



REPUBLIC OF SLOVENIA

MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING

SLOVENIAN NUCLEAR SAFETY ADMINISTRATION

# The First Slovenian Report under Council Directive 2011/70/Euratom on safe management of spent fuel and radioactive waste







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radioactive waste**

July 2015

Prepared by the **Slovenian Nuclear Safety Administration** in cooperation with:  
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Cover photos: Krško NPP and the Central Storage Facility in Brinje

Photos: archive NEK d.o.o. and archive ARAO

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Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, licence holders, design and construction, operation, waste management facilities, emergency preparedness, Krško NPP, operating experience, giving priority to safety, radiation protection, quality assurance, regulatory framework, regulatory surveillance, siting, training, verification of safety, object of national infrastructure, post closure, inventory, human resources, financial resources, disposal, spent fuel, radioactive waste, national programme.

## SUMMARY

The Republic of Slovenia has a small nuclear programme: one operating nuclear power plant, co-owned by neighbouring Republic of Croatia, one research reactor and one central storage facility for radioactive waste from small producers. In addition there is also a uranium mine at Žirovski vrh, though this is now closed. The Republic of Slovenia has no facility for final disposal of radioactive waste or spent nuclear fuel yet. Spent fuel from the NPP is stored in the pool on site. The site for the low and intermediate level waste disposal has been approved and for the time being processes of environmental impact assessment and final design are going on.

In Slovenia the national policy and strategy on nuclear safety are clearly defined in the strategic document adopted by the parliament and entitled Resolution on Nuclear and Radiation Safety in the Republic of Slovenia - for the period 2013-2023. This is applicable to all aspects of nuclear and radiological safety, including also everything related to radioactive waste and spent fuel management. The general principles in the Resolution are based on the IAEA Safety Fundamentals.

The national policy and strategy on radioactive waste and spent fuel management is further elaborated in another document, adopted in 2006 by the Parliament: The Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel. The revision of the Resolution for the period 2016-2025 is under preparation.

The Republic of Slovenia has in the area of nuclear safety and radioactive waste and spent fuel management comprehensive legal and institutional framework in place, which is in line with international standards and EU directives. The legal framework is addressing all kinds of nuclear facilities in a similar way, so that the rules, developed primarily for the nuclear power plant, are applicable also for other nuclear facilities like waste storages and repositories.

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 legislative and regulatory framework consists of the national legal framework and of those international instruments that Slovenia is party to.

The 2002 Act divided the competences in the field of nuclear and radiation safety between two regulatory bodies, namely the Slovenian Nuclear Safety Administration (SNSA) and the Slovenian Radiation Protection Administration (SRPA). The SNSA is accountable for nuclear safety of facilities and the 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 Government and the Ministries can issue legally binding regulations, subordinate to laws. The SNSA and SRPA draft such regulations and prepare them for adoption.

The SNSA as the regulatory body authorizes all stages in the life of nuclear facilities, performs the necessary review and assessment, inspects these facilities and has a power of enforcement.

The SNSA is a functionally autonomous administration within the Ministry of the Environment and Spatial Planning. The budget is the only source for financing the SNSA basic activities.

Every licensee is fully responsible for safety of its facility. He has to apply for appropriate license at clearly defined stages in the life time of the facility and for clearly defined activities. The basic document necessary for obtaining an operating license is a safety analysis report.

The 2002 Act requests from the licensee to provide sufficient number of skilled personnel and enough financial resources for safe operation. Key personnel of operating facilities has to be licensed by the special State licensing commission. This includes also the key personnel for radioactive waste and spent fuel management facilities.

In agreement with the co-owner of the Krško NPP the Republic of Croatia each country has established a special Fund for collection of financial resources for safe disposal of radioactive waste and spent fuel and for the decommissioning of the plant. In Slovenia the Fund is under the Parliamentary control. The levy

from every kWh produced in the plant is collected. The funds are used for financing activities leading towards construction of the final low and intermediate waste repository to be operational in 2020.

The “transparency principle” is one of the main principles of the 2002 Act, which ensures that the public be provided comprehensive information on nuclear safety including radioactive waste and spent fuel management. The SNSA is obliged together with other relevant authorities to prepare the annual report. The SNSA regularly informs the general public and the workers of work in its fields of competence on its website and at press conferences. The legislative initiatives, i.e. the draft legislation, are published on the special governmental webpage for the purposes of public hearings.

## CONTENTS

<b>SUMMARY .....</b>	<b>3</b>
<b>INTRODUCTION.....</b>	<b>7</b>
<b>COMPLIANCE WITH ARTICLES 4 TO 12.....</b>	<b>13</b>
<i>ARTICLE 4: General principles .....</i>	<i>13</i>
<i>ARTICLE 5: National framework.....</i>	<i>18</i>
<i>ARTICLE 6: Competent regulatory authority .....</i>	<i>27</i>
<i>ARTICLE 7: Licence holders.....</i>	<i>30</i>
<i>ARTICLE 8: Expertise and skills.....</i>	<i>36</i>
<i>ARTICLE 9: Financial resources .....</i>	<i>39</i>
<i>ARTICLE 10: Transparency.....</i>	<i>42</i>
<i>ARTICLES 11 and 12: National programmes.....</i>	<i>45</i>
<b>APPENDIX I: COMPREHENSIVE LIST OF LEGAL DOCUMENTS IN FORCE                   IN SLOVENIA (AS OF 31 JULY 2015) .....</b>	<b>49</b>
<b>APPENDIX II: INVENTORY (AS OF 31 DECEMBER 2013) .....</b>	<b>51</b>

## TABLES

<b>Table 1:</b> Transformation of national classification system into unified system.....	51
<b>Table 2:</b> Waste streams by waste producer and final solution of different waste categories and spent fuel.....	53
<b>Table 3:</b> Radioactive waste inventory in the Central Storage Facility for Radioactive Waste in Brinje (CSF) as of 31 December 2013.....	54
<b>Table 4:</b> Radioactive waste inventory in the Krško NPP storage as of 31 December 2013.....	54
<b>Table 5:</b> Inventory of Jazbec mill tailings site at the Žirovski vrh Uranium Mine as of 31 December 2013.....	55
<b>Table 6:</b> Inventory of Boršt mill tailings site at the Žirovski vrh Uranium Mine as of 31 December 2013.....	55
<b>Table 7:</b> Total amount of waste and spent fuel in Slovenia as of 31 December 2013.....	55
<b>Table 8:</b> Total expected volumes of waste by waste category and amount of spent fuel.....	56

## FIGURES

<b>Figure 1:</b> The nuclear programme in the Republic of Slovenia.....	7
<b>Figure 2:</b> The SNSA and SRPA within the governmental structure.....	28

## INTRODUCTION

This report has been prepared to meet the requirements of Article 14.1 of Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste Euratom (hereinafter the Waste Directive). The report was prepared by the Slovenian Nuclear Safety Administration with the collaboration of the implementing organisations involved in the responsible and safe management of spent fuel and radioactive waste management.

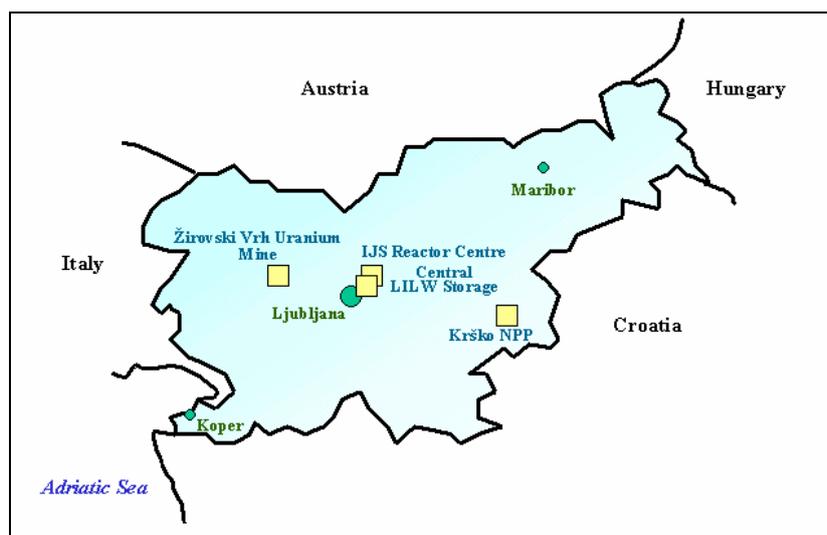
The structure of the report follows the guidelines prepared by the ENSREG group and the article-by-article reporting approach. For the overall picture of the Slovenian nuclear programme and due to the fact that naturally occurring radioactive material is one of the classes of radioactive waste according to the national classification system, the waste from mining activities is addressed in the report as well. The main spent fuel and radioactive waste management and safety issues addressed in the report are the following:

Sources of spent fuel (SF) and radioactive waste (RAW);

- The policy and legal framework for SF and RAW management;
- Regulatory bodies and implementing organisations;
- Responsibilities and interdependencies;
- Licensing and safety assessment;
- Transparency and public involvement in decision-making processes;
- Human and financial resources;
- Inventory.

### The Slovenian Nuclear Programme

The Republic of Slovenia has a small nuclear programme: one operating nuclear power plant, one research reactor and one central storage facility for radioactive waste from small producers. In addition there is also a uranium mine at Žirovski vrh, although this is now closed. The geographical locations of the nuclear and radiation facilities are given in the figure below. The Republic of Slovenia has no facility for final disposal of radioactive waste or spent nuclear fuel yet, but the site for the first one is already approved.



**Figure 1:** The nuclear programme in the Republic of Slovenia

**The Krško Nuclear Power Plant (Krško NPP)** is one of the main pillars of the Slovenian power system. It is situated on the left bank of the River Sava in the south-eastern part of Slovenia. It is a Westinghouse Pressurised Light Water Reactor with nominal output power of 727/696 MWe (gross electrical power/net electrical power). It is designed to operate until the end of 2023 but its operation is planned to be

extended from 2023 to 2043, pending the successful conclusion of Periodic Safety Reviews in 2023 and 2033. The plant is owned by state-owned Slovenian and Croatian electrical power companies (GEN energija d. o. o. and Hrvatska Elektroprivreda d. d., respectively).

The plant is operated by the public enterprise Krško NPP d. o. o. The Krško NPP is the major producer of radioactive waste in the Republic of Slovenia. All operational radioactive waste and spent nuclear fuel are stored within the plant area. Solid radioactive waste is treated and then packed into steel drums, which are then stored in the solid radwaste storage facility. Spent nuclear fuel is stored under water in the spent fuel pool. There are plans to move part of the spent fuel from the pool to dry storage facility as soon as 2018.

**The Jožef Stefan Institute Reactor Infrastructure Centre** (IJS Reactor Infrastructure Centre) is a part of the Jožef Stefan Institute (IJS). It is located in Brinje, about 15 km north-east of Ljubljana. The main purpose of the centre is operation of the TRIGA Mark II research reactor for the needs of IJS and other research groups. The TRIGA Mark II research reactor is a General Atomics open-pool type research reactor with a thermal power of 250 kW. It was initially licensed in 1966 and was re-licensed for steady state and pulse operation after renovation and reconstruction in 1991. The facility is used in research projects and for education. In addition to spent fuel, the reactor produces a small amount of low- and intermediate- level waste (LILW). One part of the IJS Reactor Infrastructure Centre is a hot laboratory, which is, inter alia, also licensed for the treatment of radioactive waste from small producers.

The research reactor is operated by the Jožef Stefan Institute, a public research institution that is financed from the national budget by the Ministry for Education, Science and Sport.

**The Žirovski vrh Uranium Mine** was in operation in the period from 1984 to 1990. Its lifetime production was 610,000 tons of ore, from which 452.5 tons of  $U_3O_8$  was produced. The Žirovski vrh Uranium Mine ended regular operation in 1990. The decision to close it was influenced by economic reasons, since its uranium production was no longer economically competitive. In 1992, the Republic of Slovenia, as the owner of the Žirovski Vrh Uranium Mine, established a company called Žirovski Vrh Mine d.o.o. to perform the permanent closure of the mine (Permanent Cessation of Exploitation of the Uranium Ore and Prevention of the Consequences of Mining in the Uranium Mine at Žirovski Vrh Act). The financial resources for decommissioning and remediation were provided from the national budget.

All entrances to the underground mine are now closed. The uranium ore mill has been decommissioned and the resulting wastes have been disposed of at the Jazbec mining waste disposal site. All mining waste from numerous other mining waste piles has been moved to this site and disposed of. The total amount of disposed material on this site is 1,910,425 tons, with a total activity of 21.7 TBq. At the Boršt uranium mill tailings disposal site, 610,000 tons of hydrometallurgical waste, 111,000 tons of mine waste and 9,450 tons of material collected during decontamination of the ore mill have been disposed of, with a total activity of 48.8 TBq. Closure works at the Jazbec disposal site have been completed and the administrative procedure is in its final stage. The closure of the Boršt disposal facility has been delayed due to the activation of a landslide.

**The Central Storage Facility for Radioactive Waste** in Brinje is intended for storage of low- and intermediate-level radioactive waste arising from medical, industrial and research applications. The construction of the facility started in 1984 and it was put into operation in 1986. The Agency for Radioactive Waste Management (ARAO) is responsible for its operation.

**The Agency for Radwaste Management** is a public utility for the implementation of radioactive waste management as a public service. It was established by the Slovenian Government and is responsible for radioactive waste management, including management of institutional radioactive waste, post-closure monitoring and maintenance of disposal sites for uranium mining and milling waste, and disposal of radioactive waste from the Krško NPP. It is financed from the national budget and fees paid by waste producers when the liabilities of further waste management are transferred from them to the ARAO. Activities regarding the siting and construction of an LILW repository are financed from the Fund for the Decommissioning of the Krško NPP.

**The Fund for Financing the Decommissioning of the Krško NPP and for the Management of Radioactive Waste from the Krško NPP** was established pursuant to the Act on the Public Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the Disposal of Radioactive

Waste from the Krško NPP. Its main activity is collection of funds for final decommissioning and disposal of RW and SF from the Krško NPP.

The Fund's sphere of activities spans over several national structures, connected with nuclear energy, but the Fund is not directly attached to them. This gives the Fund a special position that enables him to maintain independence. The Fund has a specific position in the state structure. It was founded by the Slovenian National Assembly. Its activities are also affected by the Slovenian Government, which must give its consent to the Fund's Statute, investment policy, financial plan, the annual accounts and the annual report on the Fund's operating activities.

### **Governmental Policy**

The governmental policy in the area of the safety of spent fuel management and the safety of radioactive waste management is governed by the national nuclear legislation and international agreements. A number of measures have been implemented to protect the environment and the public from the harmful impact of radioactive waste and spent fuel. The most important measures are the following:

- The establishment and functioning of the regulatory body in 1987, the Slovenian Nuclear Safety Administration (SNSA), which is the competent authority in the area of nuclear and radiation safety and radioactive waste management.
- The establishment of the ARAO as a public utility for radioactive waste management by the Slovenian Government (1991).
- The establishment of Žirovski vrh Mine d.o.o., a public enterprise for the decommissioning of the uranium production site (1992).
- The establishment of the Fund for the Decommissioning of the Krško NPP (1995).

In addition, the Government has prepared several documents pertinent to the policy in the area of radioactive waste management. The most important are the following.

**The Resolution on the National Energy Programme** adopted by the Slovenian National Assembly in 2004. In this document the following policy was adopted:

- The share of nuclear energy shall be maintained at the current level.
- The Krško NPP shall operate at least until 2023.
- In order to secure safe and reliable operation of the Krško NPP, adequate measures are to be implemented.
- A decision on the extension of the operating life of the Krško NPP shall be adopted in 2011 on the basis of an evaluation programme that shall start in 2008.

The revised National Energy Programme (NEP) or National Energy Concept is still in preparation and in the phase of general public consultation. The draft National Energy Concept foresees the use of nuclear energy as a contributor to the transition to reliable low-carbon power supply sources.

**The Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment, Exploitation and Decommissioning of the Krško NPP** (hereinafter the Agreement). In the Agreement the following policy is adopted:

- Decommissioning of the Krško Nuclear Power Plant and management of its radioactive waste and spent fuel are the joint responsibility of the contracting parties, and they should ensure efficient common solutions from both the economic and environmental protection-points of view.
- If the contracting parties do not reach agreement on a common solution for radioactive waste and spent fuel management during the regular lifetime of the Krško NPP, they undertake that within two years of such time they must finish removal of operational radioactive waste and spent fuel from the location of the Krško NPP (one-half by each party) and will individually bear the costs of their management (including subsequent division and removal of radioactive waste from decommissioning).

- The contracting parties shall, in equal shares, ensure funds for the preparation of the decommissioning programme and its execution and funds for the preparation of the programme for the disposal of radioactive waste and spent fuel. If the contracting parties agree on a joint solution for the disposal of radioactive waste and spent fuel, they shall finance such in equal shares or shall finance their shares of the activities.
- The Republic of Slovenia and the Republic of Croatia shall jointly prepare and approve a plan for the decommissioning of the Krško NPP and disposal of LILW and high-level waste (hereinafter the Decommissioning Plan).
- The Republic of Slovenia and the Republic of Croatia shall establish funds for the management and collection of financial resources for decommissioning and radioactive waste disposal costs.

The current contribution to the Slovenian fund for financing one-half of the decommissioning and spent fuel and radioactive waste disposal is 0.30 euro cents per kWh of the Slovenian share of energy produced by the Krško NPP.

The revision of the Programme for the Decommissioning of the Krško NPP and Disposal of LILW and High-Level Waste is not yet finished. The Intergovernmental Commission did not meet since 2011. Consequently, the new version of the Decommissioning Programme was not adopted. Furthermore there is still no agreement on a common LILW disposal solution and spent fuel management solution between Slovenia and Croatia based on the dual ownership and shared responsibility for radioactive waste management from the Krško NPP.

**The Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel** was adopted by the Slovenian National Assembly in February 2006. According to the programme, the Krško NPP, the major radioactive waste generator, will continue to operate until 2023, with the option to extend its operational life. After the termination of the Krško NPP's operation, the spent fuel will be transferred to dry storage for a period of approx. 35 years, when the spent fuel repository should be operational. The LILW waste repository will be built in Slovenia. The design of the repository should be modular, with sufficient capacity to accommodate all future LILW waste arising in Slovenia. The spent fuel from the Triga Mark II research reactor will be returned to the country of origin. The institutional waste stored at the Central Storage Facility for Radioactive Waste in Brinje which meets the waste acceptance criteria (WAC) will be disposed of in the LILW repository. The resolution is under revision and the revised document should be adopted by the Slovenian National Assembly until the end of 2015.

**The Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the period 2013–2023** was adopted by the Slovenian National Assembly in June 2013. The Resolution is a programmatic, high-level national policy document that contains a descriptive part divided into chapters; for each chapter the objectives that must be delivered during the period of validity of the Resolution are set. The Resolution therefore comprises the national policy, strategy and plan. The chapters are as follows:

- the fundamental safety principles;
- a description of nuclear and radiological activities in Slovenia;
- a description of the international cooperation in the field of nuclear and radiation safety;
- a description of the existing legislation;
- a description of the institutional framework;
- the competence of professional support (research, education and training).

### **Siting and design of the LILW repository**

Within the process of the preparation of the Spatial Plan of National Importance for the Vrbina site, the SNSA issued guidelines determining the content and scope of the Special Safety Analysis of the LILW repository. Considerable effort and attention are devoted to communication with stakeholders, including local communities and non-governmental organisations.

The municipal council of Krško gave its consent to the proposal of the national spatial plan in July 2009. A great step forward was the adoption of the Decree on a Detailed Plan of National Importance for an

LILW repository in Vrbina in the municipality of Krško, at the end of 2009 by which the procedure for the siting of the repository was completed. Unfortunately, further procedures for the preparation and approval of the environmental impact assessment, detailed field investigations, finalisation of the design, construction and starting operation were significantly delayed due to different administrative reasons. There were complications related to the method of financing of the project and the legal arrangements among investor and implementing organisations, which were slowly resolved only towards the end of 2013. The investment programme for the project, which is a prerequisite for most of other steps, was signed by the Minister of Infrastructure and Spatial Planning only in the summer of 2014. It is now envisaged that the repository could start receiving the first waste in 2020. The original target for the start of operations was 2013. This delay increases the challenges for the Krško NPP, which has to cope with its limited capacities regarding radwaste storage.

The following internet sites are available for additional information:

- The Slovenian Nuclear Safety Administration: <http://www.ursjv.gov.si/>
- Krško NPP: <http://www.nek.si/>
- The Jožef Stefan Institute Reactor Infrastructure Centre: <http://www.rcp.ijs.si/>
- Jožef Stefan Institute: <http://www.ijs.si/>
- The Agency for Radwaste Management: <http://www.arao.si/>
- GEN energija d.o.o.: <http://www.gen-energija.si/>
- Žirovski vrh Mine d.o.o.: <http://www.rudnik-zv.si/>
- The Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and for the Disposal of Radioactive Waste from the Krško Nuclear Power Plant: <http://www.sklad-nek.si/>

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). A comprehensive overview of the legislative and regulatory framework that governs nuclear and radiological safety is attached to this report (Appendix I).

## International Reviews

In 2011 Slovenia hosted an IAEA IRRS (Integrated Regulatory Review Service) mission. The review compared the Slovenian regulatory framework for safety against IAEA safety standards as the international benchmark for safety. The team focused its review on the responsibilities of the SNSA and also visited a number of other organisations. 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 should 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 organisational 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 in ensuring conditions for the start of the construction of a repository for 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 publication of data.

In September 2014, an IRRS Follow-Up Mission was carried out. The main purpose of the Follow-Up Mission was to review the implementation of the actions stemming from the recommendations and suggestions made by the previous mission. At the same time the IRRS Follow-Up Mission assessed whether it made sense to make any further recommendations on the basis of new findings or to praise some solutions as a good practice. The IRRS Team concluded that the recommendations and suggestions from the 2011 IRRS mission had been taken into account systematically by a comprehensive action plan. Significant progress had been made in many areas and many improvements were carried out following the implementation of the action plan. The IRRS Team identified 2 new recommendations and 5 new

suggestions in the area of the sustainable human and financial resources of the SNSA, the availability of the funds and administrative procedures for the appropriate nuclear safety research programme, documentation for emergency preparedness and the accessibility and inspectability of the waste packages in the Krško NPP storage facility.

## COMPLIANCE WITH ARTICLES 4 TO 12

### ARTICLE 4: GENERAL PRINCIPLES

#### Article 4.1

*Member States shall establish and maintain national policies on spent fuel and radioactive waste management. Without prejudice to Article 2(3), each Member State shall have ultimate responsibility for management of the spent fuel and radioactive waste generated.*

In 1996, the Slovenian Government adopted the Strategy for Long-Term Spent Fuel Management, which was later superseded by the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel, adopted by the Slovenian National Assembly in February 2006.

The Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel (the Programme), is one of the key documents in the field of radioactive waste management and is prepared in accordance with the 2002 Act. In the Programme, LILW management is treated as an integral process, covering all stages from waste generation to waste disposal. Various current and near-future radioactive waste streams are taken into account, considering both present and planned waste management practices. In addition to radioactive waste from the Krško NPP, other small producers (from medicine, industry and research) and other activities involving radioactive waste (the uranium mine under decommissioning, TENORM, the decommissioning of reactors, etc.) are also described. The Programme includes an analysis of measures for the minimisation of radioactive waste production and its treatment and conditioning before disposal. The siting and the construction of a repository for short-lived LILW is one of the principal goals of LILW management in Slovenia. The limited storage capacities at nuclear facilities call for decisions to be taken and practical solutions to be found.

Responsibility in the area of LILW management is clearly defined. Three independent parties – the producers of radioactive waste, the SNSA as the regulatory body and the ARAO as implementer of the public service of radioactive waste management – are involved in the process of radioactive waste management. The operators of nuclear and other radiation facilities are responsible for radioactive waste management at their facilities. The ARAO is responsible for collecting, transporting, treating, storing and disposing of institutional LILW. The ARAO also has responsibility for disposal of all radioactive waste coming from electricity production and long-term monitoring and maintenance of disposal facilities for waste from uranium mining and milling. All activities are made transparent to the public through annual reports, the internet, and outreach activities. Special attention is devoted to communication with and the participation in decision-making of the public in the local municipalities with nuclear facilities and in the area selected for the LILW repository site and non-governmental organisations.

The National Programme from 2006 duly implements the relevant provisions of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment, Exploitation and the Decommissioning of the Krško NPP. On the basis of the Agreement, the Republic of Slovenia and the Republic of Croatia jointly prepared and approved a Programme for the Decommissioning of the Krško NPP and the Disposal of LILW and High-Level Waste (hereinafter the Decommissioning Programme) in 2004. In accordance with the requirements under the Agreement, a revised document should be adopted every five years.

In its long-term strategy for spent fuel management the Decommissioning Programme from 2004 foresees spent fuel storage in dry casks. Spent fuel will be moved from pool to dry storage between 2024 and 2030 and will be stored in casks until 2065, when a deep geological repository is assured. The operational phase of the spent fuel repository will end in 2070 and the repository should be closed in 2075. In the event of an export option, the removal of spent fuel from dry storage is planned for between 2066 and 2070.

According to the Decommissioning Programme, disposal in deep geological formations is considered to be a safe long-term solution for spent fuel and high-level waste. In preparing the evaluation, the Swedish concept was used as a guideline.

The basic characteristics of the concept are:

- Direct disposal of spent fuel in appropriate canisters, with capacity for 1,600 fuel elements or 620 metric tons of metallic uranium and a small additional volume of high-level waste (~16 m<sup>3</sup>).
- The following phases are studied and evaluated: research and development, including site selection and characterisation, design and construction, operation, and closure.
- As an alternative to disposal in a deep geological formation either in Slovenia or in Croatia, the option of export and disposal of spent nuclear fuel in a third country was also considered.
- Within final disposal options, the ARAO participates at the EU level in two programmes which address the possibility of building a multinational/regional repository for spent fuel and high-level waste (ERDO-WG and IGD-TP).

As a consequence of the Fukushima accident, stress tests were performed and an action plan on how to improve the operational safety of the Krško NPP was prepared. In the light of new information, new knowledge regarding spent fuel management in general, and the SNSA decision issued in 2011 regarding the prevention of severe accidents and mitigation of their consequences, the Krško NPP assessed the options to reduce risk associated with spent fuel, taking into account the change in the long-term strategy for spent fuel. Wet spent fuel storage was assessed and compared to dry storage and a reprocessing (recycling) option was reviewed. Since the current wet storage capacity is not adequate, from both safety and operational capacity points of view, for the plant's commercial operational lifetime (to 2023), let alone the possible lifetime extension until 2043, a dry storage option was proposed. To ensure uninterrupted operation and sufficient storage capacity in the spent fuel pool, a dry cask storage facility should be operational in 2018.

The Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel will be revised to take into account the results of stress tests and all the various solutions, which should include the options of long-term storage and different options for fuel reprocessing and final disposal in a geological repository (national, regional and multinational). The revised Resolution should be adopted by the Slovenian National Assembly towards the end of 2015.

## Article 4.2

*Where radioactive waste or spent fuel is shipped for processing or reprocessing to a Member State or a third country, the ultimate responsibility for the safe and responsible disposal of those materials, including any waste as a by-product, shall remain with the Member State or third country from which the radioactive material was shipped.*

The Slovenian legislation (the 2002 Act and the Rules on Transboundary Shipments of Radioactive Waste and Spent Fuel) regarding the transboundary movement of radioactive waste and spent fuel is harmonised with Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel and with the Commission Decision of 5 March 2008 establishing the standard document for the supervision and control of shipments of radioactive waste and spent fuel referred to in Council Directive 2006/117/EURATOM.

Transboundary movement is covered in Articles 101–103 of the 2002 Act, Subchapter. 4.9, "Shipments into and out of EU Member States – The import, export and transit of nuclear and radioactive substances and radioactive waste". The Rules on Transboundary Shipments of Radioactive Waste and Spent Fuel define in Art. 4, paragraph 3, that an undertaking in the Republic of Slovenia that has shipped radioactive waste or spent fuel to another Member State for processing or reprocessing, shall accept that radioactive waste generated in the processing or reprocessing operations that the Member State wishes to return.

In the past Republic of Slovenia has sent radioactive waste from Krško NPP to Sweden for treatment. Before each shipment a special document "Waste return guarantee" was signed by the consignee and consignor and agreed on by the SNSA. The Republic of Slovenia fully complies with and implements the requirement of this article.

### Article 4.3

*National policies shall be based on all of the following principles:*

- (a) the generation of radioactive waste shall be kept to the minimum which is reasonably practicable, both in terms of activity and volume, by means of appropriate design measures and of operating and decommissioning practices, including the recycling and reuse of materials;*
- (b) the interdependencies between all steps in spent fuel and radioactive waste generation and management shall be taken into account;*
- (c) spent fuel and radioactive waste shall be safely managed, including in the long term with passive safety features;*
- (d) implementation of measures shall follow a graded approach;*
- (e) the costs for the management of spent fuel and radioactive waste shall be borne by those who generated those materials;*
- (f) an evidence-based and documented decision-making process shall be applied with regard to all stages of the management of spent fuel and radioactive waste.*

The requirement that generation of radioactive waste associated with spent fuel management and generation of other radioactive waste is kept to the minimum practicable, consistent with the type of fuel-cycle policy, is through the 2002 Act. Paragraph (2) of Article 93 stipulates that any person responsible for the generation of radioactive waste and spent fuel shall ensure that radioactive substances occur in the smallest possible quantities.

The interdependencies among the different steps in spent fuel management and radioactive waste management are addressed through the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel, adopted by the Slovenian National Assembly in 2006. The producers of radioactive waste and spent fuel have to consider the interdependencies among the different steps of their radioactive waste management. The requirement to consider the interdependencies among the different steps in spent fuel and radioactive waste management is also provided for in the Rules on Radioactive Waste Management that entered into force in May 2006.

The provisions ensuring the effective protection of individuals, society and the environment, by applying suitable protective methods at the national level as approved by the regulatory body, are included within the framework of the national regulations.

There are no special provisions for avoiding actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation in the Republic of Slovenia. This subject is addressed implicitly throughout all legally binding documents in the area of nuclear and radiation safety. However, as a measure against the undue impact to future generations the collection of the decommissioning and disposal funds in a special state controlled Fund could be considered.

Article 5 of the 2002 Act introduces a graded approach principle. It defines that when considering nuclear and radiation safety, matters are considered in accordance with the importance of safety, in a manner such that the major issues receive more attention than those less important.

The costs of radioactive waste and spent fuel management shall be paid by the party responsible for the occurrence of the radioactive waste or the holder of the waste when such takes possession of it from the party responsible for the occurrence thereof, or acquired it in any other manner. The financial resources for final decommissioning of the Krško NPP and the disposal of its RW and SF are collected from the current operator/owner.

An appropriate management system is also required by the 2002 Act, Article 63. It is prescribed that the operator of the radiation or nuclear facility must establish, implement, evaluate and continually improve the management system, which must be described in the documents of the management system. The JV5 Rules further defines the requirements regarding documentation of the management system. All nuclear and radiation safety activities and decisions related to all stages of spent fuel and radioactive waste shall be documented and major decisions with an impact on nuclear and radiation safety shall be approved by the SNSA.

## Article 4.4

*Except for the provisions set out in Article 2(3):*

*(a) repatriation of disused sealed sources to a supplier or manufacturer;*

*(b) shipment of spent fuel of research reactors to a country where research reactor fuels are supplied or manufactured, taking into account applicable international agreements;*

*(c) the waste and spent fuel of the existing Krško nuclear power plant, when it concerns shipments between Slovenia and Croatia.*

*Radioactive waste shall be disposed of in the Member State in which it was generated, unless at the time of shipment an agreement, taking into account the criteria established by the Commission in accordance with Article 16(2) of Directive 2006/117/Euratom, has entered into force between the Member State concerned and another Member State or a third country to use a disposal facility in one of them.*

*Prior to a shipment to a third country, the exporting Member State shall inform the Commission of the content of any such agreement and take reasonable measures to be assured that:*

*(a) the country of destination has concluded an agreement with the Community covering spent fuel and radioactive waste management or is a party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management ('the Joint Convention');*

*(b) the country of destination has radioactive waste management and disposal programmes with objectives representing a high level of safety equivalent to those established by this Directive; and*

*(c) the disposal facility in the country of destination is authorised for the radioactive waste to be shipped, is operating prior to the shipment, and is managed in accordance with the requirements set down in the radioactive waste management and disposal programme of that country of destination.*

As defined by the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel radioactive waste shall be disposed of in the national repository. The location of the repository was approved in 2009. If a joint solution is reached with the Republic of Croatia regarding the disposal of radioactive waste from Krško NPP, then the exception according to 2(3)c will be applied. Currently, Slovenia stores all the radioactive waste generated in the country in the relevant storage facilities until the disposal facility is in operation.

Article 20 of the JV11 Rules as well as Article 102 of the 2002 Act determine the prohibition of shipments to:

- a destination south of latitude 60° south; or
- a country which is party to the Partnership Agreement between the members of the African, Caribbean and Pacific Group of States of the one part, and the European Community and its Member States, of the other part, (Cotonou ACP-EC Agreement) which is not a Member State, without prejudice to Article 4 of these Rules; or
- to a third country which does not, in its opinion, in accordance with the criteria referred to in paragraph 2, have the administrative and technical capacity and regulatory structure to manage radioactive waste or spent fuel safely, as stated in the Joint Convention on the Safety of Spent Fuel

Management and on the Safety of Radioactive Waste Management. In coming to an opinion on this issue, the Administration shall duly take into account any relevant information from other Member States. In this respect, Member States shall inform the Commission and the Advisory Committee set up under Article 21 of Directive 2006/117/Euratom, on a yearly basis.

In assessing the compliance with criteria for export under subparagraph 3 of the previous paragraph, the Administration shall duly take into account the Commission Recommendation of 4<sup>th</sup> December 2008 on criteria for the export of radioactive waste and spent fuel to third countries (OJ L No. 338, 17. 12. 2008, pp. 69-71).

## ARTICLE 5: National framework

### Article 5.1

*Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

- (a) a national programme for the implementation of spent fuel and radioactive waste management policy;*
- (b) national arrangements for the safety of spent fuel and radioactive waste management. The determination of how those arrangements are to be adopted and through which instrument they are to be applied rests within the competence of the Member States;*
- (c) a system of licensing of spent fuel and radioactive waste management activities, facilities or both, including the prohibition of spent fuel or radioactive waste management activities, of the operation of a spent fuel or radioactive waste management facility without a licence or both and, if appropriate, prescribing conditions for further management of the activity, facility or both;*
- (d) a system of appropriate control, a management system, regulatory inspections, documentation and reporting obligations for radioactive waste and spent fuel management activities, facilities or both, including appropriate measures for the post-closure periods of disposal facilities;*
- (e) enforcement actions, including the suspension of activities and the modification, expiration or revocation of a licence together with requirements, if appropriate, for alternative solutions that lead to improved safety;*
- (f) the allocation of responsibility to the bodies involved in the different steps of spent fuel and radioactive waste management; in particular, the national framework shall give primary responsibility for the spent fuel and radioactive waste to their generators or, under specific circumstances, to a licence holder to whom this responsibility has been entrusted by competent bodies;*
- (g) national requirements for public information and participation;*
- (h) the financing scheme(s) for spent fuel and radioactive waste management in accordance with Article 9.*

As defined in its first article, the main purpose of the 2002 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 2002 Act divided the competences 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 the 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.

New amendments to the Act are expected at the end of 2015. As a consequence, a number of revised secondary legislation (rules and decrees) are also planned to be adopted during 2015 and 2016.

On the basis of 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.

In 2006 the Slovenian National Assembly adopted the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel. More on the content is described under Article 4.1 of this report.

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 National Assembly in June 2013 – as a high level national policy paper.

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 the Interior has the responsibility for physical protection.

Slovenia is a 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 5.1 (a)

*The national framework shall provide for all of the following:*

*(a) a national programme for the implementation of spent fuel and radioactive waste management policy;*

The 2002 Act in Art. 98 prescribes requirements for the preparation of the national programme of radioactive waste and spent fuel management.

## Article 5.1 (b)

*The national framework shall provide for all of the following:*

*national arrangements for the safety of spent fuel and radioactive waste management. The determination of how those arrangements are to be adopted and through which instrument they are to be applied rests within the competence of the Member States;*

Slovenia represents a typical model of the 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 (the Government) and rules (the 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 competences.

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.

On the basis of the Slovenian Constitution an authority within a ministry (such as the SNSA) cannot adopt binding rules; on the other hand their main duty and responsibility is to propose and prepare them for further adoption – by the minister (rules) or Government (decree) or the legislature (act).

National arrangements for the safety of spent fuel and radioactive waste management are described in more detail in previous chapters. In addition to the 2002 Act and the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel it is worth mentioning that the rules JV7 (Rules on radioactive waste and spent fuel management) are prescribing in more detail how RW and SF should be handled.

## Article 5.1 (c)

*The national framework shall provide for all of the following:*

*a system of licensing of spent fuel and radioactive waste management activities, facilities or both, including the prohibition of spent fuel or radioactive waste management activities, of the operation of a spent fuel or radioactive waste management facility without a licence or both and, if appropriate, prescribing conditions for further management of the activity, facility or both;*

Licensing of new spent fuel and radioactive waste management 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 authorisation of spent fuel and radioactive waste management facilities is the 2002 Act. The secondary legislation consists of rules. The most important of which are the JV7 “Rules on Radioactive Waste and Spent Fuel Management”, the JV5 “Rules on the Radiation and Nuclear Safety Factors” and the JV9 “Rules on the Operational Safety of Nuclear or Radiological Facilities”. The JV7 Rules lays down the classification of radioactive waste according to level and type of radioactivity, the management of radioactive waste and spent fuel, the scope of reporting on radioactive waste and spent fuel generation, and the method and scope of keeping central records of radioactive waste and spent fuel generation and keeping records of radioactive waste and spent fuel stored and disposed. The JV5 Rules describe (among others) the documentation to be submitted as well as the details of the licensing procedure, while the JV9 Rules (among others) provide instructions on the methodology to be used for the classification and notification of facility modifications. Complementary instructions are issued as practical guidelines by the regulatory body, e.g. PS 1.03 “The content of the safety analysis report of a low- and intermediate-level radioactive waste repository” and 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. Following is the brief description of main steps in the licensing process:

### **National Strategic Spatial Plan**

Drafted by the Ministry in charge of spatial planning, the Strategic Plan should define, inter alia, 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 the proposal of the Government, which after approval sets the timeline of its implementation.

### **National Spatial Plan**

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

The role of the SNSA is to review the so-called Special Safety Analysis, which has to be submitted by the applicant. The Special Safety Analysis focuses on the impact of the site on the facility 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 submission of an Environmental Impact Assessment. The SNSA reviews the relevant part of the Environmental Impact Assessment, which focuses on the radiological impact of the facility on the environment. 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 permit for the construction of a nuclear facility is issued by the Ministry of the Environment and Spatial Planning on the basis of the Construction Act; among other conditions, the consent of the SNSA is required (2002 Act, Article 68). In issuing consent, the SNSA evaluates the technologies incorporated in the design and construction of the spent fuel management or radioactive waste management facility from the points of view of nuclear and radiation safety and environmental protection. The key document governing the technical and safety measures for the construction and operation of a nuclear facility is the safety analysis report.

The main content of the safety analysis report is prescribed by the 2002 Act and the JV5 Rules. The detailed content of the safety analysis report for the LILW repository was prepared by the SNSA in the form of guidelines issued in 2012.

## Consent for the Start of Trial Operation and a Decision to Start Trial Operation

After construction work has been completed, every nuclear facility must undergo a period of trial operation. Prior to the start of trial operation of a nuclear facility, it is mandatory to obtain the consent of the SNSA. An application for consent for the start of trial operation must contain a Safety Analysis Report updated with any changes that occurred during construction, an opinion from an authorised expert in radiation and nuclear safety, and other prescribed documentation.

The SNSA shall issue consent for trial operation for a fixed period, which may not exceed two years. The consent for trial operation may be extended. The trial operation together with the technical checks of the facility represents the commissioning phase, which lasts approximately 3 years (technical checks plus 2 years of trial operation).

## Licence to Use the Facility

A licence to use of the facility is issued by the ministry responsible for 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. This is the license which is generally required for all types of facilities, not only nuclear.

## Operating Licence

An operating licence is issued by the 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 also include the opinion of an authorised expert in radiation and nuclear safety. In the operating licence the SNSA essentially confirms that the plant fulfils all safety requirements and can be operated within the set limits. The Operating License is specific for nuclear facilities.

If the operator wishes to make any significant modifications during the operation of the facility, he must apply to SNSA for authorization.

According to the 2002 Act, a periodic safety review every 10 years and its approval by the SNSA is a condition for renewing an operating licence.

## Article 5.1 (d)

*The national framework shall provide for all of the following:*

*a system of appropriate control, a management system, regulatory inspections, documentation and reporting obligations for radioactive waste and spent fuel management activities, facilities or both, including appropriate measures for the post-closure periods of disposal facilities;*

The SNSA carries out its supervision responsibilities with a combination of different processes, e.g. regulatory review and assessment, approval of modifications, regular monitoring and inspections.

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

The SNSA is conducting review and assessment taking into account and evaluating both the safety assessments conducted by the licensees and the independent safety assessments performed by an authorised expert in radiation and nuclear safety, as well as other information relevant to safety. The independent opinion of an authorised expert in radiation and nuclear safety is therefore one of the pieces of evidence considered in the licensing procedure and the SNSA is not bound by this opinion and can, in the event 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 (the 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 representatives of the SNSA.

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 the use of radiation sources in health and veterinary care, while in the area of physical protection, inspection powers are granted to the Ministry of the Interior. Lately, more emphasis has been given to joint inspections. During joint inspections, inspectors from different institutions, e.g. the SNSA, the SRPA, the Administration for Civil Protection and Disaster Relief, the Ministry of the Interior, cooperate and coordinate cross-cutting activities. Inspection includes control over the implementation of the provisions of the 2002 Act, regulations and decrees issued in accordance with the 2002 Act.

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

The waste disposal facilities are according to 2002 Act Article 99 objects of national infrastructure and article 94 of the 2002 Act stipulates that the long-term supervision and maintenance of repositories shall be responsibility of the ARAO.

## Article 5.1 (e)

*The national framework shall provide for all of the following:*

*enforcement actions, including the suspension of activities and the modification, expiration or revocation of a licence together with requirements, if appropriate, for alternative solutions that lead to improved safety;*

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

Within the scope of an inspection, an inspector may:

- issue decisions, conclusions and/or orders;
- 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 or facility 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 a decision of an inspector does not prevent its execution.

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 a 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 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 that 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 the suspension of the operation of a nuclear facility; however judicial protection is ensured.

In addition, the inspector must also apply the provisions of the general Act on Minor Offences. On the basis of this act, minor offences are divided into two main categories. For the majority of offences, the inspector charges a fine (a 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 administrative offence prosecution before the competent court. The same applies when an inspector finds more serious unlawful activities, omissions or negligence that 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 5.1 (f)

*The national framework shall provide for all of the following:*

*the allocation of responsibility to the bodies involved in the different steps of spent fuel and radioactive waste management; in particular, the national framework shall give primary responsibility for the spent fuel and radioactive waste to their generators or, under specific circumstances, to a licence holder to whom this responsibility has been entrusted by competent bodies;*

The 2002 Act, the Decree on the Method and Subject of and Conditions for Performing the Public Service of Radioactive Waste Management and the Rules on Radioactive Waste and Spent Fuel Management provides for a clear allocation of the responsibilities of the bodies involved in the different steps of regulating spent fuel and radioactive waste management (producer, holder, mandatory state-owned public services, regulatory body) and also defines the system of recording and reporting.

The general provisions and responsibilities of the holder of the radioactive waste and spent fuel (as well as of the State) are defined in Section 4.8., “Radioactive waste and spent fuel management” of the 2002 Act. The 2002 Act (Articles 93–99) contains the following provisions:

- on radioactive waste and spent fuel management;
- on the national public service of radioactive waste management;
- on the national public service of the disposal of waste from energy producing nuclear facilities;
- on surveillance of closed repositories of mining and hydro-metallurgical tailings;
- on national public utility institutions;
- on the national programme of radioactive waste and spent fuel management; and
- on national infrastructure facilities.

## Article 5.1 (g)

*The national framework shall provide for all of the following:*

*national requirements for public information and participation;*

The “transparency principle” is one of the main principles of the 2002 Act, and 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 “information of a public nature principle”).*”

The SNSA is obliged (together with other relevant authorities) to prepare an annual report. There are a variety of other methods that are used by the SNSA to inform the general public and workers about the work in its fields of competence like websites (with structured information), press conferences or legislative initiatives, where the draft legislation is published on the special governmental website for the purposes of ensuring a public hearing.

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).

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/](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 6 of the Environmental Protection Act determines that the country and municipalities should enable the participation of polluters, the provider or providers of public environmental protection services and other persons engaged in environmental protection activities, as well as the public, in the process of the adoption of policies, strategies, programmes, plans, and general legal acts pertaining to environmental protection (the basic principle of collaboration). Article 13 further states that environmental information is public and that everyone should have access to such data (the “information of a public nature principle”).

## Article 5.1 (h)

*The national framework shall provide for all of the following:*

*the financing scheme(s) for spent fuel and radioactive waste management in accordance with Article 9.*

The licensee has the prime responsibility for the safety of their facilities. This responsibility includes provision of adequate financial resources to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for their decommissioning and after closure.

### **Krško NPP**

The expenses for radioactive waste treatment, conditioning and storing and for spent fuel storage are part of the production costs. The financial resources for these activities are ensured during the operational period of the Krško NPP.

The owners of the Krško NPP, GEN energija d.o.o. and Hrvatska Elektroprivreda d.d., are obliged to ensure the funds for the decommissioning and the final disposal of radioactive waste and spent fuel.

The Slovenian share of assets for the decommissioning of the Krško NPP and for the post-operational radioactive waste and spent fuel management are ensured through the Act Governing the Fund for Financing the Decommissioning of the Krško NPP and Disposal of Radioactive Waste from the Krško NPP. This Act was amended in 2003 in light of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other

Legal Relations Regarding Investment in, Exploitation and Decommissioning of the Krško NPP. The Slovenian share of financial assets is collected through a levy for the kWh delivered to the Slovenian grid since 1996. Due to a revision of the Decommissioning Programme in 2004, in 2005 the levy was increased to 0.30 euro cents per kWh delivered to the Slovenian electrical power company GEN energija d.o.o.

The Croatian share of assets for the decommissioning of the Krško NPP and for post-operational radioactive waste and spent fuel management is ensured in accordance with the bilateral Agreement through an adequate Croatian Fund for Decommissioning and Spent Fuel Management. The Croatian Fund was established by the Act on Governing the Fund for the Financing Decommissioning and Disposal of the Radioactive Waste and Spent Fuel of the Krško NPP. This act was adopted by the Croatian Parliament in October 2007.

### **Jožef Stefan Institute Reactor Infrastructure Centre**

The financial resources for maintaining the safety of spent fuel and radioactive waste at the IJS Reactor Infrastructure Centre are provided within the budget for the reactor operation. Financial provisions for decommissioning are not provided. However, as the Republic of Slovenia is the owner of the facility, it will also have the responsibility to ensure financial resources for proper decommissioning and spent fuel management.

### **Agency for Radioactive Waste Management**

Financing of the ARAO is based on an annual work plan and is subject to annual contracts between the ARAO and the Government and the Fund for the Decommissioning of the Krško NPP, respectively. Regular work has been considerably slowed down in the last few years due to delays in contracting with the Government.

Institutional radioactive waste management is financed from the national budget and from fees paid by waste generators when the liabilities for further waste management are transferred from them to the ARAO. Fees are defined by the Government.

LILW repository siting, licensing, construction and operation and disposal of half of the LILW from the Krško NPP are financed from the Fund for the Decommissioning of the Krško NPP. This funding is also supervised by the Government.

### **Žirovski vrh Uranium Mine**

The financial resources for the activities of the public company Žirovski Vrh Mine, d.o.o., are ensured solely from the state budget.

## **Article 5.2**

*Member States shall ensure that the national framework is improved where appropriate, taking into account operating experience, insights gained from the decision-making process referred to in Article 4(3)(f), and the development of relevant technology and research.*

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

Appendix I, which contains the list of legal instruments in force in Slovenia, one can also find all amendments of the 2002 Act. Therefore this appendix provides insight into how frequently and to what extent the main legal documents are updated as well as how up-to-date they are.

All the operators of nuclear facilities are obliged to have in place an Operating Experience Feedback programme, through which they should improve their performance, but also propose eventual legislative changes. The SNSA carries out its own operational experience program (OE).

As a consequence of the Fukushima accident, stress tests were performed and an action plan on how to improve the safety of operation of the Krško NPP was drawn up. In the light of recent information, new knowledge regarding spent fuel management in general, and the SNSA decision issued in 2011 regarding the prevention of major accidents and mitigation of the consequences of any that do occur, the Krško NPP assessed the possibility of reducing risk associated with spent fuel, taking into account the change in the long-term strategy for spent fuel. Wet spent fuel storage was assessed and compared with dry storage, and the reprocessing (recycling) option was reviewed. Since the current wet storage capacity is not adequate, from both safety and operational capacity points of view, for the commercial operational lifetime (2023), let alone in the event of lifetime extension until 2043, a dry storage option was proposed. To ensure uninterrupted operation and sufficient storage capacity in the spent fuel pool, a dry cask storage facility will become operational in 2018.

In this context, the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel, which expires at the end of 2015, shall also be revised. The ARAO is preparing a technical basis for the revision of the National Programme for Radioactive Waste and Spent Nuclear Fuel Management, which should be adopted in 2015.

## ARTICLE 6: Competent regulatory authority

### Article 6.1

*Each Member State shall establish and maintain a competent regulatory authority in the field of safety of spent fuel and radioactive waste management.*

In Slovenia the Public Administration Act adopted by the National Assembly defines the functions of the Government and its ministries while the Decree on Administrative Authorities within the ministries defines the names of those organisational 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 specialised technical and developmental administrative tasks and tasks of inspection in the areas of: radiation and nuclear safety; carrying out of practices involving radiation and the use of radiation sources, except in medicine and veterinary medicine; protection of the environment against ionising radiation; physical protection of nuclear materials and facilities; non-proliferation of nuclear materials and safeguards; radiation monitoring; and liability for nuclear damage.”

The SNSA is a part of the Ministry of the Environment and Spatial Planning (MESP).

The 2002 Act divided the competences in nuclear and radiation safety between two regulatory bodies, namely the SNSA and the Radiation Protection Administration (SRPA). As previously mentioned, the SNSA is accountable for nuclear safety and the 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, that 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 the Interior (currently, after the above mentioned reorganisation of the Government) is responsible for the physical protection of nuclear facilities and nuclear materials.

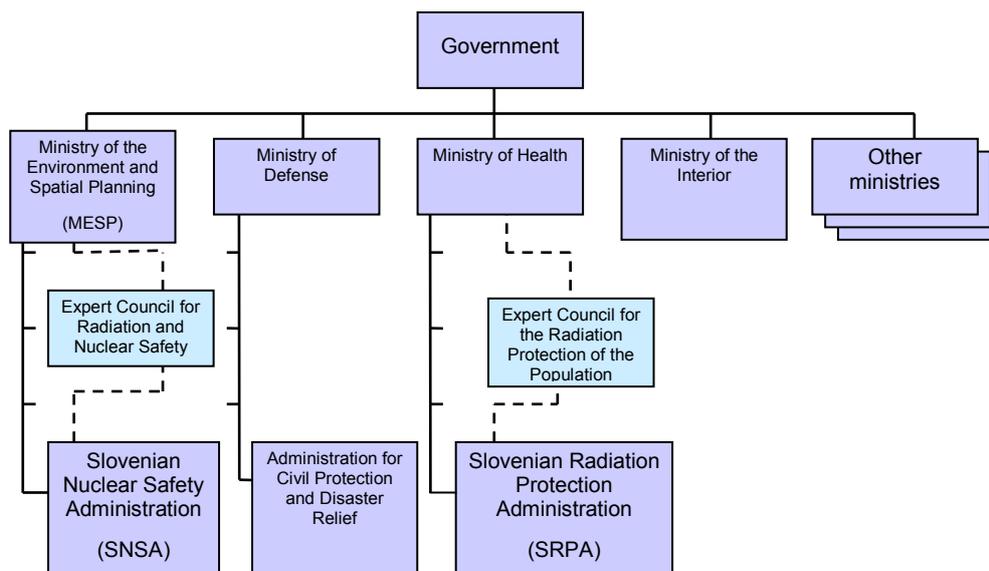
The SRPA responsibilities and competencies are (as is the case for all other governmental bodies) also defined in the Decree on Administrative Authorities within Ministries: “The SRPA performs technical, administrative, inspection and development tasks in the area of radiation practices and the use of radiation sources in health and veterinary care; health protection of people against the detrimental effects of ionising radiation; systematic inspection of working and living premises due to the exposure of people to natural radiation sources; implementation of monitoring of radioactive contamination of foodstuffs and drinking water; reduction, restriction and prevention of the health-detrimental effects of non-ionising radiation; and assessment of compliance and authorisation of radiation protection experts”.

### Article 6.2

*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 or radioactive material, including electricity production and radioisotope applications, or with the management of spent fuel and radioactive waste, in order to ensure effective independence from undue influence on its regulatory function.*

As a regulatory authority in the area of nuclear and radiation safety, the SNSA is a functionally autonomous institution within the Ministry of the Environment and Spatial Planning.

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



**Figure 2:** The SNSA and SRPA within the governmental structure

The general provisions on the independence thereof are included in Article 2 of the Public Administration Act providing that “the state administration carries out its work independently and on the basis of the Constitution, laws and regulations.”

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

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

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

### Article 6.3

*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 as described in Article 5(1) (b), (c), (d) and (e).*

With respect to the description of those provisions of Slovene legislation that provide legal powers to the SNSA, the aforementioned (see para. 6.1 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.

### **The human resources of the competent regulatory body**

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

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

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

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

The SNSA has a comprehensive Management System in place that 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 has 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 cover the needs in various technical areas and have the tools and ability to conduct independent safety analysis, both deterministic and probabilistic. On the other hand, in the case of new NPP, the technical staff of both, the SNSA and its TSOs should be increased. A preliminary analysis shows that in the event a second nuclear unit is going to be built the SNSA would need another 20 new staff. In 2014 the SNSA had 41 employees.

### **The 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 basic activities of the SNSA. The operators of nuclear or radiation installations and other licensees do not pay any licensing or inspection fees. The only fee that is envisaged by the general Act on Administrative Fees is the so-called administrative tax for the licensing (administrative) procedure, which is a symbolic amount. 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 under the provisions of the Act on General Administrative Procedure.

Although the SNSA is a body within the MESP, it still has its own share in the Ministry's budget and is independent funds for the programmes, projects and other expenses from the budget. The responsibility of enforcement rests first with the SNSA inspection staff.

## ARTICLE 7: Licence holders

### Article 7.1

*Member States shall ensure that the prime responsibility for the safety of spent fuel and radioactive waste management facilities and/or activities rest with the licence holder. That responsibility cannot be delegated.*

The provisions on the prime responsibility of the licence holder for the safety of nuclear and radiation facilities and also for the safety of spent fuel management or radioactive waste management is one of the main principles of the 2002 Act.

Article 57 of the 2002 Act provides the following specific requirement: “*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 ceased to be used, without the prior approval or permit pursuant to this Act. The safety of a facility, including the safety of handling radioactive substances, radioactive waste or spent fuel that is found or produced in the facility, must be ensured by the operator*”.

The system of licences is set up to ensure 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 a holder of radioactive waste and spent fuel shall ensure that the radioactive waste and spent fuel are handled in the manner prescribed and that transfer of the burden of disposing of radioactive waste and spent fuel to future generations is avoided as far as it is possible. The producers 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 entity responsible for its generation or by the holder of the waste if the ownership was transferred thereto by the entity responsible for its occurrence, or if the entity acquires such in any other manner.

If the entity 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 forward the information on the generation thereof to the central registry of radioactive waste and spent fuel, which is maintained by the Slovenian Nuclear Safety Administration.

### Article 7.2

*Member States shall ensure that the national framework in place require licence holders, under the regulatory control of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as is reasonably achievable, the safety of the radioactive waste and spent fuel management facility or activity in a systematic and verifiable manner. This shall be achieved through an appropriate safety assessment, other arguments and evidence.*

The 2002 Act requires that licensees shall prepare safety analysis reports 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) contain provisions that the safety analysis report must provide information on the facility including details allowing independent assessment of the safety of the facility. They also provide an exhaustive list of topics that have to be included in the report, such as the safety basis and project concepts, an analysis of the location, the object’s technical characteristics, for quality assurance, the evaluation of the protection of exposed workers against radiation, programmes for pre-operating tests and programmes for trial operation, training programmes, the assessment of the exposure of the population and the environment, a

The First Slovenian Report under Council Directive 2011/70/Euratom

safety analysis, the anticipated discharge of radioactive substances into the environment, and emergency planning. The JV9 Rules ensure the legal basis for the assessment of the safety of the nuclear facility 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, organisational or any other change that 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.

The 2002 Act requires that the licensee of a nuclear facility ensures the regular complete and systematic assessment and examination of the 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 submit it to the competent regulatory body.

An approved safety review report is a condition for further operation of a facility. Detailed information about performing a PSR is presented in the JV9 Rules and in the practical guidelines issued by the SNSA "The Content and Scope of Periodic Safety Review of a 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.

The licensee's obligations including documentation for granting an authorisation for modifications are prescribed in the 2002 Act and more specifically in the JV9 Rules. The SNSA reviews in detail the submitted documentation and assess it. In the event of more demanding modifications, the review and assessment are also carried out 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 determined in the JV9 Rules.

The legal provisions on the operational experience feedback at the licensee are contained in Chapter II.2 of the JV9 Rules. 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.

Management of radioactive waste generated by small producers (medical and industrial applications, research activities) was delegated to a non-profit public company, i.e. to the waste management agency ARAO. This includes: receiving waste at the producer's premises, the 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 historical waste.

The ARAO operates the centralised storage facility (CSF) for radioactive waste of small producers. The CSF has the status of a nuclear facility. Although major refurbishment and safety improvements were made in the past, the ARAO has been still continually improving CSF's safety. The repacking and conditioning of waste was performed in steps over several years in the nearby hot cell facility. In 2008, the ARAO completed the characterisation, treatment and conditioning of all historical waste packages. All non-radioactive material, empty packages, and waste that had 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 storage.

The ARAO regularly inspects the conditions of the structures, systems and components of the CSF. Operation licence for the CSF expires on 18 April 2018 and preparations for the periodic safety review have already begun.

The procedures for the periodic safety review and for the modification of the management of the CSF are the same for all nuclear facilities. The ARAO has several programmes and procedures in place. The QA system of the ARAO is documented by a quality manual that includes administrative and working procedures that cover all aspects of waste management in the CSF in Brinje and radiation protection dealing with waste.

## Article 7.3

*As part of the licensing of a facility or activity the safety demonstration shall cover the development and operation of an activity and the development, operation and decommissioning of a facility or closure of a disposal facility as well as the post-closure phase of a disposal facility. The extent of the safety demonstration shall be commensurate with the complexity of the operation and the magnitude of the hazards associated with the radioactive waste and spent fuel, and the facility or activity.*

*The licensing process shall contribute to safety in the facility or activity during normal operating conditions, anticipated operational occurrences and design basis accidents. It shall provide the required assurance of safety in the facility or activity. Measures shall be in place to prevent accidents and mitigate the consequences of accidents, including verification of physical barriers and the licence holder's administrative protection procedures that would have to fail before workers and the general public would be significantly affected by ionising radiation. That approach shall identify and reduce uncertainties.*

Chapter 4 (Radiation and Nuclear Safety) of the 2002 Act defines the requirements for licensing nuclear activities and nuclear facilities from the phase of siting to decommissioning and long-term monitoring and maintenance. In each phase, the licence is issued by the SNSA and licensing is based on the Safety Report. The Safety Report has to be revised and take into account the changes in the nuclear facility or activity. The opinion of an authorised expert has to be presented together with the Safety Report.

Requirements for documentation presented in the licensing procedure at each phase in the life cycle of a nuclear facility are elaborated in detail in the JV5 Rules. Article 5 of the JV9 Rules stipulates that each nuclear or radiation facility has to prepare and use written procedures for normal operation, cases of emergency, maintenance and control of activities and structures, systems and components important for nuclear safety, and for decommissioning, as provided in the Safety Report.

The design basis for the LILW repository in Slovenia, which is now in the phase of construction licensing, has been prepared for a silo-type repository. The planned LILW repository, with a net area of about 10 ha, includes all structures, systems and components required for its operation as an independent nuclear facility. An area for an additional two silos is reserved for future extension of the capacity if needed. Additionally, there are monitoring structures, physical protection (security) structures, earth-filled platforms and structures of external and landscape arrangement, and infrastructure lines and connections to utility networks. Areas within the disposal unit area and a major part of the inner areas of the waste conditioning structure are classified as radiological controlled areas and are protected by a fence. The flexibility of the repository concept was an input to the project, enabling it to cover as many future developments in the programme as could reasonably be expected. It consists of a modular approach and an intermittent mode of operation. Each silo is an independent unit and the number of silos is expandable. The second silo will be constructed when the first one has been filled and the need for a second one arises. The repository can operate intermittently, i.e. it can be temporarily in standby mode for longer or shorter periods of time. The repository also has the potential to accommodate all LILW from the Krško NPP if it is decided that this will be a joint LILW disposal facility for both Slovenia and Croatia.

## Article 7.4

*Member States shall ensure that the national framework require licence holders to establish and implement integrated management systems, including quality assurance, which give due priority to safety and are regularly verified by the competent regulatory authority.*

In the Slovenian legislation, the regulatory requirements for the 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 Rules on Radiation and Nuclear Safety Factors (Official Gazette RS 92/2009 and 9/2010).

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

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

- licensing related to the changes of the safety analysis report,
- inspection processes and
- periodic safety reviews (PSR).

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

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

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

The priority of nuclear safety is one of the general principle of the Ionising Radiation Protection and Nuclear Safety Act. The Act defines nuclear safety as “*technical and organisational measures that result in the 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, the Rules on radiation and nuclear safety factors (JV5) and the Rules on the operational safety of radiation or nuclear facilities (JV9) were issued. Both Rules further define the provisions of the Act provisions and they were prepared in line with the WENRA reference levels. The JV5 regulation provides a detailed definition of safety culture. Chapter V of the JV5 regulation includes requirements for the management of safety and quality in activities during the design, construction and operation of nuclear installations. These requirements define safety policies, safety culture programs and development, arrangements for safety management, arrangements for safety monitoring and self-assessment, independent safety assessments, as well as a process-oriented (quality) management system.

### **The Agency for Radwaste Management (ARAO)**

The Agency for Radwaste Management in Slovenia has an integrated management system that gives the required priority to nuclear safety. The ARAO integrated management system is based on IAEA GS-R-3, ISO 9001:2008 and ISO 14001:2004 requirements. Every year internal audits and management reviews are conducted to ensure the suitability, adequacy and effectiveness of the implemented management system. External management system assessment and certification is conducted according to ISO 9001:2008 and ISO 14001:2004 every year.

Through a process approach, the ARAO continuously improves the effectiveness of its integrated management system to achieve company goals and enhance nuclear safety. On the basis of our mission, vision and company policy, the main objectives are defined at <http://www.arao.si/agencija-arao/strateski-cilji>.

## **Article 7.5**

*Member States shall ensure that the national framework require licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to the safety of spent fuel and radioactive waste management as laid down in paragraphs 1 to 4.*

### **Financial Resources**

The 2002 Act introduced as one of the main principles the “generator 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.”*

On the basis of this principle the 2002 Act introduced a provision (Article 61) that 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 the costs of maintenance investments, including investments in technological refurbishments relating to the measures of radiation or nuclear safety.

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 protection against ionising radiation and nuclear safety is prescribed in Chapter 12 of the 2002 Act, where the 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 a sufficient number of qualified workers involved in the operation of the radiation or nuclear facility.

In accordance with the provisions of the Agreement 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 also stipulates that 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 the Decommission of the Krško NPP and the Disposal of Radioactive Waste from the Krško NPP, adopted in 1994. A 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 of the NPP Krško.

In the event of a nuclear accident, financial resources to compensate claims are provided through Slovenian third party liability legislation and through the 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 National Assembly ratified Protocols to both the Paris Convention and the 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, liability insurance for nuclear damage and the procedure for claiming compensation due to 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 determines only one court that shall be competent to rule on compensation for nuclear damage and include a number of provisions regarding rules of procedure for 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 the Brussels Supplementary Convention.

In the case of institutional radioactive waste management the producers have to transfer the radioactive waste to the public utility (ARAO) assigned to perform the public service of management of institutional radioactive waste. As the waste is transferred to the ARAO the state takes responsibility for financing all activities necessary for its further management. Part of the expenses are covered by the fee paid by waste producers, and the rest is paid by the state.

### **Human Resources**

With regard to human resources in Article 62 the 2002 Act 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”*. Article 62 contains several provisions about the qualifications of workers including licensing of the reactor operators, which is prescribed in detail in the JV 4 *“Rules on providing qualification for workers in radiation and nuclear facilities”* in detail.

## ARTICLE 8: Expertise and skills

### Article 8

*Member States shall ensure that the national framework require all parties to make arrangements for education and training for their staff, as well as research and development activities to cover the needs of the national programme for spent fuel and radioactive waste management in order to obtain, maintain and to further develop necessary expertise and skills.*

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

The Resolution on Nuclear and Radiation Safety in the Republic of Slovenia for the Period 2013–2023 (Official Gazette, No. 56/2013) sets the general framework for competence building in the nuclear and radiation field. Chapter 7 of the Resolution on Nuclear and Radiation Safety identifies the main obstacles to providing opportunities for education, training and sustainability of knowledge and expertise: the low interest in the nuclear field in the young generation due to the of small nuclear program and consequently poor employment prospects, the inflexible organization and structure of the leading research institutions and the unstable financing of research and education. Experts in nuclear and radiation safety, as well as experts in management of radioactive waste use opportunities for education and training abroad. Measures to improve the situation are proposed in the Resolution on Nuclear and Radiation Safety, and deal mainly with the financing of relevant study programs for the nuclear sector, including waste and spent fuel management.

There are several education, training and research programmes going on at the University of Ljubljana, University of Maribor and Josef Stefan Institute.

### Slovenian Nuclear Safety Administration

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

The staff of the SNSA is interdisciplinary, consisting of employees with a range of educational backgrounds: physicists, mechanical, electrical and chemical engineers, mining technologists and geotechnologists, architects, metallurgists, geologists, lawyers, linguists, and administrative workers.

At the end of 2014, the SNSA had 41 employees, of whom 8 held a PhD and 13 a master’s degree, 19 had completed a higher education or university level programme, and one had completed just secondary school.

Each position in the SNSA organisational chart has recognised necessary competences for the staff member occupying it. In this context, however it has to be mentioned quite openly that due to the very strict and restrictive governmental policy on employment in the last few years, no new staff member have been employed at the SNSA; on the basis of this restrictive governmental policy in the previous three years, even temporary employment substitute workers who have retired or have been temporarily on maternity or sick leave was not allowed.

At the same time, individual programmes for acquiring necessary competences is in progress. The course on “Fundamentals of nuclear technology” and other courses at the Nuclear Training Centre in Ljubljana are frequently included in such programmes, as are events (courses and workshops) organised by the IAEA. For each year, the SNSA prepares the a so-called Educational and Training Plan for its employees. There are also other tools used for the career development of SNSA’s staff, such as annual interviews and on-the-job training. Furthermore, a so-called “systematic approach to training” is under preparation at the level of the SNSA staff.

## **Krško NPP**

The Krško NPP has overall responsibility for the design, engineering, construction, licence application, operation, fuel management, procurement, quality assurance, and radioactive waste management. The Krško NPP is organised in several divisions, including the Technical Division, which is responsible for operating, maintenance and technical services; the Engineering Division, responsible for design, engineering, configuration management, licensing, procurement engineering and project management; the Quality Systems Division, which encompasses the Nuclear Oversight Section, which is responsible for independent safety assessments; the Administrative Division; and the Financial Division.

The handling of radioactive waste is the responsibility of the Chemistry Department, which is a part of the Technical Division. The Chemistry Department is also responsible for decontamination activities.

The Nuclear Fuel Department, which is a part of the Engineering Division, is responsible for accountability and control of special nuclear materials and for spent fuel management. The handling of processes themselves is carried out by the Nuclear Fuel Department and the Operations Department.

Radiological control is carried out by the Radiation Protection Department, which is a part of the Technical Division.

All technical posts at the Krško NPP are assessed. The minimum requirements in terms of educational qualifications, the number of years of experience in relevant positions and certified competence to undertake certain tasks are ensured by the Krško NPP.

The qualifications consist of the basic formal education as well as specialist knowledge. Specialist knowledge involves the basic principles of the operation of nuclear power plants, radiological protection, industrial safety and so on. The courses and training exercises are organised by the Training Department, which is also responsible for the record keeping of qualifications.

Training in radiological protection is given at different levels of complexity, depending on the level of responsibility of the employee. A basic training course is given to all personnel before they have to enter a radiologically controlled area, with the objective of ensuring that they have sufficient understanding of the principles of ionising radiation to enable them to work safely in the controlled area. A more advanced course is provided for the personnel permanently working in a controlled area or with systems that contain radioactive material. Personnel specialised in health physics attend the most advanced course.

Personnel dealing with radioactive waste and spent fuel are educated and trained to perform their duties. Special services in this area are also provided from abroad.

## **Jožef Stefan Institute Reactor Infrastructure Centre**

The TRIGA Mark II research reactor operation staff (the full-time staff consist of four reactor operators, four radiological protection technicians one of which is head of the radiological protection group and the part-time staff of the head of reactor operation, the head of the reactor infrastructure centre and a secretary) are responsible for spent fuel and radioactive waste handling and management. Staff are appropriately trained and equipped.

The Hot Cell Laboratory operates under a TRIGA Mark II research reactor operating licence. The staff consist of three part-time workers.

The TRIGA Mark II research reactor operation staff are responsible for and trained to perform specific tasks in spent fuel management and radioactive waste management. The specific knowledge, training, skills and certificates required from reactor operators for these tasks are a radiological protection certificate, a crane operator certificate, a forklift driver certificate, a welder certificate and remote manipulation skills.

The personnel must also have some practical experience with spent fuel shipment projects and the treatment of spent sealed sources for storage.

Articles 38 to 40 of the JV4 Rules determine the personnel qualification requirements of the head of the research reactor centre, the shift supervisor and the research reactor operator. The required training program to obtain a license for shift supervisor of the research reactor operator is described in Article 41 of the JV4 regulation.

### **The Agency for Radwaste Management**

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

Employees at the ARAO have at least the level of education required for their job and all required fields of expertise are covered. Transfer and improvement of knowledge between the employees is highly supported. Two-thirds of the employees are educated in science and technology fields.

In recent years, due to the ban on new recruitment in the public sector, the number of employees in the ARAO has declined. The scope of work does not diminish, however, and with fewer staff it is difficult to maintain the same quality of service in the long run. However, with expertise, dedication and high levels of motivation, the ARAO have managed to maintain service delivery and work efficiency at the same level. Along with continuing the projects adequate reinforcement of staff is also expected.

Education and training are provided by participation in courses, conferences and professional meetings at home and abroad. Employees are provided at least the education and training required by law to obtain licenses to carry out certain work, such as the transport of dangerous substances and work with radioactive sources.

### **Žirovski vrh Uranium Mine**

The public company Žirovski vrh Mine, d.o.o. is gradually concluding closing works at two disposal piles, therefore their staff number is decreasing. It relies mostly on the expertise of the experienced retired former employees, who work occasionally for the company.

## ARTICLE 9: Financial resources

### Article 9

*Member States shall ensure that the national framework require that adequate financial resources be available when needed for the implementation of national programmes referred to in Article 11, especially for the management of spent fuel and radioactive waste, taking due account of the responsibility of spent fuel and radioactive waste generators.*

The licensee has the prime responsibility for the safety of their facilities. This responsibility includes the provision of adequate financial and human resources both to support the safety of facilities for spent fuel and radioactive waste management during their operating life-time and for their decommissioning.

#### **Krško NPP**

The expenses for radioactive waste treatment, conditioning and storing and for spent fuel storage are part of the production costs. The financial resources for these activities are ensured during the operational period of the Krško NPP.

According to the Agreement, the owners of the Krško NPP, GEN energija d.o.o. and Hrvatska Elektroprivreda d.d., are obliged to ensure the funds for the decommissioning and the final disposal of radioactive waste and spent fuel.

The Slovenian share of assets for the decommissioning of the Krško NPP and for the post-operational radioactive waste and spent fuel management are ensured through the Act Governing the Fund for Financing Decommissioning of the Krško NPP and the Disposal of Radioactive Waste from the Krško NPP. This Act was amended in 2003 in light of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations Regarding the Investment, Exploitation and Decommissioning of the Krško NPP. The Slovenian share of financial assets is collected through a levy for the kWh delivered to the Slovenian grid since 1996. Due to a revision of the Decommissioning Programme in 2004, in 2005 the levy was increased to 0.30 euro cents per kWh delivered to the Slovenian electrical power company GEN energija d.o.o.

The Croatian share of assets for the decommissioning of the Krško NPP and for post-operational radioactive waste and spent fuel management is ensured in accordance with the bilateral Agreement through an adequate Croatian Fund for the Decommissioning and Spent Fuel Management. The Croatian Fund was established by the Act on Governing the Fund for Financing the Decommissioning and Disposal of Radioactive Waste and Spent Fuel of the Krško NPP. This act was adopted by the Croatian Parliament in October 2007.

#### **Jožef Stefan Institute Reactor Infrastructure Centre**

The financial resources for maintaining the safety of spent fuel and radioactive waste at the IJS Reactor Infrastructure Centre are provided within the budget, provided by the State for reactor operation. Financial provisions for decommissioning are not provided. However, as the Republic of Slovenia is the owner of the facility, it will also have the responsibility to ensure financial resources for proper decommissioning and spent fuel management.

#### **Agency for Radwaste Management**

The conditions for the decommissioning and management of the radioactive waste and spent fuel from Krško NPP and the financial aspects of these activities are elaborated in Article 10 and 11 of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Relations regarding the Investment, Exploitation and Decommissioning of the Krško Nuclear Plant. The articles stipulate that these activities are a common responsibility of both partners which are obliged to find the economically and environmentally best solution. The financial part of the decommissioning and radioactive waste and spent fuel

The First Slovenian Report under Council Directive 2011/70/Euratom

management is described in the Decommissioning Programme and Programme of Radioactive Waste and Spent Fuel Management (2004) that was prepared by both partners. The financial assets for radioactive waste and spent fuel management is being collected in financial funds (one in Republic of Slovenia (see below), one in Republic of Croatia).

Funding of the management of institutional radioactive waste in Slovenia is determined in the Decree on the Method and Subject of and Conditions for Performing the Public Utility Service of Radioactive Waste Management. Article 14 declares that the financing resources for the public service are the state budget and the fee paid by the users of the public service, e.g. waste generators when they transfer the waste to the ARAO, which is to perform the public service. The fee is confirmed by the Government and depends on the type of waste, its activity, amount and treatment and conditioning required. There is no special fund for managing institutional radioactive waste in Slovenia.

According to Article 93 of the 2002 Act the principle of state subsidiary responsibility is implemented also for financing the event of radioactive waste with no known generator.

LILW repository siting, licensing, construction and operation and disposal of half of the LILW from the Krško NPP are financed from the Fund for the Decommissioning of the Krško NPP. This funding is also supervised by the Government.

In 2013 the ARAO received more than 75% of the funds from the NPP fund (20.0% for the LILW repository project and 55.1% for the restricted land use compensation for the municipality of Krško), more than 20% from the state budget (in particular for the implementation of the public service and the operation of the CSF and to compensate the municipality of Dol pri Ljubljani for the restricted land use).

### **Žirovski vrh Uranium Mine**

The financial resources for the activities of the public company Žirovski vrh Mine, d.o.o. are ensured solely from the state budget.

### **The Fund for Financing the Decommissioning of the Krško NPP and for the Deposition of Radioactive Waste from the Krško NPP**

The Fund for Financing the Decommissioning of the Krško NPP and for the Management of Radioactive Waste from the Krško NPP was established pursuant to the Act on the Public Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the Disposal of Radioactive Waste from the Krško NPP.

The Fund's sphere of activities spans over several national structures, connected with nuclear energy, but the Fund is not directly attached to them. This gives the Fund a special position that enables him to maintain independence. The Fund has a specific position in the state structure. It was founded by the Slovenian National Assembly. Its activities are also affected by the Slovenian Government, which must give its consent to the Fund's Statute, investment policy, financial plan, the annual accounts and the annual report on the Fund's operating activities.

The Fund is responsible for raising funds for the decommissioning of the Krško NPP as well as safe storage and final disposal of spent nuclear fuel and radioactive waste. The financial assets will be collected during the lifetime of the Krško NPP. The amount that has to be paid into the Fund is defined on the basis of calculations presented in the Decommissioning Program and Program of Radioactive Waste and Spent Fuel Management (2004), which takes into account the planned date of NPP closure, the duration of repository operation, and the post-closure period. The management board of the Fund is appointed by the National Assembly of the Republic of Slovenia, the Government of the Republic of Slovenia and the local authorities.

The Fund's primary investment objectives are to maintain the value of its assets and generate return on its assets. The assets from the fund can be used solely for:

- financing the preparation and execution of projects of safe and final disposal of used fuel and radioactive waste from the Krško NPP;

- financing the preparation and execution of the project for safe decommissioning of the Krško NPP;
- payment of compensation to local authorities for restricted land use for the repository for spent fuel radioactive waste from the Krško NPP until its closure in accordance with the Decree on the criteria for setting compensation level payable for limited use of space within the area of a nuclear facility
- financing the services of the ARAO in the performance of the compulsory public service of disposal of radioactive waste from the Krško NPP.

If the co-owners of Krško NPP do not find a common solution for spent fuel and radioactive waste management, the Slovenian Fund will finance decommissioning and waste disposal for 1/2 half of the waste.

### **Users of Highly Active Sealed Sources**

As one of the conditions to get the licence for the use of Highly Active Sealed Source the applicant has to submit to the regulatory body the financial guaranties for funds that would be sufficient for return of the source to the supplier or its final disposal after the end of its use. If the user for some reason is not able to finance such return or disposal, the regulatory body can use these funds to properly handle the source in the name of the State.

## ARTICLE 10: Transparency

### Article 10.1

*Member States shall ensure that necessary information on the management of spent fuel and radioactive waste be made available to workers and the general public. This obligation includes ensuring that the competent regulatory authority inform 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.*

### Article 10.2

*Member States shall ensure that the public be given the necessary opportunities to participate effectively in the decision-making process regarding spent fuel and radioactive waste management in accordance with national legislation and 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 the 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 “public nature of information” 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, the planning, construction and operation of radiation facilities and nuclear facilities, statistically processed doses of exposed workers and members of the public, the management of radioactive waste and spent fuel, shipment into and out of the Member States of the EU, the import, export and transit of radioactive waste or radioactive substances, radioactive contamination of the environment, foodstuffs, feedstuffs and products of general use, emergencies, and protection and rescue plans in the event of emergencies shall be public.
- Procedures for access to the information specified by the law shall be used for ensuring access to the 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 authority competent for the environment, in co-operation with the authority 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 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 sent 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 is a variety of other methods that are used by the SNSA to inform the general public and workers about the work in its fields of competence:

- websites (with structured information);
- press conferences;
- legislative initiatives, where the draft legislation is published on the special governmental website for the purposes of ensuring public hearing.

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 (such as for example approval of an amendment of limitations regarding liquid discharges from Krško NPP). Furthermore, the SNSA is maintaining an up-to-date list of all approved modifications at Krško NPP on the website:

[http://www.ursjv.gov.si/si/jedrski\\_in\\_sevalni\\_objekti/nuklearna\\_elektrarna/spremembe\\_v\\_nek/](http://www.ursjv.gov.si/si/jedrski_in_sevalni_objekti/nuklearna_elektrarna/spremembe_v_nek/).

Since early 2013 the SNSA has also introduced a the practice of publishing all relevant documents related to specific issues, for which increased public interest is expected:

[http://www.ursjv.gov.si/si/info/posamezne\\_zadeve/](http://www.ursjv.gov.si/si/info/posamezne_zadeve/).

Examples include the issue of the seismic situation in the Krško area in the spring 2013 and the issue of the failed fuel elements in the Krško NPP in the autumn 2013.

There is a special provision in the 2002 Act regarding informing the public during 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 of important information from the plans.
- In the event of an emergency in accordance with this Act, an operator must ensure that the authority that issued the licence for 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 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 to notify 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 event of an emergency:

- In the event of an emergency that is likely to cause health detriment to the health of people on the territory of other countries, the competent authority for nuclear safety must ensure 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 event of emergencies.

The 2002 Act contains provisions on the information that are not public. The public Information Access Act (Official Gazette RS No. 51/2006 and amendments) provides details about ensuring for access to information. Information about radiation in the environment is also considered to be environmental information and is accessible under the provisions of the Environmental Protection Act which implements the requirements of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the Aarhus Convention). The ARAO and Krško NPP provide information about the radioactive waste amounts and management on their website. Regular press release about radiation and nuclear safety and radioactive waste and spent fuel management are given by the SNSA, the ARAO and Krško NPP.

Public participation in decision-making integrated into the construction licensing of facilities for radioactive waste and spent fuel management is defined in Article 60 of the Environmental Protection Act. Environmental consent is issued by the competent ministry on the basis of an Environmental Report

which has to be submitted to public debate. Radiation and nuclear safety issues are included in the Environmental Report. Non-Governmental Organisations that represent the public interest regarding environmental protection can actively participate in the administrative procedure of issuing environmental consent for nuclear facilities, including facilities for managing radioactive waste and spent fuel. Project documentation for the facility is made publicly available through website of the Ministry for the Environment and Spatial Planning and in the local community concerned. The time and place of the public hearing is announced in the media. The interested public can participate with comments and proposals which can be implemented in the final document.

## ARTICLES 11 and 12: National programmes

### Article 11.1

*Each Member State shall ensure the implementation of its national programme for the management of spent fuel and radioactive waste ('national programme'), covering all types of spent fuel and radioactive waste under its jurisdiction and all stages of spent fuel and radioactive waste management from generation to disposal.*

The national programme of radioactive waste and spent fuel management in accordance with the 2002 Act is prepared by the Ministry competent for the environment and adopted by the National Assembly as a part of the national programme for the protection of the environment pursuant to the regulations on environmental protection.

The technical basis for the national programme together with a detailed description of the measures relating to the minimization of the waste inventory, to the processing thereof prior to disposal and to its disposal, and the measures relating to the processing and disposal of spent fuel is prepared by the public commercial institution for radioactive waste (ARAO) and communicated to the ministry competent for the environment.

On 1 February 2006, the National Assembly of the Republic of Slovenia passed the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel (Official Gazette RS, No. 15/2006). This Programme is a part of the National Environment Protection Programme and sets goals and tasks in the field of radioactive waste and spent nuclear fuel management. In 2015 the revision of that document is prepared and is expected to be adopted by the Parliament towards the end of the year.

### Article 11.2

*Each Member State shall regularly review and update its national programme, taking into account technical and scientific progress as appropriate as well as recommendations, lessons learned and good practices from peer reviews.*

The resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel, which expires at the end of 2015 is being revised. In February 2015, the ARAO prepared the technical basis for the revision of the National Programme for Radioactive Waste and Spent Nuclear Fuel Management for the period 2016–2025. Based on this the draft National Programme has been prepared by SNSA and is expected to be adopted by the National Assembly by the end of 2015.

### Article 12.1

*The national programmes shall set out how the Member States intend to implement their national policies referred to in Article 4 for the responsible and safe management of spent fuel and radioactive waste to secure the aims of this Directive, and shall include all of the following:*

- (a) the overall objectives of the Member State's national policy in respect of spent fuel and radioactive waste management*
- (b) the significant milestones and clear timeframes for the achievement of those milestones in light of the over-arching objectives of the national programme*
- (c) an inventory of all spent fuel and radioactive waste and estimates for future quantities, including those from decommissioning, clearly indicating the location and amount of the radioactive waste and spent fuel in accordance with appropriate classification of the radioactive waste*
- (d) the concepts or plans and technical solutions for spent fuel and radioactive waste management from generation to disposal*

- (e) the concepts or plans for the post-closure period of a disposal facility's lifetime, including the period during which appropriate controls are retained and the means to be employed to preserve knowledge of that facility in the longer term*
- (f) the research, development and demonstration activities that are needed in order to implement solutions for the management of spent fuel and radioactive waste*
- (g) the responsibility for the implementation of the national programme and the key performance indicators to monitor progress towards implementation*
- (h) an assessment of the national programme costs and the underlying basis and hypotheses for that assessment, which must include a profile over time*
- (i) the financing scheme(s) in force*
- (j) a transparency policy or process as referred to in Article 10*
- (k) if any, the agreement(s) concluded with a Member State or a third country on management of spent fuel or radioactive waste, including on the use of disposal facilities*

The resolution, mentioned under the 11.1, sets out general timelines and financing for activities related to radioactive waste and spent fuel management for all radiation and nuclear facilities. It foresees the construction of a repository for LILW with the capacity to satisfy the needs of the Slovenian part of LILW generated in the operation and decommissioning of the Krško NPP and for the disposal of waste from all other Slovenian waste generators.

In the Programme, LILW management is treated as an integral process, covering all stages from waste generation to waste disposal. Various current and near-future radioactive waste streams are taken into account, considering both present and planned waste management practices. Besides radioactive waste from the Krško NPP, other small producers (from medicine, industry and research) and other activities involving radioactive waste (the uranium mine under decommissioning, TENORM, the decommissioning of reactors, etc.) are also described. The Programme includes an analysis of measures for the minimisation of radioactive waste production and its treatment and conditioning before disposal. The siting and the construction of a repository for short-lived LILW is one of the principal goals of LILW management in Slovenia. The design of the repository should be modular, with sufficient capacity to accommodate all future LILW waste arising in Slovenia. The limited storage capacities at nuclear facilities call for decisions to be taken and practical solutions to be found.

A significant step forward in solving this problem was made by the selection and approval of the site for LILW disposal in 2009. The Vrblina site in the municipality of Krško was adopted by the Government decree on the national spatial plan. In July 2014 a feasibility study and implementation programme for the LILW repository was approved by the Ministry of Infrastructure and Spatial Planning establishing an investment framework for repository construction.

The LILW repository project is advancing through the phase of obtaining a construction permit. Under the current plan the repository should be commissioned in 2020.

Responsibility in the area of LILW management is clearly defined. Three independent parties – the producers of radioactive waste, the SNSA as the regulatory body and the ARAO as the implementer of the public service for radioactive waste management – are involved in the process of radioactive waste management. The operators of nuclear and other radiation facilities are responsible for radioactive waste management at their facilities. The producers of radioactive waste and spent fuel have to consider the interdependencies among different steps of their spent fuel and radioactive waste management.

The ARAO has responsibility for collecting, transporting, treating, storing and disposing of institutional LILW. The ARAO also has responsibility for disposal of all radioactive waste coming from electricity production and long-term monitoring and maintenance of disposal facilities for waste from uranium mining and milling. All activities are made transparent to the public through annual reports, via the Internet and from outreach activities. Special attention is devoted to communication with and the participation in decision-making of the public in the local municipalities with nuclear facilities and in the area selected for the LILW repository site and non-governmental organisations.

The National Programme from 2006 duly implements the relevant provisions of the Agreement with Croatia and in parallel requests the provision of the technical possibility for the construction of a full-capacity repository for all waste from the Krško NPP, if an appropriate agreement with the Republic of Croatia on a joint solution of this issue is agreed upon.

According to the programme, the Krško NPP, the major radioactive waste generator, shall continue to operate until 2023, with the option to extend its operational life. After the termination of the Krško NPP's operation, the spent fuel will be transferred to dry storage for a period of approx 35 years, when the spent fuel repository should be operable. The LILW waste repository shall be built in Slovenia. The design of the repository should be modular, with sufficient capacity to accommodate all future LILW waste arising in Slovenia. The spent fuel from the Triga Mark II research reactor will be returned to the country of origin. The institutional waste stored at the Central Storage Facility for Radioactive Waste in Brinje which meets the waste acceptance criteria (WAC) shall be disposed of in the LILW repository. The remaining waste from the Central Storage Facility for Radioactive Waste in Brinje shall be stored and disposed of later together with SF&HLW from Krško NPP and RR TRIGA.

On the basis of the Agreement, the Republic of Slovenia and the Republic of Croatia jointly prepared and approved a Programme for the Decommissioning of the Krško NPP and Disposal of LILW and High-Level Waste (hereinafter the Decommissioning Programme) in 2004. In accordance with the requirements from the Agreement, a new revision of the document should be adopted every five years.

In its long-term strategy for spent fuel management both Programmes envisage spent fuel storage in dry casks. Spent fuel should be moved from pool to dry storage between 2024 and 2030 and should be stored in casks until 2065, when a deep geological repository is ensured. It is planned to identify sites for the geological repository by 2035 and to propose the site by 2055. The operational phase of the spent fuel repository will end in 2070 and the repository should be closed in 2075. In the event of an export option, the removal of spent fuel from dry storage is planned for between 2066 and 2070.

According to the Decommissioning Programme, for all domestic scenarios disposal in deep geological formations is considered to be a safe long-term solution for spent fuel and high-level waste. In preparing the evaluation, the Swedish concept was used as a guideline.

The basic characteristics of the concept are:

- Direct disposal of spent fuel in appropriate canisters, with capacity for 1,600 fuel elements or 620 metric tons of metallic uranium and a small additional volume of high-level waste (~16 m<sup>3</sup>).
- The following phases are studied and evaluated: research and development, including site selection and characterisation, design and construction, operation, and closure.
- As an alternative to disposal in a deep geological formation either in Slovenia or in Croatia, the option of export and disposal of spent nuclear fuel in a third country was also considered.

According to National Programme the SF from the Triga Mark II research reactor should be returned to the country of origin (the USA) by the end of May 2019. If the return of spent fuel from the IJS Reactor Infrastructure Centre to the USA does not occur, the spent fuel management will be arranged jointly with the spent fuel disposal of the Krško NPP.

The decision on siting and construction of the facility for the management and disposal of spent fuel has been deferred according to the Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel and the Programme of Krško NPP for Decommissioning and Spent Fuel and LILW Disposal. It is planned to identify sites for the Spent Nuclear Fuel Repository by 2035 and to propose the site by 2055. At present, spent fuel management is part of the operation of the Krško NPP and the TRIGA Mark II research reactor at the IJS Reactor Infrastructure Centre and no immediate activities with regard to siting of the spent fuel repository are envisaged for the near future.

For long-term spent fuel management, a dual-track strategy has been adopted as a reasonable solution in the present situation. The basic reference scenario for geological disposal has been developed, assuming the disposal of spent fuel in 2065. The option of multinational disposal is kept open. Within final disposal options, the ARAO participates at the EU level in two programmes that address the possibility of building a multinational/regional repository for spent fuel and high-level waste (ERDO-WG and IGD-TP).

In the light of new information, new knowledge in SF management in general and the SNSA decision issued in 2011 regarding the prevention of severe accidents and mitigation of their consequences, Krško NPP assessed the options to reduce risk associated with SF, taking into account the change in the long-term strategy for SF according to the National Programme for period 2006-2015 and the Decommissioning Programme. Wet SF storage was assessed and compared to dry storage and a reprocessing (recycling) option was reviewed. Since the current wet storage capacity is not adequate, from both safety and operational capacity points of view, for the plant's commercial operational lifetime (to 2023), let alone lifetime extension until 2043, a dry storage option was proposed. To ensure uninterrupted operation and sufficient storage capacity in the SF pool, a dry cask storage facility should be operational in 2018.

## Article 12.2

*The national programme together with the national policy may be contained in a single document or in a number of documents.*

The Resolution on the 2006–2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel is a stand-alone document including national policy and general principles under Article 4 of the Act on Protection against Ionizing Radiation and Nuclear Safety. The fundamental safety principles are defined and are part of The Resolution on Nuclear and Radiation Safety in the Republic of Slovenia (for the period 2013–2023).

## **Appendix I: Comprehensive List of Legal Documents in Force in Slovenia (as of 31 July 2015)**

An updated and comprehensive list of the Slovenian legislation relevant to nuclear safety is regularly maintained and always available at the SNSA's website:

[http://www.ursjv.gov.si/en/legislation\\_and\\_documents/](http://www.ursjv.gov.si/en/legislation_and_documents/)

Only the pieces of legislation relevant for this report are listed below:

### **I.1 Governmental decrees and ministerial regulations issued on the basis of the 2002 Act (Act on Protection against Ionizing Radiation and Nuclear Safety – ZVISJV (Official Gazette 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 (Official Gazette RS, 35/2003);
- Rules on the 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 (Official Gazette RS, 62/2003);
- Rules on the requirements of using ionising radiation sources in healthcare – SV3 (Official Gazette RS, 111/2003);
- Rules on the requirements and methodology of dose assessment for the radiation protection of the population and exposed workers – SV5 (Official Gazette RS, 115/2003);
- Decree on the criteria for determining the compensation rate due to the restricted use of areas and intervention measures in nuclear facility areas – UV8 (Official Gazette RS, 92/2014 and 46/2015);
- Rules on health surveillance of exposed workers – SV6 (Official Gazette RS, 2/2004);
- Rules on the obligations of the person carrying out a radiation practice and person possessing an ionizing radiation source – SV8 (Official Gazette RS, 13/2004);
- Rules on approving experts performing professional tasks in the field of ionising radiation – SV7 (Official Gazette RS, 18/2004);
- Rules on the method of keeping records of personal doses due to exposure to ionizing radiation – SV4 (Official Gazette 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 (Official Gazette RS, 36/2004, 103/2006 and 92/2014);
- Decree on activities involving radiation – UV1 (Official Gazette RS, 48/2004 and 9/2006);
- Decree on dose limits, radioactive contamination and intervention levels – UV2 (Official Gazette RS, 49/2004);
- Rules on transboundary shipments of radioactive waste and spent fuel – JV11 (Official Gazette RS, 22/2009);
- Rules on the physical protection of nuclear facilities, nuclear and radioactive materials and transport of nuclear materials (Official Gazette RS, 17/2013);
- Rules on establishing a basic training programme and periodic in-service training of security personnel performing physical protection of nuclear facilities, nuclear or radioactive materials, and transport of nuclear materials (Official Gazette RS, 12/2013);
- Rules on providing qualification for workers in radiation and nuclear facilities (Official Gazette RS, 32/2011);
- Rules on the use of radiation sources and on activities involving radiation – JV2/SV2 (Official Gazette RS, 27/2006);
- Rules on radioactive waste and spent fuel management – JV7 (Official Gazette RS, 49/2006);

- Rules on authorised experts in radiation and nuclear safety – JV3 (Official Gazette RS, 51/2006).
- Rules on the monitoring of radioactivity – JV10 (Official Gazette RS, 20/2007 and 97/2009);
- Decree on checking the radioactivity for shipments of metal scrap – UV11 (Official Gazette RS, 84/2007);
- Decree on the safeguarding of nuclear materials – UV 6 (Official Gazette RS, 34/2008)
- Rules on the transboundary shipment of nuclear and radioactive substances – JV 12 (Official Gazette RS, 75/2008 and 41/2014);
- Rules on operational safety of radiation and nuclear facilities – JV 9 (Official Gazette RS, 85/2009, 9/2010 and 87/2011);
- Rules on radiation and nuclear safety factors – JV5 (Official Gazette RS, 92/2009 and 9/2010);
- Rules on the Conditions to be met by Primary Health Care Centres for the Care of Breasts – SV 10 (Official Gazette RS, 110/2004);
- Rules on the Use of Potassium Iodide – SV 9 (Official Gazette RS, 59/2010);

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 the Working and Residential Environment and Raising Awareness about Measures to Reduce Public Exposure Due to the Presence of Natural Radiation Sources (Official Gazette RS, 17/2006).

## **I.2 Other legislation**

Third Party Nuclear Liability;

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

Decommissioning of the Krško Nuclear Power Plant;

- Act on the Fund for Financing the Decommissioning of the Krško NPP and Disposal of Radioactive Waste from the Krško NPP (Official Gazette RS, 75/1994 and subsequent amendments);

Public utility service of radioactive waste management;

- Decree on the method and subject of and conditions for performing a public utility service of radioactive waste management (Official Gazette RS, 32/1999 and 41/2004-ZVO-1);

Žirovski vrh Uranium Mine;

- Act on Permanent Closeout of Uranium Ore Exploitation and Prevention of Mining Consequences in the Žirovski vrh Uranium Mine (Official Gazette RS, 22/2006, official consolidated text);

## Appendix II: Inventory (as of 31 December 2013)

**Table 1:** Transformation of the national classification system into a unified system.<sup>1</sup>

Radioactive waste categories - IAEA Safety Guide GSG-1	IAEA description – IAEA Safety Guide GSG-1	JV 7 Classification	JV 7 Classification description
			Transitional radioactive waste
Very low-level waste (VLLW)	Waste that does not necessarily meet the criteria of EW, but that does not need a high level of containment and isolation and, therefore, is suitable for disposal in near surface landfill type facilities with limited regulatory control. Such landfill type facilities may also contain other hazardous waste. Typical waste in this class includes soil and rubble with low levels of activity concentration. Concentrations of longer lived radionuclides in VLLW are generally very limited.	VLLW	Very low-level radioactive waste (hereinafter referred to as VLLW), for which the regulatory authority competent for nuclear and radiation safety may decide on clearance
Low-level waste (LLW)	Waste that is above clearance levels, but with limited amounts of long lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered near surface facilities. This class covers a very broad range of waste. LLW may include short-lived radionuclides at higher levels of activity concentration, and also long-lived radionuclides, but only at relatively low levels of activity concentration.	Short-lived LILW	Low- and intermediate-level radioactive waste (hereinafter referred to as LILW), in the management of which heat generation does not need to be considered; it is further classified into two groups:  3.1 Short-lived LILW, where the specific activity of the contained alpha emitters, having a half-life exceeding 30 years, is equal to or lower than 4000 Bq/g in any individual package but in no case greater than 400 Bq/g on average in the overall amount of LILW
Intermediate-level waste (ILW)	Waste that, because of its content, particularly of long-lived radionuclides, requires a greater degree of containment and isolation than that provided by near surface disposal. However, ILW needs no provision, or only	Long-lived LILW	Low- and intermediate-level radioactive waste (hereinafter referred to as LILW), in the management of which heat generation does not need to be considered; it is further classified into two groups:

<sup>1</sup> This table is provided in order to help help the European Commission to deliver consistent information about the inventory of radioactive waste and spent fuel to the Council and European Parliament.

Radioactive waste categories - IAEA Safety Guide GSG-1	IAEA description – IAEA Safety Guide GSG-1	JV 7 Classification	JV 7 Classification description
	<p>limited provision, for heat dissipation during its storage and disposal. ILW may contain long-lived radionuclides, in particular, alpha emitting radionuclides that will not decay to a level of activity concentration acceptable for near surface disposal during the time for which institutional controls can be relied upon. Therefore, waste in this class requires disposal at greater depths, of the order of tens of meters to a few hundred meters.</p>		<p>3.2 Long-lived LILW, where the specific activity of alpha emitters exceeds the limitations applying to short-lived LILW</p>
<p>High-level waste (HLW)</p>	<p>Waste with levels of activity concentration high enough to generate significant quantities of heat by the radioactive decay process or waste with large amounts of long lived radionuclides that need to be considered in the design of a disposal facility for such waste. Disposal in deep, stable geological formations usually several hundred meters or more below the surface is the generally recognised option for disposal of HLW.</p>	<p>HLW</p>	<p>High-level radioactive waste (hereinafter referred to as HLW), which contains radionuclides, the decay of which generates such an amount of heat that has to be considered in its management</p>
		<p>Radioactive waste with natural radionuclides</p>	<p>Radioactive waste containing naturally occurring radionuclides that are produced in the exploitation and reprocessing of nuclear mineral raw materials or in other industrial processes and are not considered sealed sources of radiation pursuant to the regulation governing the use of radioactive sources and radiation practices.</p>

**Table 2:** Waste streams by waste producer and the final solution of different waste categories and spent fuel.

Waste Producer	Type of waste	Waste Category	Final
Krško NPP	Incineration products (A)	LLW+ILW	LILW repository
	Blowdown Resins (BR)		
	Compressible Waste (CW)		
	Evaporator Bottom (EB)		
	Filters (F)		
	Other (O)		
	Supercompacted Waste (SC)		
	Spent Resins (SR)		
	Supercompacted Waste (ST)		
	Primary (PR) and blowdown (BR) resins and dry concentrate (DC) in tube-type container (TI)		
		SNF	Geological disposal, as a reference scenario multinational option kept open
CSF	T1 (solid, compressible, combustible)	LLW+ILW	LILW repository
	T2 (solid, compressible, non-combustible)		
	T3 (solid, non-compressible, combustible)		
	T4 (solid, non-compressible, non-combustible)		
	ZV0 (smoke detectors)	ILW	
	ZV1 (spent sealed sources with: $A \leq 3.7$ GBq)	LLW+ILW	
	ZV2 (spent sealed sources with: $3.7$ GBq $< A \leq 37$ GBq)		
ZV3 (spent sealed sources with: $37$ GBq $< A \leq 370$ GBq)			
ZV4 (spent sealed sources with: $A > 370$ GBq)			
TRIGA MARK II	Waste from research reactor	LLW+ILW	LILW repository
		SNF	Return to the country of origin or geological disposal
RŽV – Jazbec	Mine waste	Radioactive waste with natural radionuclides	Disposal at the RŽV Jazbec site
RŽV – Boršt	Mill tailing	Radioactive waste with natural radionuclides	Disposal at the RŽV Boršt site

## Current inventories

### Central Storage Facility for Radioactive Waste in Brinje (CSF)

**Table 3:** Radioactive waste inventory in the Central Storage Facility for Radioactive Waste in Brinje (CSF) as of 31 December 2013

Waste category	Processed	Volume [m <sup>3</sup> ]	Activity [Bq]	Number of packages
LLW	Yes	13	1.3E+11	63
	No	41.8	1.84E+12	293
ILW	Yes	14	1.4E+10	71
	No	23.6	1.22E+12	450
<b>Total</b>		<b>92.4</b>	<b>3.2E+12</b>	<b>877</b>

Total volume of waste inventory as of 31 December 2013 was 92.4 m<sup>3</sup>, with total activity of 3.2 TBq. All waste stored in the Central Storage Facility in Brinje (CSF) is sorted and characterised. Approximately 30 % of the waste inventory is already processed (pre-treated, treated or conditioned). Methods, used for processing are compressing of compressible waste, dismantling of sealed sources and solidification of liquid waste.

### Krško NPP

**Table 4:** Radioactive waste inventory in the Krško NPP storage as of 31 December 2013

Waste category	Processed	Volume [m <sup>3</sup> ]	Activity [Bq]	Number of packages
LLW +ILW	Yes	2251	1.93E+13	3766
	No	52	0	250
<b>Total</b>		<b>2303</b>	<b>1.93E+13</b>	<b>4016</b>

Total volume of the waste inventory in the storage as of 31 December 2013 was 2,303 m<sup>3</sup>, with total activity of 19.3 TBq. All radioactive waste stored in solid radioactive waste storage and characterised. Yearly around 50 m<sup>3</sup> of compactable and other radioactive waste are transported to and stored in the Decontaminating Building to be stored and waiting for shipment to Sweden for incineration. The incineration products are then returned to Krško NPP.

Waste category	Heavy metal in metric ton (tHM)	Number of assemblies	Location
SNF	474	1097*	Pond

Burn-up of assemblies varies from 20 to 52 GWd/MTU. In the last few years the burn-up has been approximately 50 GWd/MTU.

\* Out of these 1097 fuel elements 857 are considered as completely used, while the others could potentially be used again if for some reason emergency core should be configured in the future.

### TRIGA Mark II

At the TRIGA Mark II research reactor TRIGA there are approximately 210 l of institutional LLW radioactive waste annually, which are sent to CSF. There is currently no spent nuclear fuel in the pond.

### Žirovski vrh uranium mine

**Table 5:** The inventory of the Jazbec mill tailings site at the Žirovski vrh Uranium Mine as of 31 December 2013

Waste category	Processed	Volume [m <sup>3</sup> ]	Activity [Bq]
Radioactive waste with natural radionuclides	Yes	1,198,900	21.7E12
	No	0	0
<b>Total</b>		<b>1,198,900</b>	<b>21.7E+12</b>

**Table 6:** The inventory of the Boršt mill tailings site at the Žirovski vrh Uranium Mine as of 31 December 2013

Waste category	Processed	Volume [m <sup>3</sup> ]	Activity [Bq]
Radioactive waste with natural radionuclides	Yes	415,543	48.8E12
	No	0	0
<b>Total</b>		<b>415,543</b>	<b>48.8E+12</b>

### Current inventory summary

**Table 7:** Total amount of waste and spent fuel in Slovenia as of 31 December 2013

Waste category	Nuclear Facility	Volume [m <sup>3</sup> ]	Activity [Bq]	Number of packages
LLW +ILW	CSF, NPP NEK	2,343.4**	2.25E+13	4,893
Radioactive waste with natural radionuclides	RŽV	1,614,443	7.05E+13	
		Location	Heavy metal in metric ton (tHM)	Number of assemblies
Spent Nuclear Fuel	NEK NPP (PWR)	Pond	474	1097*

\* Out of these 1097 fuel elements 857 are considered as completely used, while the others could potentially be used again if for some reason emergency core should be configured in the future.

\*\* About 50 m<sup>3</sup> of additional radioactive waste is not taken into account in that figure as it is waiting for further conditioning before final storage.

## Future prospects

**Table 8:** Total expected volumes of waste by waste category and amount of spent fuel.

Waste category	Facility	Amount	Total expected waste*		
			2020	2030	2040
LLW +ILW	CSF, Krško NPP	2,343 m <sup>3</sup>	2602 m <sup>3</sup>	2972 m <sup>3</sup>	3342 m <sup>3</sup>
Radioactive waste with natural radionuclides	RŽV	1,614,443 m <sup>3</sup>	1,614,443 m <sup>3</sup>	1,614,443 m <sup>3</sup>	1,614,443 m <sup>3</sup>
SNF (No. of assemblies)	Krško NPP (PWR)	1097	1321	1713	2105
SNF	Triga Mark II	0	0	0	0

\* On average 35 m<sup>3</sup> (NPP) and 2 m<sup>3</sup> (small producers) of LLW+ILW is generated per year and it is considered that the lifetime of the reactor will be prolonged until 2043. The weight of an spent fuel assembly is about 0.4 tHM.