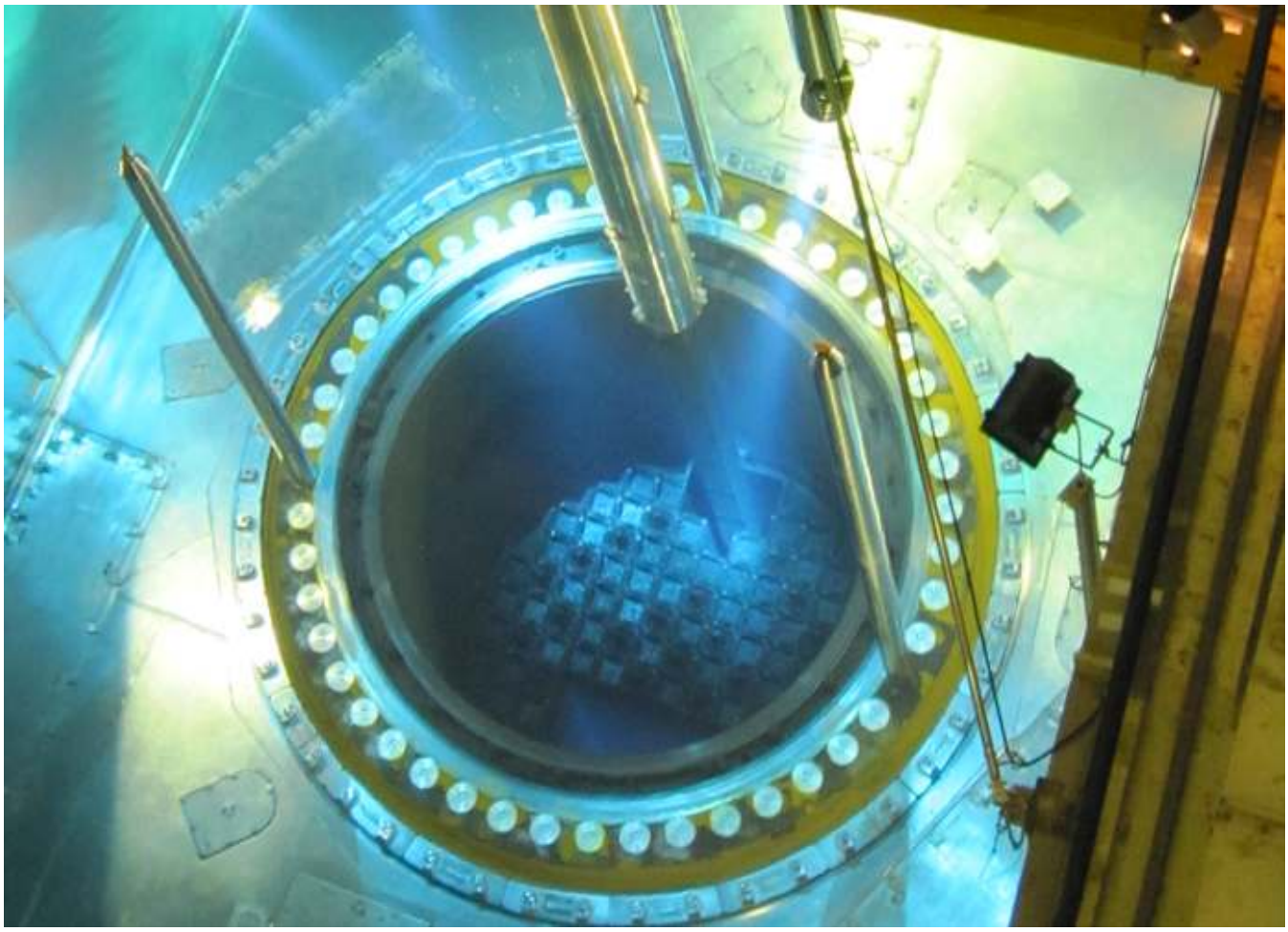
REPUBLIC OF SLOVENIA
MINISTRY OF AGRICULTURE AND THE ENVIRONMENT
SLOVENIAN NUCLEAR SAFETY ADMINISTRATION

Slovenian 1st Report on Nuclear Safety

as referred in the Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations



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EXTENDED SUMMARY

In Slovenia, the main act in the area of nuclear and radiation safety is the Act on Ionising Radiation Protection and Nuclear Safety (the 2002 Act). The comprehensive legislative and regulatory framework consists of the national legal frame and of those international instruments to which Slovenia is a party. Slovenia represents a typical model of division of powers into three branches (legislative, executive and judicial). Legislative power is exercised by the National Assembly which adopts acts, while the executive branch adopts decrees (government) and rules (ministries).

The 2002 Act divided the competencies in the field of nuclear and radiation safety among two regulatory bodies, namely the Slovenian Nuclear Safety Administration (SNSA) and the Slovenian Radiation Protection Administration (SRPA). The SNSA is accountable for nuclear safety and safety of industrial radiation sources, while the SRPA is responsible for radiation protection in medicine and veterinary practice, medical surveillance of exposed workers, surveillance of workplaces, dosimetry and dose registers and education in the area of radiation protection, but has no responsibility in the area of nuclear safety. The most important rules are the JV5 "Rules on the Radiation and Nuclear Safety Factors" and the JV9 "Rules on Operational Safety of Nuclear or Radiological Facilities". The JV5 describes (among others) the documentation to be submitted as well as the details of the licensing procedure, while JV9 gives instruction about the methodology to be used for the classification and notification of plant modifications.

The SNSA prepared in 2012 the draft of the Resolution on Nuclear and Radiation Safety in the Republic of Slovenia (for the period 2013 – 2023). The proposal has been adopted in the Parliament in June 2013 as a high level national policy paper.

Based on Slovenian Constitution the Government and the Ministries can issue legaly binding regulations, subordinate to laws. The SNSA drafts such regulations and prepare them for adoption.

The SNSA develops and issues "Practical Guidance" which main purpose is to supplement regulatory safety requirements in regulations by giving detailed explanations and guidance to licensees.

The SNSA conducts its own review and assessment, taking into account and evaluating both the safety assessments conducted by the licensees and the independent safety assessments performed by authorized expert for radiation and nuclear safety, as well as other safety relevant information. There are several mechanisms in place for communication between the SNSA and licensees in support of the regulatory review process, consisting of regulatory requirements established in regulations (2002 Act, decrees and rules), regulatory letters, licensing meetings, regulatory inspections, regular licensee reports.

The inspection of nuclear and radiation safety rests with the SNSA. On the other hand, the Slovenian Radiation Protection Administration (SRPA) is in charge of the inspection and enforcement of radiation practices and use of radiation sources in health and veterinary care, while in the area of physical protection inspection powers are granted to the Ministry of Interior. The enforcement of applicable regulations and of the terms of the licenses is ensured by the application of penal provisions, inspection provisions and provisions related to license withdrawal and suspending of the operation of a nuclear facility.

In response to the Fukushima accident the SNSA issued a decision to the Krško NPP to perform a Special Safety Review. The programme of this review was completely in line with the ENSREG specifications for European Stress Tests. The results of the stress tests showed that the plant was well designed and constructed. The Slovenian post-Fukushima National Action Plan was

prepared as a result of all activities executed in Slovenia in response to the 2011 nuclear accident in Fukushima Dai-ichi. The core of the national action plan (NAcP) and post-Fukushima improvements is the Krško NPP's Safety Upgrade Program, which was required, reviewed and approved by the SNSA.

The Krško NPP's Safety Upgrade Program (SUP) is the backbone of the National Action Plan and includes several large modifications, such as:

- Installation of containment filtered venting system and passive autocatalytic recombiners (PARs);
- Installation of additional low and high pressure pumps for injecting (un)borated water into steam generators, reactor, containment sump/reactor cavity and spent fuel pool, but could also be used to spray the containment;
- Installation of additional pressurizer relief valves qualified for severe accidents conditions;
- Installation of additional heat sink;
- Acquirement of mobile heat exchanger that can be connected to either reactor coolant system of spent fuel pool and cooled by air;
- Installation of permanent sprays around the spent fuel pool;
- Safety upgrade of AC supply;
- Establishment of emergency control room (with provisions for long term habitability even in case of severe accidents);
- Installation of separate instrumentation and control dedicated for severe accidents;
- Establishment of new technical support facility with provisions for long term habitability even in case of severe accidents and enhancement of existing operational support centre.

The SNSA is a functionally autonomous institution within the Ministry of the Agriculture and Environment. The 2002 Act enables SNSA to independently finance Technical Support Organisations when additional expertise is needed. Each position in the SNSA organisational chart has recognized necessary competences for the staff member occupying it. When the SNSA employs new members, they usually do not yet have proper competences, therefore the individual program for acquirement of necessary competences is prepared. The budget is the only source for financing the SNSA basic activities.

For obtaining the licence the operator shall produce a safety report, which must be updated with all modifications and changes made during trial operation. The safety report needs to be reviewed by the authorized expert for radiation and nuclear safety and the SNSA. The provisions on the prime responsibility of the license holder for the safety of nuclear and radiation facilities are clearly comprised in the legislation.

The Krško NPP runs a comprehensive program for the design modification control, which provides guidance for the NPP staff as well as for the contractors. The screening criteria for determining the need for safety evaluations and the requirements for documentation review and approval are specified in secondary legislation. The SNSA reviews in detail the submitted documentation and assesses it. In case of the safety important modifications the assessment is done by the TSOs, which submit it to the regulatory body.

In addition the 2002 Act requires that the licensee of a nuclear facility ensures regular, complete and systematic assessment and examination of radiation and nuclear safety of the facility by the periodic safety review (PSR) which has to be performed in the period of ten years. The second Krško NPP PSR was submitted to the SNSA in 2013.

In 2012 the SNSA issued a decision which enables the Krško NPP to extend life span beyond

2023, if the specified conditions are met. The US NRC requirements were used in the regulatory process. Amongst the conditions to extend its operational life span the Krško NPP will have to finalize already planned safety upgrades, to regularly implement periodic safety reviews in ten year cycle and to maintain Ageing Management Programme (AMP). The objective of the AMP is to determine whether ageing processes are being managed effectively and if the required safety margins are maintained.

By 2002 Act the operator of the nuclear facility in performing the assessment, examination and improvement of radiation and nuclear safety must take into account the conclusions of the programs for recording and analyzing operational experience.

The Krško NPP performs a root cause analysis of significant events. Human performance is included in the root cause analysis. The plant policy and SNSA requirement for a restart following a reactor trip requires that the cause of the trip is known, understood and corrected before the restart. The SNSA supervises corrective actions, defined by the facility. More complex events are also analyzed by internal SNSA investigation and the results are compared to the facility's corrective actions. If necessary, additional actions are required. The NE Krško operating experience feedback program considers in-house as well as external operating events. The program has been expanded by developing a corrective actions program including low level events and near misses, all types of deviations, failures, malfunctions, and deficiencies.

The plant performance monitoring program covers about 98 indicators. Besides the Krško NPP set of indicators, the SNSA is following its own set of safety indicators.

A potential investor shall obtain a construction license for a nuclear facility. The investor can submit an application for it to the construction authority only after the SNSA gives its consent for construction. The secondary legislation (JV5) contains the principles of defence in depth, single failure, redundancy, independence, diversity, safe failure and graded approach. There are also general design basis requirements, inter alia, prevention of accidents with excessive exposure of people including severe accidents.

The operator shall implement a plant-specific symptom based emergency operating procedures (EOP) as required by JV9. These assure adequate identification of the event and reliable and efficient restoration of critical safety functions and stable state of the plant. Also the implementation of severe accident management guidelines (SAMG) is mandatory for the operator and these guidelines shall be based on plant-specific analysis of severe accidents and their phenomena. Both the EOPs and SAMGs must be validated against all possible scenarios and must be regularly used in trainings of operators with the simulation of events on the plant-specific full-scope simulator.

All requirements regarding management systems defined in Slovenian legislation are in accordance with the WENRA reference levels. One of the activities of the SNSA and its management system is reviewing and controlling of the licensees' management systems including TSOs in accordance with the Slovenian legislation.

The 2002 Act introduced as one of the main principles the »causer pays« principle. In the Act there is also the obligation of the operator of a radiation or nuclear facility to ensure sufficient financial resources guaranteed throughout the operating lifetime of a facility for implementing the prescribed measures of radiation and/or nuclear safety. For the time being, the Krško NPP operator has allotted enough financial resources for maintaining the appropriate level of nuclear safety. The amount foreseen for investments and improvements in recent years is stable and gives the management proper flexibility for the long-term maintenance of nuclear safety.

Training and qualification activities at the Krško NPP are governed by the 2002 Act and the Rules on qualification requirements to be met by workers performing duties and tasks of safety

significance in nuclear and radiation installations. In general, the training programs are divided into initial and continuous training. Training program for licensed operator and shift engineer is completely implemented in the Krško NPP. The continuing training for licensed personnel consists of multiple weekly training segments (four per year per each shift) which comprise a two-year cycle of re-qualification training. The training for maintenance personnel is conducted in a special training centre, using the Krško NPP own resources (instructors and subject matter experts), or contracting such services from certified institutions or equipment vendors. Supervisory personnel and technicians also get specific knowledge at various equipment vendor training facilities.

The "transparency principle" is one of the main principles of the 2002 Act, which makes sure that the public shall receive comprehensive information and the nuclear safety information can not be disclosed. The SNSA is obliged together with other relevant authorities to prepare the annual report. The SNSA regularly informs the general public and the workers about work in its fields of competence in the website (with structured information) and at press conferences. The legislative initiatives, i.e. the draft legislation, are published on the special governmental webpage for the purposes of public hearing.

The SNSA has transposed all WENRA Reactor Harmonisation Reference Levels into the legally binding documents.

There is a special provision in 2002 Act regarding informing the public during the emergencies and also notification of international institutions and other countries is required by law in case of an emergency with off-site effects.

In 2011 Slovenia hosted the IRRS (Integrated Regulatory Review Service) mission. The experts reviewed the Slovenian nuclear safety regulatory framework. The team focused its review on the SNSA responsibilities and also visited a number of other organizations. Furthermore, the team reviewed the SNSA's response after the Fukushima nuclear accident. The IRRS mission was in general pleased with the regulatory framework in Slovenia and praised its comprehensiveness. The IRRS team identified particular strengths in the Slovenian regulatory system. The mission also made 9 recommendations and 29 suggestions for more effective administrative control. The improvements shall be sought in developing a national policy and strategy for nuclear safety; exploring alternative possibilities of financing the SNSA; developing and implementing a process for carrying out a systematic review of the SNSA's organizational structure, as well as competencies and resources. Development of a long-term plan for preparing practical guidelines was also recommended. The team noted slow progress at ensuring conditions for the start of the construction of a repository of low and intermediate level radioactive waste. The IRRS mission identified several good practices that could be taken up in other countries including the SNSA management system, a comprehensive information system that assists the SNSA in carrying out its responsibilities, a comprehensive environmental radiation monitoring programme as well as their prompt and transparent data publication.

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INTRODUCTION

This report has been prepared to meet the requirement of the Art. 9 of the Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations.

In line with the provisions of Article 3(1) there are the following nuclear installations in Slovenia:

- the Krško nuclear power plant,
- the TRIGA Mark II research reactor in Podgorica near Ljubljana, and
- the central radioactive waste storage for low and intermediate level solid radioactive waste from non-power users of nuclear energy, which is on the same site as the research reactor.

The Krško Nuclear Power Plant, situated in the south-eastern part of Slovenia, is a Westinghouse two-loop pressurised water reactor with the generating capacity of 696 MWe. The basic safety features of the plant are typical for a two-loop Westinghouse plant. The construction started in 1974. Full power was reached in August 1982, and the first full year of commercial operation was 1983.

The Krško NPP was constructed as a joint investment of the Slovenian and Croatian electric power utilities on an equal, 50:50 basis. In December 2001, the Government of Slovenia and the Government of Croatia signed the Agreement on Settlement of Statutory and Other Legal Relations Regarding the Investments into Krško NPP, its Exploitation and Decommissioning. The Agreement, which was first ratified by the Croatian Parliament, entered into force on 11 March 2003, after it was ratified also by Slovenian Parliament on 25 February 2003. Based on the Agreement, the Krško NPP is registered as a company for production of electrical energy, engineering design, technical expertise, testing, analyses, and research with experimental development in the area of nuclear technology. Since the Krško NPP is located in Slovenia, it is subject of Slovenian law and Slovenian nuclear safety regulations.

The safety features of the Krško NPP design were originally based on the 1973 requirements of the US Atomic Energy Commission. The commitment of the plant and of the regulatory body, the Slovenian Nuclear Safety Administration (SNSA), has been to follow international experience in the field of nuclear safety and to fulfil state-of-the-art safety standards maintaining close link with the regulatory requirements in the vendor country. The SNSA has in force Arrangement between the SNSA and the United States Nuclear Regulatory Commission for the Exchange of Technical Information and Cooperation in Nuclear Safety Matters.

During the years, number of modifications and improvements has been implemented in the plant based on the developments in the industry and following changing international standards and regulatory practices.

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. The reactor is utilized for research, e.g. for studies of radiation interactions, reactor physics, activation analysis. The neutron field is used for detector testing. In this facility the Slovenian universities, IAEA and technical support organisations conduct training, workshops and courses. The second INSARR mission review was conducted in November 2012. At present there are not any plans to shut down this reactor in the nearest future although the option to finish the operation in 2016 is still open. If so decided, the research reactor would be shut down to start with the fuel cooling and preparations for its shipment to the USA. The option to send spent fuel to the United States is open until 2019.

The Central Radioactive Waste Storage is located at the same site as the research reactor and is used for storage of low and intermediate level solid radioactive waste from the reactor centre and other small waste producers, such as medical, research, and industrial applications of ionising radiation. The facility is operated by the Agency for Radioactive Waste Management. Since 2000 the "polluter pays" principle has been applied, thus now the producers pay the costs of waste management, including the cost of storing, treatment and conditioning, as well as future disposal of waste. The storage is a near-surface concrete building with the roof covered with a soil layer. The usable capacity of the storage is up to 300 m^3 of radioactive waste. A small area is intended for workers for loading and unloading the waste and for internal transport. The facility is equipped with a ventilation system for reducing radon concentration and air contamination in the storage facility. To obtain relatively low and constant humidity it is equipped with the air drying system. The water and sewage collecting system is designed as a closed system to retain all potential liquids from the storage facility in the sump.

The governmental energy policy is outlined in the National Energy Program, which also addresses nuclear power as a viable option. The draft National Energy Program for the period until 2030 was prepared in 2011, but it has not been finalized yet. This draft National Energy Program foresees the use of nuclear energy as a contributor to the transition to reliable low carbon power supply sources.

The Resolution on Nuclear and Radiation Safety in the Republic of Slovenia (for the period 2013 – 2023) was adopted in the Parliament in June 2013. The Resolution is a programmatic document which contains a descriptive part divided into different chapters as well as it sets the goals/objectives for each chapter. The chapters are as follows:

- the fundamental safety principles;
- description of nuclear and radiological activities in Slovenia
- description of the international cooperation in the field of nuclear and radiation safety;
- description of the existing legislation (including binding international legal instruments, such as conventions and other relevant international instruments);
- description of the institutional framework;
- competence of professional support (research, education, training).

COMPLIANCE WITH ARTICLES 4 TO 8

ARTICLE 4. LEGISLATIVE, REGULATORY AND ORGANISATIONAL FRAMEWORK

Article 4.1

Member States shall establish and maintain a national legislative, regulatory and organisational framework (hereinafter referred to as the 'national framework') for nuclear safety of nuclear installations that allocates responsibilities and provides for coordination between relevant state bodies. The national framework shall establish responsibilities for:

(a) the adoption of national nuclear safety requirements. The determination on how they are adopted and through which instrument they are applied rests with the competence of the Member States;

(b) the provision of a system of licensing and prohibition of operation of nuclear installations without a licence;

(c) the provision of a system of nuclear safety supervision;

(d) enforcement actions, including suspension of operation and modification or revocation of a licence.

In Slovenia, the main act in the area of nuclear and radiation safety is the Act on Ionising Radiation Protection and Nuclear Safety (Off. Gaz. RS, 67/2002, hereinafter referred to as »2002 Act«). As defined in its first article, the main purpose of the Act is »to regulate ionising radiation protection, with the aim of reducing the detrimental effects on health and reducing to the lowest possible level radioactive contamination of the environment due to ionising radiation resulting from the use of radiation sources, while at the same time enabling the development, production and use of radiation sources and performing radiation practices«.

The 2002 Act was amended in 2003, 2004 and 2011; in spite of the amendments, the short name "the 2002 Act" remains unchanged, and applies to the latest version with the amendments included.

The new amendments of the act are expected for 2014. As a consequence of that a number of new secondary legislation (rules and decrees) are also planned to be adopted during 2014 and 2015.

Based on the 2002 Act, 27 governmental decrees and ministerial rules have been issued in total.

The comprehensive legislative and regulatory framework which governs the areas related to nuclear and radiation safety in Slovenia is attached to this report (Appendix I). It consists of the national legal frame and of those international instruments (multilateral and bilateral treaties, conventions, agreements/arrangements) to which Slovenia is a party.

The SNSA prepared in 2012 the draft of the Resolution on Nuclear and Radiation Safety in the Republic of Slovenia (for the period 2013 – 2023). The proposal has been adopted in the Parliament in June 2013 - as a high level national policy paper; it covers the following chapters:

- the fundamental safety principles;
- description of nuclear and radiological activities in Slovenia
- description of the international cooperation in the field of nuclear and radiation safety;
- description of the existing legislation (including binding international legal instruments, such as conventions and other relevant international instruments);
- description of the institutional framework;
- competence of professional support (research, education, training);

– objectives and measures to achieve them during the period up to 2023.

The 2002 Act divided the competencies in the field of nuclear and radiation safety among two regulatory bodies, namely the Slovenian Nuclear Safety Administration (SNSA) and the Slovenian Radiation Protection Administration (SRPA). The SNSA is accountable for nuclear safety and safety of industrial radiation sources, while the SRPA is responsible for radiation protection of patients, medical surveillance of exposed workers, surveillance of workplaces, dosimetry and dose registers and education in the area of radiation protection, but has no responsibility in the area of nuclear safety.

Apart from this general division, there are some parts of the legislative and regulatory framework which are entrusted to other institutions, e.g. the Administration for Civil Protection and Disaster Relief of the Ministry of Defence is accountable for emergency preparedness and planning, while the Ministry of Interior has the responsibility for physical protection.

Slovenia is contracting party to the Convention on Nuclear Safety which entered into force for Slovenia on 18 February 1997 as well as to the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management which entered into force for Slovenia on 18 June 2001.

Article 4.1(a)

The national framework shall establish responsibilities for:

(a) the adoption of national nuclear safety requirements. The determination on how they are adopted and through which instrument they are applied rests with the competence of the Member States;

Slovenia represents a typical model of division of powers into three branches (legislative, executive and judicial). Legislative power is exercised by the National Assembly which adopts acts, while the executive branch adopts decrees (government) and rules (ministries).

By Decrees, the Government may regulate in detail the rights, duties and other requirements as basically prescribed in the act - in accordance with the purpose and criteria of the act. Governmental decrees regulate mostly areas where several bodies of the Government exercise their competencies.

Rules are issued by ministers if required by acts or decrees or if the minister deems it necessary to adopt rules for the execution of the act and/or decree.

Based on Slovenian Constitution the authority within the ministry (like the SNSA) can not adopt binding rules; on the other hand their main duty and responsibility is to propose and prepare them for the further adoption - by minister (rules) or government (decree) or parliament (act).

Government each year adopts so called "Legislative work program of the Government" in which individual ministries include the most important legal instruments, the adoption of which will be proposed. The SNSA takes part in the preparation of such a plan by proposing the adoption of legislation (or its amendments) in the field of nuclear safety (and radiation protection). Such a plan contains the legal basis for the adoption of a regulation, the deadline and the ministry, which is in charge for a drafting of regulation.

Besides "Legislative work program of the Government" and in line with it there is an internal SNSA organisational procedure in place for development of drafts of legislation, including regulatory requirements for safety. This defines procedure for development of legislation (acts, decrees, rules), including all interfaces with the Ministry of Agriculture and Environment, other parts of the Government administration and other stakeholders. Procedure includes also formal

provisions for systematic periodical screening of legislation which may be one of the triggers for initiating change/modification in the legislation. Initiative to change or expand any part of legislation is at SNSA mainly with technical departments which also screen international standards, foreign legislative practices and developments as well as other possible sources.

SNSA also issues "Practical Guidance". Their main purpose is to supplement regulatory safety requirements in regulations by giving detailed explanations and guidance for applicants/license holders in areas where appropriate.

Article 4.1(b)

The national framework shall establish responsibilities for:

(b) the provision of a system of licensing and prohibition of operation of nuclear installations without a licence;

Licensing of nuclear facilities is performed in parallel along two main legislative lines, one being the nuclear legislation and the other the spatial development legislation for siting facilities of national importance in Slovenia.

The legal basis for the authorization of nuclear power plants is the 2002 Act. The secondary legislation consists of rules. The most important of which are the JV5 "Rules on the Radiation and Nuclear Safety Factors" and the JV9 "Rules on Operational Safety of Nuclear or Radiological Facilities". The JV5 describes (among others) the documentation to be submitted as well as the details of the licensing procedure, while JV9 (among others) gives instruction about the methodology to be used for the classification and notification of plant modifications. Complementary instructions are issued as practical guidance by the regulatory body, e.g. PS 1.01 "The content and scope of periodic safety review of a radiation or nuclear facility".

As far as siting and civil construction are concerned other acts apply, namely the Spatial Planning Act, the Act Regarding the Siting of Spatial Arrangements of National Significance in Physical Space, the Environment Protection Act and the Construction Act. Procedural instructions are provided by the General Administrative Procedure Act.

National Strategic Spatial Plan

Drafted by the Ministry in charge of spatial planning, the Strategic Plan should define among others the framework for the use of nuclear energy in Slovenia. It has to be adopted by the National Assembly of the Republic of Slovenia on a proposal of the government, which after approval sets the timeline of its implementation.

Licence to perform activities related to the production of energy and Energy permit

Licence to perform activities related to the production of energy is issued by the Energy Agency. It also grants the right to perform such activities by a nuclear power plant. The subsequent energy permit is issued by the ministry in charge of energy and is granted for a specific facility.

National Spatial Plan

Prepared by the ministry responsible for spatial planning and approved by the Government the Plan is the central instrument for siting of the nuclear installation.

The role of SNSA is reviewing the so called Special Safety Analysis that has to be submitted by the applicant. The Special Safety Analysis focuses on the impact of the site on the plant and vice versa. The drafting of the National Spatial Plan involves the participation of other national administrative authorities and foresees public involvement.

Environmental protection consent

Issued by the Environmental Agency it requires the submittal of an Environmental Impact Assessment.

The SNSA reviews the relevant part of the Environmental Impact Assessment, which focuses on the radiological impact of the plant to the environment and is prepared as a draft of the safety analysis report. The drafting of the environmental protection consent involves the participation of other national administrative authorities and foresees public involvement.

Construction consent and Construction licence

The consent, issued by SNSA, is a condition for the construction licence. The basis for issuing the consent is the approval of the Preliminary Safety Analysis Report, decommissioning programme and of the programme for the pre-operation monitoring of radioactivity. Further documents to be submitted refer to the waste management programme, management system documentation including documentary evidence that any subcontractors will comply with the same standards as the applicant, a physical-protection plan, etc. An application must include also the positive opinion of an authorized expert for radiation and nuclear safety.

The construction licence is issued by the ministry in charge of spatial planning and once granted allows the start of construction work on site.

Consent for start of trial operation and Decision for start of trial operation

Before the licence for use of the facility is issued, technical checks and trial operation must be performed. SNSA issues the consent for start of trial operation and subsequently the ministry in charge of spatial planning formalizes its decision.

Basis for issuing the SNSA consent is the review of the as built design. SNSA has to approve the Safety Analysis Report and the trial operation programme. Further programmes like the aging management programme, the systems, structures and components (SSC) qualification programme, in-service inspections and maintenance programme, etc. are also part of documentation. The application must include also the opinion of an authorized expert for radiation and nuclear safety. Furthermore, before trial operation can actually start the additional documentation has to be made available to SNSA such as the operating procedures, the results of operation tests of specific systems and components, the evidence of plant personnel qualification, etc..

In fact trial operation together with the technical checks of the plant represents the commissioning phase, which lasts approximately 3 years (technical checks plus 2 years of trial operation).

Licence for use of the facility

Licence for use of the facility is issued by the ministry in charge of spatial planning. The ministry requires the previous verification that the environmental impact of the facility as determined during trial operation is within the prescribed limits.

Operating Licence

The operating licence is issued by SNSA after review and approval of the Final Safety Analysis Report and of the report on trial operation. Further application documents include updates of the programmes required under the consent for trial operation. The application must include also the opinion of an authorized expert for radiation and nuclear safety. In the operating licence SNSA essentially confirms that the plant fulfils all safety requirements and can be operated within the set limits.

Operating Licence amendments require a similar process as the one adopted for issuing the licence. Details are set in the Rule JV9. Plant modifications are divided in three categories according to their significance.

Category 1 changes are those that do not have any implication on radiation or nuclear safety and are reported to SNSA once a year (in the operator's yearly report). In order to assess that a change is category 1 the operator has to perform a safety evaluation screening.

Category 2 changes are those that have minor impact on radiation or nuclear safety. After the screening the operator has to perform a safety evaluation in order to demonstrate the minor impact and to submit it to SNSA. With a written decision SNSA confirms the categorization made by the operator. In case SNSA cannot confirm it, the change is automatically categorized in to the third category.

Category 3 changes are those that have a substantial impact on radiation or nuclear safety. Classification in category 3 is determined based on the screening and safety evaluation previously mentioned. Category 3 changes are typically changes that affect the design basis of the plant as described in the Safety Analysis Report or changes to the limiting conditions of operation (LCO). Category 3 changes are treated as amendments to the Operating Licence and require that the operator submits, as part of the application, an opinion from an authorized expert for radiation and nuclear safety. After the application is completed SNSA has 90 days to perform its review and assessment and communicate its decision in writing.

According to the 2002 Act performing of a periodic safety review and approval by SNSA is a condition for renewing an operating licence. The procedure is the same as that for category 3 changes.

For category 3 changes of a bigger extent as well as for the periodic safety review the decision of SNSA is prepared over a longer period of time and is documented in several internal reports and minutes of official meetings (hearings) with the licence-holder and very succinctly summarized in the final written decision by SNSA.

Regarding the prohibition for the nuclear installation to operate without a valid licence the provision of the 2002 Act has to be mentioned:

"Prior to the start of the radiation practice a permit to carry out a radiation practice must be obtained."

Violation of this requirement is punishable.

Article 4.1(c)

The national framework shall establish responsibilities for:

(c) the provision of a system of nuclear safety supervision;

The Slovenian Nuclear Safety Administration carries out its supervision responsibilities with a combination of tasks, e.g. regulatory review and assessment, review, approval of modifications, regular monitoring and evaluation of the NPP's performance and inspections.

The general regulatory review and assessment principles and the regulatory process implemented by SNSA are established in the Rule JV9 and described in the SNSA Management Manual and in an internal procedure (staff guidance ON 2.1.4 "Guide on performing review and assessment").

As the only responsible for regulatory decision-making, the SNSA has to conduct its own review and assessment, taking into account and evaluating both the safety assessments conducted by the licensees and the independent safety assessments performed by authorized expert for radiation

and nuclear safety, as well as other safety relevant information. The independent opinion of an authorized expert for radiation and nuclear safety is therefore only one of the evidences considered in the licensing procedure and the SNSA is not bound by this opinion and can, in case of any doubt, obtain a second expert opinion.

There are several mechanisms in place for communication between the SNSA and licensees in support of the regulatory review process, consisting of regulatory requirements established in regulations (2002 Act, decrees and rules), regulatory letters, licensing meetings, regulatory inspections, regular licensee reports (daily, monthly, quarterly, annual reports, etc) etc., all of them supported by regulations and specific procedures that address the interface between regulator and licensee. During the reviews, regular contacts are arranged between the licensee and the SNSA representatives.

During the refueling outage besides the SNSA inspectors (and other technical staff) also the technical support organizations are engaged to inspect and evaluate selected activities of plant maintenance and testing.

The inspection of nuclear and radiation safety rests with the SNSA. On the other hand, the Slovenian Radiation Protection Administration (SRPA) is in charge of the inspection and enforcement of radiation practices and use of radiation sources in health and veterinary care, while in the area of physical protection inspection powers are granted to the Ministry of Interior. Lately more emphasis is given to joint inspections. During joint inspections the inspectors from different institutions, e.g. SNSA, SRPA, Administration for Civil Protection and Disaster Relief, Ministry of Interior, cooperate and coordinate cross-cutting activities. Inspection includes control over the implementation of the provisions of the 2002 Act, the ordered measures and the regulations and decrees issued in accordance with the 2002 Act.

In 2002 Act there is only one article on inspection since there is a general Act on Inspection which stipulates the general principles of inspection, such as its organisation, status, rights and duties of inspectors, inspection measures and other issues in relation with inspection, and which is to be followed also by nuclear and radiation safety inspectors.

For each inspection, a separate administrative procedure (case) has to be opened. Such "inspection case" may be closed /terminated by the inspection report if there is no evidence of non-compliances with the regulations, violations of the provisions of the legislation or if the inspector does not require corrective measures. In all other situations, the inspector shall issue besides the inspection report also a written decision/conclusion to the licensee to remedy the errors and/or violations found. While performing an inspection, the inspector may order, for example, material sampling, temporary or permanent seizure of any means, documents check, searching of premises, examinations, hearings, etc.

Article 4.1(d)

The national framework shall establish responsibilities for:

(d) enforcement actions, including suspension of operation and modification or revocation of a licence.

The enforcement of applicable regulations and of the terms of the licenses is ensured by the application of penal provisions (as provided for in Article 139 of 2002 Act), inspection provision (Article 138) and provisions related to license withdrawal (article 114) and suspending of the operation of a nuclear facility (Article 115).

Within the scope of an inspection, an inspector may:

- issue decisions, conclusions and/or orders within the framework of administrative proceedings,
- order measures for radiation protection and measures for radiation and nuclear safety,
- order the cessation of a radiation practice or use of a radiation source when it is established that an applicable license has not been issued or if the prescribed methods of handling a radiation source or radioactive waste have not been followed. Appeal against such decision of an inspector does not prevent its execution.

Furthermore the SNSA may order the suspension of the operation of a nuclear facility on the initiative of a competent inspector or *ex officio*.

The SNSA can order the suspension of the operation of a nuclear facility on the initiative of a competent inspector when it can be concluded that the prescribed conditions for radiation or nuclear safety are not fulfilled and the licensee has not met the prescribed conditions within a reasonable period of time in spite of the request from the inspector to remedy the deficiencies.

The SNSA can order the suspension of the operation of a nuclear facility *ex officio* if the licensee did not submit for approval the changes and amendments of the radiation protection assessment of exposed workers within the prescribed period of time, or if the licensee has started maintenance work, testing or introducing modifications, which are significant for the radiation or nuclear safety of a facility, without the prior approval of the SNSA.

There is no right of appeal against the decision on suspension of the operation of a nuclear facility; however the judicial protection is ensured.

In addition, the inspector must also apply the provisions of the general Act on Minor Offences. Based on this act, minor offences are divided into two main categories. For the majority of offences, the inspector charges a fine (penalty payment) directly, while for the second category of offences (only five of them are specifically specified in the Act), the inspector may only initiate the administrative offence prosecution to the competent court. The same applies when an inspector finds more serious unlawful activities, omissions or negligence, which the Penal Code qualifies as a criminal offence; also in these cases, defined by the Criminal Procedure Act, the inspector may only report and initiate the criminal offence to a public prosecutor.

Article 4.2

Member States shall ensure that the national framework is maintained and improved when appropriate, taking into account operating experience, insights gained from safety analyses for operating nuclear installations, development of technology and results of safety research, when available and relevant.

The updating and maintaining the national regulatory framework is planned and conducted in many different ways, e.g. as a long-term program of law-making; there is regular checking of the international standards (e.g. IAEA, WENRA) and other documents for their potential impact to domestic legislation; the domestic and foreign operating experience is considered for the potential changes and improvements of the legislation and regulatory practices.

At the beginning of 2013 the long-term program of law-making has been prepared as an appendix to the existing internal procedure "Organizational Regulation" on Preparation and Monitoring of the SNSA Regulations). This organizational procedure provides instructions for preparing the draft regulations (and/or their amendments) related to the work and the competences of the Slovenian Nuclear Safety Administration. The Long-term Program, as well as OP 4.1, are both a part of the SNSA's Documentation Management System. The revision of

long-term program shall be prepared and submitted once a year - when the SNSA provides input to the Government's Normative Program of Work for the forthcoming year.

The Appendix I, which contains the list of legal instruments in force in Slovenia, provides also when the latest pieces of legislation were issued and also in the SNSA web page, referenced in the aforementioned appendix, one can find all amendments of the 2002 Act. Therefore this appendix provides an insight how frequently and to what extent the main legal documents are updated as well as how up to date they are.

The SNSA carries out its own the operational experience program (OE) as well as developed its own set of safety performance indicators.

- SNSA supervises the Krško NPP through its own set of 46 safety and performance indicators. Some of the indicators are identical to the Krško NPP indicators, while others were selected specifically for the regulatory use. The input data for the indicators are submitted by the Krško NPP once per month. The SNSA set of performance indicators is intended to search for potential weaknesses that might lead to the degradation of nuclear safety.
- The SNSA staff regularly tracks the operating experiences throughout the world and screens them on the bases of applicability for the Slovenian nuclear facilities. The selected operating experiences are thoroughly evaluated. If the analysis shows that lessons learned are applicable also for Slovenian licensees, then more information is gathered to evaluate the conditions of the Slovenian facilities and appropriate corrective actions are considered.

The 2002 Act requires that the licensee of a nuclear facility ensures regular, complete and systematic assessment and examination of radiation and nuclear safety of the facility by the periodic safety review (PSR) which has to be performed in the period of ten years. The operator must draw up a periodic safety review report and hand it over to the competent ministry. Approved safety review report is a condition for further operation of a facility. Detailed information about performing PSR is presented in Rules JV9 and in the practical guidance issued by the SNSA. The SNSA can require an extraordinary safety review if new and important evidence on the radiation or nuclear safety of a facility has come to light.

SNSA approved the Krško NPP PSR2 program in May 2010. In 2013 the operator issued final revisions of all topical PSR2 reports for 15 safety factors, addendums for 5 safety factors to take into account Special Safety Review (stress tests) and Safety Upgrade Program, Ranking and Prioritization of PSR2 issues, Implementation Action Plan, Summary Report (incl. Global assessment of plant status) and Independent Expert Opinion.

In the context of the PSR2 programme the PSR1 issues that were not implemented through PSR1 action plan were reviewed for their relevance for safety. Many of these PSR1 issues were included into PSR2 action plan and were renumbered as PSR2 issues. The remaining PSR1 issues will be reviewed again in the PSR3 together with all PSR2 issues that are excluded from the PSR2 action plan. Similar PSR2 issues were merged into groups and are included into action plan. SNSA requested inclusion of additional PSR2 issues in the action plan. There were no major issues identified in the PSR2 which would prevent further safe operation. Application for PSR2 approval was made in December 2013. It is planned that the PSR2 is to be approved by the end of June 2014. The PSR2 action plan shall be implemented in 5 years after PSR2 approval.

Examples of safety relevant issues identified in PSR2 and included into the Action Plan:

- Krško NPP procedures periodic review,
- Root cause analysis and corrective action program,
- Temporary modifications survey,

- Generation and storage of solid radioactive waste,
- Potential wear of steam generators U tubes from secondary side loose parts,
- Personal dosimetry and offsite radioactivity monitoring in case of emergency.

Examples of issues required by the SNSA

- Plant design: population distribution around the site, heavy load drops etc.,
- Equipment qualification: seismic qualification, EM interference, equipment survivability in severe accidents etc.,
- Deterministic Safety Analysis: review of Postulated Initiating Events (PIEs) including external events and combination of internal and external events
- Probabilistic Safety Analysis: High Energy Line Break (HELB), uncertainties analysis,
- Hazard analysis: Internal flooding, Fire Hazard Analysis, Aircraft crash,
- Procedures: shutdown safety, Design Basis Accidents (DBA), Severe Accident Management Guidelines SAMG, Extensive Damage Mitigation Guidelines (EDMG) - aircraft crash, security events.

In response to the Fukushima accident, the SNSA issued a decision to the Krško NPP to perform a Special Safety Review. The programme of this review was completely in line with the ENSREG specifications for European Stress Tests. For the preparation of the stress test report the plant performed some additional analyses (e.g. evaluations of seismic and flooding margins, additional station blackout analyses to support the newest severe accident strategies, drain cycle of the 1E batteries, water heatup and evaporation rate in the spent fuel pool, evaluation of spent fuel pool criticality). The contents of the Krško NPP's safety review report were used as a basis for the Slovenian stress test report.

The results of the stress tests showed that the plant was well designed and constructed and that all potential external events were taken into account during preparation of protective and mitigating measures. In months after the Fukushima accident short-term improvements were performed, what resulted in the procurement of additional portable equipment, e.g. AC diesel generators, pumps and compressors, implementation of quick connection points for this equipment, as well as amendments to the emergency operating procedures and severe management accident guidelines. This also meets B.5.b requirements (referenced in Appendix II).

The Slovenian post-Fukushima National Action Plan (NAcP – in Appendix II) is prepared as a result of all activities executed in Slovenia in response to the 2011 nuclear accident in Fukushima Dai-ichi. These activities include, but are not limited to, the implementation of European Stress test process, review and analysis of possible long-term improvements based on which the Krško NPP's Safety Upgrade Program was prepared, review of several reports, reviews and analyses regarding the Fukushima lessons learned, etc.

However, the core of the national action plan (NAcP) and post-Fukushima improvements is the Krško NPP's Safety Upgrade Program, which was required, reviewed and approved by the SNSA. This program of upgrades was already envisioned in the Slovenian legislation from 2009. It required from the plant to upgrade its systems, structures and components to enable coping with severe accidents after the plant lifetime was extended. After the Fukushima accident the SNSA ordered the plant to implement these measures in advance. The program incorporates several large modifications (safety upgrade of AC power, new pump for supplying steam generators with a dedicated water supply, additional heat sink, additional low and high pressure pumps with a dedicated water, supply, containment filter vent system and passive autocatalytic

recombiners, establishment of emergency control room, fixed spray system around the spent fuel pit, mobile heat exchanger with provisions to quick connect, flood protection upgrade, establishment of new technical support center, upgrade of existing operational support center), which are to be implemented gradually.

The Krško NPP follows the requirements of the United States Nuclear Regulatory Commission regulations and other international practices. An overall "Programme on Inspection of Performance and Equipment Ageing" has been developed with the purpose to determine activities for ensuring long-term reliable plant operation and the supervision over ageing of structures, systems and components. The programme connects different plant programmes, such as In-Service Inspection Programme, Containment Inspection Programme, MOV (Motor Operated Valves) Programme, Snubber Programme, Erosion Corrosion Monitoring Programme, Steam Generators Programme, AOV Programme, Ageing Management Programme, Environmental Qualification Programme and Pressure Vessel Programme, to determine qualitative guidelines for maintaining high availability and reliability of components. Therefore it helps to improve the existing preventive maintenance programmes, the inspection programmes, the timely, appropriate and effective maintenance activities, timely and effective equipment replacement on the basis of ageing evaluation, the long-term planning of major replacements and special replacements, maintenance and inspection activities. The periodical verification of efficient connection of activities from different programmes is required with regard to components failure, the trends of components and systems performance, corrective actions prioritization and the verifying of the status of long-term investment plan and maintenance activities.

As stated above, the arrangements for the improved national framework for nuclear safety, which are provided in national legislation taking into account relevant operating experience, safety analyses, development of technology and results of safety research are being fulfilled by operator and supervised by the SNSA.

Since the introduction of the process for operating experience feedback, 316 events were addressed by the end of 2013, among which 252 were analyzed in detail. Recently, the following activities were carried out by the SNSA from the detailed analyses of foreign experiences: implementation of the thematic inspections (fire hazard, verification of appropriate qualification for equipment under harsh environment, etc.), amending the nuclear legislation (installation of forfeited items was added in the legislation and JV5), implementation of PSA analyses in case of event in the Krško NPP, use of various foreign guidance (e.g. ETSON), as additional reference for the internal SNSA instructions for event analysis, consideration of the idea to introduce the indicators for physical protection, etc. Following the SNSA initiative, the Krško NPP includes experiences in the corrective programs.

Also one of the reasons for one of major modifications in the Krško NPP, reactor vessel head replacement, was primary water stress corrosion cracking event on Inconel 600, which happened at the Davis-Besse nuclear power plant.

As a post-Fukushima action, installation of filtered venting system for containment, capable of depressurizing containment and filtering over 99.9% of volatile fission products and particulates and installation of passive auto-catalytic recombiners in the containment would not have been implemented if that kind of accident had not been occurred.

The operating experience is followed also for the research reactor TRIGA. The reactor TRIGA annual report contains chapter on operating events, which are reviewed by the SNSA staff. The events, which require immediate attention, are thoroughly analyzed for the root causes and the corrective actions are drawn up. One of such examples was fire which started on 17th October 2010 in a special laboratory dryer at the Jožef Stefan Institute hot cell facility which belongs to

the reactor although it is located in adjacent building. The fire was extinguished by the staff. At the time of the fire treatment and preparation of radioactive waste took place and no laboratory staff was presented. The fire in the hot cell facility did not threaten the reactor. There were no radioactive releases to the environment, although local contamination of the facility was presented and decontamination process took place. . A report was prepared about this event and it is available in the IRSRR database.

ARTICLE 5. COMPETENT REGULATORY AUTHORITY

Article 5.1

Member States shall establish and maintain a competent regulatory authority in the field of nuclear safety of nuclear installations.

In Slovenia the Public Administration Act adopted by Parliament defines the functions of Government and its ministries while the Decree on Administrative Authorities within Ministries defines the names of those organizational units within the ministries responsible for administering the specific functions of the ministries. The establishment of the SNSA and its responsibilities are therefore given through the aforementioned Decree:

> *»The SNSA performs specialized technical and developmental administrative tasks and tasks of inspection in the areas of: radiation and nuclear safety; carrying out of practices involving radiation and use of radiation sources, except in medicine and veterinary medicine; protection of environment against ionizing radiation; physical protection of nuclear materials and facilities; non-proliferation of nuclear materials and safeguards; radiation monitoring; and liability for nuclear damage.«*

In February 2012 the Act on Government changed the structure and reduced the number of ministries from the existing 15 to only 11, which practically means that some of so far independent (autonomous) ministries have been merged with others in the new ministries. The SNSA was until then the part of the Ministry of Environment and Spatial Planning (MESP), which ceased to exist. The SNSA became the organizational unit within the newly established Ministry of Agriculture and the Environment (MAE) since the environmental department of previous MESP was merged with the agricultural into new MAE. On the other hand the spatial planning department of previous MESP became a part of the newly established Ministry of Infrastructure and Spatial Planning, which is responsible for the promotion or utilisation of nuclear energy. It has to be pointed out that the legal status of the SNSA remains unchanged and that the SNSA has now (under the MEA) the same level of independence and autonomy as before - when it was under the MESP.

The 2002 Act divided the competencies in nuclear and radiation safety among two regulatory bodies, namely the SNSA and the Radiation Protection Administration (SRPA). As previously already mentioned the SNSA is accountable for nuclear safety and safety of industrial radiation sources, while the SRPA is accountable for radiation protection of patients, medical surveillance of exposed workers, radiological surveillance of workplaces, dosimetry and dose registers and education in the area of radiation protection. Besides this general division, there are some parts of the legislative and regulatory framework, referred to under Article 4.1 of this Report, which are entrusted to other institutions, i.e. the Administration for Civil Protection and Disaster Relief of the Ministry of Defence is accountable for emergency preparedness and planning, while the Ministry of Interior (as of today, after the above – mentioned reorganization of the Government) is responsible for physical protection of nuclear facilities and nuclear materials.

Article 5.2

Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with the promotion, or utilisation of nuclear energy, including electricity production, in order to ensure effective independence from undue influence in its regulatory decision making.

As a regulatory authority in the area of nuclear and radiation safety, the SNSA is a functionally autonomous institution within the Ministry of the Agriculture and Environment (MEA).

The position of the SNSA and the SRPA as well as Civil Protection and Disaster Relief Administration and Ministry of Interior in the governmental structure is shown in the Figure 1.

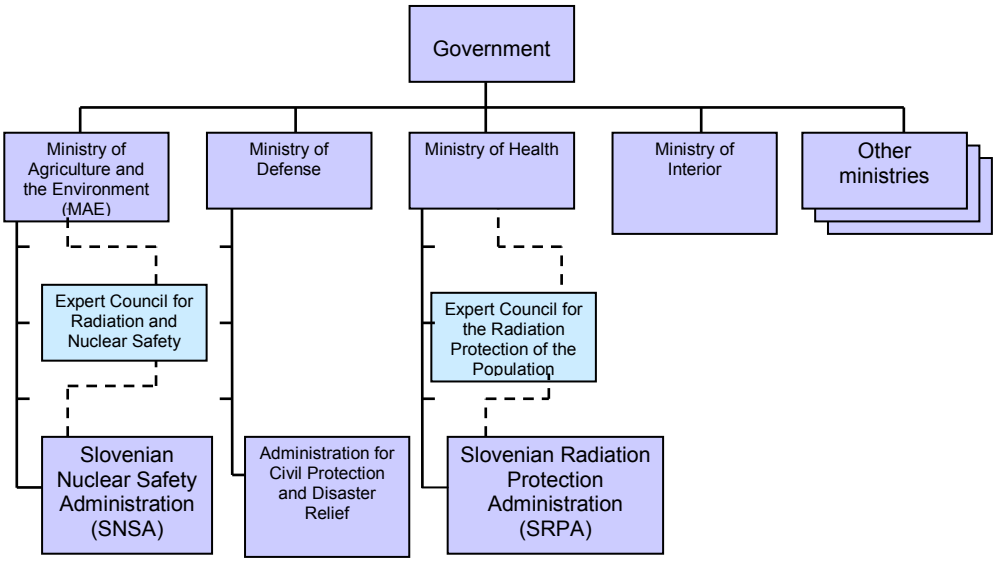

Figure 1: *The SNSA and SRPA within the governmental structure*

Based on the 2002 Act, the Expert Council for Radiation and Nuclear Safety was appointed in mid 2003 as an advisory body to the MAE and the SNSA, and the Expert Council for the Protection of the Population against the Ionising Radiation, for Radiological Procedures and Use of Radiological Sources in Health and Veterinary Care, as an advisory body to the Ministry of Health and the SRPA.

General provisions for independence are included in Article 2 of the Public Administration Act providing that "State Administration carries out its work independently and on the basis of Constitution, laws and regulations."

In Slovenia the Ministry of Infrastructure and Spatial Planning is responsible for developing strategies and for the promotion of the use of nuclear energy. SNSA is part of the Ministry of Agriculture and the Environment, which does not have a role in the promotion of nuclear energy so from this prospective the measures are put in place for ensuring the independence of SNSA as authority for nuclear safety from those entrusted with promotion of nuclear energy and should not compromise it in delivering its regulatory responsibilities.

An appeal process is in place through the 2002 Act, which allows appeals from the licensee to the Ministry of Agriculture and Environment against SNSA decisions on mostly procedural grounds, i.e. whether it had followed the relevant procedures in making its decision. However, there are specific decisions, such as: within the Periodic Safety Review, approval of modifications, consent for start of trial operation, etc. where appeals cannot be made, but the judicial protection is ensured.

With regard to financial resources the main question is related to the capability of SNSA to secure the additional technical support when in licensing process it considers it is necessary. The 2002 Act enables SNSA to independently finance Technical Support Organisations (TSO) when additional expertise is needed to help in making a regulatory decision on nuclear safety matters.

The SNSA prepares annual report on nuclear and radiation safety in Slovenia, which is based also on the contributions of other relevant institutions in Slovenia, e.g. Slovenian Radiation Protection Administration, Administration of the Republic of Slovenia for Civil Protection and Disaster Relief, Ministry of Infrastructure and Spatial Planning, Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection, Ministry of the Interior, Agency for Radioactive Waste Management, Nuclear Insurance and Reinsurance Pool, Fund for Financing Decommissioning of the Krško NPP, the Krško NPP, Žirovski Vrh Mine, Jožef Stefan Institute, Institute of Occupational Safety.

Article 5.3

Member States shall ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework described in Article 4(1) with due priority to safety. This includes the powers and resources to:

(a) require the licence holder to comply with national nuclear safety requirements and the terms of the relevant licence;

(b) require demonstration of this compliance, including the requirements under paragraphs 2 to 5 of Article 6;

(c) verify this compliance through regulatory assessments and inspections; and

(d) carry out regulatory enforcement actions, including suspending the operation of nuclear installation in accordance with conditions defined by the national framework referred to in Article 4(1).

With respect to description of those provisions of Slovene legislation which gives legal powers to the SNSA the aforementioned (see para. 5.1 above) Decree on Administrative Authorities within Ministries specifies the core areas of competence while the 2002 Act and its executive Decrees and Rules provide a more detailed division of responsibilities.

Human resources of the competent regulatory body

Each position in the SNSA organisational chart has recognized necessary competences for the staff member occupying it. When the SNSA employs new (and usually young) members, they usually do not yet have proper competences. In the call for application only formal requirements are required such as education, working experience and knowledge of Slovenian and foreign languages. Once employed, the new employee has to pass the state exam for the public servants, which covers mostly general topics.

It has to be mentioned that due to very strict and restrictive governmental policy on employment for the last three years the SNSA has not employed any new staff member. Due to such restrictive governmental policy even alternative employment was not allowed, e.g. for workers who have been retired or temporarily have been on maternity or sick leave.

At the same time the individual program for acquirement of necessary competences is in progress. The course on Fundamentals of Nuclear Technology and other courses at the Nuclear Training Centre in Ljubljana are included in such program, as well as the events (courses, workshops) organised by the IAEA and some other internationally recognized and proven organizations and/or institutions.

For each year the SNSA prepares the so-called Educational and Training Plan for its employees, in which special attention is given to newly employed colleagues. There are also other tools used for career development of our young staff members, as yearly interviews, on the job training, and so on. Furthermore, so called »Systematic Approach to Training« system is in place at SNSA.

SNSA has comprehensive Management System in place, which is in line with the IAEA GSR-3 and ISO-9001/2008 standards.

Due to the above mentioned governmental policy of not increasing the number of civil servants in administration the SNSA had to focus on improving its efficiency including implementing its own management system. For the time being, the currently available technical staff at the SNSA and TSOs adequately covers the needs in various technical areas and has tools and ability to conduct independent safety analysis, both deterministic and probabilistic. On the other hand, in case of Krško NPP lifetime extension or a new NPP, the technical staff of both, the SNSA and its TSOs should be increased. Preliminary analysis shows that in case the second nuclear unit is going to be built the SNSA would need another 20 new staff. In 2013 the SNSA had 41 employees.

Financial resources of the competent regulatory body

The budget of the SNSA is determined on the basis of the balance between the expenditures and budget from the previous year. The budget is the only source for financing the SNSA basic activities. The operators of nuclear or radiation installations and other licensees do not pay any licensing or inspection fees. The only fee, which is envisaged by the general Act on Administrative Fees, is the so-called administrative tax for the licensing (administrative) procedure, which is of symbolic value. Such fee is paid to the state budget and not directly to the SNSA. Furthermore, if the SNSA determines that some expertise is needed within the licensing (administrative) procedure, the applicant bears costs by the provision of the Act on General Administrative Procedure.

Although the SNSA is a body within the MAE, it still has its own share in the Ministry's budget and is independent in allocating the programs, projects and other expenses from the budget. The State budget is prepared for biennial cycle. The composition of the SNSA budget for 2012, 2013, 2014 and 2015 is shown in the table. This budget comprises all activities within the SNSA competences.

Table 1: The SNSA Budget for 2011, 2012 and 2013

STRUCTURE		**2012 (in EUR)**	**2013 (in EUR)**	**2014 (in EUR)**	**2015 (in EUR)**
Salaries/wages		**1.522.550**	**1.348.855**	**1.318.010**	**1.381.010**
Material expenditures		**295.037**	**280.285**	**519.963**	**519.963**
Investments and maintenance costs		**7.917**	**7.917**	**8.090**	**8.090**
Membership fees: **(IAEA, OECD/NEA membership, USNRC programs)**		**248.415**	**248.415**	**348.415**	**450.000**
Outsourcing	Nuclear safety	75.558	75.558	60.570	61.370
	Radiation safety	138.445	138.445	100.965	100.965
Total		**2.287.922**	**2.099.476**	**2.419.013**	**2.521.398**

Article 5.3(a)

This includes the powers and resources to:

(a) require the licence holder to comply with national nuclear safety requirements and the terms of the relevant licence;

Article 8 of the 2002 Act provides a core commitment of those who carry out radiation practice as well as interventions by the state including costs:

Article 8
(carrying out a radiation practice and the using radiation sources without a licence)

(1) If it has been established that a radiation practice has been carried out or a radiation source has been used without a licence, or prescribed procedures relating a radiation source or radioactive waste were abandoned, the state must take all the measures within its competency to stop the violation of the provisions of this Act and prevent the possibility of uncontrolled exposure.

(2) The costs of stopping the violations and of the prevention of uncontrolled exposure described in the previous paragraph, as well as the costs of the mitigation of the consequences to health and the environment, if these have occurred, are covered by the state if the person who has used or managed a radiation source or who has failed to follow the prescribed procedure for using a radiation source can not be determined or the person in question can not provide the resources for the removal of the said consequences.

(3) The state shall have a right and a duty to recover the costs described in the previous paragraph if the person mentioned in the previous paragraph is identified at a later date.

(4) *On illegal use of a radiation source or on the failure to follow the prescribed procedures for using a radiation source described in the first paragraph of this Article, which could cause an emergency, the ministry competent for the environment and the ministry competent for health, each within its competency pursuant to this Act, must inform the public. The competent ministries from the previous sentence are via the ministry for foreign affairs or directly, if international agreements state so, obliged to also inform the competent authorities in neighbouring countries and international organisations if the consequences of the emergency mean a risk of health detriment for people or a risk to the environment in the countries in question.*

There is also Article 11, paragraph (5), which explains that operation and decommissioning of nuclear facilities are also deemed to be radiation practices:

If carrying out a radiation practice involves the operation or decommissioning of a radiation facility or a nuclear facility, the licence described in Article 79 of this Act shall be deemed as the licence to carry out a radiation practice, except if within the radiation facility radiation sources are used for carrying out a radiation practice in health or veterinary care.

Article 57 of the 2002 Act has even more precise and on nuclear facility and nuclear safety oriented provisions:

Article 57
(prohibition and ensuring safety of a facility)

(1) A nuclear facility, a radiation facility or a less important radiation facility may not be constructed, tested, operated or used in any other way, or permanently cease to be used without a prior approval or licence pursuant to this Act.

(2) The safety of a facility referred to in the previous paragraph, including the safety of radioactive substances, radioactive waste or spent fuel management which arecontained or produced in a facility, must be ensured by the operator.

Article 80.a of the 2002 Act provides for general description of radiation or nuclear facility's operator obligations, which are elaborated in more detail in the implementing Rules:

Article 80a
(operation of a facility)

(1) *The operator of a radiation or nuclear facility must ensure in the operating life of a facility to:*

1. *operate or trial operates in accordance with the approved operational limits and conditions,*
2. *use written procedures for the operation, the trial operation, the cessation of the operation or decommissioning of a facility, which should cover all states of a facility, foreseen in the safety analyses report,*
3. *monitor their own and foreign operating experiences,*
4. *monitor operating indicators that show the safety and the operation of a facility,*
5. *monitor the process of aging of the equipment and implement the measures to reduce or eliminate the effects of these processes,*
6. *maintenance, review and test the systems and facility's components, thereby ensuring its availability, reliability and ability to fulfil its functions,*
7. *have a designed and, if necessary, implement protection and rescue plan, which is coordinated and implemented in accordance with other bodies and organizations competent for dealing with a nuclear accident,*
8. *provide training and improvement of the employees and outside undertakings in a radiation or nuclear facility,*
9. *handle the radioactive waste in the way to produce as little radioactive waste and its releases into the environment by the activity and the scope and that it is processed and stored in a way, suitable for disposal and coherent with the national management programme for radioactive waste and spent fuel,*
10. *provide operational monitoring of radioactivity in the vicinity of a radiation or nuclear facility.*

(2) *The minister competent for the environment shall define in detail the requirements for the operation and trial operation of a nuclear or radiation facility, the use of written procedures, the monitoring of operational experience, the monitoring of operating indicators, the monitoring of aging process and the implement measures to reduce or eliminate the effects of these processes, the maintenance, the review and the testing of facility's systems and components, providing training and improvement of employees and outside undertakings in a facility, the radioactive waste management and the provision of operational monitoring of radioactivity in the vicinity of a radiation or nuclear facility.*

(3) *The minister competent for the environment, in agreement with the minister competent for the protection against natural and others disasters, shall define in detail the requirements for making the protection and rescue plans for nuclear and radiation facilities.*

Based on the provision of 2 paragraph of Article 80.a the Rules JV 9 has been adopted which stipulates detailed requirements on subject matter. Rules JV 9 has the following provisions:

- written procedures for the operation or decommissioning of a radiation or nuclear facility: *Article 5: "the facility operator of a radiation or nuclear facility shall develop and implement written procedures for the facility operation, termination of operation or decommissioning, which shall cover all the states of the facility envisaged in the safety analysis report……";*

- operational experience feedback programme and monitoring of operational indicators: *Article 7: "The facility operator of a radiation or nuclear facility shall establish and conduct a programme to collect, screen, analyse, and document operational experience….."*; and Article 11: "*The facility operator of a radiation or nuclear facility shall have a programme of the monitoring of operational indicators which show the safety and performance of the facility. Each indicator shall be defined and shall be provided with an evaluation procedure, taking into account international experience."*;
- ageing management programme: *Article 15: "(1) The facility operator of a radiation or nuclear facility shall shall have an ageing management programme to identify all ageing mechanisms relevant for structures, systems and components (SSCs) important to safety, determine the possible consequences of ageing, and determine necessary activities in order to maintain the operability and reliability of these SSCs. ….. ".*

The description of the examples of implementation of these powers is in the licenses and their numerous amendments issued to the licensees. The format of these documents is a decision and for the Krško NPP the summaries of these decisions are made public: http://www.ursjv.gov.si/si/jedrski_in_sevalni_objekti/nuklearna_elektrarna/spremembe_v_nek/

Article 5.3(b)

This includes the powers and resources to:

(b) require demonstration of this compliance, including the requirements under paragraphs 2 to 5 of Article 6;

Below are some examples of legal provisions which bind the operator of a nuclear installation (see 5.3.(a) above) to report how the commitments, required by the same legislation, are met:

- operational experience feedback programme and monitoring of operational indicators:
  - *Article 13 of Rules JV9 :"The facility operator of a radiation or nuclear facility shall submit to the SNSA:*
    - *the operational experience feedback programme referred to in Article 7 of these Rules;*
    - *the programme of the monitoring of operational indicators referred to in Article 11 of these Rules;*
    - *any modification of or amendment to the programmes referred to in this article.";*
- ageing management programme:
  - *Article 16: "The facility operator of a radiation or nuclear facility shall submit to the SNSA the ageing management programme and any modification of the programme or amendment to the programme;*
  - *Article 23: "The facility operator of a radiation or nuclear facility shall submit to the SNSA the programmes of SSC maintenance, testing and inspection and any modification or amendment of such programmes;*
- reporting on radiation and nuclear safety:
  - *Article 24: "The facility operator of a radiation or nuclear facility shall submit to the SNSA on normal operation and on operational experience feedback and additionally on events. Regular reports on operation include: daily, monthly, quarterly, annual reports; and reports on outages. Special reports on events shall be made taking into account the importance of an event for radiation or nuclear safety.*

The format of the above mentioned reports is set out in Annexes, which form a constituent part of Rules JV9.

Another example of operator's commitment to demonstrate how it meets the nuclear safety requirements is related to the Periodic Safety Review concept.

Article 82 of the 2002 Act requires that a report shall be made about the periodic safety review, which is sent to the regulator for approval. In this Article operator is required to make a proposal for modifications, which may arise from change of limiting conditions for operation, if such a change increases nuclear safety. Approved report is a condition for extension of the operational licence.

Article 82
(report on an periodic safety review)

(1) The operator must draw up a report on the periodic safety review and hand it to the SNSA for approval.

(2) When it follows from a report on a periodic safety review that it shall be necessary to change the conditions of operation or the limitations from the safety analysis report with a view to improving radiation or nuclear safety, the operator must draw up a proposal for the necessary changes.

(3) A operator must also attach to an application for a confirmation of a report on an periodic safety review an opinion from an authorized expert for radiation and nuclear safety.

(4) The approved report on a periodic safety review shall be the condition for renewing a licence for the operation of a facility referred to in Article 79 of this Act.

The list of statutory provisions requiring the operator of a nuclear installation to demonstrate the evidence of fulfillment of its legal commitments is extensively elaborated in rules JV 5 and JV9. Here we give one more example from 2002 Act, Article 87, which requires from the licensee regular reporting to the regulator about: malfunction of the equipment, human errors – which may lead to an emergency, non-compliances with the limiting conditions for operation. More detailed reporting obligation (contents, scope and frequency of the reports) is in Rules JV 9. Article 87 is as follows:

Article 87
(reporting on the operation of facilities)

(1) The operator of a radiation or nuclear facility must report regularly to the ministry competent for the environment on the operation of the facility.

(2) Notwithstanding the provisions in the previous Article, a operator must give exceptional reports to the ministry competent for the environment on the following:

- *equipment faults which could cause an emergency, emergencies and measures taken for the mitigation of the consequences of the faults or emergencies,*
- *mistakes made by workers while handling or operating a facility, which could cause an emergency,*
- *deviations from operational conditions and limitations, and*
- *all other events or operational circumstances which significantly affect the radiation or nuclear safety of the facility.*

(3) The minister competent for the environment shall define for each type of nuclear or radiation facility the content, extent and frequency of regular reports, as well as the content and the extent of exceptional reports referred to in the previous paragraph, and the deadlines for the reports.

The SNSA decisions represent the examples how safety requirements were imposed to the licensees. For instance, approval of Ageing management program was one of the prerequisites for lifetime extension of the Krško NPP. Application was also reviewed by the international team of experts, SNSA also reviewed reports regarding aging management review and performed review and assessment of all programs related to aging management and all time- limited aging analyses. SNSA review included also walkdowns and application was approved in June 2012. The SNSA issued three post-Fukushima decisions to the Krško NPP on:

- performing an extraordinary PSR in line with specifications for European Stress Tests,
- reassessment of the severe accident management strategy and implementing safety improvements for prevention of severe accidents and mitigation of its consequences,
- reviewing bases for emergency planning and response including emergency planning zones.

Operators of a radiation or nuclear facility regularly report as required in Article 87 of the Act and in line with the provisions of Rules JV 9 which contains details about reporting as required in Article 97(c).

Article 5.3(c)

This includes the powers and resources to:

(c) verify this compliance through regulatory assessments and inspections; and

In order to get a operation licence the 2002 Act requires the operator to produce a safety report, which must be updated with all modifications and changes made during trial operation; the safety report needs to be reviewed by the authorized expert for radiation and nuclear safety and the SNSA.

The same act requires the operator of a nuclear installation to perform periodic safety review. Frequency, scope and contents are defined in the Rules JV9 – i.e. once in 10 yrs). Again a report on such review is reviewed by the authorized expert for radiation and nuclear safety and the SNSA.

With respect to legislative provisions which ensures that measures are in place for prevention of accidents and mitigation of consequences the section 4.10 of the 2002 Act (Articles 104 to 109) are to be mentioned as well as Section VII.2 of Rules JV9 (Articles 59 to 66); the Rules on Radiation and Nuclear Safety Factors (Rules JV5) furthermore prescribe that the operator of radiation and/or nuclear installation has to submit (among other documentation) with the the application for consent for the start of trial operation and for an operating licence for a radiation or nuclear facility an emergency plan to the SNSA.

Operator's management system is dealt with in Article 63 of the 2002 Act, while in JV5 has in Section V (Articles 49 to 61) detailed provisions on "safety and quality management"; again the same Rules prescribes that the operator of radiation and/or nuclear installation has to submit (among other documentation) with the application for consent for construction of a radiation or nuclear facility, consent for the start of trial operation and for an operating licence for a radiation or nuclear facility a management system documentation to the SNSA.

Regarding provisions on operator's financial and human resources the 2002 Act in article 61 and 62 respectively covers these aspects:

Article 61
(provision of financial resources)

(1) The operator of a radiation or nuclear facility must have sufficient financial resources guaranteed throughout the operating of a facility and until decommission is complete and, if the facility is a repository, for its long-term control after closure for implementing the prescribed measures of radiation or nuclear safety.

(2) …….

Article 62
(workers qualifications)

(1) Throughout the operating lifetime of a radiation or nuclear facility and until decommissioning is completed, the operator thereof must ensure a sufficient number of workers with appropriate knowledge and skills, who are qualified and additionally trained for all the work activities relating to radiation and nuclear safety. The operator must ensure the right attitude of workers towards radiation and nuclear safety.

And again, the Rules JV5 furthermore prescribes that the operator of radiation and/or nuclear installation has to submit (among other documentation) with the the application for consent for the start of trial operation and for an operating licence for a radiation or nuclear facility a documentary evidence of the financial resources to the SNSA.

As already explained the 2002 Act in Article 138 deals with inspection. The inspector may:

- issue written decisions and conclusions in the administrative (i.e. inspection) procedure,
- require from the operator implementation of nuclear and radiation safety measures,
- stop (suspend) the practice or activity , if the license has not been issued, or by the rules defined measures were not observed by the licensee.

A more detailed description of the legal bases for the inspection powers is given in this Report under 4.1. (c) above.

One of the important SNSA activities is safety assessment and approval of modifications and improvements in the Krško NPP, which stem mostly from operational experience., as well as they are based on the world practice and the latest achievements in the nuclear field. Changing the nuclear facility design basis could influence nuclear safety. Due to this fact all modifications have to be under rigorous control and properly documented. Following Article 83 of the Act on Ionizing Radiation Protection and Nuclear Safety, the SNSA conducted the process for approval of all safety important facility modifications and most of those modifications led to changes of conditions and limits for operation. Also the safety assessment of expert organization is required for all this modifications, which is enclosed to operator's safety evaluations and design modification package, the most important document to indicate, that modification has no negative influence to nuclear safety.

Significant example is a regulatory assessment of the most extensive modification in the 2012 outage, which was replacing the reactor vessel head and all associated equipment. This modification was subject of extensive pre-licensing process, because there was many technical documents to review even before the licensing documentation arrived. The modification comprised the replacement of the vessel head, new cooling shroud support ring, replacement of control rod drive mechanisms, thermal insulation for the dome and flange, core exit thermocouple nozzle assemblies, neutron shielding, simplified head assembly to facilitate the

refueling process and reduce the time required to remove the reactor vessel closure head in the refueling procedure and thermal sleeves. Also the four partial length control rods have been eliminated. For all parts of modification, the preliminary expert assessment was made by the TSO and reviewed by the SNSA. After the positive final expert assessment and comprehensive regulatory review of other documentation, SNSA approved modification before 2012 outage.

Assessment of other significant improvement made during the 2012 outage, which was the introduction of third safety diesel generator, is a good example of comprehensive regulatory assessment prior approval. The new diesel generator and its supporting components are housed in a new seismic category I safety related emergency diesel building. The diesel generator serves as an alternate AC source to the plant in case of a total loss of on site and off site power substituting any of the existing plant emergency diesel generators.

Recent major modifications, which were implemented in outage 2013, such as RCS Temperature Measurement Optimisation, were also subject of the extensive SNSA assessment. First, there was pre-licensing phase with review of different technical topical reports and finaly safety evaluations with positive expert opinion and SNSA approval before outage 2013.

In the framework of the Safety Upgrade Program after Fukushima there is an example of the installation of filtered venting system for containment and installation of passive auto-catalytic recombiners in the containment. Both were approved by the SNSA after the safety assessment, which included review of technical and licensing documents, expert assessment, also the audits and meetings with Krško NPP were carried out before approval.

In general, the inspection is included in the early stage of licensing and review and assessment process. The inspectors take part in hearings the licensing section has with the licensees to get familiar with current status. The inspectors monitor also all activities at the licensees when the licensing process takes place. E.g. the inspectors follow all preparatory work at licensees including writing the procedures, training, additional analyses, as well as implementation of physical preparatory activities, which require previous approval by the SNSA. For more sophisticated modifications the inspectors witness acceptance testing at the supplier, e.g. the manufacturing of reactor vessel head at Westinghouse in Santander, Spain. The inspectors are witnessing acceptance testing during installation process, on-site acceptance testing and regular surveillance testing. During the outage the inspectors get support from the TSO staff, who are hired to assist the SNSA in overseeing outage activities, including installation of modifications. The inspectors oversaw preparatory activities for installation of passive filtered venting system, which started many months before the actual installation, as well as they monitored construction of the 3rd diesel generator building construction. They also followed steps that the passive catalytic recombiners and the RCS Temperature Measurement Optimisation modification were implemented in line with their respective approvals issued by the SNSA.

Article 5.3(d)

This includes the powers and resources to:

(d) carry out regulatory enforcement actions, including suspending the operation of nuclear installation in accordance with conditions defined by the national framework referred to in Article 4(1).

The responsibility of enforcement rests first with the SNSA inspection staff. The inspectors, based on the inspection observations and document investigation, may issues decisions, conclusions and orders. They may also issue the cessation of an activity or the use of a radiation

source in limited situations such as the lack of a license or deviation from prescribed methods of handling radiation sources.

The enforcement tools available to the SNSA are (not in order of application):

- Verbal warnings,
- Written warnings,
- Orders,
- Cessation of activities,
- Initiation of prosecution for some administrative offenses or criminal offences as defined by law.

Furthermore, the SNSA has the possibility to fine for offenses, which are regulated the 2002 Act, in its penal provisions (Article 139).

Most of the open issues with the licensees are recorded in the inspection reports and are as a rule closed in due time. The closure of these items is also documented in the inspection reports. For commitment tracking of these open issues the inspection has a software which serves as a logbook of those issues, as well as it sends messages to the relevant inspector when the commitments are due to be finished in order to notify him/her to check the status with the licensees.

The inspection issued written warning in line with the Act on Inspection to the Krško NPP, when the licensee did not report on unsuccessful start of the fire protection pump. Another example of written warning to the Krško NPP was to write a procedure for the 3rd diesel generator, because before that only temporary instructions and manufacturer's manual existed. The inspection required cessation of all activities when an incident happened in which the bridge connecting reactor vessel head and the reactor cavity fell because of a broken wire during the outage 2012.

ARTICLE 6. LICENCE HOLDERS

Article 6.1

Member States shall ensure that the prime responsibility for nuclear safety of a nuclear installation rests with the licence holder. This responsibility cannot be delegated.

The provisions on the prime responsibility of the license holder for the safety of nuclear and radiation facilities and also for the safety of spent fuel management or radioactive waste management are contained in the 2002 Act and the details are explained in the paragraphs to follow.

The Article 4 (the main principles), paragraph 6, of the 2002 Act states the principle of prime responsibility: »The user of a radiation source shall be responsible for radiation protection and the facility operator shall be responsible for the nuclear safety of a nuclear facility.«

Throughout the 2002 Act there are several provisions which emphasize the implementation of the above stated principle. For example, the 2002 Act states that the operator of a radiation or nuclear facility shall:

- ensure the safety of a concerned facility, including the safety of radioactive substances, radioactive waste or spent fuel management, which are found or produced in a facility (Art. 57),
- ensure that programs of recording and analysing operational experience at nuclear facilities are implemented; in the assessment, examination and improvement of radiation and nuclear safety, the operator must take into account the conclusions of such programs (Art.60),
- have sufficient financial resources guaranteed throughout the operating lifetime of a facility for implementing the prescribed measures of radiation and nuclear safety (Art.61),
- ensure, throughout the operating lifetime of a facility, a sufficient number of qualified workers with suitable education, additionally trained for the activities related to radiation and nuclear safety (Art. 62),
- set up and implement a quality assurance programme (Art.63).

In addition the Rules on Radiation and Nuclear Safety Factors (JV 5) and Rules on Operational Safety of Radiation and Nuclear Facilities (JV 9) include provisions for the implementation of »prime responsibility« for nuclear safety of the operator in day-to-day activities.

For example, Rules JV 5 provides for the following:

- The investor/operator shall ensure that the plant is operated in a safe manner and in accordance with all applicable legal and regulatory requirements; the investor/operator shall ensure that decisions on safety matters are preceded by appropriate investigation and consultation so that all relevant safety aspects are considered. Safety issues shall be subjected to appropriate safety review by a suitably qualified independent review function [Art.49/(1),(2)];
- The investor/operator shall ensure that safety performance is continuously monitored through an appropriate review system in order to ensure that safety is maintained and improved as needed; the investor/operator shall ensure that relevant operating experience, international development of safety standards and new knowledge gained through R&D projects are analysed in a systematic way and continuously used to improve the plant and the investor/operator's activities; the investor/operator shall ensure that plant activities and processes are controlled through a documented management system covering all activities, including relevant activities of vendors and contractors, which may affect the safe operation of the plant [Art. 49/(4),(5),(6)].
- A written safety policy shall be issued by the investor/operator as a documented commitment to a high nuclear safety performance. Such safety policy shall:
    - include the commitment to ensure resources needed for reaching the planed goals,
    - be clear about giving safety an overriding priority in all plant activities
    - include a commitment to continuously develop safety,
    - require directives for implementing the policy and monitoring safety performance,
    - require safety objectives and targets, clearly formulated in such a way that they can be easily monitored and followed up by the plant management (Art.50/(1), (2)).
- The investor/operator shall prepare the organisational structure for safe and reliable operation of the plant, and for ensuring an appropriate response in emergencies; such a organisational structure shall be justified and documented (Art. 51/(1)).

– The operator shall always have in house sufficient personnel with suitable competences to understand the licensing basis of the radiation or nuclear facility as well as to understand the actual design and the operation of the facility in all its states, to develop project tasks and acceptance criteria to outsource works relevant to radiation or nuclear safety to contractors, to supervise the execution of such works and to evaluate them upon acceptance (Art. 52/(5)). This provision ensures that responsibility for nuclear safety can not be delegated to the contractor.

Also, Rules JV 9 contains many provisions which clearly address the prime responsibility of a licence holder for nuclear safety. Some of them are indirect and require preparation of Operational Experience Feedback Programme (Art.7), Performance Safety Indicators Programme (Art. 11) or Ageing Management Programme (Art 15).

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

A clear requirement for the handling of radioactive waste and spent fuel is set in Article 93 of the 2002 Act, which provides that the holder of radioactive waste and spent fuel shall ensure that the radioactive waste and the spent fuel are handled in the way prescribed and that transfer of the burden of disposing of radioactive waste and spent fuel to future generations is avoided as far as possible. The person responsible for the generation of radioactive waste and spent fuel must ensure that the radioactive waste is produced in the smallest possible quantities.

The costs of radioactive waste and spent fuel management must be paid by the person responsible for its generation or by the holder of the waste if the ownership was transferred to him by the person responsible for its generation, or if he acquires it in any other way.

If the person responsible for the generation of radioactive waste or spent fuel is not known, the state must assume full responsibility for its management.

The holder of radioactive waste and spent fuel must report the information on generation of radioactive waste and spent fuel to the SNSA, which is maintains the appropriate central register.

Each licence holder shall meet its responsibilities according to described provisions that also ensure that responsibility for nuclear safety cannot be delegated.

Article 6.2

Member States shall ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess and verify, and continuously improve, as far as reasonably achievable, the nuclear safety of their nuclear installations in a systematic and verifiable manner.

The 2002 Act requires that licensee shall prepare safety analysis report for a nuclear facility under construction, commissioning or operation, following termination of operation or under decommissioning. Details of radiation and nuclear safety, as well as operational safety of radiation and nuclear facilities are regulated by the secondary legislation. The 2009 Rules on Radiation and Nuclear Safety Factors (JV5) contains provisions that the safety analysis report must provide information on the facility including details allowing independent assessment of the safety of the facility. It also gives an exhaustive list of topics which have to be included in the report, like safety basis and project concepts, an analysis of the location, object technical characteristics, programs for quality assurance, the evaluation of the protection of exposed workers against radiation, programs for pre-operating tests and programs for trial operation, training programs,

the assessment of the exposure of the population and the environment, a safety analysis, the anticipated discharge of radioactive substances into the environment, and emergency planning. The JV9 ensures legal basis for the assessment of the nuclear facility safety throughout its life.

Regarding modifications, the 2002 Act requires that for each intended change relating to the facility or to the management method used or to the operation of the facility, including maintenance work, surveillance, testing or the introduction of a technical, organizational or any other change which affects or could indirectly affect the content of the safety analysis report, the licensee must evaluate the change in relation to its significance for radiation or nuclear safety.

Modifications are classified into three categories with regard to their importance to radiation or nuclear safety (described in Chapter 4.1(b)).

The 2002 Act requires that the licensee of a nuclear facility ensures to the regular complete and systematic assessment and examination of radiation and nuclear safety of the facility by the periodic safety review (PSR) which has to be performed every ten years. The operator must draw up a periodic safety review report and hand it over to the competent regulatory body.

Approved safety review report is a condition for further operation of a facility. Detailed information about performing PSR is presented in Rules JV9 and in the practical guidance issued by the SNSA "The Content and Scope of Periodic Safety Review of Radiation or Nuclear facility". The SNSA can require an extraordinary safety review if new and important evidence on the radiation or nuclear safety of a facility has come to light.

Thus at the Krško NPP a comprehensive program is established for the design modification control, which defines the roles and responsibilities of the site organizational units involved in the Plant Modification Process. For performing plant modifications, guidance is provided for the NPP staff as well as for the contractors. The screening criteria for determining the need for safety evaluations, guidance for the performance of these safety evaluations and the requirements for documentation review and approval are specified in Rules JV9.

A set of procedures covers all aspects of design modifications, from request, prioritization, safety screening, the preparation of the design package, review, the preparation of installation package, to the evaluation of impact, testing/commissioning requirements, documentation revision and modification hand over.

The control of temporary modifications is done by a specific procedure which requires safety screening and evaluation similarly to the one for permanent modifications.

The licensee's obligations including documentation for granting an authorization for modifications are prescribed in the 2002 Act and more specifically in Rules JV9. The SNSA reviews in detail the submitted documentation and assess it. In case of the modifications of 3rd category the review and assessment are also done by the TSOs, which write a technical assessment and submit it to the regulatory body. The methodology to be used for the assessment and classification of changes is set in Rules JV9.

At the SNSA an information system is used for archiving modification data. It is also useful for modification reviewes. In general, the information system stores the following operational experience (OE) data: on-site events, plant trips, modifications, and corrective actions. Also, the Krško NPP PSA model, inspections database, SNSA decisions issued to licensees, interesting operation events from foreign NPPs, radiation sources database, contracts, open problems, the register of persons and organizations are accessible through the SNSA information system.

At the time of writing the Krško NPP is in the process of completion of the second Periodic Safety Review (PSR). The first PSR action plan led to some important improvements like installation of the third emergency diesel generator and upgrade of flood protection dikes. The

additional diesel generator greatly increases the Krško NPP safety in case of a seismic event and also other events with loss of offsite power. Around 35% reduction of total CDF was achieved. After raising the flood protection dikes upstream of the Krško NPP the plant can not become surrounded by water even during the probable maximum flood.

The periodical verification of efficient connection of activities from different programmes is required with regard to components failure, the trends of components and systems performance, corrective actions prioritization and the verifying of the status of long-term investment plan and maintenance activities.

In addition In-Service Inspection, Corrosion and Erosion Monitoring programmes for the primary and secondary systems and components and are carried out by the plant's specialists and subcontractors. All programs are in compliance with the US NRC regulatory policy 10 CFR50.55 and ASME Code XI. The results of the In-Service Inspection are reviewed and evaluated after each outage. The procedure for the correction of deviations has been established.

Monitoring the effectiveness of maintenance is implemented by the Maintenance Rule program. The Maintenance Rule Expert Panel quarterly evaluates and reports on the performance or condition of structures, systems and components. Maintenance Rule scoping, performance criteria and implementation are performed according to updated procedures.

In 2012 the SNSA issued a decision which allows the Krško NPP to extend life span beyond 2023, if the specified conditions are met. The US NRC requirements were used in the regulatory process. Amongst the conditions to extend its operational life span, the Krško NPP will have to finalize already planned safety upgrades, to regularly implement periodic safety reviews in ten year cycle and to maintain Ageing Management Programme (AMP). AMP was developed in accordance with the NRC requirements from 10 CFR 50.54 (License Renewal Program). The objective of the AMP is to determine whether ageing processes are being managed effectively and if the required safety margins are maintained.

With the purpose of establishing and maintaining evidence that structures, systems and components will perform their function under normal and accidental environment conditions, the "Environmental Qualification Programme" (EQ) is being developed together with appropriate procedures. In accordance with requirements from 10 CFR 50.49 and standard IEEE 323-1974, the EQ program includes safety related electrical equipment located in harsh environmental conditions.

Legal provisions for the operational experience feedback at the licensee are contained in Chapter II.2 of the JV 9.

In accordance with the Article 60 of the 2002 Act (the use of experiences gained during operational events), the operator of a nuclear facility shall ensure that the programs for recording and analyzing operational experience at the nuclear facility are implemented.

In the assessment, examination and improvement of radiation and nuclear safety, the operator of the nuclear facility must take into account the conclusions of the programs referred to in the previous paragraph.

At the Krško NPP, the root cause analysis of significant events is performed. The lessons learned from the analysis are followed up and training is given where appropriate. The plant aggregates a large number of cause categories into smaller categories to obtain a more meaningful trending analysis, facilitate the preparation of management reports, and create a selection of appropriate action plans covering an adequate scope. Human performance is included in the root cause analysis through the event and causal factor charting, barrier analysis and change analysis. The plant policy for a restart following a reactor trip requires that the cause of the trip is known,

understood and corrected before the restart. The SNSA supervises corrective actions, defined by the facility. More complex events are also analyzed through internal SNSA investigation and the results are compared to the facility's corrective actions. If necessary, additional actions are required.

An operating experience feedback program is in place, which includes the consideration of in-house as well as external operating events. This activity is performed by the Independent Safety Engineering Group (ISEG). The program has been expanded by developing a corrective actions program including low level events and near misses, all types of deviations, failures, malfunctions, and deficiencies.

Off-site event reports safety screening is part of the Krško NPP operating experience assessment program. Off-site event reports are provided by the SNSA, IAEA, INPO, NRC, WANO, NUMEX, Westinghouse and PWROG. The Krško NPP shares all on-site events for which investigation was performed within INPO/WANO Newsgroup and NUMEX. These events are significant occurrences which affect plant safety (e.g. transients, redundant safety system malfunctions, events involving nuclear safety, fuel handling and storage, excessive radiation exposure or personnel injury, excessive discharge of radioactivity, management needs. and personnel or general public), less significant SSC (systems, structures, components) or human deficiencies which affect plant safety or reliability (e.g. deficiencies in design, analysis, operation, maintenance, procedures or training, unplanned radiation exposure or major equipment damage) and minor conditions which affect the quality of process (failures on non-safety SSC, minor human issues, non-radiological environmental events, and isolated seismic deficiencies on components). The technical director confirms the suitability of reported information which is prepared according to the WANO operating experience programme guideline.

The plant performance monitoring program covers about 98 indicators. The Krško NPP has been collecting performance indicators for many years and preparing annual reports that provide results for the international performance indicators defined by the World Association of Nuclear Operators (WANO).

Besides the Krško NPP set of indicators, the SNSA developed an internal set of indicators. With respect to Krško NPP indicators and yearly reporting, some SNSA indicators are evaluated through monthly or quarterly periods.

The Slovenian Nuclear Safety Administration carries out its responsibilities with a combination of tasks, e.g. inspections, review of documents, approval of modifications and regular monitoring and evaluation of the NPP's performance. During the refueling outage the technical support organizations are engaged to oversee and evaluate selected activities of plant maintenance and testing. This is an extensive support to the SNSA inspectors, since about thirty additional people are involved, and they regularly report about their work and findings to the SNSA inspectors. The Slovenian Nuclear Safety Administration does not have resident inspectors on site. Inspectors are based at their headquarters in Ljubljana about 100 km from the plant and they perform regular inspections in the Krško NPP about twice a week. Yearly, there are about 100 inspection days on site during non-outage years. Furthermore, the inspectors are present every day at the NPP during the outages. For the TRIGA research reactors there are about two inspections per year and the central radioactive waste storage is inspected once a year.

In the end of the outage, the SNSA prepares a report named "The analysis of outage at the Krško NPP", which includes a list of planned SNSA actions aimed to improve oversight over the findings identified during outage or to eliminate deficiencies found at the Krško NPP during the outage.

The application for the PSR program for TRIGA was approved in November 2011. The PSR comprises 14 safety factors (as in the IAEA standard for PSR). The PSR scope is in line with requirements for NPP with some additions for research reactors like periodic review of TRIGA decommissioning plan and review of role of the TRIGA Safety Committee. The PSR is to be completed in 2014. Currently 8 PSR topical reports have been delivered to SNSA by mid-2013. PSR is used by TRIGA operators as a process to implement requirements of regulations JV5, JV7 and JV9 (WENRA reference levels): Program of operational experience, Aging Management Program, Radwaste management program, Qualification of SSCs, Preliminary decommissioning program, Review of Design bases events and analyses, Review of RERP etc.

Upgrade of the safety analysis report is going on for TRIGA to bring it in line with requirements of the regulations JV5, JV7 and JV9 as well as to include improvements that derive from INSARR mission (2012) requirements.

Management of radioactive waste generated by small producers (medical and industrial applications, research activities), was delegated to the non-profit public company, i.e. to the waste management agency ARAO. It includes: receipt of waste at the producer's premises, transport of waste, treatment and conditioning, storage and future disposal of waste. The ARAO is also responsible for the management of radioactive waste in the case of industrial accidents and of historical waste.

ARAO operates the centralised storage facility (CSF) for radioactive waste of small producers. CSF has status of a nuclear facility. In order to comply with regulatory requirements, major refurbishment of the storage was finished in 2004. The Safety Analysis Report was updated and the license for two-year trial operation was issued in 2005. Until mid 2007 all deficiencies that occurred during the trial operation were corrected and some additional improvements were made. The Safety Analysis Report was updated again. At the end of this process in early 2008 the ARAO obtained from the SNSA the operating license for the Central Storage for Radioactive Waste which is valid for 10 years.

Although the major refurbishment and safety improvements were made in the past, ARAO is still continually improving safety since then. The repacking and conditioning of waste was performed in steps over several years in the nearby hot cell facility. In 2008 the ARAO finished the characterisation, treatment and conditioning of all historic waste packages. All non-radioactive material, empty packages, and waste which already decayed below clearance limits were exempted from storage. The volume of LILW was reduced by approximately 30 %. In 2010 all wet waste was retrieved from storage, dried, packed, and returned to the storage. To further improve the safety ARAO plans to replace the wooden pallets with the stainless steel self supporting pallets.

The procedures for periodic safety review and for modification management of the CSF are the same for all nuclear facilities and already described above. ARAO has several programmes and procedures in place. A QA system of the ARAO is documented by a quality manual including administrative and working procedures, covering all aspects of waste management in the Central Storage for Radioactive Waste in Brinje and radiation protection dealing with waste.

Radioactive waste management and other activities in the storage are performed according to the procedures. For non-regular tasks the radiation exposure of workers is estimated in advance and optimised in accordance with ALARA procedures.

Article 6.3

The assessments referred to in paragraph 2 shall include verification that measures are in place for prevention of accidents and mitigation of consequences of accidents, including verification of the physical

barriers and licence holder's administrative procedures of protection that would have to fail before workers and the general public would be significantly affected by ionizing radiations.

A potential investor shall obtain a construction license for a nuclear facility from the Ministry for Infrastructure and Spatial Planning on the basis of the Construction Act (Official Gazette RS, No. 102/04). The investor can submit an application for it only after the SNSA gives its consent for construction. The submitted application for the consent for construction needs to include project documentation (e.g. design for construction license), a Safety Analysis Report including relevant evaluations, the opinion of an appointed expert for radiation and nuclear safety, decommissioning programme, and other documents. The contents of the project documentation and other conditions are prescribed by the Rules JV5.

In the Rules JV 5, Article 3 the principles of defence in depth, single failure, redundancy, independence, diversity, safe failure and graded approach are provided. Article 4 contains general design basis requirements, inter alia, prevention of accidents with excessive exposure of people including severe accidents. Article 7 contains design bases for systems, structures and components. In the Appendix 1 of JV 5 provides for the design bases for nuclear power plants, which define basic design bases, safety functions (criticality, sub-cooling, residual heat removal,…), safety analysis, technical requirements for barriers (cladding, pressure boundaries including containment), characteristics of systems including reactor protection system.

The 2002 Act and the Rules JV5 provision the defence in depth concept as the fundamental principle. According to the Rules, this concept shall be used as the basic design criteria for designing a nuclear facility and especially for designing safety systems, systems for mitigating radioactive releases and fire protection systems. Also the JV5 stipulates that external hazards must be considered in the design bases of the plant. As a minimum, the following external initiating events must be taken into account:

- extreme winds;
- extreme outside temperatures;
- extreme rainfall, extreme snowfall, flooding, extreme cooling-water temperatures and freezing;
- earthquakes;
- aircraft crashes;
- other events on nearby transport routes, in industrial facilities or within the site region that might lead to fire, explosion or other hazards to the safety of the nuclear power plant.

The Krško NPP was designed and constructed in compliance with the US NRC "General Design Criteria (GDC) for Nuclear Power Plants", Appendix A to 10 CFR 50, thus ensuring the use of the criteria such as single failure, protection by multiple fission product barriers, redundancy, independency, diversity, fail safe failure modes, and so on.

Severe Accident Management Guides (SAMG) were introduced at the Krško NPP in 2000. The Rules JV9, adopted in 2009, made SAMGs mandatory in accordance with WENRA harmonized requirements.

At the same time adopted Rules JV5 stipulated in the transitional provisions (Article 62 (4)) that in case of plant lifetime extension the Krško NPP shall evaluate its response to severe accidents and implement appropriate measures based on the expected response.

Due to the Fukushima accident and the progress in the licensing process for lifetime extension, the SNSA decided to speed up the plant's evaluation regarding external events and

implementation of severe accident management measures. Thus in September 2011 the SNSA issued a decision requiring from the plant to reassess the severe accident management strategy, existing design measures and procedures and implement necessary safety improvements for prevention of severe accidents and mitigation of its consequences.

This evaluation was finished in January 2012. The action plan was reviewed and approved by the SNSA and shall be completely implemented within the Safety Upgrade Program (SUP). The Krško NPP's SUP includes several large modifications, such as:

- Installation of containment filtered venting system and passive autocatalytic recombiners (PARs);
- Installation of additional low and high pressure pumps for injecting (un)borated water into steam generators, reactor, containment sump/reactor cavity and spent fuel pool, but could also be used to spray the containment;
- Installation of additional pressurizer relief valves qualified for severe accidents conditions;
- Installation of additional heat sink;
- Acquirement of mobile heat exchanger that can be connected to either reactor coolant system of spent fuel pool and cooled by air;
- Installation of permanent sprays around the spent fuel pool;
- Safety upgrade of AC supply;
- Establishment of emergency control room (with provisions for long term habitability even in case of severe accidents);
- Installation of separate instrumentation and control dedicated for severe accidents;
- Establishment of new technical support facility with provisions for long term habitability even in case of severe accidents and enhancement of existing operational support centre.

For additional information on the Krško NPP's SUP and other post-Fukushima improvements see Appendix II of this report.

Some improvements for mitigating severe accidents were considered and implemented even before the Fukushima accident, e.g. the implementation of wet cavity design.

Other important design improvements implemented in the Krško NPP based on results of deterministic and probabilistic safety assessments were:

- Modifications based on 1995 Fire protection action plan,
- Steam generator replacement and power uprate in 2000,
- Reracking of the spent fuel pool project in 2003,
- Reactor building recirculation sump strainer replacement in 2007,
- Reactor pressure vessel head replacement in 2012,
- Installation of the 3rd safety related diesel generator in 2012,
- Upgrade of flood protection dikes in 2012.

The Rules JV9 require from the operator to implement a plant-specific symptom based emergency operating procedures (EOP). These assure adequate identification of the event and reliable and efficient restoration of critical safety functions and stable state of the plant. Likewise the Rules JV9 require from the licensee the implementation of severe accident management guidelines (SAMG), which must be based on plant-specific analysis of severe accidents and their phenomena.

Both the EOPs and SAMGs must be validated against all possible scenarios and must be regularly used in trainings of operators with the simulation of events on the plant-specific full-scope simulator.

The Krško NPP has in place plant-specific EOPs as well as SAMGs, which are regularly updated and verified with the use at training and simulated exercises on their plant-specific full-scope simulator. Within the implementation of training and exercises the plant also observes the impacts of the human factors, which are then incorporated into the changes of procedures and controls of the plant if necessary.

The main control room (MCR) of the Krško NPP has in place systems which ensure adequate working conditions for the operators, e.g. main control room air conditioning, MCR charcoal cleanup system, and chilled water generating and distributing system. During accident conditions the MCR is automatically isolated. The MCR cleanup system is started to keep the area habitable. The MCR air conditioning and charcoal cleanup systems are redundant, safety related, seismically qualified system energized from independent safety power buses.

In addition, the Krško NPP plans to build the backup emergency control room, which will have its own independent power supply system, independent instrumentation and controls qualified for severe accidents conditions. It will be located in a physically separated bunkered building, protected against events, which are considered within design extension conditions now (e.g. higher seismic loads, extended flood protection, large aircraft crashes and fires). For more details on the emergency control room and other post-Fukushima improvements see Appendix II of this report.

Each modification of safety related equipment (including MCR) must be reviewed and approved by the SNSA. The SNSA is also regularly informed of all changes in the EOPs and SAMGs. The SNSA inspection and other technical staff regularly oversee the regular operation, changes implemented in the plant. The SNSA staff takes part in the exercises and performs licensing the reactor operators.

Among the administrative measures to protect the workers and the public from effects of ionising radiation are also authorized dose limits, which are controlled by the radiation monitoring.

In general the radiation exposure of workers and the public is limited according to the Decree on dose limits, radioactive contamination and intervention levels (Official Gazette No. 49/04). The occupational limit for effective dose is set to 20 mSv per year. For specially authorised exposures in exceptional circumstances, a higher limit can be allowed but not higher than 50 mSv per year and 100 mSv in five consecutive years. Special limits are set also for other groups such as apprentices and students, pregnant women (for an unborn child), and for intervention workers. Besides those, an annual limit for equivalent dose for eye lenses is set to 150 mSv, and for both, skin and extremities, to 500 mSv.

Individual exposures are measured with optical stimulated luminiscent or thermoluminiscent dosimeters by approved service providers. The Krško Nuclear power plant has its own dosimetric service approved by the Slovenian Radiation Protection Administration (SRPA). The exposure data for plant workers include also neutron doses and internal exposures derived from the whole body counter measurements

The authorised dose limit for the members of the reference group due to radioactive discharges from the Krško NPP during normal operation was set to 50 μSv per year. This figure shall be the sum of partial exposures, taking into account all pathways of radionuclide transfer. Additionally, the limit of 200 μSv/y was set for external radiation from the plant facilities, controlled at the fence. The exposure of population is regulated also by the limitations of gaseous and liquid

discharges. The environmental radioactivity monitoring of the nuclear installation was defined in the Rules on the Monitoring of Radioactivity (OJ RS, 20/07 and 97/09).

In addition, the annual limits of discharged activities into the environment are stipulated by the operation licence of the Krško NPP. The limits of annual liquid releases are given for the fission and activation products (without ^{3}H) and for ^{3}H separately. Besides annual limits, the quarterly limit for fission and activation products (without ^{3}H) is also set. The annual limits for gaseous releases are given for noble gases (total dose limit < 50 μSv), radioiodine (in ^{131}I equivalent) and aerosols. Atmospheric releases of ^{3}H and ^{14}C are not limited.

The SNSA annually reports to the European Commission on radioactive releases from nuclear installations according to the requirements of Art. 37 of the Euratom Treaty.

The monitoring results and the modelling of radioactive discharges of the Krško NPP showed that the annual effective dose at 500 m distance from the reactor due to the plant operation was estimated to be between 1 and 2 μSv.

In the year 2013 off-site radiological monitoring reports show that conservatively estimated effective dose received by members of general public as a result of the Krško NPP emissions amounts to a value of 0.05 μSv per year for atmospheric discharges and for liquid discharges the effective dose is less than 0.43μSv per year. The value, 0.05 μSv per year, represents 0.1% of the authorised dose limit (50 μSv; which is the sum of the contributions from all exposure pathways) to the member of the public received at the boundary of the exclusion area. Therefore estimated sum of all radiation contributions (annual effective dose) from the NPP to the member of the public in its vicinity is about 0.02% of the characteristic unavoidable natural background radiation (2.4 mSv).

At TRIGA research reactor nine reactor core modifications were made for the experimental purposes of the institute's nuclear physics department in 2013. Active fire protection system was installed in all areas and rooms of Reactor centre Podgorica. Appropriate changes of safety analysis report were approved by SNSA. Upgrade of the system for access control to a controlled area of the reactor was installed. Two temporary modifications were introduced in 2012. The first one was installation of electrical heaters in the core to perform the reactor thermal calibration measurements. The second one was installation of a system for voids production in the reactor core, which is used for practical exercises at the reactor. In 2012 refurbishment and upgrade of complete ventilation systems of the hot cell facility was completed.

The Jožef Stefan Institute personnel and authorized external organizations conduct periodic inspections and periodically control the safety of relevant structures, systems and components (SSC) in the reactor TRIGA. Those inspections did not find any deficiencies.

Annually, the reactor is inspected by EURATOM and IAEA safeguard inspectors.

From 12 to 16 November 2012, the International Atomic Energy Agency conducted a review of the safety of the research reactor TRIGA Mark II (INSARR) on the request of the Slovenian Government. The mission members reviewed all safety aspects of the research reactor and compared them with the IAEA safety standards. All over the world, 81 similar missions known under the acronym INSARR (INtegrated Safety Assessment for Research Reactors) have been implemented so far. First such mission at the TRIGA Research Reactor was carried out in 1992.

The mission concluded that the reactor operates well and in line with the international standards and accepted practices. The mission recognized two good practices and gave advice on possible improvements, for which 16 recommendations and 8 suggestions were proposed.

The recommendations for safety improvements cover both technical and organizational factors, as well as the improvements of procedures and the update of the safety analysis report. The

recommendations regarding the organization are aimed at improving the allocation of responsibilities in the organization and operation of the reactor and in an independent safety oversight within the institute. It was recommended to the Slovenian government to provide adequate resources to ensure and improve the safety of the research reactor, which would include means to employ a full-time head of reactor at the »Jožef Stefan« Institute. The mission also concluded that the regulatory supervision by the SNSA is appropriate. The experts suggested extending the scope of inspection controls to include checking the compliance of operational conditions and limits and reviewing the results of periodic tests.

The emergency response plan for the Central Storage for Radioactive Waste in Brinje, prepared by the ARAO, covers all anticipated abnormal events and emergency situations related to the operation of the facility and handling of radioactive waste. The plan defines the competencies and responsibilities of the personnel responsible for emergency preparedness, and the response to the emergency situation.

Radiation protection in the Central Storage for Radioactive Waste in Brinje includes occupational radiation protection of workers and monitoring of radioactivity in the environment of the storage site (protection of the public).

Article 6.4

Member States shall ensure that the national framework in place requires licence holders to establish and implement management systems which give due priority to nuclear safety and are regularly verified by the competent regulatory authority.

In the Slovenian legislation regulatory requirements for management systems of the licensees are defined in:

- The Ionizing Radiation Protection and Nuclear Safety Act (Official Gazette RS 102/2004 and 60/2011), Article 63, and
- The most important regulation defining quality management systems is: "Rules on Radiation and Nuclear Safety Factors (Official Gazette RS 92/2009 and 9/2010)".

The fifth chapter (Articles 49 to 61) entitled "Safety and quality management" of the above mentioned Rules is dedicated to the requirements of the process oriented management system.

All requirements regarding management systems defined in Slovenian legislation are in accordance with the WENRA reference levels.

One of the activities of the SNSA and its management system is reviewing and controlling of the licensees' management systems including TSOs in accordance with the Slovenian legislation.

The SNSA review and control activities regarding licensee quality assurance and management system programme is performed through:

- licensing related to the changes of USAR and in particular related to the changes of the chapter 17 of USAR "Quality Assurance",
- inspection process and
- periodic safety review (PSR).

The SNSA annual inspection plan provides at least one inspection per year which is dedicated to the licensee management system and/or quality assurance system.

Additionally, the management system inspections can also be performed in a case of deficiencies of the licensee management system, found through the activities of licensing process or due to the findings not specifically dedicated to the implementation of the management system.

The inspection oversight of the licensee management system is performed in three steps:

- assessment if the management documentation is in line with the requirements of legislation,
- assessment if the implementation of the management system is in line with the management documentation,
- enforcement actions in case of deficiencies.

According to the Rules on operational safety of radiation or nuclear facilities (JV9) management system should be reviewed as a part of the Periodic Safety Review of a nuclear facility.

In the framework of the PSR 2 the oversight of licensee management system is included. The chapter 3.2.4 of PSR 2 (2013) "Review of the Management" consists of reviews related to:

- Safety Management System,
- Safety Culture,
- Procedures,
- Human factors.

The SNSA management system and its policy requires that the safety overrides all other demands.

The priority to nuclear safety is given in the general principles of the Ionising Radiation Protection and Nuclear Safety Act. The Act defines nuclear safety as "technical and organizational measures which result in safe operation of a nuclear facility, the prevention of emergency events or the alleviation of the consequences of emergency events, and which protect exposed workers, the population and the environment against ionizing radiation".

In 2009 Rules on radiation and nuclear safety factors (JV5) and Rules amending the rules on operational safety of radiation or nuclear facilities (JV9) were issued. Both Rules further define the Act provisions and they were prepared in line with the WENRA reference levels. The regulation JV5 gives a detailed definition of safety culture. Chapter V of the regulation JV5 includes requirements for the management of safety and quality in activities for the design, construction and operation of nuclear installations. These requirements define safety policies (Article 50 of the JV5), safety culture programs and development (Article 58), arrangements for safety management (Article 49), arrangements for safety monitoring and self-assessment (Article 53), independent safety assessments (Article 61), as well as a process oriented (quality) management system (Article 59).

In the course of harmonization of WENRA reference levels and their transposition into the Slovenian regulation, the SNSA checked compliance of the Krško NPP arrangements with all the WENRA issues, including those defining approach to priority to safety.

The Krško NPP

The Krško NPP as the license holder is responsible for the overall quality of the design, construction, operation, maintenance and modification of the plant. The Quality Assurance program was already implemented during the design and construction of the plant, and was in full compliance with 10CFR50 Appendix B Quality Assurance Criteria for NPP and Fuel Reprocessing Plants, and the QA guidance provided in WASH 12833 Guidance on QA

Requirements During Design and Procurement Phase of Nuclear Power Plants and in WASH-1309 Guidance on QA Requirements During the Construction Phase of Nuclear Power Plants.

Since the beginning of operation the Krško NPP Quality Assurance program and its applicable procedures were implemented to assure that all planned and systematic actions, necessary to provide adequate confidence that an item or service will satisfy given requirements to quality, are in place. The overall requirements for quality as one of the major objectives for Krško NPP operation are set forth in the Updated Safety Analysis Report, which serves as a base for operating license. During over 30 years of Krško NPP operation, the quality requirements and related documents were revised and upgraded several times. The latest revision of QD-1 Quality Assurance Plan was issued in 2011.

The bases for the revision of QD-1 were:

- Changes of the Slovenian regulatory requirements (Act 2002, JV5, JV9 …),
- Changes of Krško NPP licensing documents (USAR section 13 …),
- SNSA inspection requirements,
- Changes of international standards (IAEA, WANO …),
- Conclusions of the first PSR,
- Implementation of ISO standards in the Krško NPP (ISO 14001, ISO 17025),
- Changes of plant procedures, etc.

One of the most obvious changes was the enlargement of QD-1 scope to cover interdisciplinary areas defined in plant management program MD-1 Commitments and Goals of the Krško NPP, such as Safety Culture, Self-Assessment, Human Performance, Industrial Safety, etc. The table defining relationships between certain standards was also updated to provide a matrix for better correlation between the requirements of various standards: 10CFR50 App. B, IAEA GS-R-3, JV5 and ISO 9001.

Since 2011 the internationally recognized standard for industrial safety, BS OHSAS18001:2007, was introduced in Krško NPP practices.

Internal audits within the Krško NPP are performed in two-year intervals in accordance with administrative procedure ADP-1.0.006 Internal Plant Audits. Internal audits cover functional and cross-functional areas in accordance with IAEA, ANSI, NRC, EPRI and WANO Guidelines. Audit results are reported and documented through the plant's Corrective Action Program, where audit findings are tracked until they are closed.

The Krško NPP management system is a set of interrelated and/or interacting elements that establishes policies and objectives and which enables those objectives to be achieved in a safe, efficient and effective manner. Safety is a paramount element in the Krško NPP management system, overriding all other demands. Having an integrated management system in accordance with Slovenian regulatory requirements JV5 and IAEA GS-R-3 requirements, it is essential to maintain and continuously enhance safety. An integrated management system provides a number of benefits together with enhanced safety and business performance, and can lead to considerable savings in developing and maintaining organizational activities.

The Krško NPP maintains an active Approved Supplier List, which includes local suppliers and international suppliers. Suppliers are being audited in three-year intervals in accordance with procedure ADP-1.8.001 Supplier audit. For international suppliers Krško NPP takes part in NUPIC audits and surveys.

Independent reviews of outage activities and surveillance tests are performed by the Technical Support Organizations (TSO). The TSOs are engaged for the inspection, witnessing and safety evaluation of refuelling, surveillance and modifications activities.

Due to the policy of monitoring and constantly upgrading nuclear safety and QA requirements, the Krško NPP follows efforts of the nuclear industry (IAEA, WANO, INPO, EPRI, ASME, and other) and enhancing its management system to improve safety and to excel in operation. The most important objective of the entire organization is to ensure the safe and efficient power plant operation, which continues to be the most important goal of the Quality Assurance program.

In the Krško NPP, the nuclear safety overview is achieved through the function of different committees and departments, such as the Krško Operating Committee, the Krško Safety Committee and the Independent Safety Engineering Group (ISEG). Members of ISEG are experts from different areas; the majorities have operational background and are trained in analysis techniques, human performance areas, etc. The ISEG's independence is achieved and assured through its reporting channel to the plant senior management and the plant management supervisory board. The ISEG maintains a Performance Indicators Program which is based on the document Operational Safety Performance Indicators for Nuclear Power Plants, IAEA TECDOC-1141 and WANO performance indicators. Establishing such program of monitoring and assessing operational plant safety performance indicators represents by itself an effective safety culture of the plant personnel. The results of these performance indicators reviews identify weak points and define corrective actions for the adverse trend indicators.

The Krško NPP is required by the Act and the Rules JV9 to assure that the Operating Experience Program is established and used effectively to promote safety within organization. The Krško NPP program is used for assessing its own operational experience. For the foreign operation experience the Krško NPP uses a program of industry experience for effective identification, reporting and screening of reported events.

Jožef Stefan Institute Reactor Infrastructure Centre

Quality assurance (QA) of the IJS Reactor Infrastructure Centre is part of the Jožef Stefan Institute QA Programme. The Director of the IJS and the Head of the reactor operation department are responsible for its implementation. Specific internal QA and quality control documentation is applied. QA activities of reactor operation are subject to internal (Jožef Stefan Institute QA management and an audit team) and external inspections of the regulatory body. The QA Programme is subject to periodical reviews.

The Jožef Stefan Institute QA Programme is implemented and maintained in accordance with acceptance criteria as follows:

- SIST EN ISO 9001:2000,
- IAEA 50-C-QA, Rev. 1.
- Programme for assessment of request for performing work in the hot cell laboratories,
- Programme for performing work in the hot cell laboratories, and
- Programme for informing public about unusual events on the reactor site,
- Programme for assessment of request for performing work at the reactor,
- Programme for performing work at the reactor, and
- Instructions for performing work in the hot cell laboratories.

- Monitoring programme of operating experiences for JSI TRIGA Mark II reactor.
- Monitoring programme of operating indicators for JSI TRIGA Mark II reactor.

Agency for Radioactive Waste Management (ARAO)

ARAO has in place integrated management system that gives required priority to nuclear safety. ARAOs integrated management system is based on IAEA GS-R-3, ISO 9001:2008 and ISO 14001:2004 requirements. Every year internal audits and management review are conducted to ensure suitability, adequacy and effectiveness of implemented management system. External management system assessment and certification is conducted according ISO 9001:2008 and ISO 14001:2004 every year. Recertification audit was carried out in the year 2013.

Through process approach ARAO continuously improve the effectiveness of an integrated management system, to reach company goals and enhance the nuclear safety.

Article 6.5

Member States shall ensure that the national framework in place requires licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to nuclear safety of a nuclear installation, laid down in paragraphs 1 to 4.

Financial Resources

The 2002 Act introduced as one of the main principles the »causer pays« principle (paragraph 7 of Article 4):

> *»The user of a radiation source shall cover all costs related to the radiation protection measures in accordance with this Act, the preparedness for emergencies and intervention measures, as well as the costs of mitigation of the consequences of an emergency.«*

Based on this principle the 2002 Act introduced a provision (Article 61) which relates strictly to the obligation of the operator of a radiation or nuclear facility to ensure sufficient financial resources guaranteed throughout the operating lifetime of a facility for implementing the prescribed measures of radiation and/or nuclear safety.

Adequate financial resources must be ensured to the operator by the current owner of the facility, to the level of all operational costs as well as costs of maintenance investments, including investments in technological renewals relating to the measures of radiation or nuclear safety.

For the time being, the Krško NPP operator has allotted enough financial resources for maintaining the appropriate level of nuclear safety. The price of a kWh of electricity produced in the Krško NPP is set out by the NPP management and approved by the Supervisory Board, based on the annual business plan. Such price covers all gross operating expenses, i.e. electricity generation costs as well as necessary investments. Besides this the Supervisory Board annually approves the Long-term Investment Plan (for five years). The amount foreseen for investments and improvements in recent years is stable and gives the management proper flexibility for the long-term maintenance of nuclear safety. Both owners are obliged to settle their respective obligations towards the Krško NPP within 15 days of issuing an invoice. In the reporting period there have been no problems with any delayed payments.

As a consequence to the Fukushima accident substantial financial resources of the operator were allocated for many different actions, such as short term improvements, safety upgrade program and long terms improvements.

The suitability of ensuring financial resources, the amount thereof and the forms of warranties, as well as the method to be used for the enforcement of warranties are assessed by the SNSA during the procedure for issuing the operation license for a radiation or nuclear facility.

The financing of measures for the protection against ionising radiation and nuclear safety is prescribed in Chapter 12 of the 2002 Act, where division between the regular (and extra) costs of the user of a radiation source (Article 132) and the public expenses (Article 133, 134) is defined.

Besides other explicitly itemised tasks and measures the operator shall also cover the costs of ensuring the sufficient number of qualified workers involved in the operation of a radiation or nuclear facility.

In accordance with the provisions of the Treaty between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on Regulating the Status and Other Legal Relations with regard to Investment in the Krško Nuclear Power Plant, Its Exploitation and Decommissioning, which entered into force in March 2003, Slovenia and Croatia are obliged to meet the obligations relating to the management and exploitation of the joint power plant. The treaty stipulates that in a period of twelve months at the latest after the entry into force of the treaty, Slovenia and Croatia shall each establish a special fund to collect financial resources for their half of the expenses to cover radioactive waste and spent nuclear fuel management and final plant decommissioning.

For the Slovenian share adequate financial resources for the decommissioning of the Krško NPP and for the construction of a repository are ensured by the provisions of the Act on the Fund for Financing Decommission of the Krško NPP and Disposal of Radioactive Waste from the Krško NPP, adopted in 1994. The levy for every kWh of the Slovenian share of electric energy produced by the Krško NPP is regularly contributed to the Slovenian fund for decommissioning.

In case of a nuclear accident, financial resources to compensate the claim are provided through the Slovenian third party liability legislation and through Nuclear Insurance and Reinsurance Pool, taking into account that in 2001, Slovenia became a party to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, and in 2003, also a party to the Brussels Supplementary Convention. Furthermore, the Slovenian Parliament ratified Protocols to both Paris Convention and to Brussels Supplementary Convention. The instrument of ratification will be deposited in accordance with the Council Decision 2004/294/EC. The new Act on Liability for Nuclear Damage was adopted by the Parliament (National Assembly) on 22 September 2010 and was published in the Official Gazette No. 77 on 4 October 2010. The Act governs the liability for nuclear damage resulting from the use of nuclear energy for peaceful purposes, insurance of liability for nuclear damage and the procedure for claiming compensation for nuclear damage. The Act on one hand follows the provisions of the revised Paris Convention (Protocol of 2004 to Amend the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended.) regarding, for example, the extended heads of damages, which are covered, raised liability amounts for compensation, extended prescription and extinction periods for nuclear damage claims, etc. On the other hand the Act clearly sets only one court which shall be competent to rule on compensation for nuclear damage and include a number of provisions regarding rules of procedure of claiming compensation and the distribution of compensation. Public funds, which have to be provided by the State, shall be provided in the budget; the amount, manner and dynamics of the drawings of such public funds shall be determined by the interventional law, which would follow any eventual significant accident. Regarding those risks which nuclear insurers are unwilling or unable to cover, the Act provides for conclusion a premium based insurance agreement between the Government and the operator, but such an arrangement is limited in time (until the situation on the domestic and international insurance market has changed, but no longer than four years). The Act also prescribes all

necessary provisions which ensure its compliance with the 2004 Protocol to Brussels Supplementary Convention.

Human Resources

With regard to human resources the 2002 Act in Article 62 requires that »Throughout the operating lifetime of a radiation or nuclear facility the operator thereof must ensure a sufficient number of qualified workers with suitable education, who are qualified and additionally trained for all the work activities relating to radiation and nuclear safety«. The Article 62 covers several provisions about the qualifications of workers including licensing of the reactor operators, which is prescribed in detail in JV 4 "Rules on providing qualification for workers in radiation and nuclear facilities" in detail.

Krško NPP

There are about 600 employees in the Krško NPP, who adequately cover all necessary functions for the technical operation, including QA, training and engineering. There are 6 operation shifts with a minimum shift composition of 5 licensed operators per shift, including an on-duty shift engineer.

Training and qualification activities at the Krško NPP are governed by:

- the 2002 Act with amendments,
- the Rules on qualification requirements to be met by workers performing duties and tasks of safety significance in nuclear and radiation installations,
- the plant's Updated Safety Analysis Report, applicable plant procedures/programmes,
- the annual training program for licensed operators and shift engineers, submitted to the SNSA.

ARTICLE 7. EXPERTISE AND SKILLS IN NUCLEAR SAFETY

Member States shall ensure that the national framework in place requires arrangements for education and training to be made by all parties for their staff having responsibilities relating to the nuclear safety of nuclear installation in order to maintain and to further develop expertise and skills in nuclear safety.

The Article 62 of the 2002 Act contains provisions about the qualifications of workers including licensing of the reactor operators, which is covered in JV 4 "Rules on providing qualification for workers in radiation and nuclear facilities" in detail.

The education and training requirements are outlined in the Updated Safety Analysis Report, Chapter 13.2 "Training". The process is further elaborated in the administrative procedure Training and Qualification of the Krško NPP Personnel. Further training procedures cover specific areas, such as the Licensed Operator Training Program, the Licensed Shift Engineer Training Program, the Non-licensed Operator Training Program, the Health Physics Training Program, and so on. In addition, the Krško NPP personnel are trained and examined for using other relevant standard industry guides in areas like safety at work, hazardous chemicals, welding, non-destructive testing, specific equipment and machinery operation, and safety at work.

In general, the training programs are divided into initial and continuous training. In addition to the training for the Krško NPP personnel specific training courses are conducted for subcontractors, specifically in the area of General Employee and Radiation Protection training, and specific Work practices. The Systematic Approach to Training principles, including Job and Task Analyses, were applied for developing technical training programs.

Training program for licensed operator and shift engineer is completely implemented in-house. The continuing training for licensed personnel consists of multiple weekly training segments (four per year per each shift) which comprise a two-year cycle of re-qualification training. In each day of training there are lectures and exercises on a simulator. Initial licences and their renewals are obtained based on examinations conducted by the SNSA's Expert Commission for the Examination of the Operator's Qualifications (Commission). The SNSA has nominated nine members of the Commission. Two members of the Commission come from the regulatory body, one from technical support organisations, two from the Krško NPP and three are retired senior experts. The examination consists of:

- written examination: 38 to 40 questions (mainly multiple choice),
- simulator examination – GOP, AOP, EOP and EIP procedures,
- oral examination: reactor physics, nuclear safety, thermo hydraulics, technical specifications and administrative procedures, emergency preparedness,
- walk-down (for new reactor operators only).

Other types of training courses are conducted for specific areas, for example refuelling operations, maintenance, engineering, radiation protection, chemistry, security, emergency preparedness, and others..

The training for maintenance personnel is conducted in a special training centre, using the Krško NPP own resources (instructors and subject matter experts), or contracting such services from certified institutions or equipment vendors. Supervisory personnel and technicians also get specific knowledge at various equipment vendor training facilities. The maintenance training centre houses classrooms and laboratories that are designed for various maintenance groups and is equipped with practical tools needed to conduct hands-on training.

Rules JV4 contains in Articles 38 to 40 the requirements for personnel qualification of head of research reactor centre, shift supervisor and research reactor operator. The required program of

training to obtain a license for shift supervisor of research reactor operator is described in Article 41 of the regulation JV4. Recently, one reactor centre employee completed the course "Nuclear Technologies" in April 2013 and on June 6, 2013 obtained a TRIGA reactor operator licence for the 18 month period. New RIC employee has attended the course "Radiation Protection for exposed workers" and continues his education in accordance with "Professional training program for workers who perform safety important work on the TRIGA reactor", IJS-DP-9296, revision 2.

The head of the central radioactive waste storage for low and intermediate level solid radioactive waste obtained license in line with the Rules JV4. The training programme was approved by the SNSA. Since the formal training does not exist the head's training was mostly self-study. The head successfully passed the exam in front of the SNSA's Expert Commission for the Examination of the Operator's Qualifications.

The SNSA developed its own approach to meet the demand for training in order to maintain adequate competencies. Since 2013 during the annual career planning the employees and their supervisors identify a set of necessary competences based on a list of competences, which was prepared beforehand as sort of systematic approach to training. The necessary competences are matched with the tasks which are assigned to each employee. Based on the difference between actual level of competence for a particular employee and the desired competence the training plan is drawn up each year.

The "Nuclear Training Centre Milan Čopič" at the Jožef Stefan Institute is an important institution for providing training for the staff of different nuclear and radiation facilities. Their main activities are: training of the Krško Nuclear Power Plant staff, radiation protection training, organization of international seminars and public information about nuclear technology.

ARTICLE 8. INFORMATION TO THE PUBLIC

Member States shall ensure that information in relation to the regulation of nuclear safety is made available to the workers and the general public. This obligation includes ensuring that the competent regulatory authority informs the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations.

The "transparency principle" is one of the main principles of the 2002 Act, which is prescribed in Article 4 (10), which states "Information on radioactivity in the environment, on exposure of members of the public and on the procedures and activities of state authorities, public services companies and licensees, relating to radiation protection and nuclear safety, is public (the publicity principle)."

This provision is elaborated further in Article 7 on "information transparency" of the 2002 Act:

- *Information on radiation practices, use of radiation sources, radiation of natural sources, planning, construction and operation of radiation facilities and nuclear facilities, statistically processed doses of exposed workers and members of the public, management of radioactive waste and spent fuel, shipment into and out of the Member States of the EU, import, export and transit of radioactive waste or radioactive substances, radioactive contamination of the environment, foodstuff, feeding stuff and products of general use, emergencies, and protection and rescue plans for case of emergencies shall be public.*
- *Procedures for access to information specified by the law shall be used for access to information described in the previous paragraph.*

The SNSA is obliged (together with other relevant authorities) to prepare the annual report. This obligation is stipulated in Article 128 of the 2002 Act:

- *The ministry competent for the environment, in co-operation with the ministry competent for health, the ministry competent for agriculture, the ministry competent for protection against natural and other accidents, and the ministry competent for internal affairs shall, by 31st July of each year, draw up a report on the protection against ionising radiation and on nuclear safety for the previous year.*
- *The report referred to in the previous paragraph shall be debated and adopted by the Government and then passed on to the National Assembly.*
- *After having been adopted by the Government the report shall be published in such a way as to be accessible to the public.*

There are varieties of other methods which are used by the SNSA to inform the general public and the workers about work in its fields of competence:

- website (with structured information),
- topical interviews and press conferences,
- legislative initiatives, where the draft legislation is published on the special governmental webpage for the purposes of public hearing.

Each section or sub page of the SNSA website has the editor who is responsible for verifying and updating its content.

The legislation does not provide that the licenses have to be published by the regulatory body, so for the time being only some of them have been published in full (as for example approval of an amendment of limitations of liquid discharges from NPP Krško). However, SNSA is maintaining

the up-to-date list of all approved modifications at Krško NPP at the web page http://www.ursjv.gov.si/si/jedrski_in_sevalni_objekti/nuklearna_elektrarna/spremembe_v_nek/.

Since early 2013 SNSA has also introduced a practice of publishing all relevant documents related to specific issues, for which the increased public interest is expected (http://www.ursjv.gov.si/si/info/posamezne_zadeve/). Such were the issue about the seismic situation in the Krško area in the spring 2013 and the issue of failed fuel elements in the Krško NPP in the fall 2013.

There is a special provision in 2002 Act regarding informing the public during the emergencies. Article 108 deals with public information during emergencies:

- *Operators and those involved in the implementation of protective actions according to the local and national radiation emergency plans must regularly inform the public about important information from the plans.*
- *In the case of an emergency in accordance with this Act, an operator must ensure that the authority which issued the licence for the carrying out radiation practices is notified of the event within the shortest possible time, as well as other authorities competent for the matter in accordance with the regulations on the protection against natural and other accidents, who shall promptly inform the population in the affected area of the relevant facts of the emergency.*
- *In the case of the transport of nuclear materials, radioactive substances, spent fuel or radioactive waste, the shipper shall have the duty of notifying the competent authorities in accordance with the previous paragraph.*
- *Regulations from the field of protection against natural and other accidents shall apply to the method used for and the extent of informing the general public, the population in the affected area and the competent ministries and authorities in accordance with this Article and to the procedure for regular review and confirmation of statements to the public on the important facts from the protection and rescue plans.*

Article 109 covers international notification in the case of an emergency:

- *In the case of an emergency which is likely to cause health detriment to people on the territory of other countries, the competent authority for nuclear safety must ensure the notification in accordance with international agreements.*
- *The Government shall decide on the acceptance of assistance from other countries and the International Atomic Energy Agency and on the provision of assistance to other countries in the case of emergencies.*

There are no any specific provisions in the 2002 Act (as well as implementing Decrees and Rules) about limiting the access to some categories of information. This area is covered by the general Slovenian legislation on classified information.

APPENDIX I: COMPREHENSIVE LIST OF LEGAL DOCUMENTS IN FORCE IN SLOVENIA (AS OF 30 APRIL 2014)

Updated and comprehensive list of the Slovenian legislation, relevant to nuclear safety, is regularly maintained and always available at the SNSA's web page: http://www.ursjv.gov.si/en/legislation_and_documents/

In the continuation only the pieces of legislation relevant for this report are listed:

I.1 Governmental decrees and ministerial regulations issued on the basis of 2002 Act (Act on Protection against Ionizing Radiation and Nuclear Safety – ZVISJV (Off. Gaz. RS, 67/2002, 24/2003, 50/2003, 46/2004, 102/2004 and 60/2011))

- Rules on the expert council on radiation and nuclear safety - JV1 (Off. Gaz. RS, 35/2003),
- Rules on functioning of the Expert Council for the issues of ionizing radiation protection, radiological activities, and the use of radiation sources in human and veterinary medicine - SV1 (Off. Gaz. RS, 62/2003),
- Rules on the requirements of using ionising radiation sources in healthcare - SV3 (Off. Gaz. RS, 111/2003),
- Rules on the requirements and methodology of dose assessment for the radiation protection of the population and exposed workers- SV5 (Off. Gaz. RS, 115/2003),
- Decree on the criteria for setting compensation level payable for limited use of space within the area of nuclear facility- UV8 (Off. Gaz. RS, 134/2003, 100/2008),
- Rules on health surveillance of exposed workers- SV6 (Off. Gaz. RS, 2/2004),
- Rules on the obligations of the person carrying out a radiation practice and person possessing an ionizing radiation source - SV8 (Off. Gaz. RS, 13/2004),
- Rules on approving of experts performing professional tasks in the field of ionising radiation - SV7 (Off. Gaz. RS,18/2004),
- Rules on the method of keeping records of personal doses due to exposure to ionizing radiation - SV4 (Off. Gaz. RS,33/2004),
- Decree on the areas of limited use of space due to a nuclear facility and the conditions of facility construction in these areas - UV3 (Off. Gaz: RS, 36/2004, 103/2006),
- Decree on activities involving radiation - UV1 (Off. Gaz. RS,48/2004, 9/2006) ,
- Decree on dose limits, radioactive contamination and intervention levels - UV2 (Off.Gaz.RS,49/2004),
- Rules on transboundary shipments of radioactive waste and spent fuel - JV11 (Off. Gaz. RS,22/2009),
- Rules on physical protection of nuclear facilities, nuclear and radioactive materials and transport of nuclear materials (Off. Gaz. RS, 17/2013),
- Rules on establishing a basic training program and periodic in-service training of security personnel performing physical protection of nuclear facilities, nuclear or radioactive materials, and transport of nuclear materials (Off. Gaz. RS, 12/2013),
- Rules on providing qualification for workers in radiation and nuclear facilities (Off. Gaz. RS, 32/2011) Rules on the use of radiation sources and on activities involving radiation - JV/SV2 (Off. Gaz. RS, 27/2006),
- Rules on radioactive waste and spent fuel management - JV7 (Off. Gaz. RS, 49/2006),
- Rules on authorised experts on radiation and nuclear safety - JV3 (Off. Gaz. RS, 51/2006).
- Rules on the monitoring of radioactivity - JV10 (Off. Gaz. RS, 20/07, 97/2009),
- Decree on checking the radioactivity for shipments of metal scrap - UV11 (Off. Gaz. RS, 84/2007)
- Decree on safeguarding of nuclear materials - UV 6 (Off. Gaz. RS, 34/2008)
- Rules on the transboundary shipment of nuclear and radioactive substances - JV 12 (Off. Gaz. RS, 75/2008)

- Rules on operational safety of radiation and nuclear facilities - JV 9 (Off. Gaz. RS, 85/2009, 9/2010 and 87/2011)
- Rules on radiation and nuclear safety factors - JV5 (Off. Gaz. RS, 2/2009, 9/2010)
- Rules on the Conditions to be met by Primary Health Care Centres for Breast – SV 10 (Off. Gaz. RS, 110/2004),
- Rules on the Use of Potassium Iodide – SV 9 (Off. Gaz. RS, 142/2004)

In addition to the above mentioned decrees/regulations the 2002 Act was used as a basis for the adoption of the:

- Programme on Systematic Monitoring of Working and Residential Environment and Raising Awareness about Measures to Reduce Public Exposure Due to the Presence of Natural Radiation Sources (Off. Gaz. RS, 17/2006).

I.2 Other legislation

Third Party Nuclear Liability

- Act on Third Party Liability for Nuclear Damage (Off. Gaz. SFRY, 22/1978 and 34/1979);
- Act on Insurance of Liability for Nuclear Damage (Off. Gaz. SRS, 12/1980),
- Decree on Establishment of the Amount of Limited Operator's Liability for Nuclear Damage and on Establishment of the Amount of Insurance for Liability for Nuclear Damage (Off. Gaz. RS, 110/2001)
- Act on Liability for Nuclear Damage (Off. Gaz. RS, 77/2010),
- Decree on determining the persons to whom the insurance of liability for nuclear damage is not mandatory (Off. Gaz. RS, 110/2010).

Decommissioning of the 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, 75/1994 and subsequent amendments).

APPENDIX II: POST-FUKUSHIMA SAFETY RELATED ACTIVITIES

A. The Implemented Short-Term Improvements - Accelerated B.5.b Requirements Actions

Post-Fukushima actions in Slovenia started immediately after the accident. While the SNSA cooperated in the preparation and issuance of the ENSREG Stress test specifications, the Krško NPP implemented an analysis to identify short-term improvements. The Krško NPP partly implemented this analysis in advance, when implementing B.5.b requirements (post 9/11 requirements endorsed by the US NRC [1]), which were required by the SNSA with a decision issued in 2008, so the post-Fukushima actions were also based on that analysis. The result was the procurement of additional portable equipment, e.g. AC diesel generators, pumps and compressors, implementation of quick connection points for this equipment, as well as amendments to the emergency operating procedures and severe management accident guidelines enabling the use of this new equipment to mitigate consequences in case of a severe accident.

The operator applied a request to license these modifications at the end of May 2011, while modifications were mostly implemented by the end of June 2011 and were also considered in the stress test report submitted to the European Commission [2]. All the modifications and procurement of new equipment that resulted out of the above mentioned activities are shortly described in Table 3 below.

Table II.1: Implemented short-term improvements in the Krško NPP – accelerated B.5.b requirements

Modification or equipment procurement	Description	Concerns topic
Portable generator 5 kW (2 pcs)	To be used as a backup source for powering essential instrumentation	All, particularly SBO
Portable generator 2.6 kW (2 pcs)	To be used as a backup source for powering essential instrumentation	All, particularly SBO
Mobile diesel generator 150 kW (3 pcs)	To be used as a backup source for powering essential instrumentation or equipment (e.g. motor operated valves)	All, particularly SBO
Mobile diesel generator 600 kW	To be used as a backup source for powering essential equipment (e.g. battery chargers, pumps)	All, particularly SBO
Mobile diesel generator 1000 kW	To be used as a backup source for powering essential equipment (e.g. battery chargers, pumps)	All, particularly SBO
Portable oil free compressor (2 pcs)	To be used as a backup source of instrument air (e.g. for operating air valves)	All
Portable fire protection pump 60 m3/h / 1.5 MPa (2 pcs)	To be used as a backup source of feedwater for SGs	All
Submersible pump 2.8 kW / 7 m^3/h / 0.2 MPa (4 pcs)	To provide low pressure sources of water to high pressure pumps	All
Trailer with portable pump 60 m^3/h / 1.1 MPa / suction from 35 m	To be used as a backup source of water for filling steam generators (SG), spent fuel pool (SFP), containment, etc.	All

Portable transformer 230/118 V / 3 kVA (2 pcs)	To transform voltage for essential instrumentation	All
Tractor "Arion 630C" 103 kW, with additional equipment, e.g, air compressor, fork lift, equipment for ploughing (removing debris, etc.)	To be used as means of transportation of different equipment (e.g. portable diesel generators, pumps, barrels of oil, etc.), for transferring the fuel between tanks/barrels and equipment, for ploughing/clearing way at the site, etc.	All, particularly Severe Accident Management (SAM)
Installation of quick connection points for feeding the SGs	Installation of quick connection points (for standard fire hose connections) to enable feeding of SGs from several water sources	All
Installation of quick connection points for flooding the containment	Installation of quick connection points (for standard fire hose connections) to enable flooding the containment from several water sources	All
Installation of quick connection points for alternative sources of instrument air	Installation of quick connection points for quick connection of portable oil-free compressors to instrument air system or directly to end users	All
Installation of quick points for manual SG PORV control	Installation of quick connection points for quick connection of alternative sources of instrument air as well as manually controlled air regulator to enable manual control of SG's PORVs	All
Installation of quick connection points for filling the SFP	Installation of quick connection points (for standard fire hose connections) to enable filling the SFP from several water sources	All
Installation of alternative measurement system for SFP temperature and level	Installation of alternative measurement system with alternative independent power supply (portable DGs or batteries)	All

B. The Implemented Short-Term Improvements - Implementation of the Slovenian Stress Test Action Plan

In the meantime the SNSA also issued a decision requiring from the plant to perform an extraordinary safety review in line with the ENSREG Stress Test specifications. In the process of Stress Tests additional short-term actions were identified. These additional actions, which were implemented by the end of 2011, are shortly described in Table 4 below.

Table II.2: Implemented short-term improvements in the Krško NPP – implementation of the Slovenian Stress Test action plan

Modification or equipment procurement	Description	Concerns topic
Mobile diesel generator 2000 kW	To be used as a backup source for powering essential equipment (e.g. battery chargers, larger pumps)	All, particularly SBO
Portable fire protection high pressure pump 30 m^3/h / 3.2 MPa (2 pcs)	To be used as a backup source of feedwater for SGs	All
HFS HydroSub 450 floating	Assure additional high capacity "portable	All

unit 720 m³/h / 1.1 MPa / suction from 45 m 2,900 m 8“ hoses Trailer with hose layer container	water ring” around the plant (as a backup fire protection system, but with enough capacity that it could be used as alternative water source for heat removal from the reactor, containment and SFP)	
Installation of additional quick connection points	Installation of additional quick connection points (for standard fire hose connections)	All

The process of the stress tests was implemented and completed by the end of March 2012, which also came up with the first recommendation to be followed by regulator in its future activities. Namely, the Slovenian ENSREG Country Report [3] identified a single recommendation, i.e. “It is recommended that the regulator should consider requesting to update the seismic design basis for future design modifications and consequently the associated PSA model.”

C. The Safety Upgrade Program (SUP)

The Slovenian legislation (Rules on radiation and nuclear safety factors – JV5 [4]) stipulates:

“Upon the plant life extension of the Krško nuclear power plant or extension of the service life of its SSCs, if approved, the facility operator shall undertake a study of the response of the nuclear power plant to severe accidents in accordance with Chapter 1.12 of Annex 1 and, based on the findings of this study, propose any appropriate measures and implement them as quickly as practicable.”

Due to the Fukushima accident and the progress in the licensing process for lifetime extension, the SNSA decided to speed up the plant’s above mentioned evaluation and implementation of severe accident management’ measures. Thus in September 2011 the SNSA issued a decision requiring from the plant to reassess the severe accident management strategy, existing design measures and procedures and implement necessary safety improvements for prevention of severe accidents and mitigation of its consequences.

This evaluation was finished in January 2012. The action plan was reviewed and approved by the SNSA and shall be completely implemented within the Safety Upgrade Program (SUP).

Additional systems, structures and components, which will be implemented within the SUP, will be designed and structured in accordance with the design extension conditions (DEC) requirements specific for the Krško NPP design and site location. A set of DEC is derived on the basis of engineering judgment, deterministic assessment and probabilistic assessment based on the IAEA methodology defined in SSR-2/1, Safety of Nuclear Power Plants: Design Specific Safety Requirements [5], Krško NPP’s Individual Plan Examination and the Krško NPP Analyses of Potential Safety Improvements.

The DEC are described by:

- earthquake, extended design condition seismic value is 2xSSE[1] (0.6 g PGA),
- flooding, extended design condition flood level is 157.53 m (above sea level) (existing flood protection dikes are at 157.10 m),
- earthquake + flooding, flood due to dikes damaged by earthquake with the river flow at current maximum PMF[2] flow,
- earthquake + fire, fire caused by DEC earthquake,

[1] SSE – Safe shutdown earthquake of PGA 0.3 g set as a design basis for the Krško NPP.
[2] PMF – Probable maximum flood, 7081 m3/s, is a deterministically determined value of the highest still possible flood at the Krško site. (for comparison, the design basis flood for Krško NPP is probabilistically evaluated value of 4790 m3/s with a return period of 10,000 years).

- external low and high temperatures, air temperatures with a return period of 10,000 years,
- aircraft crash accident, crash of large commercial aircraft at the maximum landing velocity,
- fire, fire due to DEC aircraft crash.

All other combinations of events/accidents are considered as Beyond Design Basis Accidents (BDBA) and will be addressed by mobile equipment (procedures are also in place; SAMGs).

The assumed time duration of the above-mentioned conditions are:

- loss of off-site power (LOOP) for 7 days,
- station black-out (SBO) for 72 hours,
- loss of ultimate heat sink (UHS) for 30 days,
- loss of UHS combined with SBO for 72 hours,
- flooding water (from Sava river) retains for 7 days.

DEC systems, structures and components will be located in two new bunkered buildings, one already built and the other is still to be built.

The new DEC equipment can be separated into the prevention and mitigation part. The prevention part of the equipment serves to preserve adequate fuel cooling in case of DEC events, taking into account prolonged duration of these events.

For the mitigation part it is assumed that preventive DEC equipment will not be available for 24 hours and that core will be melted and corium relocated into containment. This is the basic assumption for DEC containment filtered vent system and passive autocatalytic recombiners. This assumption also led to the requirement that batteries for DEC equipment and emergency control room shall have a 24 hour capacity.

The SUP safety improvements are shortly described in Table II.3.

Table II.3: The Safety Upgrade Program (SUP)

Modification or equipment procurement	Description	For prevention and/or mitigation
Containment filtered venting system	Containment filtered venting system capable of depressurizing containment and filtering over 99.9% of volatile fission products and particulates (not including noble gasses)	mitigation
Installation of passive auto-catalytic recombiners in the containment	Replacement of electric DBA recombiners with passive BDBA auto-catalytic recombiners in the containment[3]	mitigation
Additional high pressure pump for RCS and RCP seal injection	Additional high pressure pump for RCS injection in the separated bunkered (2×SSE and PMF flood protected) building with dedicated source of borated water for 8 hours with provisions to refill by mobile equipment from different water sources	prevention (and mitigation)
Additional high pressure	Additional high pressure pump for feeding SGs in the	prevention

[3] The two electric DBA recombiners will be replaced with two DEC PARs. Additional DEC PARs will be installed into different containment compartments for managing severe accidents hydrogen.

Modification or equipment procurement	Description	For prevention and/or mitigation
pump for feeding SGs	separated bunkered (2×SSE and PMF flood protected) building with dedicated source of water for 8 hours with provisions to refill by mobile equipment from different water sources	
Additional low pressure pump for spraying and flooding the containment	Additional low pressure pump for spraying (pressure control) and flooding the containment (preventing core concrete interaction in case of failed reactor pressure vessel). It will also enable injection into SFP through a new SFP spray system. This pump will also be located in the separated bunkered (2×SSE and PMF flood protected) building with dedicated source of water for 8 hours with provisions to refill by mobile equipment from different water sources.	prevention and mitigation
Installation of additional pressurizer PORVs	Additional pressurizer PORVs will be installed, qualified for DEC events	prevention
Additional heat sink	Additional heat sink (2×SSE and PMF flood protected)	prevention
Mobile heat exchanger	Mobile heat exchanger (cooled by mobile equipment or air) with provisions to quick connect to SFP, containment sump or reactor coolant system	prevention (and mitigation)
Installation of permanent sprays around the SFP	Installation of permanent sprays (2×SSE qualified) around the SFP with provisions for quick connection of mobile equipment and different sources of water. Spraying of SFP is needed in case of loss of SFP integrity.	prevention
Safety upgrade of AC supply	Within this action several modifications/upgrades will be performed on the AC power supply, including modification of alternative supply of non-safety related buses, requalification of 3rd 6.3 kV safety related bus (MD3), upgrade of connection between 400 V safety related bus (for charging batteries) and mobile diesel generators,…	Prevention
Establishment of emergency control room	Relocation and expansion of existing remote shutdown panels into a new emergency control room in the separate bunkered (2×SSE and PMF flood protected) building with all I&C needed for safe shutdown of the plant and maintaining the safe shutdown conditions.	prevention and mitigation
Installation of separate dedicated BDBA I&C	Installation of separate dedicated BDBA I&C capable of monitoring and controlling both from the existing as well as the new emergency control room	prevention and mitigation
Long term habitability of emergency control room and support staff facility	The above-mentioned emergency control room will enable long term habitability of control room staff even during severe accidents (air filtering, radiation protection). For the same conditions also new facility for supporting staff will be designed and build	prevention and mitigation
Acquiring the technology and material for quick filling of possible ruptures in SFP	Acquiring the technology and material for quick filling of possible ruptures in SFP	prevention
Additional flood	Nuclear island and the above-described newly installed	prevention and

Modification or equipment procurement	Description	For prevention and/or mitigation
protection of nuclear island and newly installed equipment	equipment will be additionally flood protected against the failure of flood protection dikes or high river flows exceeding flood protection dikes by 0.4 m	mitigation
Protection against extreme air temperatures	The above-described newly installed equipment will be protected against extreme outside 10,000-year temperatures	prevention and mitigation

D. Additional Long-Term Improvements – Preparation of the National Action Plan

Within the preparation of the long-term action plan, the SNSA reviewed several reports with post-Fukushima recommendations and compared them with measures already implemented in the Krško NPP or planned within the SUP, as well as other measures incorporated in the Slovenian nuclear infrastructure. The reports reviewed include:

- ENSREG's Peer Review Report [6],
- US Nuclear Regulatory Commission's (US NRC) "Recommendations for Enhancing Reactor Safety in the 21st Century", The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident [7],
- US NRC's "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report" [8],
- US NRC's "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned" [9],
- 2nd Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety, topic and summary reports (CNS EOM) [10],
- ENSREG Compilation of recommendations and suggestions [11],
- IAEA's Action Plan on Nuclear Safety [12],
- Japanese "The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission" [13],
- "Das KKW Krško in Licht der Nuklear-Katastrophe von Fukushima" (Eng.: The Krško NPP in light of the nuclear disaster in Fukushima) prepared by the University of Natural Resources and Life Sciences in Vienna (Department of Water, Atmosphere and Environment; Institute of Safety and Risk Sciences) [14], and
- ASME's report "Forging a New Nuclear Safety Construct" [15].

These reviews identified 11 additional actions that could further enhance nuclear safety in Slovenia, either indirectly by changing the legislation, hosting additional peer reviews, performing additional studies, or directly by improving the NPP and regulatory body processes, enhancing of emergency preparedness and nuclear safety infrastructure or improving the safety culture of both the operator and the regulatory body.

These 11 actions were combined with planned actions from the Krško NPP's SUP (see previous chapter) and together they form the Slovenian National Action Plan [16]. All National Action Plan actions are given in Table II.4 below.

Table II.4: The Slovenian National Action Plan

No.	Future action / activity	Area	Status	Level
1	SUP comprises of a set of modifications/ improvements (see numbers 1.1 to 1.10) that will be implemented in steps. Some of the discussed recommendations (see related recommendations) are to be verified within the licensing and implementation of the SUP. (for SUP details see chapter 2 in Part IV)	SUP	in progress	site
1.1	Safety upgrade of AC power supply	SUP	in progress	site
1.2	New pump for supplying SGs; in a bunkered building, with a dedicated water supply	SUP	in progress	site
1.3	Installation of additional heat sink	SUP	in progress	site
1.4	Additional pumps (low and high pressure, as well as a special pump for seal injection) in a bunkered building, with a dedicated water supply	SUP	in progress	site
1.5	Containment integrity safety upgrades including containment filtered vent systems and PARs	SUP	finished	site
1.6	Establishment of emergency control room	SUP	in progress	site
1.7	Installation of fixed spray system around the SFP with provisions for quick connection from different sources of water.	SUP	in progress	site
1.8	Mobile heat exchanger with provisions to quick connect to SFP, containment sump or reactor coolant system	SUP	in progress	site
1.9	Flood protection upgrade (additional protection of nuclear island and bunkered buildings)	SUP	in progress	site
1.10	Establishment of new technical support center and upgrade of existing operational support center (emergency operating facilities)	SUP	in progress	site
2.1	SNSA shall amend its legislation to include: • requirements regarding the use of advanced deteriorating weather warning systems • requirements regarding the use of seismic monitoring systems • PSA Level 3 requirements (at least for new NPPs) • requirements for Beyond Design Basis Accidents I&C for Spent Fuel Pool • emergency planning requirements for prolonged SBO in the areas of communications capability (onsite, e.g., radios for response teams and between facilities, and offsite, e.g., cellular telephones, satellite telephones), ERDS capability, training and exercises, and equipment and facilities	legislation	planned	national
2.2	The SNSA shall consider amending its regulation for the design basis by more stringent safety objectives for: • Prevention and mitigation of core-melt accident in reactor and in spent fuel storage to avoid off-site long term contamination • Large or early release to be practically eliminated (for new NPPs) • Increase robustness of NPPs to be able to face natural hazards more severe than the ones considered in the	legislation	to consider	national

No.	Future action / activity	Area	Status	Level
	design basis (DEC) ; this should also include requirements for test and maintenance of equipment, training,... This will be done mainly by following WENRA/ENSREG new initiatives, updated RL,... The SNSA shall also examine whether more detailed requirements are needed regarding LOOP, SBO and loss of UHS			
3	In January 2012 SNSA issued the third decision regarding the Fukushima event requiring from the Krško NPP to review the basis and assumptions for the Radiological Emergency Response Plan. This is to be finished by March 2013. The results of the review, possible proposals for improvements of the Radiological Emergency Response Plan, shall be implemented as appropriate. In addition the SNSA (together with other appropriate stakeholders) shall give further consideration to: • supplementing the national radiological emergency response plan with provisions for off-site support regarding to the long-term fuel supply and also some additional pieces of mobile equipment in case of widespread disruption of plant's infrastructure • within the supplementing of national radiological emergency response plan further consideration shall be given to: - Reference levels for importing food, - Trans-boundary processing of goods and services such as container transport - Approach / philosophy and associated limits and criterion to govern the 'remediation' phase of the event - Return to evacuated area criteria and criteria for return to normal from the emergency state - Establishing contamination monitoring protocols and locations during the recovery phase • preparing national strategy (also amending legislation if needed) regarding solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water • enhancement of intervention personnel training, trans-boundary arrangements and education of the public and media • enhancing cooperation with neighboring countries (especially Croatia), including mutual exercises • enhancing exercises by including all interface points (National, Regional, Municipal…), performing longer term exercises for better reflection of the extreme events challenges, and incorporating failure of communication systems and radiation data availability into drill programs • enhancement of national radiological monitoring system	emergency response	to consider	national
4	SNSA shall assign dedicated inspections to: • verify the external hazard protection equipment. • systematically review and inspect SAME equipment, SAMGs, test and maintenance procedures, as well as full scale training events at the Krško NPP with the emphasis on how the limited number of staff are able to cope with	inspection	planned	site

No.	Future action / activity	Area	Status	Level
	equipment deployment and transfer of additional fuel to the users, what are the available and needed times, are there enough resources (human and equipment) available,… • check what are plant's capabilities to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO.			
5	The SNSA shall consider requiring the plant to perform additional studies regarding: • accident timing, including core melt, reactor pressure vessel (RPV) failure, basemat melt-through, SFP fuel uncovery, etc., using different computer codes • radiological protection equipment for SA response • analysis and identification of situations that would prevent performance of work for radiological reasons. • the question of stress on staff behavior including emotional, psychological and cultural aspects associated with emergency response and associated training and support	additional studies	to consider	site
6	Nuclear safety infrastructure in Slovenia needs more political support. Only in such environment the human resource capacity and competence across all organizations in the field of nuclear safety can be further developed. SNSA shall organize a meeting, where this topic shall be brainstormed by all involved parties (the utility, the regulatory body, TSOs…). Special action plan shall be prepared and executed to enhance political support to nuclear safety infrastructure.	nuclear safety infrastructu -re	planned	national
7	To enhance its processes SNSA shall: • reconsider, which of the international meetings/groups are of outmost importance, since the decreasing number of staff and increasing number of international activities the quality of regular work may start to suffer • review its capability for evaluating defense-in-depth to see whether and how it could be further enhanced • enhance its staff training on severe accidents and SAMGs	SNSA processes	planned	national
8	The SNSA shall consider inviting the following peer review missions • additional RAMP mission (best after completion of SUP) to again properly and independently validate the SAMGs. Likewise consideration shall be given to inviting peer review missions to reassess the external hazards. • a follow-up IRRS mission in 2014, and next IRRS mission in the next 5-6 years • OSART mission to review plant design safety features and related modifications (in next 3 years) • EPREV (Emergency Preparedness Review) mission	peer reviews	to consider	site
9	SA plant parameters are being transferred to regulator premises. Still, this system needs a revision to include all needed SA parameters, increase reliability of the system,…	ERDS	planned	site

No.	Future action / activity	Area	Status	Level
10	A full scope PSA (including Level 2) for low power and shutdown modes shall be implemented for the Krško NPP. SNSA shall consider requiring a PSA for the Krško's Spent Fuel Pool.	PSA	planned	site
11	SNSA shall (together with the operator) analyze how the following topics are taken into account, maintained and improved: • Transparency; public discussion of safety issues • An open and trustful relationship between regulators, operators and the public with keeping in mind their respective roles and functions •Define appropriate actions to ensure that the desired safety culture characteristics are achieved in the regulatory and operational organizations • Methods to evaluate and detect degraded safety culture	safety culture	to consider	national
12	Within the reassessment of its severe accident management strategy, existing design measures and procedures, the operator has also reassessed its possibilities for alternative spent fuel strategy. The results showed that best strategy would be storing the spent fuel in dry cask storage with a possibility to combine it with later reprocessing. In accordance with the latest study further actions shall be implemented on the national level to change the national strategy and to enable licensing of the modification.	reviews and NPP improve-ments	planned	national

The implementation of the Action Plan will be followed by the SNSA. Most of the actions will be performed by the SNSA itself in scope of legislation changes, decision issuance or special theme inspections. Actions concerning changing or enhancing nuclear safety infrastructure will require involvement of other stakeholders, including the operator, utility, technical support organizations, and others.

The Action Plan will be periodically reviewed twice a year until the end of its implementation.

The National Action Plan, which was prepared based on the methodology developed by ENSREG [17], was published in December 2012 and is available at the SNSA's web page. The National Action Plan was peer reviewed within the EU countries (plus Switzerland and Ukraine) in April 2013.

References to Appendix II:

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[2] Slovenian National Report on Nuclear Stress Tests, SNSA, December 2011

[3] Peer Review Country Report – Slovenia, ENSREG, April 2012

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[5] Safety of Nuclear Power Plants: Design Specific Safety Requirements, SSR-2/1, IAEA, February 2012

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[7] Recommendations for Enhancing Reactor Safety in the 21st Century, The Near-Term Task Force Review of Insights from the Fukushima Dai ichi Accident, SECY-11-0093, US NRC, July 2011

[8] Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report (SECY-11-0124), US NRC, September 2011

[9] Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned (SECY-11-0137), US NRC, October 2011

[10] 2nd Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety, topic and summary reports (CNS EOM), August 2012, Vienna, Austria

[11] Compilation of recommendations and suggestions, ENSREG, July 2012

[12] IAEA Action Plan on Nuclear Safety, September 2011, Vienna, Austria

[13] The official Report of the Fukushima Nuclear Accident Independent Investigation Commission, The National Diet of Japan, 2012

[14] Das KKW Krško in Licht der Nuklear-Katastrophe von Fukushima" (Eng.: The Krško NPP in light of the nuclear disaster in Fukushima), University of Natural Resources and Life Sciences in Vienna; Department of Water, Atmosphere and Environment; Institute of Safety and Risk Sciences, October 2012

[15] Forging a New Nuclear Safety Construct, ASME, June 2012

[16] The Slovenian Post-Fukushima National Action Plan, SNSA, December 2012

[17] Template NAcP-Proposal WG1-Rev.doc, ENSREG, October 2012