Audit
13.5 Plant Procedures
13.6 Record Retention
13.7 Plant Security

14.0 INITIAL TEST PROGRAM
14.1 Summary of Test Program and Objectives
14.2 Organization and Staffing
14.3 Test Procedures
14.4 Conduct of Test Program
14.5 Review, Evaluations, and Approval of Test Results
14.6 Test Records
14.7 Conformance of Test Programs with Regulatory Guides
14.10 Initial Fuel Loading and Initial Criticality
14.12 Individual Test Descriptions

15.0 ACCIDENT ANALYSIS
15.1 Increase in Heat Removal by the Secondary System
15.2 Decrease in Heat Removal by the Secondary System
15.3 Decrease in Reactor Coolant System Flow Rate
15.4 Reactivity and Power Distribution Anomalies
15.5 Increase in Reactor Coolant Inventory
15.6 Decrease in Reactor Coolant Inventory
15.7 Radioactive Release from a Subsystem or Component
15.8 Anticipated Transients Without Scram
15a Appendix 15a; Dose Models Used to Evaluate the Radiological Effects and Consequences of Accidents (Original Issue)
15b Appendix 15b; Dose Models Used to Evaluate the Radiological Effects and Consequences of Accidents (Revised Issue)

16.0 TECHNICAL SPECIFICATIONS

17.0 QUALITY ASSURANCE

17.1 Krško NPP Quality Assurance Program During Design and Construction

17.2 Quality Assurance During the Operations Phase

ANNEX C. Contents of the Krško NPP Technical Specifications

1. DEFINITIONS

2. SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS
2.1 SAFETY LIMITS
SL 2.1.1 Reactor Core
SL 2.1.2 Reactor Coolant System Pressure
2.2 LIMITING SAFETY SYSTEM SETTINGS
LSSS 2.2.1 Reactor Trip System Instrumentation Setpoints

3. LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS
3.0 APPLICABILITY
3.1 REACTIVITY CONTROL SYSTEMS
LCO 3.1.1 Boration Control
LCO 3.1.2 Boration Systems
LCO 3.1.3 Movable Control Assemblies
3.2 POWER DISTRIBUTION LIMITS
LCO 3.2.1 Axial Flux Difference
LCO 3.2.2 Heat Flux Hot Channel Factor - $F_Q(Z)$
LCO 3.2.3 Nuclear Enthalpy Rise Hot Channel Factor - $F^N_{Delta\ H}$
LCO 3.2.4 Quadrant Power Tilt Ratio
LCO 3.2.5 DNB Parameters
3.3 INSTRUMENTATION
LCO 3.3.1 Reactor Trip System Instrumentation
LCO 3.3.2 Engineered Safety Features Actuation System Instrumentation
LCO 3.3.3 Monitoring Instrumentation
LCO 3.3.4 Turbine Overspeed Protection
3.4 REACTOR COOLANT SYSTEM
LCO 3.4.1 Reactor Coolant Loops and Coolant Circulation
LCO 3.4.2 Safety Valves
LCO 3.4.3 Pressuriser
LCO 3.4.4 Relief Valves
LCO 3.4.5 Steam Generators
LCO 3.4.6 Reactor Coolant System Leakage
LCO 3.4.7 Chemistry
LCO 3.4.8 Specific Activity
LCO 3.4.9 Pressure/Temperature Limits
LCO 3.4.10 Structural Integrity
LCO 3.4.11 Reactor Coolant System Vents
3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)
LCO 3.5.1 Accumulators
LCO 3.5.2 ECCS Subsystems - $T_{avg} >= 177^oC$
LCO 3.5.3 ECCS Subsystems - $T_{avg} < 177^oC$
LCO 3.5.4 Boron Injection System

LCO 3.5.5 Refuelling Water Storage Tank

3.6 CONTAINMENT SYSTEMS

LCO 3.6.1 Primary Containment
LCO 3.6.2 Depressurization and Cooling Systems
LCO 3.6.3 Iodine Cleanup System
LCO 3.6.4 Containment Isolation Valves
LCO 3.6.5 Combustible Gas Control
LCO 3.6.6 Penetration Room Exhaust Air Cleanup System
LCO 3.6.7 Vacuum Relief Valves
LCO 3.6.8 Secondary Containment

3.7 PLANT SYSTEMS

LCO 3.7.1 Turbine Cycle
LCO 3.7.2 Steam Generator Pressure/Temperature Limitation
LCO 3.7.3 Component Cooling Water System
LCO 3.7.4 Essential Service Water System
LCO 3.7.5 Ultimate Heat Sink
LCO 3.7.6 Flood Protection
LCO 3.7.7 Main Control Room Charcoal Cleanup System
LCO 3.7.8 Main Control Room Air Conditioning System
LCO 3.7.9 Snubbers
LCO 3.7.10 Sealed Source Contamination
LCO 3.7.11 Fire Suppression Systems
LCO 3.7.12 Fire Rated Assemblies
LCO 3.7.13 Area Temperature Monitoring

3.8 ELECTRICAL POWER SYSTEMS

LCO 3.8.1 A.C. Sources
LCO 3.8.2 D.C. Sources
LCO 3.8.3 Onsite Power Distribution
LCO 3.8.4 Electrical Equipment Protective Devices

3.9 REFUELLING OPERATIONS

LCO 3.9.1 Boron Concentration
LCO 3.9.2 Instrumentation
LCO 3.9.3 Decay Time
LCO 3.9.4 Containment Building Penetrations
LCO 3.9.5 Communications
LCO 3.9.6 Manipulator Crane
LCO 3.9.7 Crane Travel - Spent Fuel Storage Areas
LCO 3.9.8 Residual Heat Removal and Coolant Circulation
LCO 3.9.9 Containment Ventilation Isolation System
LCO 3.9.10 Water Level - Reactor Vessel
LCO 3.9.11 Water Level - Storage Pool
LCO 3.9.12 Spent Fuel Pit Area Air Cleaning Exhaust System

3.10 SPECIAL TEST EXCEPTIONS

LCO 3.10.1 Shutdown Margin
LCO 3.10.2 Group Height, Insertion, and Power Distribution Limits
LCO 3.10.3 Physics Tests
LCO 3.10.4 Reactor Coolant Loops
LCO 3.10.5 Position Indication System - Shutdown

3.11 RADIOACTIVE EFFLUENTS
- LCO 3.11.1 Liquid Holdup Tanks
- LCO 3.11.2 Explosive Gas Mixture
- LCO 3.11.3 Gas Storage Tanks

4. DESIGN FEATURES SECTION

4.1 SITE
- 4.1.1 Exclusion Area
- 4.1.2 Low Population Zone
- 4.1.3 Map Defining Unrestricted Areas and Site Boundary for Radioactive Gaseous and Liquid Effluents

4.2 CONTAINMENT
- 4.2.1 Configuration
- 4.2.2 Design Pressure and Temperature

4.3 REACTOR CORE
- 4.3.1 Fuel Assemblies
- 4.3.2 Control Rod Assemblies

4.4 REACTOR COOLANT SYSTEM
- 4.4.1 Design Pressure and Temperature
- 4.4.2 Volume

4.5 METEOROLOGICAL TOWER LOCATION

4.6 FUEL STORAGE
- 4.6.1 Criticality
- 4.6.2 Drainage
- 4.6.3 Capacity

4.7 COMPONENT CYCLIC OR TRANSIENT

5. ADMINISTRATIVE CONTROLS

5.1 RESPONSIBILITY

5.2 ORGANIZATION
- 5.2.1 Onsite and Offsite Organization
- 5.2.2 Unit Staff
- 5.2.3 Independent Safety Engineering Group (ISEG)
- 5.2.4 Shift Engineer

5.3 UNIT STAFF QUALIFICATIONS

5.4 TRAINING

5.5 REVIEW AND AUDIT
- 5.5.1 Krško Operating Committee
- 5.5.2 Krško Safety Committee

5.6 REPORTABLE EVENT ACTION

5.7 SAFETY LIMIT VIOLATION

5.8 PROCEDURES AND PROGRAMS

5.9 REPORTING REQUIREMENTS
- 5.9.1 Routine Reports
- 5.9.2 Special Report
- 5.9.3 Daily Reports

5.10 RECORD RETENTION

5.11 RADIATION PROTECTION PROGRAM
5.12 HIGH RADIATION AREA
5.13 PROCESS CONTROL PROGRAM (PCP)
5.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

6. BASES

ANNEX D. Contents of the Krško NPP Radiological Emergency Response Plan

8.3 Plant recovery operations

TABLES (17)
FIGURES (24)

APPENDIX A - EMERGENCY ORGANIZATION JOB DESCRIPTION
APPENDIX B - LETTERS OF AGREEMENT
APPENDIX C - SUPPORTING EMERGENCY PLANS
APPENDIX D - KRŠKO NPP EMERGENCY EQUIPMENT LIST
APPENDIX E - EMERGENCY IMPLEMENTING PROCEDURES
APPENDIX F - NUREG-0654 CROSS REFERENCE

LIST OF THE KRŠKO NPP's EMERGENCY IMPLEMENTING PROCEDURES

EIP NO.	TITLE
EIP-5.001	Classification of emergencies
EIP-5.011	Unusual event
EIP-5.012	Alert
EIP-5.013	Site area emergency
EIP-5.014	General emergency
EIP-5.021	Emergency notifications
EIP-5.022	Technical support centre - activation
EIP-5.023	Operational support centre - activation
EIP-5.024	Technical support centre - support functions
EIP-5.025	Operations support centre - support functions
EIP-5.031	Protective action recommendation guidelines
EIP-5.041	Evacuation
EIP-5.042	Personnel accountability
EIP-5.043	Search and rescue
EIP-5.044	Medical emergencies
EIP-5.045	Fire emergencies
EIP-5.046	Security guards actions in emergencies
EIP-5.047	Recovery
EIP-5.048	Chlorine release emergencies
EIP-5.049	Public information during emergencies
EIP-5.061	Offsite dose calculation
EIP-5.062	Radiation exposure controls
EIP-5.064	Offsite radiological monitoring
EIP-5.065	Post-accident sampling operation
EIP-5.081	Periodical review of the RERP
EIP-5.082	Emergency communications testing
EIP-5.083	Emergency preparedness training
EIP-5.084	Emergency facilities and equipment inventory control
EIP-5.085	Maintenance of emergency telephone book

EIP-5.086 Periodic pager response check
EIP-5.087 Public education and information program

ANNEX E. List of the Krško NPP Plant Procedure Categories

1.0 Administrative/Inter-Departmental Procedures

2.0 Engineering Services Procedures

3.0 Operations Procedures

4.0 Maintenance Procedures

5.0 Technical Support Procedures

6.0 Chemistry/Radiochemistry Procedures

7.0 Radiological Control Procedures

8.0 Security Plan and Implementation Procedures

9.0 Quality Systems Procedures

10.0 Procurement/Commercial Procedures

11.0 Financial Procedures

12.0 Information Systems Procedures

13.0 Training Procedures

14.0 Industrial Safety Procedures

20.0 Decommissioning Procedures

ANNEX F. Contents of the Krško NPP PSA Study

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35. IPE of NPP Krško Level 2 Report, August 1995, Volume 3 Source Term Notebook (WENX/95/24)
36. IPE of NPP Krško Level 2 Report, August 1995, Volume 4 Containment Event Tree Notebook - Part 4 (WENX/95/24)
37. Probabilistic Safety Assessment of NPP Krško - 3. IPEEE Other External Events, August 1995
38. Probabilistic Safety Assessment of NPP Krško - 1.B IPEEE Seismic Relay Chatter, September 1995
39. Krško IPE - Level 2, Summary Report, Rev. 2, October 1995 (WENX/95/25)
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ANNEX G. Technical Information on the Krško NPP