Western European
WENRA
Nuclear Regulators Association

Report

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Waste and Spent Fuel Storage Safety Reference Levels

Report of Working Group on Waste and Decommissioning (WGWD)

Version 2.2, April 2014

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Executive Summary

The Western European Nuclear Regulators' Association (WENRA) is an international body made up of the Heads and senior staff members of nuclear regulatory authorities of European countries with nuclear power plants. The main objectives of WENRA is to develop a common approach to nuclear safety, to provide an independent capability to examine nuclear safety in applicant countries and to be a network of chief nuclear safety regulators in Europe exchanging experience and discussing significant safety issues.

To accomplish these tasks two working groups within the WENRA have been established - Reactor Harmonization Working Group (RHWG) and Working Group on Waste and Decommissioning (WGWD).

This document contains the results of the work of WGWD in the area of the safety for spent fuel and radioactive waste storage facilities. The objective of this report is to provide safety reference levels for these facilities, which are based on corresponding IAEA documents (requirements, guidances, etc). Although the IAEA safety standards establish an essential basis for safety of all nuclear installations covering also the spent fuel and radioactive waste stores, the WENRA safety reference levels incorporate more facility specific requirements.

The document was prepared by reviewing the Storage Report Version 1.0 by the working group based on support by the German task manager, Mr. Bernhard Gmal, and, for the final version, Mr. Sven Keßen. WGWD members during the review period are listed below:

Belgium	Joris CREEMERS
	Olivier SMIDTS
Bulgaria	Magda PERIKLIEVA
Czech Republic	Peter LIETAVA (former chairman of WGWD)
Finland	Jarkko KYLLÖNEN
France	Loïc TANGUY
Germany	Sven KESSEN
	Manuela M. RICHARTZ
Hungary	Gábor NAGY
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Slovenia	Polona TAVCAR
Spain	Gregorio OROZCO
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Sweden	Nicklas CARLVIK
Switzerland	Stefan THEIS (Chairman of WGWD)
United Kingdom	Joyce RUTHERFORD

WENRA Policy Statement

We, the heads of the national nuclear safety authorities, members of WENRA, commit ourselves to a continuous improvement of nuclear safety in our respective countries.

Nuclear safety and radiation protection are based on the principle of the prime responsibility of the operators. Our role is to ensure that this responsibility is fully secured, in compliance with the regulatory requirements.

In order to work together, we created the Western European Nuclear Regulators' Association (WENRA) with the following main objectives to:

- build and maintain a network of chief nuclear safety regulators in Europe;
- promote exchange of experience and learning from each other´s best practices;
- develop a harmonized approach to selected nuclear safety and radiation protection issues and their regulation, in particular within the European Union;
- provide the European Union Institutions with an independent capability to examine nuclear safety and its regulation in applicant countries.

In order to develop a harmonized approach, we are making efforts to:

- share our experience feedback and our vision;
- exchange personnel, allowing an in-depth knowledge of working methods of each other;
- develop common safety reference levels in the fields of reactor safety, decommissioning safety, radioactive waste and spent fuel management facilities in order to benchmark our national practices.

We recognise the IAEA standards to form a good base for developing national regulations. The developed reference levels represent good practices in our counties and we are committed

- by the year of 2010 to adapt at a minimum our national legislation and implementation to the reference levels;
- to influence the revision of the IAEA standards when appropriate;
- to continuously revise the reference levels when new knowledge and experience are available.

We strive for openness and improvement of our work. For that purpose we are making efforts to

- keep the European nuclear safety and radiation protection bodies not belonging to WENRA and the EU Institutions informed of the progress made in our work;
- make the WENRA reports available on the Internet (www.wenra.org);
- invite stakeholders to make comments and suggestions on our reports and the proposed reference levels.

Signed in Stockholm December 2005

J-P. Samain, Belgium

S. Tzotchev, Bulgaria

D. Drabova, Czech Republic

J. Laaksonen, Finland

A-C. Lacoste, France

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I. Lux, Hungary

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Glossary

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Acceptance criteria for storage
See: waste or spent fuel acceptance criteria

Ageing
General process in which characteristics of a structure, system or component gradually change with time or use.

Ageing degradation
Ageing effects that could impair the ability of a structure, system or component to function within its design limits.

Ageing management
Engineering, operations and maintenance actions to control within acceptable limits the ageing degradation of structures, systems and components.

Burnup credit
Credit in the safety assessment of a structure, component, system or facility that is given for the reduction in spent fuel nuclear reactivity as a result of fission

Conditioning
Those operations that produce a waste or spent fuel package suitable for handling, transport, storage and/or disposal. Conditioning may include the conversion of the waste to a solid waste form, enclosure of the waste in containers and, if necessary, providing an overpack.

Design basis accident
Accident conditions against which a facility is designed according to established design criteria, and for which the damage to the fuel and the release of radioactive material are kept within authorized limits.

Discharge, authorized
Planned and controlled release of (usually gaseous or liquid) radioactive material into the environment in accordance with an authorization.

Licensee
The licensee is the legal person or organization having overall responsibility for a facility or activity

Remark: WGWD recognizes that this organization may change as the facility passes to the decommissioning phase according to national strategies.

Management system
A set of interrelated or interacting elements (system) for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner. The management system integrates all elements of an organization into one coherent system to enable all of the organization's objectives to be achieved. These elements include the organizational structure, resources and processes. Personnel, equipment and organizational culture as well as the documented policies and processes are parts of the management system. The organization's processes have to address the totality of the requirements on the organization as established in, for example, IAEA safety standards and other international codes and standards.

The term management system reflects and includes the evolution in the approach from the initial concept of 'quality control' (controlling the quality of products) through 'quality assurance' (the system to ensure the quality of products) to 'quality management' (the system to manage quality).

Monitoring
1. The measurement of dose or contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances, and the interpretation of the results,
2. Continuous or periodic measurement of radiological or other parameters or determination of the status of a structure, system or component. Sampling may be involved as a preliminary step to measurement.

Nuclear facility
A facility and its associated land, buildings and equipment in which radioactive materials are produced, processed, used, handled, stored or disposed of on such a scale that consideration of safety is required.

Nuclear safety
See: Protection and Safety

Operation
All activities performed to achieve the purpose for which an authorized facility was constructed.

Operational limits and conditions
A set of rules setting forth parameter limits, the functional capability and the performance levels of equipment and personnel approved by the regulatory body for safe operation of an authorized facility.

Owner
Owner means a body having legal title to waste or spent fuel including financial liabilities (it is usually the waste and spent fuel producer).

Passive Safety Feature
A safety feature which does not depend on an external input and/or continuous supply of media.

Protection and Safety
The protection of people against exposure to ionizing radiation or radioactive materials and the safety of radiation sources, including the means for achieving this, and the means for preventing accidents and for mitigating the consequences of accidents should they occur.

Safety is primarily concerned with maintaining control over sources, whereas radiation protection is primarily concerned with controlling exposure to radiation and its effects. Clearly the two are closely connected: radiation protection is very much simpler if the source in question is under control, so safety necessarily contributes towards protection. Sources come in many different types, and hence safety may be termed nuclear safety, radiation safety, radioactive waste safety or transport safety, but protection (in this sense) is primarily concerned with protecting humans against exposure, whatever the source, and so is always radiation protection.

> **Radiation protection:**
> The protection of people from the effects of exposure to ionizing radiation, and the means for achieving this.
>
> **Nuclear safety:**
> The achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards.

Quality management system
See: management system

Radiation protection
See: protection and safety

Regulatory body
An authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

Safety analysis
Evaluation of the potential hazards associated with the conduct of an activity.

Safety assessment
1. Assessment of all aspects of facility practice which are relevant to protection and safety; for a nuclear facility this includes the site, the design and the operation of the facility.

2. The systematic process that is carried out throughout the design process to ensure that all the relevant safety requirements are met by the proposed (or actual) design. Safety assessment includes, but is not limited to, the formal safety analysis.

Safety case
A collection of arguments and evidence in support of the safety of a facility or activity. This will normally include the findings of a safety assessment.

Safety policy
A documented commitment by the licensee to a high nuclear safety performance supported by clear safety objectives and targets and a commitment of necessary resources to achieve these targets. The safety policy is issued as separate safety management document or as visible part of an integrated organization policy.

Spent fuel

1. Nuclear fuel removed from a reactor following irradiation, that is no longer usable in its present form.[1]
2. Nuclear fuel that has been irradiated in and permanently removed from a reactor core.

Storage
The holding of spent fuel or of radioactive waste in a facility that provides for their/its containment, with the intention of retrieval.

Structures, systems and components (SSCs)
A general term encompassing all of the elements (items) of a facility or activity which contribute to protection and safety, except human factors.

- **Structures** are the passive elements: buildings, vessels, shielding, etc.
- A **system** comprises several **components**, assembled in such a way as to perform a specific (active) function.
- A **component** is a discrete element of a system.

Waste treatment
Operations intended to benefit safety and/or economy by changing the characteristics of the waste. Three basic treatment objectives are:

- volume reduction,
- removal of radionuclides from the waste, and
- change of composition.

[1] The adjective 'spent' suggests that *spent fuel* cannot be used as fuel in its present form (as, for example, in *spent source*). In practice, however (as in (2) above), *spent fuel* is commonly used to refer to fuel which has been used as fuel but will no longer be used, whether or not it could be (which might more accurately be termed 'disused fuel').

Treatment may result in an appropriate waste form.

Waste
Material for which no further use is foreseen.

Waste, radioactive
For legal and regulatory purposes, waste that contains or is contaminated with radionuclides at concentrations or activities greater than clearance levels as established by the regulatory body.

Waste or spent fuel acceptance criteria
Quantitative or qualitative criteria specified by the regulatory body, or specified by an operator and approved by the regulatory body, for radioactive waste or spent fuel to be accepted by the operator of a storage facility. Waste acceptance criteria might include, for example, restrictions on the activity concentration or the total activity of particular radionuclides (or types of radionuclides) in the waste or the spent fuel or criteria concerning the waste form or the packaging of the waste or the spent fuel.

Waste characterization
Determination of the physical, chemical and radiological properties of the waste to establish the need for further adjustment, treatment or conditioning, or its suitability for further handling, processing, storage or disposal.

Waste or spent fuel package
The product of conditioning that includes the waste or spent fuel form and any container(s) and internal barriers (e. g. absorbing materials and liner), as prepared in accordance with requirements for handling, transport, storage and/or disposal.

List of Abbreviations

AMP	ageing management program
EIA	environmental impact assessment
EU	European Union
IAEA	International Atomic Energy Agency
NEA	Nuclear Energy Agency (OECD)
NPP	nuclear power plant
OEF	operational experience feedback
OLC	operational limits and conditions
PIE	postulated initiating event
PSR	periodic safety review
QM	quality management
R&D	research and development
RHWG	Reactor Harmonization Working Group
SSCs	structures, systems and components
SRL	safety reference level
V.1	Version 1 of the SRLs
V.2	Version 2 of the SRLs
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators' Association
WGWD	Working Group on Waste and Decommissioning

Part 1
Introduction and Methodology

1.1 Introduction

This report is the result of an effort by the Working Group on Waste and Decommissioning (WGWD) of WENRA, from 2002 to 2009. It presents the safety reference levels (SRLs) for radioactive waste and spent fuel management facilities and practices that are thought to be a good basis for future harmonization on a European level.

The SRLs cannot be considered as independent European safety requirements because current legislation in WENRA member states would not allow that due to fundamental differences reflecting the historical development in European countries. The SRLs are a set of requirements against which the situation of each country is assessed and it is each country's responsibility to implement actions to ensure that these levels are reached.

1.1.1 Background

WENRA, which has been established in February 1999, is the association of the Heads of nuclear regulatory authorities of European countries with at least one nuclear power plant in construction, operation or decommissioning phase. WENRA has been formally extended in 2003 to include future new European Union (EU) member states. Currently following countries are members of WENRA: Belgium, Bulgaria, the Czech Republic, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Romania, Slovenia, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. Recently various other states have been appointed to WENRA meetings with the status of "observers". However such states have not yet been participating in the work of WGWD and have not taken part in the preparation of this report.

The original objectives of the Association were:

- to provide the EU institutions with an independent capability to examine nuclear safety and its regulation in applicant countries,
- to provide the EU with an independent capability to examine nuclear safety and regulation in candidate countries,
- to evaluate and achieve a common approach to nuclear safety and regulatory issues which arise.

The second objective of WENRA has been fulfilled by the preparation of a report on nuclear safety in candidate countries having at least one nuclear power plant. After May 1st, 2004, when most of these candidate countries became regular EU member states, the new WENRA tasks, based on first and third original Association's objectives, became:

- provide the European Union institutions with an independent capability to examine nuclear safety and its regulation in applicant countries and
- to develop common approaches to nuclear safety and regulations and to encourage the harmonization of practices.

To perform these tasks two working groups within the WENRA have been established - Reactor Harmonization Working Group (RHWG) and Working Group on Waste and Decommissioning (WGWD). The work of WGWD has started in 2002.

1.1.2 Objective

The objective of this report is to provide SRLs for spent fuel and radioactive waste storage facilities. The design storage period involved will typically be several decades, depending on the national waste and spent fuel management strategy.

Although the SRLs in this report are oriented toward the licensees of the above-mentioned facilities, who are usually responsible for the safety of the facilities throughout their lifetime, they can also be used by the regulatory body for the review and evaluation of storage facilities' safety.

According to the WENRA policy statement the harmonization process of the national legal systems in member states should be finished by the year 2010. In 2009 WENRA decided to prolong the deadline in case of the storage SRLs until end of 2012.

1.1.3 Scope

The SRLs are primarily focussed on separate, purpose built or adapted storage facilities used to store spent fuel or radioactive waste in solid form. As this document is intended to cover a wide range of storage facilities, the reference levels will need to be implemented in different ways to be appropriate for the particular facility. The SRLs were also primarily developed for licensed nuclear facilities for storage, but can be used also for other facilities accommodating radioactive waste from industry, hospitals, research centres etc.

Under certain circumstances (steam generator exchange, decommissioning) large, bulky waste items are subject to storage. The SRLs of this document shall be applied as appropriate to such material as well.

These SRLs may also be applied to stores as integrated parts of other facilities, e.g. NPPs, facilities for waste conditioning or for disposal. In such cases it should be recognized that many of the SRLs of a general nature, e.g. on quality management and facility operation, may have to be applied together with SRLs developed for the other parts of the facility. A similar situation occurs if the storage facility is operated in combination with other facilities, or incorporates other nuclear activities than storage.

Spent fuel stores built for the operation of the reactors are not covered by this report. Because of the national policies on spent fuel, operators can consider the need to extend the use of the stores or adapting the existing ones, beyond the operational period of the reactor. Those facilities shall be covered by this report.

Because WGWD members do not all regulate the following matters, WGWD has concentrated on relevant nuclear and waste safety requirements and, in particular, it has not taken into account in detail other regulatory requirements such as Environmental Impact Assessment regulation (required by EU directives), discharge authorization, waste disposal, conventional occupational health and safety, physical protection including safeguards, and funding issues. In some countries, these matters are addressed by other national regulatory organizations.

1.1.4 Structure

The report consists of three main parts.

Following this introduction, Section 1.2 presents the general methodology that was followed to develop the SRLs and to analyse their application in participating countries.

Part 2 of the report presents the actual waste and spent fuel storage reference levels.

Part 3 of the report describes the results of the benchmarking process and the National Action Plans (NAP)

1.2 Methodology

The working methodology of WGWD has gone through several steps and changes since 2002, when the working group was established. A list of topics to be covered by WGWD was defined taking into account the common field of responsibility of WENRA members. Generally for the development of storage SRLs relevant IAEA documents were consulted, the latest list of which is as follows:

- Fundamental Safety Principles, Safety Fundamentals SF-1, Vienna (2006)
- Storage of Spent Fuel, DS 371, Vienna (January 2010)
- Predisposal Management of Radioactive Waste, GSR Part 5, Vienna (2009),
- Periodic safety review of nuclear power plants, NS-G-2.10, Vienna (2003),
- A System for Feedback of Experience from Events in Nuclear Installations, NS-G-2.11, Vienna (2006),
- Storage of Radioactive Waste, WS-G-6.1, Vienna (2006),
- Safety of Nuclear Fuel Cycle Facilities, NS-R-5, Vienna (2009),
- Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety, Safety Requirements,
  GS-R-1, Vienna (2000).
- Management Systems for Facilities and Activities, Safety Requirements, GS-R-3, Vienna (2006).
- The Management System for the Processing, Handling and Storage of Radioactive Waste, GS-G-3.3, Vienna (2008)
- The Management System for Nuclear Installations GS-G-3.5, Vienna (2009)
- Preparedness and Response for a Nuclear or Radiological Emergency, GS-R-2, Vienna, 2002
- Periodic Safety Review of Nuclear Power Plants, DS 426, Vienna (2009)
- Safety Case and Safety Assessment for Predisposal Management of Radioactive Waste, DS 284, Vienna (August 2008)

A first set of SRLs was posted on the website of the WENRA organization at the beginning of 2006 and presented to stakeholders in order to receive their comments before June 1st, 2006. Most of the comments recommended to address more specifically the issues raised by the storage of spent fuel and radioactive waste in order to prevent the specific hazards they pose. WGWD reflected a considerable number of comments and established in December 2006 Version 1 (herein referred as V.1) of the waste and spent fuel storage report on which basis the following benchmarking exercise of the storage-SRLs in WENRA member countries was conducted.

An evaluation of the implementation of the SRLs in the regulations (national legal systems) and in the facilities has been performed till mid-2009 in each WENRA member state. In a benchmarking exercise the justification and evidence for implementation of each SRL was discussed country by country and agreed within WGWD in subgroups. After this evaluation, all member states developed national action plans in order to address identified discrepancies and to update their national regulations till the end of 2012. Progress of the national action plans is under continuous review of the working group.

Reflecting the results of the national assessments, the set of SRLs was subject to further improvement, which together with updated references of IAEA documents, led to this most recent Version 2 (herein referred as V.2) of the "Waste and Spent Fuel Storage Safety Reference Levels". For accomplishing this, two review readings of the SRLs were carried out in the plenary sessions of the 21st and 22nd meeting of the WGWD. Before the 23rd meeting an update of the references and quotations of relevant IAEA documents had been performed. After the 23rd meeting of WGWD with a final reading WENRA approved the report in spring 2010 for official release as draft on the WENRA homepage. Stakeholders have been invited to respond with comments until June 30th 2010. In subsequent WGWD meetings

- all comments received were evaluated
- SRL-texts were modified accordingly where agreed and
- any such decisions were discussed with representatives of relevant stakeholder organisations in a special working group session.

Finally the resulting storage report was approved by WENRA in autumn 2010 and published as Version 2.1 in February 2011.

Part 2
Waste and Spent Fuel Storage Safety Reference Levels

These reference levels are intended for separate, purpose built or adapted storage facilities which should incorporate passive safety features as far as reasonably practical and which will be used to store spent fuel or waste in solid form. The design base storage period involved will typically be several decades, depending on the national waste and spent fuel management strategy. In the future WGWD may consider other aspects of radioactive waste and spent fuel management.

Some reference levels apply to the owner of the waste or spent fuel (S-04, S-05, S-06, S-07, S-18, S-51).

WGWD is conscious that some of the reference levels, in particular those related to the design of facilities, may not be fulfilled by existing facilities. Implementation of these levels for existing facilities will have to be examined within the national regulatory framework.

The term “nuclear safety” covers in this document also the measures for radiation protection.

The reference levels apply to a wide range of facilities for the storage of spent fuel and radioactive waste, for which the hazard potential may vary significantly. On the one hand, the reference levels apply to fuel stores which may require active protection systems of high reliability. On the other hand, the reference levels apply to the storage of wastes where the design of both the waste package and the store are based on the concept of passive safety.

Consideration therefore needs to be given as to whether individual reference levels are relevant in specific circumstances, and when they are relevant they need to be applied in a proportionate manner, taking account the magnitude of the hazard.

2.1
Safety area: Safety management

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2.1.1 Safety issue: Responsibility

S-01:

The licensee of the radioactive waste or spent fuel storage facility is responsible for the safety of all activities in the facility, and for the implementation of programs and procedures necessary to ensure safety, including the waste or spent fuel stored. In accordance with the graded approach, the programs and procedures necessary to ensure safety shall be commensurate with the scale of the facility and the type of the inventory.

*Related **IAEA** safety standards:*

The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks. (SF-1; principle 1)

The person or organization responsible for any facility or activity that gives rise to radiation risks or for carrying out a programme of actions to reduce radiation exposure has the prime responsibility for safety.(SF-1; para 3.3)

The operator is responsible for the safety of all activities in the storage of radioactive waste and for the implementation of the programmes and procedures necessary to ensure safety. In accordance with the graded approach, the programmes and procedures necessary to ensure safety will generally be less extensive for the operator of a small facility. (WS-G-6.1, para 3.11).

S-02:

To fulfil its prime responsibility for safety during the lifetime of the facility, the licensee shall establish and implement safety policies and ensure that safety issues are given the highest priority.

*Related **IAEA** safety standards:*

To fulfil its prime responsibility for safety throughout the lifetime of a fuel cycle facility, the operating organization shall establish, implement, assess and continually improve a management system that integrates safety, health, environmental, security, quality and economic elements to ensure that safety is properly taken into account in all the activities of an organization. (NS-R-5, para 4.1)

The operating organization shall establish and implement safety, health and environmental policies in accordance with national and international standards and shall ensure that these matters are given the highest priority (NS-R-5, para 4.2)

S-03:

The licensee shall commit itself to maintain the safety of the facility and, as far as reasonably practicable, improve it on the basis of operating experience.

*Related **IAEA** safety standards:*

Operators shall be responsible for the safety of predisposal radioactive waste management facilities or activities.4 The operator shall carry out safety assessments and shall develop a safety case, and shall ensure that the necessary activities for siting, design, construction, commissioning, operation, shut-down and decommissioning are carried out in compliance with legal and regulatory requirements. (GSR Part 5, Requirement 4)

S-04:

There shall be clear and unequivocal ownership of the waste and spent fuel stored in the facility.

*Related **IAEA** safety standards:*

There should be clear and unequivocal ownership of the spent fuel stored in the facility. […] (DS 371; para 3.29)

[…] The legal framework should include provisions to ensure a clear allocation of responsibility for safety throughout the entire process of predisposal management, in particular with respect to storage, and including any transfer between operators. The continuity of responsibility for safety should be ensured by means of authorization by the regulatory body. […] (WS-G-6.1, para 3.2).

S-05:

The waste or spent fuel owner shall be responsible for the overall strategy for the management of its waste and spent fuel, taking into account interdependencies between all stages of waste and spent fuel management and options available, from generation to disposal. The strategy shall be consistent with the overall national radioactive waste and spent fuel management strategy.

*Related **IAEA** safety standards:*

Interdependences among all steps in the predisposal management of radioactive waste, as well as the impact of the anticipated disposal option, shall be appropriately taken into account. (GSR Part 5, Requirement 6)

Owing to the interdependences among the various steps in the predisposal management of radioactive waste, all activities from the generation of radioactive waste up to its disposal, including its processing, are to be seen as parts of a larger entity, and the management elements of each step have to be selected so as to be compatible with those of the other steps. This has to be achieved principally through governmental and regulatory requirements and approaches. It is particularly important to consider the established acceptance criteria for disposal of the waste or the criteria that are anticipated for the most probable disposal option. (GSR Part 5, para 3.21)

S-06:

The interface between responsibilities of the licensee of the storage facility and the waste or spent fuel owner shall be clearly defined, agreed and documented.

*Related **IAEA** safety standards:*

The interface between the responsibilities of the operator and the spent fuel owner, if they differ, should be clearly defined, agreed and documented. (DS 371; para 3.29)

S-07:

Information about changes of waste and spent fuel ownership, or about changes to the relationship between owner and licensee, shall be provided to the regulatory authority.

*Related **IAEA** safety standards:*

Information about changes of ownership of waste or about changes in the relationship between owner and licensee has to be provided to the regulatory body. (GSR Part 5, para 3.18)

2.1.2 Safety issue: Organizational structure

S-08:

The licensee shall establish an organizational structure to enable its safety policy to be delivered with a clear definition of responsibilities and accountabilities, lines of authority and communication.

*Related **IAEA** safety standards:*

Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks. (SF-1; principle 3)

The operating organization shall establish an organizational structure to enable these policies to be carried out with a clear definition of responsibilities and accountabilities, lines of authority and communication. (NS-R-5; para 4.2).

S-09:

The licensee shall maintain the capability in terms of staffing, skills, experience and knowledge to enable it to competently undertake the activities during the lifetime of the facility from siting to decommissioning. Where the resources and skills necessary to deliver any part of theses undertakings are provided by an external organization, the licensee shall nevertheless retain within its organization the capability to assess the adequacy of the external organizations' capabilities of ensuring safety.

*Related **IAEA** safety standards:*

The operating organization shall maintain the capability in terms of staffing, skills, experience and knowledge to undertake competently all activities during the lifetime of the facility from siting to decommissioning. Where the resources and skills necessary to deliver any part of these undertakings are

provided by an external organization, the operating organization shall nevertheless retain within its organization the capability to assess the adequacy of the external organizations' capabilities for ensuring safety. (NS-R-5; para 4.9).

S-10:

The licensee shall specify the necessary qualifications and experiences for all staff involved in activities that may affect safety and establish training programs for developing and maintaining the professional skills of the staff.

*Related **IAEA** safety standards:*

The operating organization shall specify the necessary qualifications and experience for all staff involved in activities that may affect safety. It shall also specify appropriate requirements on training and its assessment and approval. (NS-R-5; para 4.10).

2.1.3 Safety issue: Management system

S-11:

A management system shall be established, implemented, assessed and continually improved. It shall be aligned with the goals of the organization and shall contribute to their achievement. The main aim of the management system shall be to achieve and enhance safety by:

- bringing together in a coherent manner all the requirements for managing the organization
- describing the planned and systematic actions necessary to provide adequate confidence that all these requirements are satisfied
- ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, to help preclude their possible negative impact on safety.

*Related **IAEA** safety standards:*

A management system shall be established, implemented, assessed and continually improved. It shall be aligned with the goals of the organization and shall contribute to their achievement. The main aim of the management system shall be to achieve and enhance safety by:

- *Bringing together in a coherent manner all the requirements for managing the organization;*
- *Describing the planned and systematic actions necessary to provide adequate confidence that all these requirements are satisfied;*
- *Ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, to help preclude their possible negative impact on safety. (GS-R-3; para 2.1, also cited in GS-G-3.3, para 2.1)*

Leadership in safety matters has to be demonstrated at the highest levels in an organization. Safety has to be achieved and maintained by means of an effective management system. This system has to integrate all elements of management so that requirements for safety are established and applied coher-

ently with other requirements, including those for human performance, quality and security, and so that safety is not compromised by other requirements or demands. The management system also has to ensure the promotion of a safety culture, the regular assessment of safety performance and the application of lessons learned from experience. (SF-1, principle 3, para 3.12)

S-12:

The management system shall cover the full lifetime of a facility and the entire duration of activities in normal, transient and emergency situations. For a storage facility, these phases usually include planning, siting, design, construction, commissioning, operation and decommissioning.

*Related **IAEA** safety standards:*

This Safety Requirements publication is applicable throughout the lifetime of facilities and for the entire duration of activities in normal, transient and emergency situations. …. For a facility, these phases usually include siting, design, construction, commissioning, operation and decommissioning (or close-out or closure). (GS-R-3; para 1.11)

S-13:

The processes of the management system that are needed to achieve the goals, provide the means to meet all requirements and deliver the products of the organization shall be identified, and their development shall be planned, implemented, assessed and continually improved. The work performed in each process shall be carried out under controlled conditions, by using approved current procedures, instructions, drawings or other appropriate means that are periodically reviewed to ensure their adequacy and effectiveness.

*Related **IAEA** safety standards:*

The processes of the management system that are needed to achieve the goals, provide the means to meet all requirements and deliver the products of the organization shall be identified, and their development shall be planned, implemented, assessed and continually improved. (GS-R-3; para. 5.1)

The work performed in each process shall be carried out under controlled conditions, by using approved current procedures, instructions, drawings or other appropriate means that are periodically reviewed to ensure their adequacy and effectiveness. (GS-R-3; para. 5.9)

S-14:

The documentation of the management system shall include the following:

- the policy statements of the licensee;
- a description of the management system;
- a description of the functional responsibilities, accountabilities, levels of authority and interactions of those managing, performing and assessing work;
- a description of the interactions with relevant external organizations;
- a description of the processes and supporting information that explain how work is to be prepared, reviewed, carried out, recorded, assessed and improved.

*Related **IAEA** safety standards:*

The documentation of the management system shall include the following:

- *The policy statements of the organization;*
- *A description of the management system;*
- *A description of the structure of the organization;*
- *A description of the functional responsibilities, accountabilities, levels of authority and interactions of those managing, performing and assessing work;*
- *A description of the processes and supporting information that explain how work is to be prepared, reviewed, carried out, recorded, assessed and improved. (GS-R-3; para. 2.8)*

2.1.4 Safety issue: Record keeping

S-15:

The licensee shall develop and maintain a record system on the location and characteristics of every waste and spent fuel package or unpackaged spent fuel element in storage, including information on its ownership and origin.

*Related **IAEA** safety standards:*

The operating organization should develop and maintain a records system on spent fuel data and on the storage system, which includes the radioactive inventory, location and characteristics of the spent fuel, information on ownership, origin and information about its characterization. […] (DS 371, para 3.27)

For the storage of radioactive waste, a variety of records should be compiled, managed and maintained in accordance with a management system. The scope and detail of the records will depend on the hazard associated with the facility and on the complexity of the operations and activities. (WS-G-6.1, para 4.3)

S-16:

The licensee shall ensure that each waste and spent fuel package or unpackaged spent fuel element can be uniquely identified with a marking system that will last for the storage period.

*Related **IAEA** safety standards:*

[…] There should be an unequivocal identification with a marking system that will last for the storage period. These records should be preserved and updated, to enable the implementation of the spent fuel management strategy whether disposal or reprocessing. (DS 371, para 3.27)

A tracking system for waste packages should be developed and implemented. The system should provide for the identification of waste packages and their locations and an inventory of waste stored. The sophistication of the waste tracking system required (e.g. including labelling and bar coding) will depend on the number of waste packages, the anticipated duration of storage of the waste and the hazard associated with it. (WS-G-6.1, para 4.11)

S-17:

The licensee shall implement an adequate system to provide up-to-date information on the radioactive inventory within the storage facility.

*Related **IAEA** safety standards:*

The operating organization should develop and maintain a records system […].These records should be preserved and updated, to enable the implementation of the spent fuel management strategy whether disposal or reprocessing. (DS 371, para 3.27)

The stored radioactive waste should be characterized (e.g. by radionuclide type, inventory, activity concentration, half-life and the physical, chemical and pathogenic properties of the waste) and the results should be documented in an inventory log. (WS-G-6.1, para 5.5)

S-18:

The owner and/or the licensee shall ensure that sufficient records are preserved and updated during the whole storage period (taking into account in particular the condition of waste and spent fuel package or unpackaged spent fuel element during storage), to enable implementation of its strategy for the management of waste or spent fuel, including disposal.

*Related **IAEA** safety standards:*

The operating organization of a spent fuel storage facility should receive detailed information concerning the characteristics of the spent fuel received for storage. This information should be supplied by the nuclear facility (i.e. power plant or research reactor) generating spent fuel (DS 371, para 6.123)

[…] The management system should be designed to ensure […] that the quality of the records and of subsidiary information such as the marking and labelling of waste packages is preserved. […] (WS-G-6.1, para 3.21)

2.2
Safety area: Design

The design of the storage facility should incorporate passive safety features as far as reasonably practicable, thereby minimising the reliance on active safety system, monitoring and human intervention to ensure safety. Where it is not reasonably practicable to incorporate passive safety features in the design, then the safety function will need to be fulfilled with active safety features. The SRLs in this subsection are connected with relevant design aspects.

2.2.1 Safety issue: Storage facility design requirements

S-19:
The storage facility shall be designed to fulfil the fundamental applicable safety functions:

- control of sub-criticality,
- removal of heat,
- radiation shielding,
- confinement of radioactive material,
- retrievability

during normal operation, anticipated operational occurrences and design basis accident conditions.

*Related **IAEA** safety standards:*

6.4. In general the storage facility should be designed to fulfil the main safety functions, i.e. maintaining subcriticality, removal of heat, containment of radioactive material and shielding from radiation, and in addition retrievability of the fuel […] […] (DS 371, para 6.4)

The following should be provided for in the design of storage facilities for radioactive waste for normal operations:

(a) Containment of the stored materials;
(b) Prevention of criticality (when storing fissile materials);
(c) Radiation protection (shielding and contamination control);
(d) Removal of heat (if applicable);
(e) Ventilation, as necessary;
(f) Inspection and/or monitoring of the waste packages, as necessary;
(g) Maintenance and repair of waste packages;
(h) Retrieval of the waste, whether for processing, repackaging or disposal;
(i) Inspection of waste packages and of the storage facility;
(j) Future expansion of the storage capacity, as appropriate;
(k) Transport of waste inside the storage facility to improve the flexibility of operations;

(l) Decommissioning. (WS-G-6.1, para 6.23)

The operating organization shall identify postulated initiating events that could lead to a release of radiation and/or significant amounts of radioactive material and associated chemical substances [...] (NS-R-5, para 6.8)

A design basis accident approach, or an equivalent methodology, shall be used to identify significant accident sequences. For each accident sequence identified, the safety functions, the corresponding SSCs important to safety and the administrative safety requirements that are used to implement the defence in depth concept shall be identified. (NS-R-5, para 6.9)

S-20:

The design of the storage facility shall take into account the expected operational lifetime of the facility to ensure that the safety conditions, the operational limits and conditions identified in the safety case will be met.

*Related **IAEA** safety standards:*

Predisposal radioactive waste management facilities shall be located and designed so as to ensure safety for the expected operating lifetime under both normal and possible accident conditions, and for their decommissioning. (GSR Part 5, Requirement 17)

S-21:

The design of the storage facility shall incorporate passive safety features as far as reasonably practicable.

*Related **IAEA** safety standards:*

[…]Due account shall be taken of the expected period of storage, and, to the extent possible, passive safety features shall be applied. For long term storage in particular, measures shall be taken to prevent degradation of the waste containment. (GSR Part 5, Requirement 11)

S-22:

The licensee shall demonstrate that design and construction of the facility are based on applicable standards and appropriate materials especially taking into account the expected lifetime of the facility.

*Related **IAEA** safety standards:*

The storage system, particularly the storage cask, should be constructed of suitable materials, using appropriate design codes and standards and construction methods, to maintain shielding and containment functions under the storage and loading/unloading conditions expected during its design lifetime unless adequate maintenance and/or replacement methods during operation can be demonstrated. […] (DS 371, Appendix I.54)

The need for and the extent of commissioning activities and tests will vary depending on the size, complexity and contents of the storage facility. Commissioning involves a logical progression of tasks and tests to demonstrate the correct functioning of specific equipment and features incorporated into the

design of the storage facility to provide for safe storage. The adequacy of the facility's design […] should be demonstrated and confirmed. (WS-G-6.1, para 4.17)

S-23:

The radioactive waste and spent fuel storage facility shall be designed on the basis of assumed conditions for its normal operations and assumed incidents or accidents. The design basis shall be clearly and systematically defined and documented.

*Related **IAEA** safety standards:*

Predisposal radioactive waste management facilities shall be located and designed so as to ensure safety for the expected operating lifetime under both normal and possible accident conditions, and for their decommissioning. (GSR Part 5, Requirement 17)

S-24:

The licensee shall identify and classify structures, systems and components important to safety (SSCs), applying a graded approach.

*Related **IAEA** safety standards:*

The safety functions, and structures, systems and components important to safety (SSCs) shall be identified in the safety analysis report to the extent appropriate and in accordance with a graded approach. The SSCs provide barriers for the prevention of the occurrences of postulated initiating events (PIEs), the control and limitation of accident sequences and mitigation of the consequences (NS-R-5; para 2.12).

S-25:

The licensee shall address the ageing of SSCs and safety features of facilities for the storage of spent fuel and waste by establishing, if necessary, provisions for their maintenance, testing and inspection. Results derived from this program shall be used to review the adequacy of the design at appropriate intervals.[2]

*Related **IAEA** safety standards:*

In the design stage, design safety margins shall be adopted so as to accommodate the anticipated properties of materials at the end of their useful life. This is particularly important for fuel cycle facilities because of the range and characteristics of chemical and radiation conditions experienced in operational states and in accident conditions. Where details of the characteristics of materials are unavailable, a suitable material surveillance programme shall be implemented by the operating organization. Results derived from this programme shall be used to review the adequacy of the design at appropriate intervals. This may require provisions in the design for the monitoring of materials whose mechanical properties may change in service owing to factors such as fatigue (e.g. from cyclic mechanical or thermal loadings), stress corrosion, erosion, chemical corrosion or the induction of changes by irradiation. (NS-R-5, para 6.17)

[2] This may require design provisions to monitor materials whose mechanical properties may change in service owing to such factors as fatigue (cyclic mechanical or thermal loadings), stress corrosion, erosion, chemical corrosion or radiation induced changes.)

Before the start of operations, the operator should prepare a programme of periodic maintenance, testing and inspection of systems that are essential to safe operation. The need for maintenance, testing and inspection should be addressed from the design stage. […] Systems and components that should be considered for periodic maintenance, testing and inspection may include:

(a) Waste containment systems, including tanks and other containers;
(b) Waste handling systems, including pumps and valves;
(c) Heating and/or cooling systems;
(d) Radiation monitoring systems;
(e) Calibration of instruments;
(f) Ventilation systems;
(g) Normal and standby systems for electrical power supply;
(h) Utilities and auxiliary systems such as systems for water, gas and compressed air;
(i) The system for physical protection;
(j) Building structures and radiation shielding;
(k) Fire protection systems. (WS-G-6.1, para 6.79)

The operation of a spent fuel storage facility should include an appropriate programme of maintenance, inspection and testing of items important to safety, i.e. structures, systems and components. Safe access to all structures, systems, areas and components requiring periodic maintenance, inspection and testing should be provided. Such access should be sufficient for the safe operation of all required tools and equipment and for the installation of spares. (DS 371, para 6.108)

S-26:
The licensee shall establish operational limits and conditions (OLCs) in order to maintain the storage facility and waste and spent fuel packages or unpackaged spent fuel elements in a safe state during facility operation.

*Related **IAEA** safety standards:*

[…] All operations and activities important to safety have to be subject to documented limits, conditions and controls, and have to be carried out by trained, qualified and competent personnel.

(GSR Part 5, para 5.19)

The OLCs are the set of rules that establish parameter limits, the functional capability and the performance levels of equipment and personnel for the safe operation of a facility. (NS-R-5, para 2.13)

Operational limits and conditions shall be prepared before operation of the facility commences. (NS-R-5, para 9.21)

S-27:
The defined OLCs (see S-26) shall consider, in particular, and as appropriate:

- environmental conditions within the store (e. g. temperature, humidity, contaminants, …);
- the effects of heat generation from waste or spent fuel, covering both each individual waste and spent fuel packages or unpackaged spent fuel elements as well as the whole store;

- potential aspects of gas generation from waste or spent fuel, in particular the hazards of fire ignition, explosion, waste and spent fuel package or unpackaged spent fuel element deformations and radiation protection aspects;
- criticality prevention, covering both each individual waste and spent fuel packages or unpackaged spent fuel elements as well as the whole store (including operational occurrences and accidental conditions);
- suitability for handling and retrieval.

*Related **IAEA** safety standards:*

Operational limits and conditions for a spent fuel storage facility should be developed on the basis of the following:

(a) Design specifications and operating parameters and the results of commissioning tests;
(b) The sensitivity of items important to safety and the consequences of events following the failure of items, the occurrence of specific events or variations in operating parameters;
(c) The accuracy and calibration of instrumentation equipment for measuring safety related operating parameters; […] (DS 371, para 6.102)

Operational limits and conditions form an important part of the basis on which operation is authorized and as such should be incorporated into the technical and administrative arrangements that are binding on the operating organization and operating personnel. Operational limits and conditions for spent fuel storage facilities, which result from the need to meet legal and regulatory requirements, should be developed by the operating organization and subject to approval by the regulatory body as part of the licence conditions. [….] (DS 371, para 6.103)

While all operations can be directly or indirectly related to some aspect of safety, the aim of operational limits and conditions should be to manage and control the basic safety hazard in the facility and they should be directed toward:

(a) Preventing situations which might lead to unplanned exposure of people (workers and the public) to radiation; and
(b) Mitigating the consequences of such events should they occur. (DS 371, para 6.104)

Gas generation by radiolysis or chemical reaction may be associated with the storage of radioactive waste. The concentration of gases in air shall be kept below hazardous levels to avoid, for example, explosive gas/air mixtures. (WS-R-2 5.26)

If necessitated by the nature of the radioactive waste, dissipation of heat from the waste shall be ensured and criticality shall be prevented. (WS-R-2; para 5.28)

S-28:

The design of the facility shall take into account all relevant postulated initiating events (PIEs), depending on the storage characteristics. A list of potential PIE is provided in the appendix.

*Related **IAEA** safety standards:*

The operating organization shall identify postulated initiating events that could lead to a release of radiation and/or significant amounts of radioactive material and associated chemical substances. [...]

The set of postulated initiating events shall include both internally and externally initiated events (NS-R-5, para 6.8).

The postulated initiating events that may influence the design of the spent fuel storage facility and the integrity and safety of the spent fuel should be identified […]. (DS 371, para 5.19)

In addition to radiological hazards, external hazards (e.g. fire or explosion), which may contribute to radiologically significant consequences, should also be considered in the design of storage facilities for radioactive waste. (WS-G-6.1, para 6.25)

S-29:

The criticality safety shall be achieved by design as far as practicable. If burnup credit is adopted, compliance with the limiting burnup level shall be verified by administrative and operational controls.

*Related **IAEA** safety standards:*

As far as reasonably practicable, criticality hazard shall be controlled by means of design. (NS-R-5, para 6.43)

Approval to consider burnup credit in the safety assessment should be granted only if based on design engineered safety features and operational controls. Operational controls provide defence in depth and contribute to maintaining subcritical conditions. The minimum required burnup value should be verified by independent measurement. (DS 371, Appendix II, para II.8)

S-30:

The licensee shall make design arrangements for fire safety on the basis of a fire safety analysis and implementation of defence in depth (prevention, detection, control and mitigation of a fire).

*Related **IAEA** safety standards:*

The operating organization shall make design provisions for fire safety on the basis of a fire safety analysis and the implementation of the concept of defence in depth (i.e. for prevention, detection, control and mitigation). (NS-R-5, para 6.55).

2.2.2 Safety issue: Handling and retrieval requirements

S-31:

The handling equipment shall be designed particularly to take account of radiation protection aspects, ease of maintenance and minimization of the probability and consequences of associated incidents and accidents.

*Related **IAEA** safety standards:*

Handling equipment should be designed to minimize the probability and consequence of incidents and accidents, and to minimize the potential for damaging spent fuel, spent fuel assemblies, and storage or transport casks. […] (DS 371, para 6.49)

Waste handling equipment should be designed to include provision for the following:

(a) Safe operation under all anticipated conditions;
(b) Avoiding damage to the waste package;
(c) Safe handling of defective or damaged waste packages;
(d) Minimizing contamination of the equipment itself;
(e) Avoiding the spread of contamination. (WS-G-6.1, para 6.32)

S-32:

The storage facility shall be designed in such a way that any waste or spent fuel package or unpackaged spent fuel can be retrieved within an appropriate time, at the end of the facility operation or in order to intervene in the event of unexpected faults.

*Related **IAEA** safety standards:*

Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management. […] (GSR Part 5, Requirement 11)

S-33:

The storage facility shall be designed so that waste and spent fuel packages or unpackaged spent fuel elements can be inspected to verify their continued integrity.

*Related **IAEA** safety standards:*

Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management. […] (GSR Part 5, Requirement 11)

Provision has to be made for the regular monitoring, inspection and maintenance of the waste and of the storage facility to ensure their continued integrity. […] (GSR Part 5 para 4.22)

2.2.3 Safety issue: Storage capacity

S-34:

The licensee shall ensure that reserve storage capacity is included in the design or is otherwise available to allow for inspection, retrieval, maintenance or remedial work.

*Related **IAEA** safety standards:*

Design aspects associated with the layout of a spent fuel storage facility are set out in the following: [...] (g) Space should be provided to permit the inspection of spent fuel and inspection and maintenance of components, including spent fuel handling equipment; [...] (DS 371, para 6.47)

The facility should have a reserve storage capacity, which should be included in the design or should be otherwise available, e.g. to allow for reshuffling of spent fuel casks or unpackaged spent fuel elements for inspection, retrieval or maintenance work. The reserve capacity should be such that the largest type of storage cask can be unloaded or, in the case of a modular storage facility, that at least one module can be unloaded. (DS 371, para 6.15)

There should be reserve storage capacity available to accommodate waste arising in various situations. Such situations may include abnormal conditions (e.g. the need to empty a leaking tank) or periods when modifications or refurbishments are being undertaken. (WS-G-6.1, para 6.58)

2.3 Safety Area: Operation

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2.3.1 Safety issue: Conduct of Operation

S-35:

The storage facility shall be operated so that in accordance with the inspection program as defined in S-48 waste and spent fuel packages or unpackaged spent fuel elements can be inspected.

*Related **IAEA** safety standards:*

Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management. […] (GSR Part 5, Requirement 11)

S-36:

The licensee shall ensure that the reserve storage capacity will stay available for retrieved waste and spent fuel packages or unpackaged spent fuel elements.

*Related **IAEA** safety standards:*

The facility should have a reserve storage capacity, which should be included in the design or should be otherwise available, e.g. to allow for reshuffling of spent fuel casks or unpackaged spent fuel elements for inspection, retrieval or maintenance work. The reserve capacity should be such that the largest type of storage cask can be unloaded or, in the case of a modular storage facility, that at least one module can be unloaded. (DS 371, para 6.15)

There should be reserve storage capacity available to accommodate waste arising in various situations. Such situations may include abnormal conditions (e.g. the need to empty a leaking tank) or periods when modifications or refurbishments are being undertaken. (WS-G-6.1, para 6.58)

2.3.2 Safety issue: Emergency Preparedness

If for the set of design basis accidents as consequence from the safety case events requiring protective measures cannot be excluded, planned emergency arrangements will be required. These emergency plans should be proportionate taking account of the magnitude of the accident consequence. For some facilities (such as with low radioactive inventory) an off-site emergency plan may not be required, which must be justified and the off-site aspects of this safety issue will not apply.

S-37:

Based upon an assessment of reasonably foreseeable events and situations that may require protective measures the licensee shall provide arrangements for responding effectively to events requiring protective measures at the scene for:

(a) regaining control of any emergency arising at the site, including events related to combinations of non-nuclear and nuclear hazards;
(b) preventing or mitigating the consequences at the scene of any such emergency and
(c) co-operating with external emergency response organizations in preventing adverse health effects in workers and the public.

*Related **IAEA** safety standards:*

Arrangements must be made for emergency preparedness and response for nuclear or radiation incidents. (SF-1, Principle 9)

The primary goals of preparedness and response for a nuclear or radiation emergency are:

- *To ensure that arrangements are in place for an effective response at the scene and, as appropriate, at the local, regional, national and international levels, to a nuclear or radiation emergency;*
- *To ensure that, for reasonably foreseeable incidents, radiation risks would be minor;*
- *For any incidents that do occur, to take practical measures to mitigate any consequences for human life and health and the environment. (SF-1; para 3.34)*

Emergency preparedness and response arrangements commensurate with the threat category of the facility, […], should be developed and implemented. (WS-G-6.1, para 5.14)

The operator should draw up emergency plans based on the potential radiological impacts or accidents and be prepared to respond to accidents at all times as indicated in the emergency plans. (DS 371, para 3.28)

The potential radiological impacts of accidents should be assessed by the operating organization and reviewed by the regulatory body [21]. Provision should be made to ensure that there is an effective capability to respond to accidents. Considerations should include the development of scenarios of anticipated sequences of events (see Section 5) and the establishment of emergency procedures and emergency plan to deal with each of the scenarios, including checklists and lists of persons and organizations to be alerted. (DS 371, para 6.73)

S-38:

The licensee shall

- prepare an on-site emergency plan as basis for preparation and conduct of emergency measures (An example for the contents of such emergency plan is given in app. 2),
- establish the necessary organizational structure for clear allocation of responsibilities, authorities and arrangements for coordinating facility activities and cooperating with external response agencies throughout all phases of an emergency and

- ensure, that based on the on-site emergency plan trained and qualified personnel, facilities and equipment need to control an emergency are appropriate, reliable and available at the time.

*Related **IAEA** safety standards:*

The operating organization, taking into account the potential hazards of the facility, shall develop an emergency plan in coordination with other bodies having responsibilities in an emergency, including public authorities; shall establish the necessary organizational structure; and shall assign responsibilities for managing emergency response. (NS-R-5; para 9.62).

Emergency response procedures should be documented, made available to the personnel concerned and kept up to date. Exercises should be held periodically to test the emergency response plan and the degree of preparedness of the personnel. Inspections should be performed regularly to ascertain whether the equipment and other resources needed in the event of an emergency are available and in working order. (DS 371, para 6.74)

In addition to providing operating procedures and contingency procedures as described above, the operating organization should also develop an emergency plan […] (DS 371, para 6.99)

The appropriate responsible authorities shall ensure that:

(a) emergency plans [are] prepared and approved for any practice or source which could give rise to a need for emergency intervention;
(b) [response organizations are] involved in the preparation of emergency plans, as appropriate;
(c) the content, features and extent of emergency plans take into account the results of any [threat assessment] and any lessons learned from operating experience and from [emergencies] that have occurred with sources of a similar type […];
(d) emergency plans [are] periodically reviewed and updated." […] (GS-R-2, para 5.17)

Adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation (such as procedures, checklists, telephone numbers and manuals) shall be provided for performing the functions specified in Section 478. These items and facilities shall be selected or designed to be operational under the postulated conditions (such as the radiological, working and environmental conditions) that may be encountered in the emergency response, and to be compatible with other procedures and equipment for the response (such as the communication frequencies of other response organizations), as appropriate. These support items shall be located or provided in a manner that allows their effective use under postulated emergency conditions (GS-R-2, para 5.25)

The operator and the response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the functions specified […]. The operator and the response organizations shall make arrangements for the selection of personnel and for training to ensure that the personnel have the requisite knowledge, skills, abilities, equipment, and procedures and other arrangements to perform their assigned response functions. The arrangements shall include ongoing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training. (GS-R-2, para 5.31)

S-39:

The on-site emergency plan shall be submitted to the regulatory body. At regular intervals there shall be emergency exercises, some of which shall be witnessed by the regulatory body.

Some of these exercises shall be integrated and shall include the participation of all organizations concerned. The plan shall be subject to review and updating in light of the experience gained.

*Related **IAEA** safety standards:*

In developing the emergency response arrangements, consideration has to be given to all reasonably foreseeable events. Emergency plans have to be exercised periodically to ensure the preparedness of the organizations having responsibilities in emergency response. (SF-1; para 3.37)

The emergency plan shall be approved by the regulatory body as appropriate and shall be tested in an exercise before radioactive material is introduced into the facility. There shall thereafter be exercises of the emergency plan at suitable intervals, some of which shall be observed by the regulatory body. Some of these exercises shall be integrated with local, regional and national response organizations, as appropriate, and shall involve the participation of as many as possible of the organizations concerned. The plans shall be subject to review and to updating in the light of the experience gained. (NS-R-5; para 9.66)

2.3.3 Safety issue: Operational Experience Feedback

S-40:

The licensee shall establish and conduct an Operating Experience Feedback (OEF) program to collect, screen, analyze and document safety relevant operating experience and events at the facility in a systematic way. Relevant operational experience and events reported by other facilities shall also be considered as appropriate.

*Related **IAEA** safety standards:*

Despite all measures taken, accidents may occur. The precursors to accidents have to be identified and analysed, and measures have to be taken to prevent the recurrence of accidents. The feedback of operating experience from facilities and activities - and, where relevant, from elsewhere - is a key means of enhancing safety. Processes must be put in place for the feedback and analysis of operating experience, including initiating events, accident precursors, near misses, accidents and unauthorized acts, so that lessons may be learned, shared and acted upon. (SF-1; para 3.17)

Adequate arrangements should be made for the review and approval of operating procedures, the systematic evaluation of operating experience, including that of other facilities, and the taking of corrective actions in a timely and appropriate manner to prevent and counteract developments adverse to safety. Provision should be made for controlling the distribution of operating procedures, in order to guarantee that operating personnel have access to only the latest approved edition. (DS 371, para 6.91)

In the generation and storage of waste, as well as subsequent management steps, a safety culture should be fostered and maintained to encourage a questioning and learning attitude to protection and safety and to discourage complacency. (WS-G-6.1, para 2.6)

S-41:

The licensee shall ensure that results are obtained, that conclusions are drawn, measures are

taken, good practices are considered and that timely and appropriate corrective actions are implemented to prevent recurrence and to counteract developments adverse to safety.

*Related **IAEA** safety standards:*

All organizations involved in the process of operational experience feedback should screen information on events, taking into account their own needs. Operating organizations should have the objective of enhancing safety, plant availability and commercial performance by identifying the causes of events so as to be able to avoid their recurrence, and by evaluating the applicability of good practices used by others. [...] (NS-G-2.11, para 3.3)

Operating experience and events at the facility and reported by similar facilities should be collected, screened and analysed in a systematic way. Conclusions should be drawn and implemented by means of an appropriate feedback procedure [….]. (DS 371, para 6.100, see also para 6.91)

2.3.4 Safety issue: Operation facility modification

S-42:

Modifications of design, equipment, storage conditions, waste or spent fuel characteristics, control or management, especially changes of SSCs, OLCs or operational procedures in a spent fuel or radioactive storage shall be subject to planning, assessment, review and authorization processes commensurate to the importance to safety of the modification. These processes shall ensure that the modifications will not impact adversely the safety of the facility or associated facilities or the further management of spent fuel or waste.

*Related **IAEA** safety standards:*

The operating organization shall establish a process whereby its proposals for changes in design, equipment, feed material characteristics, control or management are subject to a degree of assessment and scrutiny appropriate to the safety significance of the change, so that the direct and wider consequences of the modification are adequately assessed. The process shall include a review of possible consequences to ensure that a foreseen modification or change in one facility will not adversely affect the operability or safety of associated or adjacent facilities (NS-R-5; para 9.35)

S-43:

Before introducing a modification according to S-42, personnel shall, as appropriate, have been trained according to the new operating procedures and all relevant documents necessary for facility operation shall have been updated.

*Related **IAEA** safety standards:*

[…] Provisions should be made for implementing a controlled distribution of operational procedures, in order to guarantee that operating personnel have only the last approved edition. (DS 371, para 6.91)

In accordance with the management system, arrangements should be in place for the review and approval of operating procedures and for the communication to operating personnel of any revisions. Periodic reviews should be undertaken to take account of operational experience. Any revisions should

be adopted only after they have been reviewed to ensure compliance with operational limits and conditions, approved by authorized persons and documented. (WS-G-6.1, Para 6.75)

The operating organization should ensure that the appropriate revisions to plant procedures, personnel training and plant simulators necessitated by the modifications are implemented in a complete, correct and timely manner as part of the implementation process.(NS-G-2.3 para 3.9)

2.3.5 Safety issue: Maintenance, periodic testing and inspection

S-44:

A maintenance, periodic testing and inspection program shall be conducted according to written procedures in order to ensure that SSCs are able to function in accordance with the design intents and safety requirements.

*Related **IAEA** safety standards:*

Maintenance, calibration, periodic testing and inspection shall be performed to ensure that SSCs are able to function in accordance with the design intent and with safety requirements. In this context, the term maintenance includes both preventive and corrective actions. Maintenance, calibration and periodic testing shall also be carried out on the equipment necessary for implementation of the on-site emergency plan (NS-R-5; para 9.28).

S-45:

The extent of the program for maintenance, periodic testing or inspection of SSCs shall be in accordance with the facility safety case.

*Related **IAEA** safety standards:*

The frequency for maintenance, calibration, periodic testing and inspection of SSCs shall be in accordance with the facility licensing documentation. (NS-R-5; para 9.30).

S-46:

The result of maintenance, periodic testing and inspection shall be recorded and assessed.

*Related **IAEA** safety standards:*

The results of maintenance, testing and inspection shall be recorded and assessed (NS-R-5; para 9.32).

S-47:

The maintenance, periodic testing and inspection programs shall be reviewed at regular intervals to incorporate the lessons learned from experience.

*Related **IAEA** safety standards:*

The maintenance, calibration, periodic testing and inspection programmes shall be reviewed at regular intervals to incorporate the lessons learned from experience (NS-R-5; para 9.33).

S-48:

The licensee shall develop an inspection program for the verification of the continuing compliance of waste and spent fuel packages or unpackaged spent fuel stored with the limits specified in the safety case to ensure continued functionality of safety features on which safety case is based. This program shall address:

- the required environmental conditions within the storage facility,
- the state of waste and spent fuel packages or unpackaged spent fuel elements.

*Related **IAEA** safety standards:*

[…] Safety related operating instructions shall be prepared before operations commence. Operating instructions shall clearly describe the methods of operating, including all checks, tests, calibrations and inspections necessary to ensure compliance with the operational limits and conditions […]. (NS-R-5, para 9.22)

The integrity of stored spent fuel should be monitored in the operation of a spent fuel storage facility. [….] (DS 371, para 6.101)

2.3.6 Safety issue: Specific contingency plans

S-49:

The licensee's procedures for the receipt of waste and spent fuel packages or unpackaged spent fuel elements shall contain provisions to deal safely with those that fail to meet the acceptance criteria, e. g. returning to the owner, taking remedial actions.

*Related **IAEA** safety standards:*

Acceptance criteria should be developed for the spent fuel storage facility and the spent fuel, taking into account all relevant operational limits and conditions and the future reprocessing or disposal requirements, including retrieval. Before spent fuel is transferred to the storage facility, acceptance must be given by the operator and the respective legal authority. Contingency plans should be available on how to deal safely with spent fuel that does not comply with acceptance criteria. (DS 371, para 6.118)

The operators' procedures for the reception of waste have to contain provisions for safely managing waste that fails to meet the acceptance criteria; for example, by taking remedial actions or by returning the waste.(GSR Part 5, para 4.26)

S-50:

The licensee shall have plans and establish appropriate contingency arrangements for waste and spent fuel packages or unpackaged spent fuel elements that are not retrievable by normal means or show signs of degradation.

*Related **IAEA** safety standards:*

Spent fuel assemblies that have become damaged as a result of mechanical events, should be kept separate from intact fuel and provided with appropriate monitoring to detect any outer containment

failure. Consideration should be given to contingency arrangements on how to deal with spent fuel that is not retrievable by normal means or that cannot be transported easily. (DS 371, para 6.131)

Procedures should be developed for the safe operation of a large waste storage facility. The extent and the degree of detail of specific procedures should be commensurate with the safety significance of the particular subject of the procedures and should cover, where applicable: [...]

(i) Contingency and emergency arrangements; [...] (WS-G-6.1, para 6.3)

2.3.7 Safety issue: Requirements for acceptance of waste and spent fuel packages and unpackaged spent fuel elements

S-51:

The owner and/or the licensee is responsible for ensuring that the waste and spent fuel packages and unpackaged spent fuel elements fulfil all relevant requirements such as:

- compatibility with handling, transport and storage requirements, including suitability for retrieval and transport after the anticipated storage period;
- known or likely requirements for subsequent disposal or other management aspects included in the owner's waste and spent fuel management strategy, such as the need for further treatment or conditioning of the waste or spent fuel.

*Related **IAEA** safety standards:*

[…]It is necessary that those persons responsible for a particular step in the predisposal management of radioactive waste, or for an operation in which waste is generated, adequately recognize these interactions and relationships so that the safety and the effectiveness of the predisposal management of radioactive waste may be considered in an integrated manner. This includes taking into account the identification of waste streams, the characterization of waste, and the implications of transporting and disposing of waste. There are two issues in particular to be addressed: compatibility (i.e. taking actions that facilitate other steps and avoiding taking decisions in one step that detrimentally affect the options available in another step) and optimization (i.e. assessing the overall options for waste management with all the interdependences taken into account). […] (GSR Part 5, para 3.22)

S-52:

The licensee shall establish acceptance criteria for its storage facility.

*Related **IAEA** safety standards:*

Waste packages and unpackaged waste that are accepted for processing, storage and/or disposal shall conform to criteria that are consistent with the safety case. (GSR Part 5, Requirement 12)

The responsibilities of the operator of a large storage facility for radioactive waste would typically include: [...]

(d) Developing and applying acceptance criteria for the storage of radioactive waste; [...] (WS-G-6.1, para 3.12)

The responsibilities of the operating organization of a spent fuel storage facility would typically include: [...]

(d) Developing and applying acceptance criteria for the storage of spent fuel as approved by the regulatory body; [...] (DS 371, para 3.17)

S-53:

These acceptance criteria shall take into account storage conditions and shall ensure compatibility with the safety case of the storage facility, and shall ensure suitability for handling and retrieval.

*Related **IAEA** safety standards:*

Waste acceptance criteria have to be developed that specify the radiological, mechanical, physical, chemical and biological characteristics of waste packages and unpackaged waste that are to be processed, stored or disposed of; for example, their radionuclide content or activity limits, their heat output and the properties of the waste form and packaging. (GSR Part 5, para 4.24)

Waste acceptance criteria should be developed for the storage facility, with account taken of all relevant operational limits and future requirements for disposal, if the latter are known. (WS-G-6.1, para 6.6)

Acceptance criteria should be developed for the spent fuel storage facility and the spent fuel, with account taken of all relevant operational limits and conditions and future demands for reprocessing or disposal, including retrieval of the spent fuel. (DS 371, para 6.1118)

S-54:

The licensee shall make sure that appropriate processes are set up and implemented, involving auditing, inspection and testing, to ensure that waste and spent fuel packages or unpackaged spent fuel elements meet the acceptance criteria for storage.

*Related **IAEA** safety standards:*

Upon receipt, waste packages should be checked for leakage and surface contamination and to ensure that they are consistent with the documentation. Waste characterization, process control and process monitoring should be applied within a formal management system. (WS-G-6.1 para 6.9)

Upon receipt, spent fuel casks should be checked for gamma and neutron radiation levels, leakage, surface contamination and to ensure that they are consistent with the documentation. Characterization of the spent fuel including process control and process monitoring, should be applied within a formal management system. (DS 371, para 6.120)

2.4
Safety area: Safety verification

–

2.4.1 Safety issue: Contents and updating of the safety case

S-55:
The licensee shall provide a safety case and use it as a basis for continuous support of safe operation throughout the lifetime of a facility.

*Related **IAEA** safety standards:*

The operator shall prepare a safety case and a supporting safety assessment. In the case of a step by step development, or in the event of modification of the facility or activity, the safety case and its supporting safety assessment shall be reviewed and updated as necessary. (GSR Part 5, Requirement 13)

S-56:
The licensee shall use the safety case also as a basis for assessing the safety implications of changes to the facility or to operating practices.

*Related **IAEA** safety standards:*

[…] in the event of modification of the facility or activity, the safety case and its supporting safety assessment shall be reviewed and updated as necessary. (GSR Part 5, Requirement 13)

S-57:
The safety case shall cover both the facility itself and the waste and spent fuel packages or unpackaged spent fuel elements and their respective safety-relevant features. The safety case shall include a description of how all the safety aspects of the site, the design, construction and operation, as well as provisions for decommissioning of the facility, and the managerial controls satisfy the regulatory requirements (for a typical list of contents see Annex 3).

*Related **IAEA** safety standards:*

The safety case for a predisposal radioactive waste management facility shall include a description of how all the safety aspects of the site, the design, operation, shutdown and decommissioning of the facility and the managerial controls satisfy the regulatory requirements. The safety case and its supporting safety assessment shall demonstrate the level of protection provided and shall provide assurance to the regulatory body that safety requirements will be met. (GSR Part 5, Requirement 14)

S-58:
The licensee shall update the safety case to reflect

- modifications and new regulatory requirements and relevant standards;

- results of the periodic safety review;
- results from analysis of incidents

as soon as practicable and in accordance with safety relevance of the modification after the new information is available and applicable.

*Related **IAEA** safety standards:*

The operator shall carry out periodic safety reviews and shall implement any safety upgrades required by the regulatory body following this review. The results of the periodic safety review shall be reflected in the updated version of the safety case for the facility. (GSR part 5 Requirement 16, also Requirement 13, see S-55)

The licensing documentation shall be maintained and updated during the operational lifetime of the facility on the basis of the experience and knowledge gained and in accordance with the regulatory requirements, with account taken of modifications to the facility (NS-R-5; para 2.15).

The safety case and supporting safety assessments including their implementing management systems should be periodically reviewed in accordance with regulatory requirements. The review of management systems should include aspects of safety culture. In addition, they should be reviewed and updated:

(a) When there is any significant change to the installation or radionuclide inventory that affects safety;
(b) When changes occur in the site characteristics that may impact on the storage facility, e.g. industrial development, nearby population;
(c) When significant changes in knowledge and understanding occur (such as from research data or operational experience feedback);
(d) When there is an emerging safety issue due to a regulatory concern or an incident; and
(e) Periodically at predefined periods as specified by the regulatory body. Some Member States specify not less than once in ten years.

Safety should be reassessed in the case of significant, unexpected deviations in the storage conditions, e.g. if safety relevant spent fuel properties change and begin to deviate from those taken as a basis in the safety assessment. (DS 371, para 5.27)

2.4.2 Safety issue: Periodic safety review

S-59:

The licensee shall carry out at regular intervals a review of the safety of the facility (PSR). The review shall be made periodically, at a frequency which shall be established by the national regulatory framework (e. g. every ten years).

*Related **IAEA** safety standards:*

The process of safety assessment for facilities and activities is repeated in whole or in part as necessary later in the conduct of operations in order to take into account changed circumstances (such as the application of new standards or scientific and technological developments), the feedback of operating experience, modifications and the effects of ageing. For operations that continue over long periods of time, assessments are reviewed and repeated as necessary. Continuation of such operations is subject

to these reassessments demonstrating to the satisfaction of the regulatory body that the safety measures remain adequate. (SF-1; para 3.16)

The safety assessment and the management systems within which it is conducted have to be periodically reviewed at predefined intervals in accordance with regulatory requirements. […] (GSR Part 5 para 5.12)

S-60:

The scope and methodology of the PSR shall be clearly defined and justified. The PSR shall confirm the compliance with the licensing requirements. It shall also identify and evaluate the safety significance of differences from applicable current safety standards and good practices and take into account the cumulative effects of changes to procedures, modifications to the facility and the operating organization, technical developments, operational experience accumulated and ageing of SSCs. It shall include consideration of the acceptance criteria for waste and spent fuel packages and unpackaged spent fuel elements and any deviation from these criteria during storage.

*Related **IAEA** safety standards:*

See also S-59

In accordance with the national regulatory requirements, the operating organization shall carry out periodic safety reviews to confirm that the licensing documentation remains valid and that modifications made to the facility, as well as changes in its operating arrangements or utilization have been accurately reflected in the licensing documentation. In conducting these reviews, the operating organization shall expressly consider the cumulative effects of changes to procedures, modifications to the facility and the operating organization, technical developments, operating experience and ageing. (NS-R-5; para 4.26)

S-61:

The results of the PSR shall be documented. All reasonably practicable improvement measures shall be subject to an action plan.

*Related **IAEA** safety standards:*

Protection must be optimized to provide the highest level of safety that can reasonably be achieved. (SF-1; Principle 5)

Central to the management and verification of safety is the ability of an organization to establish effective review and improvement as an ongoing process. To establish this process, the operating organization shall periodically conduct a review of the facility's operational and safety performance to identify, investigate and correct adverse trends that may have an impact on safety. Such a process shall also cover safety culture, and the improvement of attitudes and the operating environment for safe operation. (NS-R-5 para 9.70)

The results of the reviews and the PSR reports should be recorded in a systematic and auditable manner. (DS 426, para 8.10)

Appendix 1
Postulated Initiating Events

–

External postulated events

Natural phenomena

- Extreme weather conditions (precipitation: rain, snow, ice, hail, wind, lightning, high or low temperature, humidity);
- flooding
- earthquake
- natural fires
- effect of terrestrial and aquatic flora and fauna (blockage of inlet and outlets, damages on structure)

Human induced phenomena

- fire, explosion or release of corrosive/hazardous substance (from surrounding industrial and military installations or transport infrastructure);
- aircraft crash (accidents);
- missiles due to structural/mechanical failure in surrounding installations;
- flooding (failure of a dam, blockage of a river);
- power supply and potential loss of power;
- civil strife (infrastructure failure, strikes and blockages);

Internal postulated events

- loss of energy and fluids: electrical power supplies, air and pressurised air, vacuum, super heated water and steam, coolant, chemical reagents and ventilation;
- improper use of electricity and chemicals;
- mechanical failure including drop loads, rupture (pressure retaining vessels or pipes), leaks (corrosion), plugging;
- instrumentation and control, human failures;
- internal fires and explosions (gas generation, process hazards);
- flooding, vessel overflows;

*Related **IAEA** safety standards:*

External postulated initiating events

Natural phenomena

- *Extreme weather conditions:*
  Precipitation including rain, hail snow, ice, frazil ice, wind including tornadoes, hurricanes, cyclones, dust or sand storms, lightning, extreme high or low temperature, extreme humidity;
- *Flooding,*
- *Earthquakes and eruption of volcanoes*
- *Natural fires*
- *Effects of terrestrial and aquatic flora and fauna (leading to blockages of inlets and outlets, and damage to structures)*

Human induced phenomena

- *Fires, explosions or releases of corrosive/hazardous substances*
- *(from surrounding industrial and military installations or transport infrastructure)*
- *Aircraft crashes*
- *Missile strikes(arising from structural/mechanical failure in surrounding installations);*
- *Flooding (e. g. failure of a dam, blockage of a river);*
- *Loss of power supply*
- *Civil strife (leading to infrastructure failure, strikes and blockages).*

Internal postulated events

- *Loss of energy and fluids (loss of electrical power supplies, air and compressed air, vacuum, super heated water and steam, coolant, chemical reagents, and ventilation;*
- *Failures in use of electricity or chemicals;*
- *Mechanical failure including drop loads, rupture (pressure retaining vessels or pipes), leaks (due to corrosion), plugging;*
- *Failure of and human error with instrumentation and control systems;*
- *Internal fires and explosions (due to gas generation and, process hazards);*
- *Flooding (e. g. vessel overflows).*

(selected from NS-R-5, Annex 1)

Appendix 2
Contents of the On-Site Emergency Plan

–

The emergency plan of the licensee shall provide for arrangements to address the following:

Emergency preparedness

(1) The requirements for personnel training;
(2) the list of potential accidents, including combinations of nuclear and non-nuclear hazards as necessary. If relevant, the description of possible severe accidents and their consequences;
(3) the conditions and criteria under which an emergency shall be declared, and a description of suitable means for alerting response personnel and the public authorities;
(4) an inventory of the emergency equipment to be kept in readiness at specified locations;

Personal and organizational responsibilities and provisions

(1) The designation of persons who will be responsible for directing on-site activities and for ensuring liaison with off-site organizations;
(2) a list of job titles and/or functions of persons empowered to declare it;
(3) the chain of command and communication, including a description of related facilities and procedures; there shall be a means of informing all persons on the site of the actions to be taken in the event of an emergency;
(4) the actions to be taken by persons and organizations involved in the implementation of the plan;
(5) provisions for declaring the termination of an emergency.;

Assessment of impacts of incidents

(1) The arrangements for assessment of the radiological conditions on and off the site (water, vegetation, soil, air sampling);
(2) assessment of the state of the facility;

Mitigation of adverse consequences

(1) Provisions for minimizing the exposure of persons to ionising radiation and for ensuring medical treatment of casualties;
(2) the actions to be taken on the site to limit the extent of radioactive release and spread of contamination;

*Related **IAEA** safety standards:*

The emergency plan of the operating organization shall include:

(a) The designation of persons who will be responsible for directing on-site activities and for ensuring liaison with off-site organizations;
(b) The requirements for personnel training;
(c) A listing of possible accidents and, if relevant, descriptions of the accidents and their foreseeable consequences;
(d) The conditions under which, and criteria according to which an emergency shall be declared, a list of job titles and/or functions of the persons empowered to declare an emergency, and a description of suitable means for alerting response personnel and public authorities;
(e) The arrangements for assessment of radiological conditions on and off the site (for water, vegetation and soil and by air sampling);
(f) Provisions for minimizing the exposure of persons to radiation and for ensuring the medical treatment of casualties;
(g) Assessment of the state of the facility and the actions to be taken on the site to limit the extent of radioactive releases and the spread of contamination;
(h) The chain of command and communication, including a description of related facilities and procedures;
(i) An inventory of the emergency equipment to be kept in readiness at specified locations;
(j) The actions to be taken by persons and organizations involved in the implementation of the emergency plan;
(k) Provisions for declaring the termination of an emergency. (NS-R-5; para 9.63).

Appendix 3
Typical Contents of a Safety Case

The preparation of a safety case including the supporting safety assessment is a step by step development. The safety case is progressively developed and refined as the storage facility project proceeds. The proposed content of the safety case takes into account the scope of this document (see chapter 01.3) and therefore does not specifically address items such as EIA, physical protection including safeguards, etc.

The detailed structure and format of the safety case depends on the requirements of national regulatory systems and may be different country by country.

The safety case shall as appropriate among others:

- describe the site characteristics, storage facility layout, design basis and safety functions of the facility and contain a list of safety relevant SSCs to demonstrate how safety is achieved throughout the anticipated storage period;

  *Related **IAEA** safety standards:*

  A facility specific safety case and supporting assessment should generally include aspects such as:

  (a) A description of the site and facility (including the maximum expected inventory of spent fuel and its acceptance criteria, the storage facility and its characteristics, structures, systems and components, including the characteristics of items important to the safety of the spent fuel storage facility, in accordance with the requirements of its licence) and a specification of applicable regulations and guidance;
  … (DS 371, para. 5.22)

  The content of a safety case for a facility may vary between Member States but the components of the safety case for a predisposal waste management facility or activity should include:
  ...

  Descriptions of the facilities and the site. These descriptions should be based on traceable information and should identify the features of the facilities and the site. They should be at a level of detail that is sufficient to inform an assessment of the processes and events that might affect the performance of the facilities.

  ... (DS 284, para. 4.4)

- describe handling and storage activities and any other type of operations to be performed in the storage facility;

  *Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:
…

(b) A description of spent fuel handling and storage activities and any other operations at the facility;

(DS 371, para. 5.22)

- describe the expected amount and characteristics of waste or spent fuel packages or unpackaged spent fuel elements to be stored;

*Related **IAEA** safety standards:*

(DS 371, para. 5.22)

The content of a safety case for a facility may vary between Member States but the components of the safety case for a predisposal waste management facility or activity should include:

- *A description of the waste, a discussion of possible the options for management of the waste, and the rationale for the chosen / proposed waste management options. (DS 284, para. 4.4)*

- contain information on and justify the predicted lifetime of the storage facility;

*Related **IAEA** safety standards:*

... Due account shall be taken of the expected period of storage, ... (GSR Part 5, Requirement 11)

The safety case will have to justify the expected lifetime of the facility. The expected lifetime of the facility needs to be sufficient for the activity being undertaken. (DS 284, para. 6.43)

- include assessment of the safety of normal operation and during possible accident conditions in response to postulated initiating events and provide clear evidence of compliance with safety criteria and radiological limits (safety assessment);

*Related **IAEA** safety standards:*

facility specific safety case and supporting assessment should generally include aspects such as:
….

(g) Documentation of safety analyses and the safety assessment for inclusion in the documentation supporting the licensing of the facility;

….
The expected values for subcriticality, heat removal capacity and calculated radiation doses inside and at the boundary of the spent fuel storage facility;(DS 371, para. 5.22)

The content of a safety case for a facility may vary between Member States but the components of the safety case for a predisposal waste management facility or activity should include:
...
A safety assessment that provides assurance to the regulatory body and other interested parties

that operations will be conducted safely and that safety requirements will be met. (DS 284, para. 4.4)

- describe the management system;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:

….
The management system;
…. (DS 371, para. 5.22)

To ensure the safety of predisposal radioactive waste management facilities and the fulfilment of waste acceptance criteria, management systems are to be applied to the siting, design, construction, operation, maintenance, shutdown and decommissioning of such facilities and to all aspects of processing, handling and storage of waste. Features that are important to safe operation, and that are considered in the management system, are to be identified on the basis of the safety case and the assessment of environmental impacts [2, 8, 14]. These activities are required to be supported by means of an effective management system that establishes and maintains a strong safety culture [8, 14]. (GSR Part 5 para. 3.24)

The content of a safety case for a facility may vary between Member States but the components of the safety case for a predisposal waste management facility or activity should include:

…
Descriptions of the managerial ... controls over the facilities.
... (DS 284, para. 4.4)

- describe the provisions for the management and minimization of waste produced during operation of the facility;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:
….

(u) Provisions for the management of radioactive waste and for decommissioning.

. (DS 371, para. 5.22)

- contain descriptions of commissioning programme and assessment of its results including justification of any non-compliances;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:
….

(g) The commissioning programme;

…. (DS 371, para. 5.22)

– define an appropriate program for demonstrating the continuing long term compliance of waste and spent fuel packages or unpackaged spent fuel stored within the acceptance criteria including the environmental conditions within the storage facility;

*Related **IAEA** safety standards:*

... For long term storage in particular, measures shall be taken to prevent the degradation of the waste containment. (GSR Part 5, Requirement 11)

A facility specific safety case and supporting assessment should generally include aspects such as:
….

(k) Monitoring programmes, including a programme for shielding verification, a programme for surveillance of the condition of stored spent fuel and a programme for surveillance of stored spent fuel assemblies, if appropriate;

…. (DS 371, para. 5.22)

Because long-term storage is an interim measure, the safety case should describe the provisions for the regular monitoring ... of the waste and the storage facility to ensure their continued integrity over the anticipated lifetime of the facility. (DS 284, para. 6.56)

– contain operational documentation such as:

- operational limits and conditions for safe operation of the storage facility and their technical bases, and waste and spent fuel packages or unpackaged spent fuel acceptance criteria;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:
….

(f) Establishment of operational limits, conditions and administrative controls based on the safety assessment. If necessary, the design of the spent fuel storage facility should be modified and the safety assessment should be updated. Such controls should include acceptance criteria for spent fuel casks, including canisters containing failed fuel;

….. (DS 371, para. 5.22)

Waste packages and unpackaged waste that are accepted for processing, storage and/or disposal shall conform to criteria that are consistent with the safety case. (GSR Part 5, Requirement 12).

Predisposal radioactive waste management facilities shall be operated in accordance with ... the conditions imposed by the regulatory body. (GSR Part 5, Requirement 19).

- procedures and operational manuals for activities with significant safety implications

  *Related **IAEA** safety standards:*

  A facility specific safety case and supporting assessment should generally include aspects such as:
  …

  (j) Procedures and operational manuals for activities with significant safety implications;

  ….. (DS 371, para. 5.22)

  Operations shall be based on documented procedures. ...(GSR Part 5, Requirement 19).

- the operational inspection, maintenance and testing provisions,

  *Related **IAEA** safety standards:*

  A facility specific safety case and supporting assessment should generally include aspects such as:
  ….

  (g) Organizational control of operations;

  (k) A programme for periodic maintenance, inspection and testing; (DS 371, para. 5.22)

  Waste shall be stored in such a manner that it can be inspected ... (GSR Part 5, Requirement 11)

  ... Due consideration shall be given to the maintenance of the facility to ensure its safe performance. ...
  (GSR Part 5, Requirement 19).

  Because long-term storage is an interim measure, the safety case should describe the provisions for the regular ... inspection and maintenance of the waste and the storage facility to ensure their continued integrity over the anticipated lifetime of the facility. (DS 284, para. 6.56)

- the operational experience feedback programme,

  *Related **IAEA** safety standards*

  A facility specific safety case and supporting assessment should generally include aspects such as:
  ….

  (n) A programme for feedback of operational experience;

  …. (DS 371, para. 5.22)

- the programme for management of ageing;

*Related **IAEA** safety standards*

For storage beyond the original design lifetime, a re-evaluation of the initial design (and of the current design if it is significantly different), operations, maintenance, ageing management, safety assessment and any other aspect of the spent fuel storage facility relating to safety should be performed. […]
(DS 371, para.5.29)

– describe the arrangements for qualification and training of personnel;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:

….

(o) The training programme for staff;

…. (DS 371, para. 5.22)

– describe the emergency preparedness arrangements at least at the level of on-site emergency plan;

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:

- *The emergency preparedness and response plan;*
  …. (DS 371, para. 5.22)
- *Emergency preparedness and response plans, if developed by the operator, are subject to the approval of the regulatory body (GSR Part 5, Requirement 19)*

– include the site strategy for decommissioning and the (initial) decommissioning plan[3];

*Related **IAEA** safety standards:*

A facility specific safety case and supporting assessment should generally include aspects such as:
….

(u) Provisions for the management of radioactive waste and for decommissioning.

(DS 371, para. 5.22)

The operator shall develop, in the design stage, an initial plan for the shutdown and decommissioning of predisposal radioactive waste management facilities and shall periodically update it throughout the operational period. (GSR Part 5, Requirement 20).

[3] Further details on the structure and content of decommissioning plan are covered by WGWD document "Decommissioning Safety Reference Levels Report"

The content of a safety case for a facility may vary between Member States but the components of the safety case for a predisposal waste management facility or activity should include:

- *...*
- *Plans regarding the ... decommissioning of the facilities. ...*
- *... (DS 284, para. 4.4)*

Part 3
Benchmarking, SRL-update and action Plans

Part 3 of the Storage Report provides information on

- the process of benchmarking, i.e. the verification of the application of storage SRLs in WENRA member countries using a systematic appraisal procedure in the working group,
- updating some of the SRLs in light of experience from the benchmarking procedure
- the national action plans (NAPs), working documents to support carrying out corrective actions whenever any deficiencies had been identified in the previous benchmarking process.
- The WENRA approval procedure for such corrective actions.

It has to be highlighted that a first set of 77 storage SRLs (the so called version 1, V.1 SRLs) had been drafted, which was never approved by WENRA-directors. However this set was the basis for the initial benchmarking procedure as described in the following chapters 3.1 and 3.2. Parallel to working on the NAPs and on the basis of experience from the benchmarking procedure WGWD redrafted the storage report. The resulting 61 storage SRLs (referred to as V.2 SRLs) as described in this report have been approved by WENRA directors and are referenced throughout this report except for the previously mentioned chapters 3.1 and 3. The relations between V.1 and V.2 storage SRLs are explained in some detail in chapter3.3.

3.1 Benchmarking of original storage SRLs (V1)

The Benchmarking process compassed two main steps of evaluation. In the first step all participating countries performed a self-assessment of their national regulatory system with regard to the WENRA safety reference levels. In accordance with WENRA's Reactor Harmonization Working Group (RHWG), a code of three degrees for evaluation has been applied:

A – The requirement is covered explicitly by national regulatory system: no action required
B – A difference exists, but can be justified from the safety point of view: no action required
C – A difference exists and should be addressed for harmonization in the national action plan.

For the self-assessment, each country had to perform the rating level by level and to justify the proposed rating by quoting the relevant text sections from the corresponding national regulation in an evaluation table.

In the second step of the benchmarking, the results of the self-assessment were reviewed by other countries. Four sub-groups have been created from the seventeen participating member countries in order to review the rating and justifications within the groups. Each country had to justify its self-assessment to the members of the review group. In the sub-group sessions, the self-assessment of the group members were reviewed in detail and up- or downgraded if appropriate. The group sessions took place during the WGWD meetings, starting at the 18th meeting in Budapest end of May 2007 and formally ending at the 22nd meeting in Brussels in April 2009. So the legal benchmark results reflect the regulatory state of the participating countries at the year 2007.

Due to partially different levels of requirements for spent fuel and low or medium level waste, a separate benchmarking was performed for each of these two categories of storage facilities. The evaluation process outlined here above in shortness is referred to as **legal benchmarking**.

In accordance with the RHWG approach a further step of benchmarking has been added, addressing the implementation of the safety reference levels in existing facilities. This part is referred to as **implementation benchmarking**. For the implementation benchmarking, selected existing facilities underwent the same benchmarking procedure as described above, consisting of self-assessment and review through peer review groups. The objective was to evaluate the degree of compliance with the WENRA SRLs in selected operating storage facilities.

The countries were asked to propose, if possible, facilities which are representative with regard to capacity, safety level and operation time.

3.2 Benchmarking Results

The summary of results presented in the following tables and figures is based on the summary tables, which were prepared by the secretaries of the sub-groups. The tables 1a and 2a give an overview of the legal benchmarking results by country and SRL for spent fuel and radioactive waste respectively. The results of the implementation benchmarking are presented in table 1b and 2b for each country. If several facilities have been subjected to the implementation benchmarking, the results are presented in separate columns for each facility. For the implementation benchmark 20 facilities for spent fuel storage and 24 facilities for radioactive waste storage have been evaluated in total. The rating is represented by the colors green for A, blue for B and red for C. For the implementation benchmark additionally the 'NA' (not applicable) was accepted in cases, where a requirement was not adequate or obsolete, as for example criticality safety measures in a storage facility for low level waste excluding fissile material.

Some SRLs which are subject to revision are marked by brown color.

For the legal benchmarking the 'NA' rating was excluded and in addition the evaluating sub groups were instructed not to make extensive use of the B rating. Only in cases where neither C nor A seemed adequate, a B rating was recommended. In total 8 B ratings were assigned for spent fuel storage and 15 B ratings were assigned for radioactive waste storage. Some examples of B ratings are given in table 3 below.

The total number of ratings is 77, in compliance with the number of SRLs. The number of participating countries is 17, while for the implementation benchmarking 20 facilities for spent fuel storage and 24 facilities for radioactive waste storage have been evaluated.

Finally the figures 1 and 2 of this section provide compilations of the legal benchmarking results with regard to the C ratings. Each column corresponds to one safety issue, which comprises several SRLs. The height of the column represents the number of countries, which have at least one (or more) C ratings for the respective safety issue. As the number of participating countries is 17, one can see from the figures that for the safety issues "Storage facility design" (S-19 to S-34) and "Maintenance, in-service inspection and functional testing" (S-50 to S-58) all countries received at least one C rating for spent fuel storage and radioactive waste storage as well. It emphasized again, that the benchmarking results presented here are reflecting the legal and licensing status as of the year 2007.

Legal Benchmark		V1.1	Countries sorted by V1.1 report order																
Spent Fuel Storage		SRL	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
Safety Management	Respon-sibility	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
	Organi-sational Structure	8																	
		9																	
		10																	
	Quality Manage-ment	11																	
		12																	
		13																	
		14																	
	Record keeping	15																	
		16																	
		17																	
		18																	
Design	Storage Facility Design	19																	
		20																	
		21																	
		22																	
		23																	
		24																	
		25																	
		26																	
		27																	
		28																	
		29																	
		30																	
		31																	
		32																	
		33																	
		34																	
	Handling and Retrieval	35																	
		36																	
		37																	
		38																	
	Storage Cap.	39																	
Operation	Operation	40																	
		41																	
	Emergency Prepared-ness	42																	
		43																	
		44																	
	Operational Expe-rience Feedback	45																	
		46																	
	Operation Facility Modification	47																	
		48																	
		49																	
	Maintenance, In-Service-Inspection and Functional Testing	50																	
		51																	
		52																	
		53																	
		54																	
		55																	
		56																	
		57																	
		58																	
	Specific Contingency Plans	59																	
		60																	
		61																	
	Waste/Spent Fuel Acceptance	62																	
		63																	
		64																	
		65																	
Safety Verification	Contents and Updating of the Safety Case	66																	
		67																	
		68																	
		69																	
		70																	
	Periodic Safety Review	71																	
		72																	
		73																	
		74																	
		75																	
		76																	
		77																	
Sum		A	38	49	58	54	70	62	49	50	61	14	48	48	24	19	51	34	18
		B	1	4	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0
		C	38	24	17	23	7	15	28	27	15	63	29	29	53	58	26	43	59

Table 1a: Legal Benchmark Results for Spent Fuel Storage by Countries

Implem. Benchmark		V1.1	Storage facilities sorted by V1.1 report order																			
Spent Fuel Storage		SRL	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20
Safety Management	Respon-sibility	1																				
		2																				
		3																				
		4																				
		5													NA	NA						
		6																				
		7																				
	Organi-sational Structure	8																				
		9																				
		10																				
	Quality Manage-ment	11																				
		12																				
		13																				
		14																				
	Record keeping	15																				
		16																				
		17																				
		18																				
Design	Storage Facility Design	19																				
		20																				
		21																				
		22																				
		23																				
		24																				
		25																				
		26																				
		27																				
		28												NA								
		29																				
		30												NA								
		31												NA								
		32																				
		33																				
		34																				
	Handling and Retrieval	35																				
		36																				
		37																				
		38												NA								
	Storage Cap.	39																				
Operation	Operation	40																				
		41																				
	Emergency Prepared-ness	42																				
		43																				
		44																				
	Operational Expe-rience Feedback	45																				
		46																				
	Operation Facility Modification	47																				
		48																				
		49																				
	Maintenance, In-Service-Inspection and Functional Testing	50																				
		51																				
		52																				
		53																				
		54																				
		55																				
		56												NA	NA	NA						
		57																				
		58																				
	Specific Contingency Plans	59																				
		60																				
		61																				
	Waste/Spent Fuel Acceptance	62																				
		63																				
		64																				
		65																				
Safety Verification	Contents and Updating of the Safety Case	66																				
		67																				
		68																				
		69																				
		70																				
	Periodic Safety Review	71																				
		72																				
		73																				
		74																				
		75																				
		76																				
		77																				
Sum		A	39	71	68	67	68	64	66	69	69	67	66	57	65	64	70	73	68	64	62	49
		B+NA	7	4	4	10	9	13	7	4	2	3	4	7	4	2	0	0	0	0	1	0
		C	31	2	5	0	0	0	4	4	6	7	7	13	8	11	7	4	9	13	14	28

Table 1b: Implementation Benchmark Results for Spent Fuel Storage by Facilities

Legal Benchmark		V1.1	Countries sorted by V1.1 report order																
Waste		SRL	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
Safety Management	Respon-sibility	1																	
		2																	
		3																	
		4																	
		5																	
		6																	
		7																	
	Organi-sational Structure	8																	
		9																	
		10																	
	Quality Manage-ment	11																	
		12																	
		13																	
		14																	
	Record keeping	15																	
		16																	
		17																	
		18																	
Design	Storage Facility Design	19																	
		20																	
		21																	
		22																	
		23																	
		24																	
		25																	
		26																	
		27																	
		28																	
		29																	
		30																	
		31																	
		32																	
		33																	
		34																	
	Handling and Retrieval	35																	
		36																	
		37																	
		38																	
	Storage Capacity	39																	
Operation	Operation	40																	
		41																	
	Emergency Preparedness	42																	
		43																	
		44																	
	Operational Expe-rience Feedback	45																	
		46																	
	Operation Facility Modification	47																	
		48																	
		49																	
	Maintenance, In-Service-Inspection and Functional Testing	50																	
		51																	
		52																	
		53																	
		54																	
		55																	
		56																	
		57																	
		58																	
	Specific Contingency Plans	59																	
		60																	
		61																	
	Waste Acceptance	62																	
		63																	
		64																	
		65																	
Safety Verification	Contents and Updating of the Safety Case	66																	
		67																	
		68																	
		69																	
		70																	
	Periodic Safety Review	71																	
		72																	
		73																	
		74																	
		75																	
		76																	
		77																	
Sum		A	37	43	53	48	70	63	46	50	65	10	47	48	25	19	16	34	11
		B	1	5	2	1	0	0	0	0	1	0	0	0	1	1	2	1	0
		C	39	29	22	28	7	14	31	27	11	67	30	29	51	57	59	42	66

Table 2a: Legal Benchmark Results for Radioactive Waste Storage by Countries

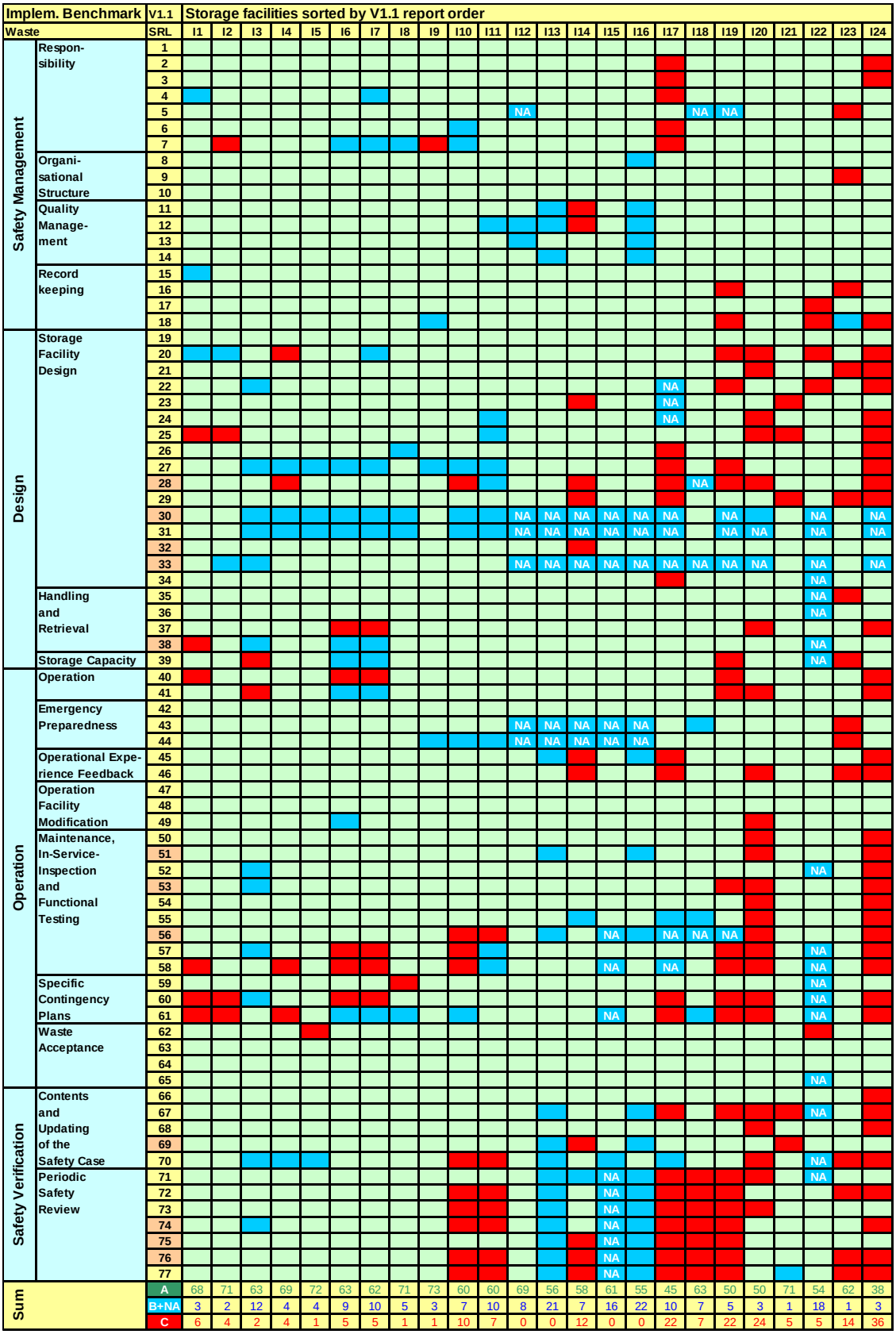

Table 2b: Implementation Benchmark Results for Radioactive Waste Storage by Facilities

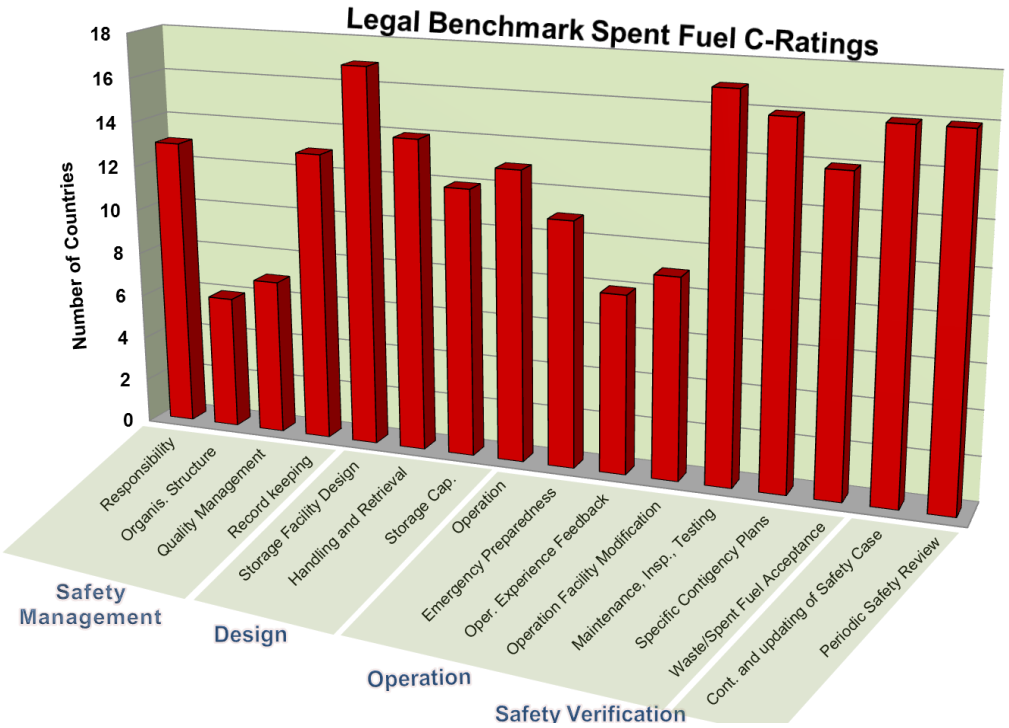

Figure 1: Number of countries with C-ratings sorted by safety issues for spent fuel storage

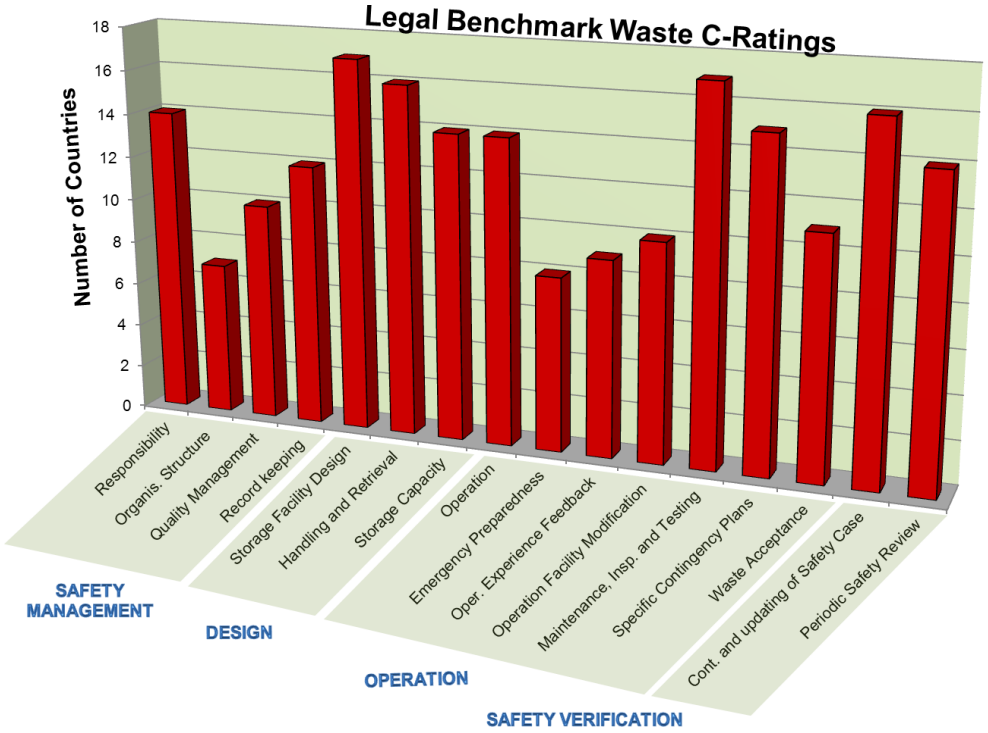

Figure 2: Number of countries with C-ratings sorted by safety issues for radioactive waste storage

3·3 Preparation of National Action Plans, SRL update

After final conclusion of the regulatory benchmarking procedure in 2009, the WGWD members were requested in accordance with the approach of the RHWG to develop and present national actions plans (NAPs) of their countries, in order to demonstrate the planned activities and efforts for harmonizing their national regulations with the WENRA safety reference levels (SRLs). The need for harmonization was derived from the results of the legal benchmarking for each country, where existing differences of the national regulations with respect to the WENRA SRLs have been identified.

The NAP initially had to provide information on planned modification and amendments of relevant national regulations. It had to be treated as a 'living document' and be improved and completed stepwise in line with ongoing process for harmonization of the national regulations. Finally, it provides a document that demonstrates the respective national regulation being in line with the WENRA SRLs. In accordance with the regulatory benchmarking, the NAP had to cover two areas of radioactive material storage: spent fuel and low or medium level waste. This activity was initiated by the WGWD chairman at the 22nd meeting in Brussels in April 2009 and had to be performed in parallel to other tasks of the WGWD. At the following meetings, the country representatives regularly gave short oral reports on the status and progress of their NAPs.

The deadline for implementation of NAP-actions had originally been set to end of 2012 but was in later decision of WENRA directors prolonged until end of 2013. This prolongation was deemed necessary because the requirements in the original draft set of 77 storage V.1-SRLs had been reworded and rearranged resulting in a finally approved set of only 61 storage V.2-SRLs. It is to be emphasized that in doing so no requirement of the original V.1-SRLs has been lost. In some cases, however, the degree of detail was adjusted to the general and binding character of WENRA-SRLs. Furthermore the new V.2-SRLs took into account the most recent developments in IAEA publications especially the modified approach to quality ("management system" approach replaced "quality management" / "quality control" / "quality assurance").

Before taking any action, obviously the results of the benchmarking exercise, which referred to the V.1-SRLs, had first to be related to the updated V.2-set of SRLs. To support member countries in this translation procedure WGWD prepared the following cross reference table

indicating the relation between old and new SRLs and providing information on changes of the addressed requirements.

Cross Reference Table for WGWD-reports 1.0 and 2.0, based on short descriptions

	* Relevant requirement changes in V2.0	
SRL V1.0	**Requirement (short description)**	**SRL V2.0**
S-01	Responsibilities	S-01
S-02	Prime responsibility, Safety policy	S-02
S-03	Maintaining and improving safety	S-03
S-04	Ownership	S-04
S-05	Safety responsibilities of waste owner	S-05
S-06	Interface between licensee and owner	S-06
S-07	Information to regulatory authority	S-07
S-08	Organisational structure	S-08
S-09	Licensee's capabilities	S-09
S-10	Defining qualification and experience	S-10
S-11	Quality management system	S-11
S-12	QM in the design phase	S-12
S-13	Quality of safety related work	S-13
S-14	Procurement and quality	-
-	Documentation of the management system	S-14
S-15	Waste record system	S-15
S-16	Identification of packages	S-16
S-17	Inventory information system	S-17
S-18	Record update and availability	S-18
S-19	Design and safety functions	S-19
S-20	Design for the lifetime of the facility	S-20
S-21	Designing for passive safety features	S-21
S-22	Construction standards	S-22
S-23	Design basis	S-23
S-24	SSC identification	S-24
S-25	Ageing of SSCs and safety features	S-25
S-26	Establishing operational limits and conditions	S-26
S-27	OLC conditions (5 items)	S-27
S-28	Storage limits	-
S-29	List of Probable Initiating Events (PIE)	S-28
S-30	Prevention of criticality accidents	S-29
S-31	Criticality prevention by design	S-29
S-32	Release prevention	-
S-33	Design for fire safety and DiD	S-30
S-34	Design for handling equipment	S-31
S-35	Design for package retrieval	S-32
S-36	Retrievability of packages	-
S-37	Ability to inspect packages (Design)	S-33
S-38	Equipment for handling degraded packages	-
S-39	Reserve capacity	S-34

	* Relevant requirement changes in V2.0	
SRL V1.0	**Requirement (short description)**	**SRL V2.0**
S-40	Ability to inspect packages (operation)	S-35
S-41	Reserve storage capacity	S-36
S-42	Emergency plan, organisation	S-37, S-38
S-43	Emergency plan content [11 items]	S-38
S-44	Emergency plan: Review and training	S-39
S-45	Operation Experience Feedback (OEF)	S-40
S-46	Improvement measures from OEF	S-41
S-47	Process evaluating safety impact of changes	S-42
S-48	Modification of storage conditions	S-42
S-49	Training and documentation for modifications	S-43
S-50	Maintenance, testing and inspection (MTI)	S-44
S-51	MTI program and procedures	S-45
S-52	MTI frequency	-
S-53	MTI equipment and items	-
S-54	MTI recording and assessment	S-46
S-55	MTI review	S-47
S-56	MTI cross-effects awareness	-
S-57	Verification of compliance with safety case	S-48
S-58	Program for inspection and maintenance	S-44
S-59	Receipt procedure for failed packages	S-49
S-60	Plan for loss of integrity or degradation	-
S-61	Contingency arrangements	S-50
S-62	Package design requirements	S-51
S-63	Acceptance criteria	S-52
S-64	Compatibility with conditions and safety case	S-53
S-65	Auditing, inspection and testing on reception	S-54
S-66	Safety case and application	S-55
S-67	Safety case content [17 items]	-
-	Use of the safety case for assessing changes	S-56
S-68	Safety case for facility and packages	S-57
S-69	Update of the safety case	S-58
S-70	Conditions to revise the safety case	S-58
S-71	Periodic Safety Review (PSR)	S-59
S-72	PSR and changes or modifications	S-60
S-73	PSR and improvement measures	S-61
S-74	PSR and safety case update	S-58
S-75	PSR frequency	S-59
S-76	PSR scope and methodology	S-60
S-77	PSR and deviations/interdependancies	S-60

Table 3: Cross Reference Table for WGWD Reports 1.0 and 2.0 based on short descriptions

3.4 Benchmarking of the National Action Plans

As previously explained it was understood that all agreed C-ratings in the individual national regulatory systems would require actions in order to reach full compatibility with the set of WENRA-SRLs. The whole procedure included the following successive steps:

1. Preparation of comprehensive list of C-ratings
2. For each C-rated SRL of V.1:
   a. Find corresponding new SRL of V.2
   b. Use the new V.2 text of this SRL for updating national regulation
3. Follow step 2b also for any SRLs which had been identified as "unclear" and any SRL with relevant requirement changes in the transformation procedure from V.1 to V.2.
4. Supply reference for actions as carried out and report to WGWD

The final objective of the NAPs was to provide the necessary arguments to WGWD that missing requirements had been fully included in each country's national regulatory system. For the final approval a second benchmarking exercise was carried out, specifically concentrating on those NAPs which were claimed to be finally concluded. For this review process WGWD used the same techniques as for the original legal benchmarking, sometimes working in the plenary and sometimes in up to four sub-groups, as appropriate. An improved template for the NAP has been developed to facilitate handling of the documents for the group benchmarking. After introducing the new template at the 27th meeting in Ljubljana in October 2011, the first group benchmarking of NAPs took place at the 29th meeting in Stockholm on 25 – 27 September 2012. In total nine NAPs fully or partially ready for benchmarking had been submitted in advance of this meeting. After plenary discussion and agreement on the rules for evaluation, the benchmarking was performed in two subgroups. Further evaluations of NAPs have been done in the following WGWD meetings until the 32nd in Rome in February 2014. Some countries were not able to fulfill their NAP within this time frame, in particular because they choose time-consuming parliamentary procedures, which could not yet be completed.

3.5 Country Implementation Reports

In this section the results of the NAP benchmarking are presented for each country in two parts. The first part (text) consists of a short description on the measures taken for fulfillment of the NAP, provided by each country. The second part is a table, which lists in the first column the SRLs for which differences had been identified initially, whereas the second and third column show the status of harmonization for spent fuel and waste. An A-Rating in the second column indicates that the required harmonization has been implemented in national regulations and was agreed by the WGWD. For countries, whose NAP benchmarking procedure could not yet be concluded by the WGWD at least at their meeting in Feb. 2014 information as provided by the respective country representative is presented.

BELGIUM

Regulatory changes taken for the National Action Plan

In Belgium, most of the WENRA Waste and Spent Fuel Storage Safety Reference Levels are covered by the generic chapter 2 of the Royal Decree "Safety requirements for nuclear installations", published on November 30th, 2011. This chapter 2 includes the WENRA Reactor Safety Reference Levels that Belgium considered to be applicable to all its major nuclear installations (class I installations), which includes Waste and Spent Fuel Storage installations.

To comply with the remaining Waste and Spent Fuel Storage Safety Reference Levels, a new chapter of this Royal Decree was drafted. Its publication is expected before the end of 2014.

At the 29 WGDW meeting in Stockholm in September 2012, Belgium reported its (planned) regulatory implementations for benchmarking. All (proposed) changes were endorsed by the WENRA WGWD, so once the Royal Decree is published, Belgian regulations will be in full agreement with the requirements mandated by the WGWD SRLs.

Results of the NAP Benchmarking (Belgium)

Spent Fuel Storage and Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-03	A	Royal Decree "Safety requirements for nuclear installations", Ch. 2, Art. 4.2
S-07	A	(not relevant in Belgium)
S-09	A	Royal Decree, Ch. 2, Art. 4.3
S-10	A	Royal Decree, Ch. 2, Art. 4.3
S-11	A	Royal Decree, Ch. 2, Art. 5.1
S-12	A	Royal Decree, Ch. 2, Art. 5.1
S-13	A	Royal Decree, Ch. 2, Art. 5.5
S-14	A	Royal Decree, Ch. 2, Art. 5.2
S-16	C	Royal Decree, Ch. 5, Art. 53 (not yet published)
S-19	C	Royal Decree, Ch. 5, Art. 50 (not yet published)
S-20	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-21	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-22	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-24	A	Royal Decree, Ch. 2, Art. 8
S-25	A	Royal Decree, Ch. 2, Art. 10
S-26	A	Royal Decree, Ch. 2, Art. 9.1
S-27	C	Royal Decree, Ch. 5, Art. 52 (not yet published)
S-31	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-32	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-33	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-34	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-35	C	Royal Decree, Ch. 5, Art. 53 (not yet published)
S-36	C	Royal Decree, Ch. 5, Art. 51 (not yet published)
S-37	A	Royal Decree, Ch. 2, Art. 16
S-40	A	Royal Decree, Ch. 2, Art. 11
S-41	A	Royal Decree, Ch. 2, Art. 11
S-42	A	Royal Decree, Ch. 2, Art. 15
S-43	A	Royal Decree, Ch. 2, Art. 15
S-44	A	Royal Decree, Ch. 2, Art. 12
S-45	A	Royal Decree, Ch. 2, Art. 12
S-46	A	Royal Decree, Ch. 2, Art. 12
S-47	A	Royal Decree, Ch. 2, Art. 11
S-48	C	Royal Decree, Ch. 5, Art. 55 (not yet published)
S-49	C	Royal Decree, Ch. 5, Art. 56 (not yet published)
S-50	C	Royal Decree, Ch. 5, Art. 56 (not yet published)
S-51	C	Royal Decree, Ch. 5, Art. 54 (not yet published)
S-52	C	Royal Decree, Ch. 5, Art. 54 (not yet published)
S-53	C	Royal Decree, Ch. 5, Art. 54 (not yet published)
S-54	C	Royal Decree, Ch. 5, Art. 54 (not yet published)
S-55	A	Royal Decree, Ch. 2, Art. 13
S-56	A	Royal Decree, Ch. 2, Art. 13
S-57	C	Royal Decree, Ch. 2, Art. 13; Royal Decree, Ch. 5, Art. 54 (not yet published)
S-58	A	Royal Decree, Ch. 2, Art. 13
S-59	C	Royal Decree, Ch. 2, Art. 14; Royal Decree, Ch. 5, Art. 58 (not yet published)
S-60	C	Royal Decree, Ch. 2, Art. 14; Royal Decree, Ch. 5, Art. 58 (not yet published)
S-61	A	Royal Decree, Ch. 2, Art. 14; Royal Decree, Ch. 5, Art. 58 (not yet published)

BULGARIA

Regulatory changes taken for the National Action Plan

In accordance with the National Action Plan, approved by an order of the chairman of the BNRA, revision and analysis of the compliance with the requirements of the Act on the Safe Use of Nuclear Energy, new IAEA documents and the WGWD Safety Reference Levels (SRLs) have been carried out.

During the amendment of the legislative documents, the taking into account of the developed by the WGWD SRLs and the harmonization of the Bulgarian legislation with that of the European countries were of primary importance, with the objective of achieving a common approach in the management of RAW and SF.

At the time of the 29th WGWD meeting in Stockholm and at the 30th WGWD meeting in Prague, Bulgaria reported the incorporation of the SRLs (rated C in the NAP) in the draft of the Regulation on Safety of RAW Management.

The amendments of the regulations were related with the establishment of a management system, qualification of the personnel, ensuring reserve storage capacity, etc.

Before the adoption of the regulations, in a systematic way the amendments in the documents were discussed and agreed on with the representatives of the stakeholders and other competent authorities.

In the course of amending the legislation all of the WGWD SRLs have been incorporated in the Regulation on Safety of RAW Management and the Regulation for Safety of Spent Fuel Management which have entered into force in 2013.

Results of the NAP Benchmarking (Bulgaria)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-05	A	Reg. on SF management, Art. 2a and 117
S-10	A	Reg. on SF management, Art. 117 and 73
S-11	A	Reg. on SF management, Art. 118
S-12	A	Reg. on SF management, Art. 116
S-13	A	Reg. on SF management, Art. 118
S-14	A	Reg. on SF management, Art. 120, 116, 118
S-16	A	Reg. on SF management, Art. 119
S-18	A	Reg. on SF management, Art. 119
S-36	A	Reg. on SF management, Art. 82
S-37	A	Reg. on SF management, Art. 2b and 109
S-43	A	Reg. on SF management, Art. 90 and 119
S-49	A	Reg. on SF management, Art. 78
S-50	A	Reg. on SF management, Art. 78
S-51	A	Reg. on SF management, Art. 82
S-57	A	Reg. on SF management, Art. 110
S-58	A	Reg. on SF management, Art. 110

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-05	A	Regulation on RAW management, Art. 3 and 5
S-10	A	Regulation on RAW management, Art. 40 and 48
S-11	A	Regulation on RAW management, Art. 49, 47, 50
S-12	A	Regulation on RAW management, Art. 47
S-13	A	Regulation on RAW management, Art. 49
S-14	A	Regulation on RAW management, Art. 47, 48, 51, 53
S-16	A	Regulation on RAW management, Art. 50 and 6
S-21	A	Regulation on RAW management, Art. 35
S-30	A	Regulation on RAW management, Art. 22 and 31
S-34	A	Regulation on RAW management, Art. 35
S-36	A	Regulation on RAW management, Art. 41
S-40	A	Regulation on RAW management, Art. 42
S-41	A	Regulation on RAW management, Art. 42
S-43	A	Regulation on RAW management, Art. 50
S-46	A	Regulation on RAW management, Art. 49
S-47	A	Regulation on RAW management, Art. 49
S-49	A	Regulation on RAW management, Art. 5 and 10
S-57	A	Regulation on RAW management, Art. 54
S-58	A	Regulation on RAW management, Art. 56

CZECH REPUBLIC

Regulatory changes taken for the National Action Plan

The WGWD Safety Reference Levels for waste and spent fuel storage are considered in the Czech Republic in the process of update of national legal framework. This process has already been launched in 2009 but is not finished yet. It is expected that the new Atomic Act and related decrees will enter into force in mid-2015.

Current national legal framework, especially the Act No. 18/1997 Coll. (Atomic Act) and Decree No. 307/2002 Coll. (on radiation protection) already comply with most of WGWD reference levels. However there are some non-compliances, especially related to the safety issues responsibility, management system, operation, OEF, maintenance, specific contingency plan, acceptance criteria and contents and updating of the safety case.

The new national legal framework, especially the Decree on safe radioactive waste management, which is in well advanced stage of preparation, will fully comply with the WGWD Safety Reference Levels.

Results of the NAP Benchmarking (Czech Republic)

Spent Fuel Storage SRLs:

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	C	In the draft version of new Atomic Act (V. 2)
S-05	B	In the draft versions of new Atomic Act (V. 2) and new Decree on the safe radioactive waste management (V. 3)
S-10	C	In the draft version of new Atomic Act (V. 2)
S-11	C	In the draft version of new Decree on management system
S-12	C	In the draft version of new Decree on management system
S-13	C	In the draft version of new Decree on management system
S-14	C	In the draft version of new Decree on management system
S-16	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-21	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-23	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-28	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-34	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-36	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-37	C	In the draft version of new Decree on emergency preparedness
S-40	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback
S-41	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback.
S-47	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback
S-49	C	In the draft versions of new Atomic Act and new Decree on the safe radioactive waste management
S-50	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-52	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-53	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-54	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-57	C	In current Atomic Act (18/1997 Coll.) and in the draft version of new Atomic Act (V. 2)
S-58	C	In the draft versions of new Atomic Act (V. 2) and new Decree on safety documentation.
S-60	B	In the draft versions of new Atomic Act (V. 2) and new Decree on safety documentation
S-61	B	In the draft version of new Atomic Act (V. 2)

Results of the NAP Benchmarking (Czech Republic, cont.)

Waste Storage SRLs:

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	C	In the draft version of new Atomic Act (V. 2)
S-05	B	In the draft versions of new Atomic Act (V. 2) and new Decree on the safe radioactive waste management (V. 3)
S-10	C	In the draft version of new Atomic Act (V. 2)
S-11	C	In the draft version of new Decree on management system
S-12	C	In the draft version of new Decree on management system
S-13	C	In the draft version of new Decree on management system
S-14	C	In the draft version of new Decree on management system
S-16	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-19	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-21	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-23	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-28	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-33	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-34	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-35	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-36	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-37	C	In the draft version of new Decree on emergency preparedness
S-40	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback
S-41	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback
S-47	C	In the draft versions of new Atomic Act (V. 2) and new Decree on operating experience feedback
S-48	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-49	C	In the draft versions of new Atomic Act and new Decree on the safe radioactive waste management
S-50	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-52	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-53	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-54	C	In the draft version of new Decree on the safe radioactive waste management (V. 3)
S-57	C	In current Atomic Act (18/1997 Coll.) and in the draft version of new Atomic Act (V. 2)
S-58	C	In the draft versions of new Atomic Act (V. 2) and new Decree on safety documentation
S-60	B	In the draft versions of new Atomic Act (V. 2) and new Decree on safety documentation
S-61	B	In the draft version of new Atomic Act (V. 2)

FINLAND

Regulatory changes taken for the National Action Plan

The Finnish Radiation and Nuclear Safety Authority STUK regulates use of nuclear energy in Finland and gives detailed guidance in the form of guides called YVL Guides. When the WGWD Safety Reference Levels for waste and spent fuel storage were published in February 2011, STUK had already begun a full revision of the regulatory guides. When performing the revision, the WENRA storage reference level requirements were implemented into the new Finnish regulations. The revision of the Finnish Guides was finalized in 2013 and they came into force at December 1st 2013. Storage of waste and spent fuel are discussed in distinct Guides.

Finland reported its regulatory implementations of the benchmarking based on drafts of the Guides at the 30th and 31st WGDW meetings in Prague and Trnava in 2013. The requirements presented in the new YVL Guides were approved and the Finnish regulations were found to be in full agreement with the requirements mandated by the WGWD SRLs. Only minor editorial changes were made to the Guides after the benchmarking had been presented at the WGWD meetings.

Legislation:
- NEA = Nuclear Energy Act, 11.12.1987/990
- NED = Nuclear Energy Decree, 12.2.1988/161
- GD 733 = Government Decree on the Safety of NPPs 733/2008
- GD 735 = Government Decree on Emergency Response Arrangements at NPPs 735/2008

Guidance
- YVL A.3 = Guide YVL A.3, Management systems for nuclear facilities
- YVL A.4 = Guide YVL A.4, Organisation and personnel of a nuclear facility (only in Finnish)
- YVL A.10 = Guide YVL D.3, Operating experience feedback at nuclear facilities
- YVL C.5 = Guide YVL C.5, Emergency preparedness arrangements of a NPP
- YVL D.3 = Guide YVL D.3, Handling and storage of nuclear fuel
- YVL D.4 = Guide YVL D.4, Handling of low- and intermediate-level nuclear waste and decommissioning of a nucl. facility

Results of the NAP Benchmarking (Finland)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	A	GD 733, 29 §, Guide YVL A.3
S-08	A	GD 733, 30 §, Guide YVL A.3
S-09	A	NEA 7i §, GD 733, 30 §, 29 §, Guide YVL A.3
S-10	A	GD 733, 30 §
S-11	A	GD 733, 29 §, 28 §, Guide YVL A.3
S-12	A	GD 733 29 §, 30 §, Guide YVL A.3
S-13	A	GD 733, 29 §, Guide YVL A.3
S-14	A	Guide YVL A.3
S-16	A	Guide YVL D.3
S-18	A	Guide YVL D.3
S-37	A	NEA 7 and 9 §, GD 735 6 and 12 §, Guide YVL C.5
S-43	A	GD 733, 30 §, Guide A.4
S-48	A	Guide YVL D.3
S-49	A	Guide YVL D.3
S-52	A	Guide YVL D.3
S-53	A	Guide YVL D.3
S-54	A	Guide YVL D.3
S-57	A	Guide YVL D.3, D.4
S-58	A	Guide YVL D.3

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	A	GD 733, 29 §, Guide YVL A.3
S-08	A	GD 733, 30 §, Guide YVL A.3
S-09	A	NEA 7i §, GD 733, 30 §, 29 §, Guide YVL A.3
S-10	A	GD 733, 30 §
S-11	A	GD 733, 29 §, 28 §, Guide YVL A.3
S-12	A	GD 733 29 §, 30 §, Guide YVL A.3
S-13	A	GD 733, 29 §, Guide YVL A.3
S-14	A	Guide YVL A.3
S-34	A	NEA 7h §, Guide YVL D.4
S-36	A	Guide YVL D.4
S-37	A	NEA 7 and 9 §, GD 735 6 and 12 §, Guide YVL C.5
S-43	A	GD 733, 30 §, Guide A.4
S-46	A	Guide YVL D.4, Guide YVL A.10
S-48	A	Guide YVL D.4
S-49	A	Guide YVL D.4
S-50	A	Guide YVL D.4
S-52	A	Guide YVL D.4
S-53	A	Guide YVL D.4
S-54	A	Guide YVL D.4
S-57	A	Guide YVL D.4
S-58	A	Guide YVL D.4,

FRANCE

Regulatory changes taken for the National Action Plan

Since the publication of the WGWD Safety Reference Levels for waste and spent fuel storage in February 2011, France has continued to fulfill its obligations to implement necessary changes into its national regulations. In 2012, the ministerial order of 7th February setting general rules relative to basic nuclear installations was published and entered into effect on 1st July 2013. This order – which follows the TSN act of 2006 – enabled an important update of the French regulatory framework that used to rely mainly on the quality order of 1984 and on the environment order of 1999. This order also permits to transpose directly a number of important safety reference levels identified by WENRA, such as those concerning the safety policy, the integrated management system or the safety verification. Additionally, this ministerial order contained a dedicated title on waste management and specific requirements for storage and disposal facilities. However, this ministerial order sets generic requirements that have to be further developed in decisions to be issued by ASN and then approved by the Minister for nuclear safety, to give them a regulatory status. Thus, several decisions are under writing by ASN and among them decisions on waste management, decommissioning, storage facilities, periodic safety review, integrated management system, etc. The validation process includes different steps of consultation of stakeholders. Some of these decisions have already been published (e.g. ASN Resolution of 16th July 2013 relative to control of nuisance effects and the impact of basic nuclear installations on health and the environment) but others won't be fully approved before the end of year 2014 or 2015.

At the 30 WGWD meeting in Prague in February 2013, France reported its regulatory implementations for benchmarking, relying on dispositions of the Ministerial order of 7th February and on early drafts of the decisions under validation. This benchmarking enabled France to check that its obligations will be fulfilled once these decisions are finally approved.

Results of the NAP Benchmarking (France)

Spent Fuel and Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	A	Ministerial order of 7th Feb. 12 - article 2.3,1
S-03	A	MO of 7/2/12 - article 2.3,1 and chapter 2.7 "continual improvement" : articles 2.7.1 to 2.7.3
S-05	A	Waste act - MO of 7/2/12 - article 7.2 + ASN decision on "waste management in nuclear facilities" under finalization
S-06	A	MO of 7/2/12 - article 8.4.3
S-07	A	L,594 of the environnement code
S-10	A	MO of 7/2/12 - article 2.5.5
S-11	A	MO of 7/2/12 - article 2.4.1 and 2.4.2
S-12	A	MO of 7/2/12 - article 2.4.1
S-13	A	MO of 7/2/12 - article 2.4.1 and 2.4.2
S-14	C	MO of 7/2/12 - article 2.3.2 + ASN decision on safety management under discussion
S-15	A	MO of 7/2/12 - articles 6.5 and 8.4.2
S-16	C	ASN decision (under development) on storage facilities - article 5.3.2,2
S-17	A	MO of 7/2/12 - articles 6.5
S-18	A	MO of 7/2/12 - article 6.5 + ASN decision on storage (under development) article 5.3.3.4
S-19	A	MO of 7/2/12 - article 3.4 and 3,2 + ASN decision on storage (under development) article 5.3.3.4
S-20	C	MO of 7/2/12
S-21	C	ASN decision on storage (under development)
S-22	C	ASN decision on storage (under development)
S-29	C	ASN decision on storage (under development) + another decision about criticality under development
S-31	C	ASN decision on storage (under development)
S-32	A	MO of 7/2/12 - article 8.4.2 + ASN decision on storage (under development)
S-33	A	MO of 7/2/12 - article 8.4.2 + ASN decision on storage (under development)
S-34	C	ASN decision on storage (under development)
S-35	C	MO of 7/2/12 - article 8.4.2 + ASN decision on storage (under development)
S-36	C	ASN decision on storage (under development)
S-37	A	Public Health Code + decree 2/11/2007+ MO of 7/2/12
S-40	A	MO of 7/2/12
S-43	C	MO of 7/2/12
S-46	C	MO of 7/2/12
S-47	C	MO of 7/2/12 - title 2 chapter VII
S-48	C	MO of 7/2/12 - article 8.4.2 + ASN decision on storage (under development)
S-49	C	ASN decision on storage (under development)
S-51	A	MO of 7/2/12 + ASN decision on conditioning (under development)
S-52	A	MO of 7/2/12
S-53	C	ASN decision on storage (under development)
S-57	C	ASN decision on storage (under development)
S-58	A	Ministerial decree of 2 Nov. 2007 + decision on waste storage (under development)

GERMANY

Regulatory changes taken for the National Action Plan

In parallel to the publication of the WGWD Safety Reference Levels (SRLs) for waste and spent fuel storage, version 2.1 in February 2011, Germany continued to fulfill its commitments within the WENRA WGWD to implement necessary modifications and amendments into its regulatory framework in order to harmonize the national regulations with the agreed code of SRLs. Most of the required revisions to the German regulations were related to two safety issues, namely the proper establishment of

- a safety management system and
- periodic safety reviews (PSR) of spent fuel storage facilities, including systematic ageing management.

In the German regulatory framework general issues of storage are covered in two guidelines, formulating specific recommendations and requirements for storage facilities dealing with spent fuel and radioactive wastes, respectively /ESK 13a, 13b/. Those guidelines have been drafted and finalised by the Nuclear Waste Management Commission (ESK), an independent expert committee advising the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). After publication and formal enactment through BMUB, the guidelines have mandatory character for licensees and operators of spent fuel and waste storage facilities. The new guidelines on waste and spent fuel storage are the result of a complete review of the former guidelines (issued in 2001 and 2003, respectively) considering the results of the first regulatory benchmarking. The newly revised and upgraded versions were then published in June 2013 and include requirements to implement a safety management system according to the new formulation of the related SRLs.

In the case of PSRs, the ESK developed a set of recommendations which were brought into effect in November 2010 as a separate set of guidelines /ESK 10/. After receiving application feedback from selected facilities, an updated version of the PSR Guidelines is expected for publication by the end of 2014.

The German approach to implement the necessary changes into the national regulatory framework was presented and discussed at the 29th WGWD meeting in Stockholm in September 2012. All changes were approved by the WGWD.

/ESK 10/ ESK recommendations for guides to the performance of periodic safety reviews for storage facilities for spent fuel and heat-generating radioactive waste (PSÜ-ZL), 14.11.2010

/ESK 13a/ Guidelines for dry cask storage of spent fuel and heat-generating waste; recommendations of the Nuclear Waste Management Commission (ESK), revised version of 10.06.2013

/ESK 13b/ Guidelines for the storage of radioactive waste with negligible heat generation; recommendations of the Nuclear Waste Management Commission (ESK), revised version of 10.06.2013

Results of the NAP Benchmarking (Germany)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	Update of guidelines for SF storage (ESK 13a)
S-11	**A**	Update of guidelines for SF storage (ESK 13a)
S-12	**A**	Update of guidelines for SF storage (ESK 13a)
S-13	**A**	Update of guidelines for SF storage (ESK 13a)
S-14	**A**	Update of guidelines for SF storage (ESK 13a)
S-35	**A**	Update of guidelines for SF storage (ESK 13a)
S-37	**A**	Update of guidelines for SF storage (ESK 13a)
S-39	**A**	Update of guidelines for SF storage (ESK 13a)
S-47	**A**	Update of guidelines for SF storage (ESK 13a)
S-49	**A**	Update of guidelines for SF storage (ESK 13a)
S-57	**A**	Update of guidelines for SF storage (ESK 13a)
S-59	**A**	Guidelines for PSR (ESK 10)
S-60	**A**	Guidelines for PSR (ESK 10)
S-61	**A**	Guidelines for PSR (ESK 10)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	Update of guidelines for waste storage (ESK 13b)
S-11	**A**	Update of guidelines for waste storage (ESK 13b)
S-12	**A**	Update of guidelines for waste storage (ESK 13b)
S-13	**A**	Update of guidelines for waste storage (ESK 13b)
S-14	**A**	Update of guidelines for waste storage (ESK 13b)
S-21	**A**	Update of guidelines for waste storage (ESK 13b)
S-37	**A**	Update of guidelines for waste storage (ESK 13b)
S-39	**A**	Update of guidelines for waste storage (ESK 13b)
S-47	**A**	Update of guidelines for waste storage (ESK 13b)
S-49	**A**	Update of guidelines for waste storage (ESK 13b)
S-57	**A**	Update of guidelines for waste storage (ESK 13b)

HUNGARY

Regulatory changes taken for the National Action Plan

The spent fuel management is regulated by the Hungarian Atomic Energy Authority (HAEA) in Hungary. There is only one facility on the list of spent fuel management facilities, the Interim Spent Fuel Storage Facility next to Paks NPP.

After benchmarking the Hungarian legal system to the WGWD Safety Reference Levels for spent fuel storage, Hungary has four SRLs in "C" ratings (S-50, S-53, S-54, S-57) which will be handled by the modification of the Volume 6 of the Nuclear Safety Codes. The planned implementation deadline is September 1st 2014. The Hungarian Atomic Law will be handling the following reference level requirements: S-05, S-06, S-07. The S-04 is not fully covered and S-51 is not published yet, so they are classified as "C". Once the proposed changes to Hungary's regulatory framework will be implemented, these regulations will be in full accordance with the safety criteria required by the WGWD

A summary can be found in the attached tables.

According to the Amendment of the Hungarian Atomic Law as of July 6th 2013, the HAEA will take over the supervision of all Hungarian radwaste disposal facilities as the "competent authority". According to the plan the takeover will take place on the 1st of July 2014. In order to prepare this authority take over, a Decree, similar to the current "Nuclear Safety Codes" is under elaboration which has to go into effect on the date of the takeover. The new legalization shall take care all of the safety reference levels of waste. During the last half year we have been working to create and implement a new criteria system for it. Now we are working on the cross-checking process with other concerned authorities and the higher levels of the legalization.

Results of the NAP Benchmarking (Hungary)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-04	C	Necessary legal instruments not yet determined
S-05	A	Implementation of the A 2011/70/EURATOM Directive in §5 of the "Atomic Law"
S-06	C	1. § (1) 5/A. § (1) 40. § (1) of Hungarian Atomic Law
S-07	C	1. § (1) 5/A. § (1) 40. § (1) of Hungarian Atomic Law
S-10	A	New requirement in Nuclear Safety Code, Vol.1, 1.8.1.100.
S-11	A	New requirement in Nuclear Safety Code, Vol.2, 2.2.1.0100.
S-12	A	New requirement in Nuclear Safety Code, Vol.2, 2.2.1.0200.
S-13	A	New requirement in Nuclear Safety Code, Vol. 2., para 2.5.1.0200
S-14	A	New requirement in Nuclear Safety Code, Vol. 2., para 2.2.4.0100
S-15	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.3.19.0100
S-16	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.3.19.0200
S-18	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.3.19.0400
S-33	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.2.7.0900
S-34	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.3.4.0500
S-36	A	New requirement in Nuclear Safety Code, Vol. 6., para 6.3.4.0500
S-37	A	New legal requirements: i) IAEA SF-1, Principle 9 has been adopted to the Govt. Decree 118/2011 (VII.11.) ii) Chapter 6.3.21. Emergency preparedness in Nuclear Safety Code, Vol. 6. has been amended.
S-40	A	New legal requirement in Nuclear Safety Code, Vol. 6., para 6.3.17.0100
S-42	A	A totally new licensing process for modification was developed in Ch. 6.3.9. of Nuclear Safety Codes, Vol.6.
S-44	A	New requirements in Nuclear Safety Codes, Vol.6. Ch. 6.3.10. "Maintenance'
S-48	A	New requirements in Nuclear Safety Codes, Vol.6. Ch. 6.3.14. 'Assessment of safety operation'
S-49	A	New requirements for the acceptance criteria in the Nuclear Safety Codes, Vol.6. Ch. 6.3.4. 'Handling spent fuel assemblies'
S-50	C	New requirements for the retrievability of SFs in the Nuclear Safety Codes, Vol.6. Ch. 6.2.1. 'Safety functions'
S-51	C	Is covered by amendment to the regulation, not yet published
S-52	A	New requirements for the acceptance criteria in the Nuclear Safety Codes, Vol.6. Ch. 6.3.4. 'Handling spent fuel assemblies'
S-53	C	New requirements for the acceptance criteria in the Nuclear Safety Codes, Vol.6. Ch. 6.3.4. 'Handling spent fuel assemblies'
S-54	C	New requirements for the acceptance criteria in the Nuclear Safety Codes, Vol.6. Ch. 6.3.4. 'Handling spent fuel assemblies'
S-57	C	Detailed content of the SC will be developed in a Safety Guide

Results of the NAP Benchmarking (Hungary, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	C	Amendment to be published in 2014
S-04	C	Amendment to be published in 2014
S-05	C	Amendment to be published in 2014
S-06	C	Amendment to be published in 2014
S-07	C	Amendment to be published in 2014
S-08	C	Amendment to be published in 2014
S-09	C	Amendment to be published in 2014
S-10	C	Amendment to be published in 2014
S-11	C	Amendment to be published in 2014
S-12	C	Amendment to be published in 2014
S-13	C	Amendment to be published in 2014
S-14	C	Amendment to be published in 2014
S-15	C	Amendment to be published in 2014
S-16	C	Amendment to be published in 2014
S-18	C	Amendment to be published in 2014
S-19	C	Amendment to be published in 2014
S-20	C	Amendment to be published in 2014
S-21	C	Amendment to be published in 2014
S-22	C	Amendment to be published in 2014
S-23	C	Amendment to be published in 2014
S-24	C	Amendment to be published in 2014
S-25	C	Amendment to be published in 2014
S-26	C	Amendment to be published in 2014
S-27	C	Amendment to be published in 2014
S-28	C	Amendment to be published in 2014
S-29	C	Amendment to be published in 2014
S-31	C	Amendment to be published in 2014
S-32	C	Amendment to be published in 2014
S-33	C	Amendment to be published in 2014
S-34	C	Amendment to be published in 2014
S-35	C	Amendment to be published in 2014
S-36	C	Amendment to be published in 2014
S-37	C	Amendment to be published in 2014
S-40	C	Amendment to be published in 2014
S-41	C	Amendment to be published in 2014
S-42	C	Amendment to be published in 2014
S-43	C	Amendment to be published in 2014
S-44	C	Amendment to be published in 2014
S-45	C	Amendment to be published in 2014
S-46	C	Amendment to be published in 2014
S-47	C	Amendment to be published in 2014
S-48	C	Amendment to be published in 2014
S-49	C	Amendment to be published in 2014
S-50	C	Amendment to be published in 2014
S-51	C	Amendment to be published in 2014
S-54	C	Amendment to be published in 2014
S-57	C	Amendment to be published in 2014
S-58	C	Amendment to be published in 2014

ITALY

Regulatory changes taken for the National Action Plan

The WGWD Safety Reference Levels for waste and spent fuel storage are considered in ITALY in the process of update of national legal framework.

A Regulatory Guide has been developed on “Safety Criteria for Radioactive Waste Storage”. The Guide is in an advanced stage of development. A consultation process with interested entities (Operators, others Ministers, etc.) will start by April 2014. Publication is expected by summer 2014. SRLs 11 and 13 addressing management systems are not completely responding to the WENRA SRLs for the reason that a general regulatory guide on Management Systems for Radioactive Waste Management and Decommissioning is foreseen by next year.

As far as the SRLs on spent fuel storage is concerned, ITALY is of the opinion that it is not necessary to develop specify regulatory guide for spent fuel storage for the reason that the existing spent fuel still present in Italy is in the process of being transferred to France for reprocessing. This process will be completed by 2015. The only spent fuel Italy will have to manage is only 1.6 tHM of U-Th that will be stored in a dual purpose metal cask.

Results of the NAP Benchmarking (Italy)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-03	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-05	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-08	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-09	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-10	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-11	**C**	Regulatory guide on management systems (in development)
S-12	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-13	**C**	Regulatory guide on management systems (in development)
S-14	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-17	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-18	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-19	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-20	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-21	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-22	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-24	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-25	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-26	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-27	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-28	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-29	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-31	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-32	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-33	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-34	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-35	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-36	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-37	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-39	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-40	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-41	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-42	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-43	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-44	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-45	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-46	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-47	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-48	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-49	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-50	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-51	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-53	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-54	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-55	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-56	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-57	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-58	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-59	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-60	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"
S-61	**A**	Reg. Guide on "Safety Criteria for Radioactive Waste Storage"

LITHUANIA

Regulatory changes taken for the National Action Plan

After benchmarking the Lithuanian legal system to the WGWD Safety Reference Levels for waste and spent fuel storage, Lithuania had about 30% of C ratings. This means Lithuania had to improve its legal system in order to reach "A" ratings for all safety reference levels. Main deficiencies found were related to periodic safety reviews of safety case and operational limits and conditions issues also to some more specific requirements defined in safety reference levels.

In 2010, two legal documents (BSR–3.1.2–2010: Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities, and BSR–3.1.1–2010: General Requirements for Spent Nuclear Fuel Storage Facility of the Dry Type) were revised. During this revision, requirements were supplemented. During the 30th WGWD meeting in Prague in February 2013, Lithuania provided all the changes of legal system to the members of the group and had no objection to state that Lithuanian national action plan for storage document is implemented.

Results of the NAP Benchmarking (Lithuania)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Updated BSR-3.1.1-2010
S-06	**A**	Updated BSR-3.1.1-2010
S-07	**A**	Updated BSR-3.1.1-2010
S-10	**A**	Updated BSR-3.1.1-2010
S-11	**A**	Updated BSR-3.1.1-2010
S-12	**A**	Updated BSR-3.1.1-2010
S-13	**A**	Updated BSR-3.1.1-2010
S-14	**A**	Updated BSR-3.1.1-2010
S-16	**A**	Updated BSR-3.1.1-2010
S-17	**A**	Updated BSR-3.1.1-2010
S-22	**A**	Updated BSR-3.1.1-2010
S-27	**A**	Updated BSR-3.1.1-2010
S-29	**A**	Updated BSR-3.1.1-2010
S-31	**A**	Updated BSR-3.1.1-2010
S-37	**A**	Updated BSR-3.1.1-2010
S-38	**A**	Updated BSR-3.1.1-2010
S-39	**A**	Updated BSR-3.1.1-2010
S-42	**A**	Updated BSR-3.1.1-2010
S-44	**A**	Updated BSR-3.1.1-2010
S-48	**A**	Updated BSR-3.1.1-2010
S-50	**A**	Updated BSR-3.1.1-2010
S-51	**A**	Updated BSR-3.1.1-2010
S-54	**A**	Updated BSR-3.1.1-2010
S-56	**A**	Updated BSR-3.1.1-2010
S-57	**A**	Updated BSR-3.1.1-2010
S-58	**A**	Updated BSR-3.1.1-2010
S-59	**A**	Updated BSR-3.1.1-2010
S-60	**A**	Updated BSR-3.1.1-2010
S-61	**A**	Updated BSR-3.1.1-2010

Results of the NAP Benchmarking (Lithuania, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Updated BSR-3.1.2-2010
S-06	**A**	Updated BSR-3.1.2-2010
S-07	**A**	Updated BSR-3.1.2-2010
S-10	**A**	Updated BSR-3.1.2-2010
S-11	**A**	Updated BSR-3.1.2-2010
S-12	**A**	Updated BSR-3.1.2-2010
S-13	**A**	Updated BSR-3.1.2-2010
S-14	**A**	Updated BSR-3.1.2-2010
S-17	**A**	Updated BSR-3.1.2-2010
S-19	**A**	Updated BSR-3.1.2-2010
S-22	**A**	Updated BSR-3.1.2-2010
S-27	**A**	Updated BSR-3.1.2-2010
S-29	**A**	Updated BSR-3.1.2-2010
S-34	**A**	Updated BSR-3.1.2-2010
S-36	**A**	Updated BSR-3.1.2-2010
S-37	**A**	Updated BSR-3.1.2-2010
S-38	**A**	Updated BSR-3.1.2-2010
S-39	**A**	Updated BSR-3.1.2-2010
S-42	**A**	Updated BSR-3.1.2-2010
S-44	**A**	Updated BSR-3.1.2-2010
S-50	**A**	Updated BSR-3.1.2-2010
S-56	**A**	Updated BSR-3.1.2-2010
S-57	**A**	Updated BSR-3.1.2-2010
S-58	**A**	Updated BSR-3.1.2-2010
S-59	**A**	Updated BSR-3.1.2-2010
S-60	**A**	Updated BSR-3.1.2-2010
S-61	**A**	Updated BSR-3.1.2-2010

THE NETHERLANDS

Regulatory changes taken for the National Action Plan

The Netherlands committed itself in 2011 to implement the WGWD Safety Reference Levels (SRLs) on radioactive waste management in its legal system.

The most relevant elements of the Dutch legal system are given by the Nuclear Energy Act, together with the Radiation Protection Decree and the Nuclear Installations, Fissionable Materials and Ores Decree. This legislation provides for a system of mainly general goal oriented rules and regulations. It also establishes a licensing system.

The Netherlands has a small nuclear program with one national radioactive waste management organization, i.e. the Central Organisation for Radioactive Waste (COVRA), located at one site. The single and unique role of COVRA in the Netherlands has been established in legislation. Due to this fact, The Netherlands has decided in the past to regulate waste and spent fuel storage mainly by means of the COVRA license conditions rather than by means of generic guidelines in legislation.

The implementation of the SRLs into the Dutch legal system was benchmarked for the first time at the 21st WGWD meeting in Sofia in November 2008. The Netherlands reported detailed references to the COVRA-license and plans for updating the COVRA-license.

At the 29th WGWD meeting in Stockholm in September 2012, the Netherlands reported its progress in the legal implementations for re-benchmarking.

A majority of SRLs are implemented in the COVRA license and rated B (justified difference) by WGWD, based on the single case in the Netherlands described above. The remaining eight C-ratings deal with requirements on aspects of the management system, periodic testing and inspection and contingency plan and arrangements. These SRLs will be implemented by means of a revision of the COVRA license in 2014 and by means of a new ordinance on Management and Organisation in 2015.

Results of the NAP Benchmarking (Netherlands)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Ordinance on the implementation of the Nuclear Safety Directive, article 5, effective since June 30, 2013
S-03	**A**	Ordinance on the implementation of the Nuclear Safety Directive, article 2 and 3, effective since June 30, 2013
S-05	**C**	Introduce requirement in next amendment of COVRA-license due in 2014
S-06	**B**	No action is foreseen to address A-practice in legal system
S-09	**A**	Ordinance on implementation Nuclear Safety Directive, effective since June 30, 2013
S-11	**C**	Ordinance on Management and Organisation, due in 2015
S-12	**C**	Ordinance on Management and Organisation, due in 2015
S-13	**C**	Ordinance on Management and Organisation, due in 2015
S-14	**C**	Ordinance on Management and Organisation, due in 2015
S-15	**B**	COVRA license
S-16	**B**	COVRA license
S-18	**B**	COVRA license
S-20	**B**	COVRA license
S-21	**B**	COVRA license
S-25	**B**	COVRA license
S-27	**B**	COVRA license
S-28	**B**	COVRA license
S-32	**B**	COVRA license
S-33	**B**	COVRA license
S-34	**B**	COVRA license
S-35	**B**	COVRA license
S-36	**B**	COVRA license
S-39	**B**	Nuclear Energy Act, Article 40, COVRA license
S-40	**B**	COVRA license
S-47	**C**	Introduce requirement in next amendment of COVRA-license, due in 2014
S-48	**C**	Introduce requirement in next amendment of COVRA-license, due in 2014
S-49	**B**	COVRA license
S-50	**C**	Introduce requirement in next amendment of COVRA-license, due in 2014
S-51	**B**	COVRA license
S-52	**B**	COVRA license
S-53	**B**	COVRA license
S-54	**B**	COVRA license
S-57	**B**	COVRA license
S-58	**B**	COVRA license
S-59	**A**	Ordinance on the implementation of the Nuclear Safety Directive, article 5, effective since June 30, 2013
S-60	**B**	COVRA license
S-61	**A**	Ordinance on the implementation of the Nuclear Safety Directive, article 5, effective since June 30, 2013

ROMANIA

Regulatory changes taken for the National Action Plan

The WGWD Safety Reference Levels for waste and spent fuel storage are considered in national regulatory framework which is under revision now.

The revision of the regulatory framework was required since the transposition of the provisions of Council Directive 2011/70/EURATOM establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste and will continue with the transposition of the Council Directive 2013/59/EURATOM of 5th December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation.

Current national legal framework, especially the Law 111/1996 on the safe deployment, regulation, licensing and control of nuclear activities, Order 14/2000 approving the Fundamental Regulation on the radiological safety as well as Order 56/2005 approving the Fundamental regulation on the safe management of radioactive waste and spent nuclear fuel, already comply with some of WGWD reference levels.

The non-compliances with WGWD reference levels will be treated in the new revised regulatory framework especially in the Order approving the Regulation on the safety requirements for predisposal activities and facilities and safety requirements for storage of spent nuclear fuel which is in very advanced stage. The Regulation on the safety requirements for predisposal activities and facilities and safety requirements for storage of spent nuclear fuel will comply with WGWD Safety Reference Levels and it is estimate to be in force at the end of 2014.

Results of the NAP Benchmarking (Romania)
Spent Fuel and Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	CNCAN order, to be enacted in 2014
S-03	**A**	CNCAN order, to be enacted in 2014
S-06	**A**	CNCAN order, to be enacted in 2014
S-10	**A**	CNCAN order, to be enacted in 2014
S-11	**A**	CNCAN order, to be enacted in 2014
S-12	**A**	CNCAN order, to be enacted in 2014
S-13	**A**	CNCAN order, to be enacted in 2014
S-14	**A**	CNCAN order, to be enacted in 2014
S-16	**A**	CNCAN order, to be enacted in 2014
S-17	**A**	CNCAN order, to be enacted in 2014
S-18	**A**	CNCAN order, to be enacted in 2014
S-19	**A**	CNCAN order, to be enacted in 2014
S-20	**A**	CNCAN order, to be enacted in 2014
S-21	**A**	CNCAN order, to be enacted in 2014
S-22	**A**	CNCAN order, to be enacted in 2014
S-23	**A**	CNCAN order, to be enacted in 2014
S-24	**A**	CNCAN order, to be enacted in 2014
S-25	**A**	CNCAN order, to be enacted in 2014
S-26	**A**	CNCAN order, to be enacted in 2014
S-27	**A**	CNCAN order, to be enacted in 2014
S-28	**A**	CNCAN order, to be enacted in 2014
S-29	**A**	CNCAN order, to be enacted in 2014
S-30	**A**	CNCAN order, to be enacted in 2014
S-31	**A**	CNCAN order, to be enacted in 2014
S-32	**A**	CNCAN order, to be enacted in 2014
S-33	**A**	CNCAN order, to be enacted in 2014
S-34	**A**	CNCAN order, to be enacted in 2014
S-35	**A**	CNCAN order, to be enacted in 2014
S-36	**A**	CNCAN order, to be enacted in 2014
S-37	**A**	CNCAN order, to be enacted in 2014
S-39	**A**	CNCAN order, to be enacted in 2014
S-40	**A**	CNCAN order, to be enacted in 2014
S-41	**A**	CNCAN order, to be enacted in 2014
S-42	**A**	CNCAN order, to be enacted in 2014
S-43	**A**	CNCAN order, to be enacted in 2014
S-44	**A**	CNCAN order, to be enacted in 2014
S-45	**A**	CNCAN order, to be enacted in 2014
S-46	**A**	CNCAN order, to be enacted in 2014
S-47	**A**	CNCAN order, to be enacted in 2014
S-48	**A**	CNCAN order, to be enacted in 2014
S-49	**A**	CNCAN order, to be enacted in 2014
S-50	**A**	CNCAN order, to be enacted in 2014
S-51	**A**	CNCAN order, to be enacted in 2014
S-52	**A**	CNCAN order, to be enacted in 2014
S-53	**A**	CNCAN order, to be enacted in 2014
S-54	**A**	CNCAN order, to be enacted in 2014
S-55	**A**	CNCAN order, to be enacted in 2014
S-56	**A**	CNCAN order, to be enacted in 2014
S-57	**A**	CNCAN order, to be enacted in 2014
S-58	**A**	CNCAN order, to be enacted in 2014
S-60	**A**	CNCAN order, to be enacted in 2014
S-61	**A**	CNCAN order, to be enacted in 2014

SLOVAKIA

Regulatory changes taken for the National Action Plan

With the publication of the WGWD Safety Reference Levels for waste and spent fuel storage in February 2011, Slovakia continued to fulfil its obligations to implement necessary changes into its national regulations.

ÚJD SR as a central governmental body, within its competency, prepares legislation and establishes binding nuclear safety criteria for nuclear installations.

Necessary changes identified during the legal benchmarking of Safety Reference Levels for waste and spent fuel storage were implemented mainly by the update of the Act No. 541/2004 Coll. l. on peaceful use of nuclear energy (the Atomic Act) or by the update of its respective regulations.

The Atomic Act came into effect on Dec. 1st, 2004 and repealed the original Act No. 130/1998 Coll. l., as well as all its implementing regulations. The Act has been amended several times: 125/2006, 238/2006, 21/2007, 94/2007, 335/2007, 408/2008, 120/2010, 137/2010, 145/2010, 350/2011 and the last amendment was No. 143/2013. By before mentioned updates of the Atomic Act were amongst others aspects addressed also areas identified during the legal benchmarking of Safety Reference Levels for waste and spent fuel storage like e.g. graded approach and periodic safety review.

Details of safe management of spent fuel and radioactive waste were both elaborated by the Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel (valid from 2012/03/01), which replaced previously binding Regulation of ÚJD SR No. 53/2006 Coll. l., setting the details of requirements for handling nuclear materials, radioactive waste and spent nuclear fuel. Main updates here were related to appropriate contingency arrangements during storage of radioactive waste and spent fuel, requirements to develop and maintain a record system on the location and characteristics of radioactive waste, retrieval of radioactive waste and spent fuel within an appropriate time, at the end of the facility operation or in order to intervene in the event of unexpected faults, etc.

Missing aspects related to area of management system were addressed by the Regulation No. 431/2011 Coll. on a quality management system (valid from 2012/1/1).

Missing aspects related to the demonstration of construction standards and material used, with respect to the length of the storage period of radioactive waste and spent fuel, were addressed by the Regulation No.430/2011 Coll. on details on nuclear safety requirements for nuclear facilities (valid from 2012/1/1).

At the 29th WGWD meeting in Stockholm in September 2012, Slovakia reported its regulatory implementations for benchmarking, all changes were approved and the Slovak regulations were found to be in full agreement with the requirements mandated by the WGWD SRLs.

Results of the NAP Benchmarking (Slovakia)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act); Regulation No. 431/2011 Coll. on a quality management system
S-10	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-11	**A**	Regulation No. 431/2011 Coll. on a quality management system; Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-12	**A**	Regulation No. 431/2011 Coll. on a quality management system
S-13	**A**	Regulation No. 431/2011 Coll. on a quality management system; Act No. 350/2011 amending and supplementing Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-14	**A**	Regulation No. 431/2011 Coll. on a quality management system
S-22	**A**	Regulation No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities; Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-31	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel; Regulation No. 431/2011 Coll. on a quality management system
S-34	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-37	**A**	Act No. 350/2011 amending and supplementing Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act); Regulation No. 35/2012 Coll., changing and amending Decree No. 55/2006 Coll., on details of emergency planning in case of a nuclear incident or accident
S-45	**A**	Regulation No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities
S-48	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-49	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-50	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-54	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-58	**A**	Act No. 350/2011 amending and supplementing Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act) (→ Regulation No. 33/2012 Coll.)
S-60	**A**	Regulation No. 33/2012 Coll. on the regular, comprehensive and systematic evaluation of the nuclear safety of nuclear equipment: Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel

Results of the NAP Benchmarking (Slovakia, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act); Regulation No. 431/2011 Coll. on a quality management system
S-10	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-11	**A**	Regulation No. 431/2011 Coll. on a quality management system; Act No. 350/2011 amending and supplementing Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-12	**A**	Regulation No. 431/2011 Coll. on a quality management system
S-13	**A**	Regulation No. 431/2011 Coll. on a quality management system; Act No. 350/2011 amending and supplementing Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act)
S-14	**A**	Regulation No. 431/2011 Coll. on a quality management system
S-15	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-22	**A**	Regulation No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities; Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-34	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-37	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act); Regulation No. 35/2012 Coll., Decree No. 55/2006 Coll., on details of emergency planning in case of a nuclear incident or accident
S-45	**A**	Regulation No. 430/2011 Coll. on details on nuclear safety requirements for nuclear facilities
S-48	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-49	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-50	**A**	Regulation No. 30/2012 Coll., laying down details of requirements for the handling of nuclear materials, nuclear waste and spent nuclear fuel
S-58	**A**	Act No. 350/2011 to Act No. 541/2004 Coll. on the Peaceful Use of Nuclear Energy (Atomic Act) (→ Regulation No. 33/2012 Coll.)
S-60	**A**	Regulation No. 33/2012 Coll. on the regular, comprehensive and systematic evaluation of the nuclear safety of nuclear equipment

SLOVENIA

Regulatory changes taken for the National Action Plan

Slovenian Nuclear Safety Administration (SNSA) as the competent authority in the field of radioactive waste and spent fuel storage continuously takes all necessary actions for implementation of changes in obligations into the national regulatory requirements. Slovenian regulatory framework in the pertinent field consists mainly of the Ionizing Radiation Protection and Nuclear Safety Act, Resolution on the 2006-2015 National Program for Managing Radioactive Waste and Spent Nuclear Fuel and a list of rules which regulate specific areas of waste and spent fuel management in detail. Slovenia made the main step forward to the full consistency of its regulatory framework with the new international standards and recommendations when, in 2009, two new regulations were published, namely Rules on radiation and nuclear safety factors (JV5) and the Rules on operational safety of radiation and nuclear facilities (JV9). The rules set detailed requirements for design bases, contents of applications and main safety documentation, management system, modification management, periodic safety reviews and others.

At the 30th WGWD meeting in Prague, Slovenia reported on the implementation of storage SRLs and its action plan. The majority of the SRLs were implemented through new rules JV5 and JV9. Therefore all changes were approved except one SRL where a better reference was required. The SRL refers to the reserve storage capacity to stay available for retrieved waste and spent fuel packages. Based on this requirement the SNSA made a proposal for additional amendment of the JV5 Rules. It is expected that this amendment will be published by the end of 2014. Beside the identified deficiency the Slovenian regulations were found to be in full agreement with the requirements mandated by the WGWD SRLs. There is one SRL rated B but it is not required to make any changes in national legislation. It refers to an option on having adopted the burnup credit.

Results of the NAP Benchmarking (Slovenia)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	JV5 (Rules on radiation and nuclear safety factors)
S-08	**A**	JV5
S-09	**A**	JV5 and ZVISJV (Ionizing Radiation Protection and Nuclear Safety Act)
S-11	**A**	JV5 and ZVISJV
S-12	**A**	JV5
S-13	**A**	JV5
S-14	**A**	JV5
S-19	**A**	JV5
S-20	**A**	JV5
S-21	**A**	JV5
S-22	**A**	JV5
S-23	**A**	JV5
S-24	**A**	JV5
S-25	**A**	JV5 and JV9 (Rules on operational safety of radiation or nuclear facilities)
S-26	**A**	JV5
S-27	**A**	JV5
S-28	**A**	JV5
S-29	**B**	JV5
S-30	**A**	JV5
S-31	**A**	JV5
S-32	**A**	JV5
S-33	**A**	JV5
S-34	**A**	JV5
S-35	**A**	JV5 and JV7 (Regulation on radioactive waste and spent fuel management)
S-36	**C**	Amendments of JV5 proposed, not yet published
S-37	**A**	JV9
S-38	**A**	JV9 and ZVISJV
S-39	**A**	JV5, JV9 and National Emergency Response Plan for Nuclear and Radiological Accidents
S-40	**A**	ZVISJV and JV9
S-41	**A**	JV9
S-42	**A**	ZVISJV and JV9
S-43	**A**	JV9
S-44	**A**	JV9
S-45	**A**	JV5
S-46	**A**	JV9
S-47	**A**	JV9
S-48	**A**	JV9
S-49	**A**	JV5
S-50	**A**	JV5
S-59	**A**	ZVISJV and JV9
S-60	**A**	JV9
S-61	**A**	JV9

Results of the NAP Benchmarking (Slovenia, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-02	**A**	JV5 (Rules on radiation and nuclear safety factors)
S-08	**A**	JV5
S-11	**A**	JV5 and ZVISJV (Ionizing Radiation Protection and Nuclear Safety Act)
S-14	**A**	JV5
S-19	**A**	JV5
S-20	**A**	JV5
S-21	**A**	JV5
S-22	**A**	JV5
S-23	**A**	JV5
S-24	**A**	JV5
S-25	**A**	JV5 and JV9 (Rules on operational safety of radiation or nuclear facilities)
S-26	**A**	JV5
S-27	**A**	JV5
S-28	**A**	JV5
S-29	**B**	JV5
S-30	**A**	JV5
S-31	**A**	JV5
S-32	**A**	JV5
S-33	**A**	JV5
S-34	**A**	JV5
S-35	**A**	JV5 and JV7 (Regulation on radioactive waste and spent fuel management)
S-36	**C**	Amendments of JV5 proposed, not yet published
S-37	**A**	JV9
S-38	**A**	JV9 and ZVISJV
S-39	**A**	JV5, JV9 and National Emergency Response Plan for Nuclear and Radiological Accidents
S-40	**A**	ZVISJV and JV9
S-41	**A**	JV9
S-42	**A**	ZVISJV and JV9
S-43	**A**	JV9
S-44	**A**	JV9
S-45	**A**	JV5
S-46	**A**	JV9
S-47	**A**	JV9
S-48	**A**	JV9
S-49	**A**	JV5
S-50	**A**	JV5
S-59	**A**	ZVISJV and JV9
S-60	**A**	JV9
S-61	**A**	JV9

SPAIN

Regulatory changes taken for the National Action Plan

As result of the first benchmarking, the Spanish NAP Table had a total of 39 SRLs evaluated as ´C´, for both spent fuel and waste categories. This led to the elaboration of several CSN Safety Standards, in particular the IS-29, "Safety Criteria at Spent Fuel and High Level Waste Storage Facilities (Official Gazette of 2-11-2010) which addresses not only Spent Fuel and High Level Waste but also `Special Waste´, therein defined as:

> "fuel accessories […], reactor internals […] and that other waste which is not susceptible, given its radiological characteristics, of being managed at the L-I LW surface disposal facility (El Cabril)".

During the 2nd benchmarking, in the 30th Meeting some difficulties arose about the applicability of this IS-29 to graphite in Vandellós 1 NPP (currently undergoing a differed decommissioning process). The position shown by Spanish representatives in the 32nd Meeting is that the IS-29 applies also to graphite waste, given that the scope of this standard encompasses all waste not accepted in `El Cabril´ disposal facility. This position was accepted by the Group.

In addition, a new text for the SRL-47 was provided, which was also accepted. Therefore, after the 32nd meeting, the Spanish NAP table has been evaluated with all the 61 SRLs as A in both categories Spent Fuel and Waste, i.e. in full agreement with the Storage Report V-2.1 .

Results of the NAP Benchmarking (Spain)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	Royal Decree 1836/1999: Regulation on Nuclear and Radioactive Facilities, modified by Royal Decree 35/2008
S-11	**A**	IS-26: "Basic Nuclear Safety Requirements applicable to Nuclear Installations (June 2010)"
S-12	**A**	IS-26
S-13	**A**	IS-26
S-14	**A**	IS-26
S-16	**A**	IS-29 "CSN Safety Standard Safety Criteria for Spent Fuel and High Level Waste (Jul 2010)"
S-17	**A**	IS-29
S-18	**A**	IS-29
S-19	**A**	IS-29
S-20	**A**	IS-29
S-21	**A**	IS-29
S-22	**A**	IS-29
S-24	**A**	IS-29
S-25	**A**	IS-29
S-27	**A**	IS-29
S-28	**A**	IS-29
S-29	**A**	IS-29
S-30	**A**	IS-29
S-31	**A**	IS-29
S-32	**A**	IS-29
S-33	**A**	IS-29
S-34	**A**	IS-29
S-35	**A**	IS-20 "CSN Safety Standard Design Criteria for Spent Fuel Storage Casks (Feb 2003)"; IS-29
S-36	**A**	IS-29
S-37	**A**	Royal Decr. 1836/1999; IS-29
S-40	**A**	IS-29
S-41	**A**	IS-29
S-44	**A**	IS-29
S-45	**A**	IS-20
S-46	**A**	IS-20
S-47	**A**	IS-20
S-48	**A**	IS-20
S-49	**A**	IS-20
S-50	**A**	IS-20
S-51	**A**	IS-20
S-52	**A**	IS-20
S-53	**A**	IS-20
S-54	**A**	IS-20
S-55	**A**	IS-20
S-56	**A**	IS-20
S-57	**A**	IS-20
S-58	**A**	IS-29
S-59	**A**	IS-29
S-60	**A**	IS-26; IS-29
S-61	**A**	IS-26

Results of the NAP Benchmarking (Spain, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	Royal Decree 1836/1999: Regulation on Nuclear and Radioactive Facilities, modified by Royal Decree 35/2008
S-11	**A**	IS-26: "Basic Nuclear Safety Requirements applicable to Nuclear Installations"
S-12	**A**	IS-26
S-13	**A**	IS-26
S-14	**A**	IS-26
S-16	**A**	IS-29 "Safety Criteria for Spent Fuel and High Level Waste "
S-17	**A**	IS-29
S-18	**A**	IS-29
S-19	**A**	IS-29
S-20	**A**	IS-29
S-21	**A**	IS-29
S-22	**A**	IS-29
S-24	**A**	IS-29
S-25	**A**	IS-29
S-27	**A**	IS-29
S-28	**A**	IS-29
S-29	**A**	IS-29
S-30	**A**	IS-29
S-31	**A**	IS-29
S-32	**A**	IS-29
S-33	**A**	IS-29
S-34	**A**	IS-29
S-35	**A**	IS-29
S-36	**A**	IS-29
S-37	**A**	Royal Decree 1836/1999, IS-29
S-39	**A**	Royal Decree 1836/1999, IS-29
S-40	**A**	IS-29
S-41	**A**	IS-29
S-44	**A**	IS-29
S-45	**A**	IS-20 "Design Criteria for Spent Fuel Storage Casks"
S-46	**A**	IS-20
S-47	**A**	IS-29
S-48	**A**	IS-20
S-49	**A**	IS-29
S-50	**A**	IS-29
S-51	**A**	IS-29
S-52	**A**	IS-29
S-53	**A**	IS-29
S-54	**A**	IS-29
S-55	**A**	IS-29
S-56	**A**	IS-29
S-58	**A**	IS-29
S-59	**A**	IS-29
S-60	**A**	IS-26
S-61	**A**	IS-26

SWEDEN

Regulatory changes taken for the National Action Plan

The Swedish regulations on waste and spent fuel were updated and elaborated and taken in force on the first of November 2012. A lot of work was done to make sure that the WGWD Safety Reference Levels for waste and spent fuel storage was implemented in Swedish regulations.

The changes necessary to the Swedish regulations were mostly in the area of designing storage facilities in a manner that would facilitate retrievability, inspection, maintenance of the stored material. Also acceptance criteria needed to be implemented.

At the 29 WGDW meeting in Stockholm in September 2012, Sweden reported its regulatory implementations for benchmarking. All changes were approved with the sole exception of one reference to both waste and spent fuel storage concerning the SRL-50 regarding contingency arrangements for material that are not retrievable by normal means or show signs of degradation. This reference was prior to the 31 WGWD in Rome evaluated as 'Earmarked'. That SRL was addressed on the 31 WGDW in Rome, where sufficient information was provided and SRL-50 was benchmarked as an 'A'. Swedish regulations were now found to be in full agreement with the requirements mandated by the WGWD SRLs.

Results of the NAP Benchmarking (Sweden)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §9, SSMFS 2008:32 §§ 10-13
S-11	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §8
S-12	**A**	SSMFS 2008:1 (rev. 2011:3) CH1 §1, CH2 §8 CH5 §2
S-13	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §8
S-14	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §§8-9
S-15	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §10 AR, CH8, SSMFS 2008:3 and SSMFS 2008:38
S-17	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §10 AR, CH8, SSMFS 2008:3 and SSMFS 2008:38
S-18	**A**	SSMFS 2008:3 and COUNCIL REGULATION (EC) No 1334/2000
S-20	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-21	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-27	**A**	SSMFS 2008:1 (rev. 2011:3) AR APP3
S-32	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §§1-2
S-33	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-34	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-35	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-36	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-37	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §12
S-39	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §13
S-48	**A**	SSMFS 2008:1 (rev. 2011:3) CH5 §3, AR CH6 §2
S-49	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §12
S-50	**A**	SSMFS 2008:1 (rev. 2011:3) AR CH6 §2
S-52	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §11
S-53	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §11
S-54	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §12
S-57	**A**	SSMFS 2008:1 (rev. 2011:3) CH4 §2
S-58	**A**	SSMFS 2008:1 (rev. 2011:3) CH4 §§2,4,5
S-60	**A**	The Act on Nuclear Activities §10 a

Results of the NAP Benchmarking (Sweden, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §9, SSMFS 2008:32 §§ 10-13
S-11	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §8
S-12	**A**	SSMFS 2008:1 (rev. 2011:3) CH1 §1, CH2 §8 CH5 §2
S-13	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §8
S-14	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §9
S-18	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §10 and SSMFS 2008:38
S-20	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-21	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-22	**A**	SSMFS 2008:1 (rev. 2011:3) CH3, CH6 §2
S-27	**A**	SSMFS 2008:1 (rev. 2011:3) AR APP3
S-32	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §§1-2
S-33	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-34	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-35	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-36	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §2
S-37	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §12
S-39	**A**	SSMFS 2008:1 (rev. 2011:3) CH2 §13
S-48	**A**	SSMFS 2008:1 (rev. 2011:3) CH5 §3, AR CH6 §2
S-49	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §12
S-50	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §4
S-52	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §11
S-53	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §11
S-54	**A**	SSMFS 2008:1 (rev. 2011:3) CH6 §12
S-57	**A**	SSMFS 2008:1 (rev. 2011:3) CH4 §2
S-58	**A**	SSMFS 2008:1 (rev. 2011:3) CH4 §§2,4,5
S-60	**A**	The Act on Nuclear Activities §10 a

SWITZERLAND

Regulatory changes taken for the National Action Plan

Before benchmarking WENRA, safety reference levels requirements on interim storage facilities as formulated in the nuclear energy act and the nuclear energy ordinance have not been detailed in a specific regulatory guide with the exception of a guide addressing specifically spent fuel dry storage facilities (HSK-R-52). This is why most general SRLs could be rated A at first hand whereas most of the C-ratings refer to more specific reference levels which, according to Swiss regulatory principles, should be reserved to be detailed in regulatory guides.

As the old guide on dry storage of spent fuel had to be updated anyway, this procedure has been used to widen the scope of this guide in order to address also wet storage of spent fuel as well as storage of any other radioactive waste. Most C-ratings could be addressed in this new regulatory guide ENSI-G04: "*Design and operation of storage facilities for radioactive waste and spent fuel*" which has been published March 1st, 2012.

Some of the C-ratings on emergency preparedness are covered by the regulatory guide ENSI-B12: *"Emergency preparedness in nuclear facilities*". Although this guide had already been published before the first benchmarking exercise it had not been considered to the full extend applicable.

Those C-ratings which referred to human and organizational factors have been considered in the update of the already existing regulatory guide ENSI-G07 "*Organization of nuclear facilities*" which has been published June 28th, 2013. However even the previous version of this guide already covered the SRL requirements as this only was relevant for the management system related SRLs, which were marked as "unclear" in the translation procedure from SRLs in Version 1 of the report to SRLs in the up-to-date Version 2.

Results of the NAP Benchmarking (Switzerland)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-06	**A**	Reg Guide G04
S-10	**A**	No changes necessary
S-11	**A**	Reg. Guide G04 and G07
S-12	**A**	Reg. Guide G07
S-13	**A**	Reg. Guide G07
S-14	**A**	Reg. Guide G07
S-16	**A**	Reg. Guide G04
S-27	**A**	Reg. Guide G04
S-33	**A**	Reg. Guide G04
S-34	**A**	Reg. Guide G04
S-35	**A**	Reg. Guide G04
S-37	**A**	Ordinance SR 732.112.2
S-38	**A**	Reg. Guide B12
S-39	**A**	Reg. Guide B11
S-43	**A**	Reg. Guide G04; Reg. Guide A04
S-44	**A**	Reg. Guide G04
S-47	**A**	Reg. Guide G04
S-48	**A**	Reg. Guide G04
S-49	**A**	Reg. Guide G04 and G07
S-50	**A**	Reg. Guide G04
S-51	**A**	Reg. Guide G04
S-54	**A**	Reg. Guide G04
S-57	**A**	NEO
S-58	**A**	Reg. Guide G04
S-59	**A**	Reg. Guide G04
S-60	**A**	Reg. Guide G04
S-61	**A**	Reg. Guide G04

Results of the NAP Benchmarking (Switzerland, cont.)

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-06	**A**	Reg. Guide G04
S-10	**A**	No changes necessary
S-11	**A**	Reg. Guide G04 and G07
S-12	**A**	Reg. Guide G07
S-13	**A**	Reg. Guide G07
S-14	**A**	Reg. Guide B05
S-22	**A**	Reg. Guide G04, ch. 6.1.1
S-27	**A**	Reg. Guide G04; Reg. Guide B05
S-29	**A**	Reg. Guide G04
S-33	**A**	Reg. Guide G04
S-34	**A**	Reg. Guide G04
S-35	**A**	Reg. Guide G04
S-36	**A**	Reg. Guide G04
S-37	**A**	Ordinance SR 732.112.2
S-38	**A**	Reg. Guide B12
S-39	**A**	Reg. Guide B11
S-43	**A**	Reg. Guide G04; Reg. Guide A04
S-44	**A**	Reg. Guide G04
S-47	**A**	Reg. Guide G04
S-48	**A**	Reg. Guide G04
S-49	**A**	Reg. Guide G04 and G07
S-50	**A**	Reg. Guide G04
S-54	**A**	Reg. Guide G04
S-57	**A**	NEO
S-58	**A**	Reg. Guide G04
S-59	**A**	Reg. Guide G04
S-60	**A**	Reg. Guide G04
S-61	**A**	Reg. Guide G04

UNITED KINGDOM

Regulatory changes taken for the National Action Plan

The initial benching for the storage SRLs showed that the UK regulatory system was largely compliant with the SRLs, as there were only 6 SRLs in category C out of a total of 77. Since the original benchmarking the Office for Nuclear Regulation (ONR) has produced a new suite of guidance for radioactive waste, in conjunction with the UK's environmental regulators (i.e. the Joint Guidance on the management of higher activity radioactive waste on nuclear licensed sites, from the Health and Safety Executive, the Environmental Agency and Scottish Environmental Protection Agency to nuclear licensees). ONR has also reviewed and updated its Technical Assessment Guides (TAGs) and Technical Inspection Guides (TIGs). A new Technical Assessment Guide on the management of spent fuel has also been produced. The ONR Safety Assessment Principles are currently under review.

The table below shows how the storage SRLs originally marked as category C have been addressed in the UK regulatory system. The table also addresses those SRLs which have been re-benchmarked because the SRLs were significantly re-worded after the original benchmarking. The evidence to support the categorisation has been peer reviewed by the WGWD. The UK's regulatory system is therefore fully compliant with the storage SRLs.

The above statement and the table below apply to the legal benchmarking of the storage SRLs with respect to both radioactive waste and spent fuel.

Results of the NAP Benchmarking (United Kingdom)

Spent Fuel Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-11	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-12	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-13	**A**	Updated regulatory guidance on management systems
S-14	**A**	Updated regulatory guidance on management systems
S-31	**A**	New regulatory guidance (Joint Guidance on Radioactive Waste)
S-37	**A**	New evidence from Licence Conditions and Safety Assessment Principles and regulations
S-43	**A**	Updated guidance on licence conditions

Waste Storage

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
S-10	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-11	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-12	**A**	New evidence from Licence Conditions and Safety Assessment Principles
S-13	**A**	Updated regulatory guidance on management systems
S-14	**A**	Updated regulatory guidance on management systems
S-31	**A**	New regulatory guidance (Joint Guidance on Radioactive Waste)
S-37	**A**	New evidence from Licence Conditions and Safety Assessment Principles and regulations
S-43	**A**	Updated guidance on licence conditions

WENRA
WESTERN EUROPEAN NUCLEAR REGULATORS ASSOCIATION

RHWG
REACTOR HARMONISATION WORKING GROUP

WGWD
WORKING GROUP ON WASTE AND DECOMISSIONING