Western European
WENRA WGWD
Nuclear Regulators Association

Report

Decommissioning Safety Reference Levels

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Version 2.2

22 April 2015

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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 objective 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 Harmonisation 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 decommissioning of nuclear installations. The objective of this report is to provide safety reference levels for decommissioning activities, which are based on corresponding documents (requirements, guidance, etc.) of the International Atomic Energy Agency (IAEA).

This document was prepared by the WENRA WGWD, based on the previous version 1.0 of March 2007, taking into account results from the national benchmarking processes for version 1.0, in particular the implementation of the safety reference levels in the national legal and regulatory framework. It is also taken into account results from the stakeholder involvement performed in early 2012

Point 3 of this report describes the process by which the SRLs have been updated since version 1.0. It also describes benchmarking process and the status of the country-specific national action plans which have been developed to incorporate the SRLs in each countries national regulatory framework.

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25.03.2015

Terms Of Reference

of the

WESTERN EUROPEAN NUCLEAR REGULATORS´ ASSOCIATION

(WENRA)

1. We, the Heads of Nuclear Regulatory Authorities (signatories) of European countries with nuclear power plants:

   - drawing from the experience already gained with WENRA and noting its achievements,
   - recognizing that the current regulatory challenges in Europe lead to envisage the activities of WENRA in a broader perspective,
   - re-affirming the need for increased co-operation between us, and
   - maintaining our independence,

   have again revised the previous Terms of Reference of the Western European Nuclear Regulators´ Association (WENRA), which were signed on 4 February 1999 and revised on 14 March 2003 and on 26 March 2010.

2. With the general aim of improving nuclear safety, has the following objectives:

   - to build and maintain a network of chief nuclear safety regulators in Europe,
   - to promote exchange of experience and learning from each others best practices,
   - to develop a harmonized approach to nuclear safety and regulation, in particular within the European Union,
   - to discuss and, where appropriate, express its opinion on significant safety and regulatory issues.

3. Decisions in the name of WENRA are taken by consensus.

4. WENRA will keep the European Union Institutions informed about its activities, and is prepared to consider requests from these institutions for advice on nuclear safety and regulatory matters.

5. Heads of the regulatory authorities (or corresponding) in other European countries, which have expressed an interest, are invited as observers to WENRA. Observers have the right to express their opinion at the WENRA meetings but can not participate in the decision making. Observers may send suitably qualified participants to the working groups.

6. WENRA will develop and maintain, when appropriate, suitable relations with regulatory authorities from other countries as well as with international organisations.

7. WENRA will ensure appropriate opportunities for stakeholders to comment on its work.

25.03.2015

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Glossary

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Ageing

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

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

Decommissioning

Administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility (except for a repository or for certain nuclear facilities used for the disposal of residues from the mining and processing of radioactive material, which are 'closed' and not 'decommissioned'). For a repository, the corresponding term is closure.

Decommissioning plan

An initial or final document – depending on the operational phase of the facility - with detailed information about the concept and schedule for the decommissioning and dismantling of the nuclear facility.

> **Initial decommissioning plan** based on the decommissioning strategy includes the feasibility of decommissioning, main steps of the decommissioning/dismantling and the end state of the facility and is the basis for the estimation of decommissioning costs. This document is of general nature during the design and operational phase and will be updated during the operational phase to the level as appropriate.
>
> **Final decommissioning plan** as the basis to start major decommissioning activities shall be prepared before the beginning of the decommissioning phase together with the safety case. This detailed document will be updated as required during the decommissioning stages.

Decommissioning strategies

> **Immediate dismantling** is the strategy in which the equipment, structures and parts of a nuclear facility containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use, or with restrictions imposed by the regulatory body. In this case decommissioning implementation activities begin shortly after permanent cessation of operations. It implies prompt and complete decommissioning and involves the removal and processing of all radioactive material from the facility to another new or existing licensed nuclear facility for either long-term storage or disposal.

Deferred dismantling (sometimes called safe storage, safe store or safe enclosure) is the strategy in which parts of a nuclear facility containing radioactive contaminants are either processed or placed in such a condition that they can be safely stored and maintained until they can subsequently be decontaminated and/or dismantled to levels that permit the facility to be released for other uses. The period in which those parts are safely stored and maintained is the "period of deferment".

Entombment is the strategy in which radioactive contaminants are encased in a structurally long-lived material until radioactivity decays to a level permitting unrestricted release of the nuclear facility, or release with restrictions imposed by the regulatory body. Because radioactive material will remain on the site, this essentially means that the facility will eventually become designated as a near surface waste disposal facility as long as it can meet the requirements for a near surface disposal facility.

Decontamination

The complete or partial removal of contamination by a deliberate physical, chemical or biological process.

Discharge, authorized

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

Emergency

A non-routine situation that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment. This includes nuclear and radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard.

Nuclear or radiological emergency. An emergency in which there is, or is perceived to be, a hazard due to:

(a) The energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; or

(b) Radiation exposure.

Points (a) and (b) approximately represent nuclear and radiological emergencies, respectively. However, this is not an exact distinction.

Emergency Preparedness

The capability to take actions that will effectively mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.

End state

A predetermined criterion defining the point at which the specific task or process is to be considered completed. The licensee can apply for termination of the license when the proposed end-state of decommissioning activities has been reached.

Licensee

The licensee is the person or organization having overall responsibility for a facility or activity (the responsible organization)

Remark: WGWD recognizes that this organisation 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.

Monitoring

1. The measurement of dose or contamination for reasons related to the assessment or control of exposure
2. Continuous or periodic measurement of radiological or other parameters or determination of the status of a system, structure 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 nuclear 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.

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.

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 assessment

Assessment of all aspects of the site, design, operation and decommissioning of an authorized facility that are relevant to protection and safety.

Note: assessment should be distinguished from analysis. Assessment is aimed at providing information that forms the basis of a decision on whether or not something is satisfactory. Various kinds of analysis may be used as tools in doing this. Hence an assessment may include a number of analyses.

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 and a statement of confidence in these findings.

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.

Use

Authorized use: Use of radioactive materials or radioactive objects from an authorized practice in accordance with an authorization.

Restricted use: The use of an area or of materials, subject to restrictions imposed for reasons of radiation protection and safety. Restrictions would typically be expressed in the form of prohibition of particular activities (e.g. materials may only be recycled or reused within a facility).

Unrestricted use: The use of an area or of materials without any radiologically based restrictions.

List of abbreviations

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EU	European Union
IAEA	International Atomic Energy Agency
NPP	nuclear power plant
OLC	operational limits and conditions
PIE	postulated initiating events
RHWG	Reactor Harmonisation 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
WENRA	Western European Nuclear Regulators' Association
WGWD	Working Group on Waste and Decommissioning

Part 1
Introduction and Methodology

1.1 Introduction

The Decommissioning Safety Reference Level Report in version 2.0 is the result of an effort by the Working Group on Waste and Decommissioning of WENRA, from 2009 to 2011 to improve the version 1.0 of March 2007. The improvement is based on lessons learned from the benchmarking processes for version 1.0, especially on the implementation of the reference levels in the national legal and regulatory framework. Version 2.0 presents the safety reference levels (SRLs) for decommissioned facilities that are thought to be a good basis for future harmonisation 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.

The original objectives of the Association were:

- to develop a common approach to nuclear safety and regulation, in particular within the EU,
- 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 1st May 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:

- to develop an independent nuclear safety assessment capability, based on in-depth knowledge of nuclear installations, and
- to develop common approaches to nuclear safety and regulations and to encourage the harmonisation of practices.

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

1.1.2 Objective

The term "decommissioning" refers to administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a nuclear facility other than a repository. These actions involve decontamination, dismantling and removal of radioactive materials, waste, components and structures. They are carried out to achieve a progressive and systematic reduction in radiological hazards.

This report provides harmonised safety reference levels applicable during design, construction, operation and decommissioning of a nuclear facility to ensure a safe decommissioning process.

Although the SRLs in this report are oriented toward the licensees they can also be used by the regulatory body for the review and assessment of decommissioning activities safety.

These SRLs constitute the basis for a common approach to nuclear safety during decommissioning in the WENRA Member States and, based on national action plans, shall be implemented in the legal and regulatory framework system of each WENRA Member State. Detailed country-specific progress on these activities is presented in part III of the report.

1.1.3 Scope

The decommissioning SRLs apply to nuclear reactors (of any power), fuel reprocessing facilities, fuel manufacturing facilities, uranium concentration and conversion facilities, uranium enrichment facilities, research facilities involving nuclear material.
They may also be applied to waste storage facilities and other waste management facilities. These reference levels are not intended to be applicable to uranium mining and milling, and to isotope production facilities other than reactors.

The point at which decommissioning starts will vary from country to country depending on national arrangements, ranging from the decision to shut down the facility up to the beginning of dismantling activities.

For the purposes of this document, is assumed that the normal operational phase includes the removal of the bulk of fuel and radioactive materials from the facility in accordance with the safety case for normal operations. In certain cases part of the nuclear inventory of a facility is only removed after the start of decommissioning activities. In such case appropriate SRLs (e.g. for criticality control) for the operational phase of the facility remain applicable. The decommissioning phase is assumed to start technically once further operations cannot be carried out using normal operational methods or within the bounds of the safety case for normal operation. The decommissioning phase is usually governed by a specific decommissioning licence.

The decommissioning SRLs address mainly the radiological hazards resulting from the activities associated with the decommissioning of facilities, primarily with decommissioning after a planned shutdown. Non-radiological hazards can also arise during decommissioning activities. These hazards should be given due consideration during the planning process and in the risk analyses as far as they may influence the radiological hazards or risks.

Regulatory requirements for Environmental Impact Assessment (required by EU directives), waste disposal, conventional occupational health and safety, physical protection and decommissioning funding, are important for decommissioning. Aspects on waste disposal are addressed in a new Safety Reference Levels Report of the WGWD. The other matters are not always regulated by the WENRA members, but are addressed by other national regulatory organisations. As a result, WGWD did not take into account in detail these matters and has therefore concentrated on the nuclear safety requirements.

As this document is intended to cover a wide range of sites and facilities (from small isolated nuclear facility to large complex reprocessing or reactor sites), the SRLs will need to be implemented in different ways to be appropriate for the particular facility, taking into account the magnitude of the hazard in a graded approach. In accordance with that graded approach, the decommissioning strategies and plans necessary to ensure safety need to be commensurate with the type and status of the facility and the hazards associated with the decommissioning of the facility. Some SRLs apply to design and construction of a nuclear facility. In case of already existing nuclear facilities these SRLs need to be implemented by the licensee during and after the operational phase to achieve the safety objectives intended.

It should be noted, that some SRLs from other WENRA reports need to be considered during decommissioning, if spent fuel is still in the nuclear facility during decommissioning or storages for spent fuel or radioactive waste are part of the decommissioning project. Vice versa, some of the decommissioning related SRLs shall be considered during construction and operation of nuclear power plants and storage facilities and as such complement the related reports on safety reference levels.

1.1.4 Structure

The report consists of three main parts.

Following this Introduction in Part I of the report, Section I.-2 presents the general methodology that was followed to develop the version 2.1 of the SRLs.

Part II of the report presents the actual decommissioning safety reference levels.

Part III of the report describes the results of the benchmarking process and the undertaken or foreseen efforts of the WENRA Member States to implement these SRLs in the national legal and regulatory framework on the basis of national action plans.

1.2 Methodology

The objective of this report is to provide safety reference levels for decommissioning activities. This document contains the results of the work of WGWD in the area of the decommissioning of nuclear installations performed from 2009 to 2011 resulting in version 2.0 of November 2011 to improve the Decommissioning Safety Reference Levels Report, version 1.0 of March 2007, and the results from a stakeholder involvement, performed early 2012 on version 2.0.

For version 1.0 of the Decommissioning Safety Reference Levels report while considering their own experiences the WENRA WGWD members selected a set of requirements and recommendations from decommissioning related IAEA Safety Standards. From WENRA WGWD members' point of view the selected requirements and recommendations are those which they regarded as of prime importance for harmonisation on the European level and which address the licensee and are enforceable by the regulatory body. The SRLs of version 2.1 cover most of these specific requirements and recommendations stated in version 1.0 taking into account lessons learned from the national benchmarking processes on version 1.0, especially on the implementation of the safety reference levels in the national legal and regulatory framework and feedback from stakeholders, and the results from the stakeholder involvement on version 2.0.

In a benchmarking exercise the justification and evidence for implementation of each SRL was discussed country by country and agreed within WGWD in subgroups and/or panel discussions taking into account national action plans developed by the WENRA Member States in order to address identified discrepancies and to update their national regulations till the end of 2014. The progress of the national action plans is described in part III of this report, version 2.2.

Document / activity	Date	SRL-Version
Decommissioning report V 1.0; (only working document, never approved by WENRA-directors)	2007	1: 81 SRLs(D-nn)
Benchmarking with reference to V 1.0	2007-2009	1: 81 SRLs(D-nn)
Decommissioning report V 1.1 (restricted for use within WENRA only): identical to V 1.0 but including documentation of benchmarking results	2012	1: 81 SRLs(D-nn)
Decommissioning report V 1.2 (Public version): identical to V 1.1 but including anonymised benchmarking results	2012	1: 81 SRLs(D-nn)
Decommissioning report V 2.0: updated set of SRLs, approved by WENRA-directors	2011	2: 62 SRLs(D-nn)
Decommissioning report V 2.1: based on V 2.0 and taking into account results of a stakeholder involvement process performed in early 2012	2012	2: 62 SRLs(D-nn)
Re-benchmarking with reference to results of national action plans and consideration of modified SRL-set of version 2	2013-2015	2: 62 SRLs(D-nn)
Decommissioning report V 2.2: identical to V 2.1 but including country-specific information on NAP-status	2015	2: 62 SRLs(DE-nn)*
**modified SRL-labelling: D-nn changed to DE-nn (not to confuse with disposal SRLs)*		

Part 2
Decommissioning Safety Reference Levels

2.1 Safety area: Safety management

This safety area covers selected elements of a management system as required by GS-R-3. Especially safety issue 1.4 covers some requirements on the implementation of a safety management system.

2.1.1 Safety issue: Responsibility

DE-01: A licensee[1] shall be responsible for all aspects of nuclear safety on the facility. The continuity of responsibility shall be ensured throughout operation and decommissioning.

*Related **IAEA** safety standards:*

... The operating organization shall also be responsible for all aspects of safety and environmental protection during the decommissioning activities.... (WS-R-5, para. 3.7)

DE-02: To fulfil its prime responsibility for safety during decommissioning 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)

DE-03: The ultimate responsibility for safety shall remain with the licensee, although it is permissible to delegate the performance of specific tasks to subcontractors. The licensee shall ensure that the work of contractors is appropriately controlled so that it is conducted safely.

*Related **IAEA** safety standards:*

The ultimate responsibility for safety shall remain with the operating organization, although it is permissible to delegate the performance of specific tasks to a subcontractor. The decommissioning management shall ensure that the work of contractors is appropriately controlled so that it is conducted safely. ... (WS-R-5, para. 7.2)

[1] *Covers the possible change of licensee*

DE-04: In accordance with the national system the licensee or the owner shall provide financial assurances and resources to cover the costs associated with safe decommissioning, including management of resulting radioactive waste.

*Related **IAEA** safety standards:*

... The operating organization shall provide financial assurances and resources to cover the costs associated with safe decommissioning, including management of the resulting radioactive waste. (WS-R-5, para 3.7)

2.1.2 Safety issue: Organisational structure

DE-05: The licensee shall establish an organizational structure for the management and implementation of decommissioning, with the responsibility to ensure that decommissioning will be conducted safely.

*Related **IAEA** safety standards:*

An organization for the management and implementation of decommissioning shall be established as part of the operating organization, with the responsibility for ensuring that decommissioning will be conducted safely. ... (WS-R-5, para 7.1)

DE-06: The licensee shall assess the adequacy of the organisational structure, for safe and reliable decommissioning of the facility, and for ensuring an appropriate response in emergencies, on a regular basis and in particular, if there is a major change in the plant state or hazard.

*Related **IAEA** safety standards:*

A safety assessment should form an integral part of the decommissioning plan. The operating organization is responsible for preparing the safety assessment and submitting it for review by the regulatory body. The safety assessment should be commensurate with the complexity and potential hazard of the installation and, in case of deferred decommissioning, should take into account the safety of the installation during the period leading up to final dismantling. (WS-G-2.1, para 5.3)

In order to control all decommissioning activities, the operating organization should implement an effective management control system. This should include control of preparatory decommissioning activities (such as the installation of new safety systems) and recognition of the risks associated with the changing conditions that arise during decommissioning. (WS-G-2.4, para 7.7)

Administrative measures from the operational phase of the facility may be relevant to the decommissioning. These measures should be reviewed and modified to ensure that they are appropriate and, if necessary, additional administrative measures should be taken. … (WS-G-2.4, para 7.9)

DE-07: The licensee shall ensure that there is a clear allocation of authorities and responsibilities, together with the interfaces and communication routes that will be used especially when contractors or outside organizations are used.

Related **IAEA** safety standards:

… There should be a clear delineation of authorities and responsibilities, together with the interfaces and communication routes that will be used. This is particularly important when contractors or outside organizations are used. (WS-G-2.4, para 7.6)

DE-08: The licensee shall evaluate the skills needed for safe decommissioning and shall determine the minimum number and qualification requirements of staff responsible for safety at the various stages of decommissioning.

*Related **IAEA** safety standards:*

The skills needed for decommissioning shall be evaluated and the minimum requirements for qualifications of staff in each position shall be established. ... (WS-R-4, para 7.3)

Decommissioning may be carried out in a sequence of operations separated by one or more periods of time (i.e. phased decommissioning). Some of these periods (i.e. decommissioning phases) may consist of inactive, safe enclosure. In such cases of multiple decommissioning phases, the operating organization should submit to the regulatory body a description of:

(a)….
…
(e) the number of staff needed and their qualifications, during any period of deferment. (WS-G-2.1, para. 5.12)

2.1.3 Safety issue: Record and knowledge keeping

DE-09: The licensee shall ensure that sufficient knowledge of the facility and technical expertise is maintained during life time of the facility.
The licensee shall ensure that appropriate records and reports that are relevant to decommissioning (e.g. records on the use of the facility, events and incidents, radionuclide inventories, dose rates and contamination levels) shall be retained during life time of the facility. In this way, the design and modifications of the facility and its operating history will be identified and factored into the decommissioning plan.

*Related **IAEA** safety standards:*

Provision shall be made, as far as possible, to ensure that key staff are retained and that institutional knowledge about the facility is maintained and is accessible. Appropriate records and reports that are relevant to decommissioning (e.g. records on the use of the facility, events and incidents, radionuclide inventories, dose rates and contamination levels) shall be retained during the lifetime of the facility. In this way the design and modifications of the facility and its operating history will be identified and factored into the decommissioning plan. (WS-R-5, para 5.9).

DE-10: The licensee shall maintain an appropriate record system to ensure, before decommissioning, that the radioactive material contained in the facility at the end of the operational phase is accounted for. During decommissioning, this record system shall include an up-to-date inventory of the radioactive material contained in the facility.

*Related **IAEA** safety standards:*

Relevant documents and records shall be prepared by the operating organization, shall be kept for an agreed time and shall be maintained to a specified quality by appropriate parties before, during and after decommissioning. (WS-R-5, para 7.6)

2.1.4 Safety issue: Implementation of a management system

DE-11: The licensee shall establish, implement, assess and continually improve a management system. 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 coherently 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)

DE-12: The licensee shall ensure that the management system is applied to all phases of decommissioning taking into account the continuous change during decommissioning.

*Related **IAEA** safety standards:*

7.7. A comprehensive quality assurance programme under the operating organization's management system [7] shall be applied to all phases of decommissioning ... (WS-R-5, para 7.7)

DE-13: The licensee shall ensure, that 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 are identified, and their development are 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)

DE-14: The licensee shall ensure that the documentation of the management system includes the following:

- The policy statements of the licensee;
- A description of the management system;
- A description of the organisational structure of the licensee;
- 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 organisations;
- 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)*

2.2
Safety area: Decommissioning strategy and planning

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2.2.1 Safety issue: Facilitating decommissioning during design, construction and operational phase

DE-15: The licensee shall take account of the need to decommission a facility at the time it is being planned, designed, constructed and operated. Measures, including design features, contamination and activation control, shall be described and justified.

*Related **IAEA** safety standards:*

The responsibilities of the operating organization include:

- *Establishing a decommissioning strategy and preparing and maintaining a decommissioning plan throughout the lifetime of the facility;*
- *... (*WS-R-5, para 3.8)

DE-16: The licensee shall undertake a baseline survey, including radiological conditions of the site before construction, for comparison with the proposed end-state after decommissioning. For those practices for which such a baseline survey has not been done in the past, data from analogous, undisturbed areas with similar characteristics can be used instead of pre-operational baseline data.

*Related **IAEA** safety standards:*

A baseline survey of the site, including obtaining information on radiological conditions, shall be performed prior to construction and updated prior to commissioning of a new facility. This information will be used to determine background conditions during the end state survey. For those practices for which such a baseline survey has not been done in the past, data from analogous, undisturbed areas with similar characteristics shall be used instead of pre-operational baseline data. (WS-R-5, para 5.8)

2.2.2 Safety issue: Decommissioning strategy

DE-17: The licensee shall establish a decommissioning strategy for its facility. This decommissioning strategy shall be consistent with existing related national strategies and regulatory requirements, e. g. on decommissioning or radioactive waste management.

*Related **IAEA** safety standards:*

The responsibilities of the operating organization include:

- *Establishing a decommissioning strategy and preparing and maintaining a decommissioning plan throughout the lifetime of the facility;*
- *... (WS-R-5, para 3.8)*

... The strategy shall be consistent with national decommissioning and waste management policy. (WS-R-5, para 4.1)

DE-18: The decommissioning strategy shall be documented including a description of the options, overall timescales for the decommissioning of the facility and the end-state after completion of all decommissioning activities. The reasons for the preferred option shall be explained, and options not involving immediate dismantling shall be rigorously justified.

*Related **IAEA** safety standards:*

The preferred decommissioning strategy shall be immediate dismantling. There may, however, be situations where immediate dismantling is not a practical strategy when all relevant factors are considered. These factors may include: the availability of waste disposal or long term storage capacity for decommissioning waste; the availability of a trained workforce; the availability of funds; co-location of other facilities on the same site requiring decommissioning; technical feasibility; and optimization of the radiation protection of workers, the public and the environment. If the deferred dismantling or entombment strategy is chosen, the operating organization shall provide a justification for the selection. The operating organization shall also demonstrate that, for the selected strategy, the facility will be maintained in a safe configuration at all times and will be adequately decommissioned in the future and that no undue burdens will be imposed on future generations. (WS-R-5, para 4.2)

2.2.3 Safety issue: Facility decommissioning plan during design, construction and operational phases

DE-19: Based on the established decommissioning strategy the licensee shall establish an initial decommissioning plan for the facility. The details of the plan shall be commensurate with the type and status of the facility (graded approach).

*Related **IAEA** safety standards:*

The responsibilities of the operating organization include:

- *Establishing a decommissioning strategy and preparing and maintaining a decommissioning plan throughout the lifetime of the facility;*
- *... (WS-R-5, para 3.8)*

DE-20: The licensee shall submit the initial decommissioning plan to the regulatory body in support of the licence application for construction for a new facility.

*Related **IAEA** safety standards:*

An initial plan for decommissioning should be prepared and submitted by the operating organization in support of the licence application for the construction of a new reactor. Although the level of detail in the initial plan will necessarily be lower than that in the final decommissioning plan, many of the aspects listed in para. 5.11 should be considered in a conceptual fashion. A generic study showing the feasibility of decommissioning may suffice for this plan, particularly in standardized installations. Depending on applicable regulations, the plan should address the costs and the means of financing the decommissioning work. (WS-G-2.1, para 5.6)

DE-21: The initial decommissioning plan shall:

(a) take into account major safety issues;
(b) support the fact that decommissioning can be safely conducted using proven techniques or ones being developed;
(c) include a generic study showing the feasibility of decommissioning;
(d) include consideration of environmental aspects of decommissioning, such as management of waste and radioactive effluents;
(e) provide a basis to assess the costs of the decommissioning work and the means of financing it.

*Related **IAEA** safety standards:*

An initial plan for decommissioning shall be prepared which outlines the overall decommissioning process (Ref. [2], para. 3.13). This plan should be submitted by the operating organization to the regulatory body in support of the licence application for commissioning and/or operating the facility. This plan:

(a) Should take into account basic safety issues;
(b) Should support the fact that decommissioning can be safely conducted using proven techniques or ones being developed;
(c) Should include a generic study showing the feasibility of decommissioning;
(d) Should include consideration of environmental aspects of decommissioning, such as management of waste and radioactive effluents;
(e) Should address the costs of the decommissioning work and the means of financing it. (WS-G-2.4, para 5.6).

DE-22: If several facilities are located at the same site it shall be ensured that in each facility decommissioning plan any interactions and interdependencies between the facilities are taken into account.

*Related **IAEA** safety standards:*

For sites that house more than one facility, a global decommissioning programme shall be developed for the entire site to ensure that interdependences are taken into account in the planning for individual facilities. (WS-R-5, para 4.8)

DE-23: During operation the decommissioning plan shall be reviewed by the licensee regularly, at least as frequently as the periodic safety review, and shall be updated as required. These reviews of the decommissioning plan shall consider, in particular, changes in the facility operation experiences or regulatory requirements, and advances in technology to further evolve the decommissioning plan.

*Related **IAEA** safety standards:*

During the operation of a reactor, the decommissioning plan should be reviewed, updated and made more comprehensive with respect to technological developments in decommissioning, incidents that may have occurred, including abnormal events, amendments in regulations and government policy, and, where applicable, cost estimates and financial provisions. …. All significant systems and structural changes during plant operation should be reflected in the process of ongoing planning for decommissioning. (WS-G-2.1, para 5.8)

DE-24: The decommissioning plan shall be supported by an appropriate safety assessment for the decommissioning activities the details of which are commensurate with the type and status of the facility (graded approach).

*Related **IAEA** safety standards:*

…. The decommissioning plan should evolve with respect to safety considerations, based on operational experience and on information reflecting improved technology. All significant systems and structural changes during plant operation should be reflected in the process of ongoing planning for decommissioning. (WS-G-2.1, para 5.8)

The decommissioning plan shall be supported by an appropriate safety assessment covering the planned decommissioning activities and abnormal events that may occur during decommissioning. The assessment shall address occupational exposures and potential releases of radioactive substances with resulting exposure of the public. (WS-R-5, para 5.2)

DE-25: The decommissioning plan shall identify major existing systems and equipment that may be used during decommissioning to ensure that they are available when needed. The decommissioning plan shall also identify necessary changes or replacements of these existing systems. The decommissioning plan shall also identify the need for existing and new facilities to carry out decommissioning and waste management.

*Related **IAEA** safety standards:*

The existing facilities and equipment that will be used during decommissioning should be identified at an early stage in the initial planning phase. This will enable the necessary steps to be taken to ensure that the equipment is available when needed. (WS-G-2.4, para 5.7)

2.2.4 Safety issue: Final decommissioning plan[2]

DE-26: As soon as it has been decided to permanently shut down a nuclear facility, the licensee shall inform the regulatory body.

*Related **IAEA** safety standards:*

The operating organization shall inform the regulatory body prior to shutting down the facility permanently. ... (WS-R-5, para 8.2)

DE-27: If a facility is shut down and no longer used for its intended purpose, a final decommissioning plan shall be submitted to the regulatory body not later than two years after the shut down of the facility, unless an alternative schedule for the submission of the final decommissioning plan is specifically authorized by the regulatory body.

*Related **IAEA** safety standards:*

... If a facility is shut down and no longer used for its intended purpose, a final decommissioning plan[5)] shall be submitted for approval within two years of the cessation of the authorized activities, unless an alternative schedule for the submission of the final decommissioning plan is specifically authorized by the regulatory body. The operating organization shall not implement the decommissioning plan until the regulatory body has approved it. Any amendments to this plan shall also be submitted to the regulatory body for approval. The operating organization shall ensure that the facility is maintained in a safe configuration until the approval of the decommissioning plan. (WS-R-5, para 8.2)

5) The final decommissioning plan is that version of the decommissioning plan submitted for approval to the regulatory body prior to implementation of the plan. During implementation of this final plan revisions or amendments may subsequently be needed as the activity progresses.

DE-28: A final decommissioning plan shall

- be consistent with the decommissioning strategy proposed for the facility,
- be consistent with the safety case for decommissioning (ref. DE-50),
- describe the decommissioning activities, including the timeframe and the end-state of the decommissioning project, and the content of the individual phases, if a phased approach is applied,
- describe the facilities, systems and equipment needed to perform the decommissioning project,
- describe the organisational structure, skills and qualifications required for safe decommissioning,
- describe the management of residual material and waste in accordance with the national waste strategy, and
- describe the program of the final radiation survey of the end-state of decommissioning.

[2] *For explanations on the relation between the final decommissioning plan and the safety case for decommissioning please refer to appendix C.*

*Related **IAEA** safety standards:*

Prior to the implementation phase of decommissioning activities, a final decommissioning plan shall be prepared and submitted to the regulatory body for approval. This plan shall define how the project will be managed, including: the site management plan, the roles and responsibilities of the organizations involved, safety and radiation protection measures, quality assurance, a waste management plan, documentation and record keeping requirements, a safety assessment and an environmental assessment and their criteria, surveillance measures during the implementation phase, physical protection measures as required, and any other requirements established by the regulatory body. (WS-R-5, para 5.10)

The safety assessment for decommissioning should be consistent with the decommissioning plan [1, 9–11] and with other relevant national and site specific strategies and requirements, for example, with requirements for radioactive waste management and for the release of material and sites from regulatory control. (WS-G-5.2, para 2.2)

The experience from previous decommissioning should be appropriately taken into account as a matter of principle. The following list of items to be considered for the final decommissioning plan should thus be updated whenever previous decommissioning experience permits:

(a) a description of the nuclear reactor, the site and the surrounding area that could affect, and be affected by, decommissioning;

(b) the life history of the nuclear reactor, reasons for taking it out of service, and the planned use of the nuclear installation and the site during and after decommissioning;

(c) a description of the legal and regulatory framework within which decommissioning will be carried out;

(d) explicit requirements for appropriate radiological criteria for guiding decommissioning;

(e) a description of the proposed decommissioning activities, including a time schedule;

(f) the rationale for the preferred decommissioning option, if selected;

(g) safety assessments and environmental impact assessments, including the radiological and non-radiological hazards to workers, the public and the environment; this will include a description of the proposed radiation protection procedures to be used during decommissioning;

(h) a description of the proposed environmental monitoring programme to be implemented during decommissioning;

(i) a description of the experience, resources, responsibilities and structure of the decommissioning organization, including the technical qualification/skills of the staff;

(j) an assessment of the availability of special services, engineering and decommissioning techniques required, including any decontamination, dismantling and cutting technology as well as remotely operated equipment needed to complete decommissioning safely;

(k) a description of the quality assurance programme;

(l) an assessment of the amount, type and location of residual radioactive and hazardous non-radioactive materials in the nuclear reactor installation, including calculational methods and measurements used to determine the inventory of each;

(m) a description of the waste management practices, including items such as:

- *identification and characterization of sources, types and volumes of waste;*
- *criteria for segregating materials;*
- *proposed treatment, conditioning, transport, storage and disposal methods;*
- *the potential to reuse and recycle materials, and related criteria; and*
- *anticipated discharges of radioactive and hazardous non-radioactive materials to the environment;*

(n) a description of other applicable important technical and administrative considerations such as safeguards, physical security arrangements and details of emergency preparedness;

(o) a description of the monitoring programme, equipment and methods to be used to verify that the site will comply with the release criteria;

(p) details of the estimated cost of decommissioning, including waste management, and the source of funds required to carry out the work; and

(q) a provision for performing a final confirmatory radiological survey at the end of decommissioning. (WS-G-2.1, para 5.11)

2.2.5 Safety issue: Decommissioning plan update during decommissioning operations

DE-29: Depending on the timeframe of decommissioning, the decommissioning plan shall be reviewed regularly by the licensee during decommissioning operations, and shall be updated as required. These updates of the decommissioning plan are to reflect, in particular, changes in the decommissioning strategy, deviations from the scheduled program, experiences from ongoing decommissioning or changes of regulatory requirements and advances in technology.

*Related **IAEA** safety standards:*

The decommissioning plan shall be reviewed regularly and shall be updated as required to reflect, in particular, changes in the facility or regulatory requirements, advances in technology and, finally, the needs of the decommissioning operation. If an abnormal event occurs, a new decommissioning plan or modification of the existing decommissioning plan may be necessary. (WS-R-2. para 6.3).

During the implementation of the decommissioning plan, revisions or amendments may need to be made to the plan in the light of operational experience gained, new or revised safety requirements, or technological developments. (WS-R-2, para 6.4).

2.3 Safety area: Conduct of decommissioning

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2.3.1 Safety issue: Safety classification

DE-30: SSCs may be re-classified as they change in importance to safety in the course of decommissioning activities. The licensee shall reflect this re-classification in the safety case.

*Related **IAEA** safety standards:*

As part of the safety assessment, safety functions and their associated SSCs should be identified, both for planned decommissioning activities and for accident conditions, and their suitability and sufficiency should be demonstrated. The safety functions required to be fulfilled during decommissioning comprise a combination of safety functions that were needed during operation of the facility and additional functions that will be needed as a result of the specific decommissioning activities proposed (e.g. fire detection and suppression during cutting and grinding activities). The effects of decommissioning on the safety functions at adjacent facilities should also be evaluated. In addition, dismantling of major facility structures during decommissioning may involve the deliberate destruction and removal of engineered SSCs that had fulfilled specified safety functions during operation of the facility (e.g. containment, shielding, ventilation, cooling). If these safety functions are still required, the associated SSCs should be maintained in an appropriate state during decommissioning. If this is not practicable, these functions should be provided by suitable alternative means (e.g. tents, temporary facilities, fire systems, electrical systems, administrative procedures) for as long as is required on the basis of the safety assessment. The appropriateness of alternative means of fulfilling these functions should be demonstrated. Any change of safety functions during decommissioning should be justified in advance before its implementation. (WS-G-5.2, para 3.14)

Non-radiological as well as radiological hazards associated with the decommissioning activities should be identified and evaluated in the safety assessment. As a result of this assessment, the protective measures can be defined that will ensure that the regulatory requirements are met. These protective measures may require changes to the existing safety systems that were used during operation. The acceptability of such changes should be clearly justified in the safety assessment. … (WS-G-2.4, para. 5.14)

2.3.2 Safety issue: On-site emergency preparedness

If for the set of foreseeable accidents considered in 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. This site emergency plan can be based on the operational one but modified according to changed hazards during the decommissioning actions. The following SRLs therefore need to be applied in a proportionate manner.

DE-31: The licensee shall provide arrangements for responding effectively to reasonably foreseeable events requiring 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)

Emergency planning arrangements, commensurate with the hazards, shall be established and maintained and incidents significant to safety shall be reported to the regulatory body in a timely manner. Additional requirements for preparedness and response to emergencies are established in another IAEA publication [8]. (WS-R-5, para 8.7)

A programme for emergency planning shall be established (Ref. [2], para. 3.14) and described in the decommissioning plan. This programme should be subject to approval by the regulatory body. Operating organizations should ensure that procedures to deal with unforeseen events are prepared and are put in place. Personnel should be trained in emergency procedures. Provision should be made for regular testing and updating of these procedures by conducting exercises periodically. (WS-G-2.4, para 7.27)

DE-32: The licensee shall:

- prepare an on-site emergency plan as the basis for preparation and conduct of emergency measures,
- establish the necessary organizational structure for clear allocation of responsibilities, authorities and arrangements for coordinating on-site 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 needed to control an emergency are appropriate, reliable and available at the time.

*Related **IAEA** safety standards:*

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 the results of which arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training. (GS-R-2, para 5.31)

DE-33: During decommissioning, the licensee shall review and update as necessary the existing on-site emergency plan, so that it stays appropriate for current and future states of the facility. Experience from recent emergency exercises and reports on real emergency occurrences shall be taken into account.

Related IAEA safety standards:

Emergency planning arrangements, commensurate with the hazards, shall be established and maintained and incidents significant to safety shall be reported to the regulatory body in a timely manner. ... (WS-R-5, para 8.7)

"The operating organization [of a facility or practice in threat category I, II, III or IV] shall prepare an emergency plan that covers all activities under its responsibility, to be adhered to in the event of an emergency. This emergency plan shall be co-ordinated with those of all other bodies having responsibilities in an emergency, including public authorities, and shall be submitted to the regulatory body." (Ref. [12], para. 2.31.) (NS-R-2, para 5.19)

DE-34: The licensee shall perform at regular intervals on-site emergency exercises, the results of which shall be reported to the regulatory body. Some of these exercises shall include the participation to the extent possible of external organizations concerned with on-site emergency.

*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)

Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III and the national level programmes for threat category IV or V are tested at suitable intervals[84, 85]. These programmes shall include the participation in some exercises of as many as possible of the organizations concerned. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body. The programme shall be subject to review and updating in the light of experience gained (see paras 3.8, 3.16, 5.37 and 5.39 for further requirements in relation to exercises) (GS-R-2, para 5.33).

2.3.3 Safety issue: Decommissioning experience feedback

DE-35: The licensee shall establish and implement experience feedback arrangements to collect, screen, analyse and document experience and events at the facility in a systematic way to improve and ensure safe decommissioning. Relevant experience and events reported by other facilities shall also be considered as appropriate.

*Related **IAEA** safety standards:*

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 coherently 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, para 3.12).

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. ... (SF-1, para 3.16).

... 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).

DE-36: To prevent recurrence and to counteract developments adverse to safety the licensee shall ensure that results are obtained, that conclusions are drawn, measures are taken, good practices and advances in technology are considered and that timely and appropriate corrective actions are implemented.

*Related **IAEA** safety standards:*

The causes of non-conformances shall be determined and remedial actions shall be taken to prevent their recurrence. (NS-R-3, para 6.11)

Products and processes that do not conform to the specified requirements shall be identified, segregated, controlled, recorded and reported to an appropriate level of management within the organization. The impact of non-conformances shall be evaluated and non-conforming products or processes shall be either:

- *Accepted;*
- *Reworked or corrected within a specified time period; or*
- *Rejected and discarded or destroyed to prevent their inadvertent use. (NS-R-3, para 6.12)*

Corrective actions for eliminating non-conformances shall be determined and implemented. Preventive actions to eliminate the causes of potential non-conformances shall be determined and taken. (NS-R-3, para 6.14)

In many organizations there are several processes to control nonconforming products or processes, for example product inspections. The process or processes should include provisions to prevent the inadvertent use or installation of products or processes that do not conform and to ensure that effective corrective action is taken. (GS-G-3.1, para 6.50)

DE-37: Following any abnormal event during decommissioning which is significant for safety the licensee shall carry out an investigation and implement corrective measures to prevent a recurrence and to recover an appropriate level of safety as defined by the safety case for decommissioning.

*Related **IAEA** safety standards:*

Following any abnormal event, the operating organization shall revalidate the safety functions and functional integrity of any component or system which may have been challenged by the event. Necessary remedial shall include inspection, testing and maintenance as appropriate (NS-R-2, 6.9)

2.3.4 Safety issue: Waste management

Waste from decommissioning shall be safely managed using appropriate routes with respect to their nature and characteristics that have to be determined as soon as possible. Procedures shall be implemented so that waste is segregated as soon as possible to avoid mixing of waste of different natures so as to optimize their management. Whenever categories of waste exit in the national waste management system, procedures shall be such that the waste is segregated in accordance with these categories.

DE-38: The licensee shall develop, document and implement arrangements to characterise, segregate and manage the particularly large quantities and different types of radioactive waste and of other material that are produced during decommissioning, in accordance with the requirements set by the national regulatory authority and with the national waste management strategy.

*Related **IAEA** safety standards:*

Decommissioning of nuclear reactors invariably involves the generation of large amounts of radioactive wastes. In the course of decommissioning, waste will be generated in forms that are different from materials and wastes of the types routinely handled during the operational phase of a nuclear power plant or research reactor. Subject to safety considerations, "generation of radioactive waste shall be kept to the minimum practicable". …. (WS-G-2.1, para 2.20)

DE-39: The licensee shall develop, document and implement optimized arrangements to segregate radioactive waste and reduce its volume in accordance with the requirements set by the national legal framework and with the national waste management strategy.

*Related **IAEA** safety standards:*

… For example, appropriate decontamination and dismantling techniques and the reuse or recycling of materials can reduce the waste inventory. (WS-G-2.1, para 2.20)

A large part of the waste and other materials arising during the decommissioning process may be sufficiently low in activity concentration for regulatory control to be wholly or partly removed. Some waste may be suitable for disposal in normal landfill sites, while some materials such as steel and concrete may be suitable for recycling or reuse outside the nuclear industry. The removal of regulatory controls should be accomplished in compliance with criteria established by the national regulatory body. (WS-G-2.4, para 7.21)

DE-40: The licensee shall keep accurate records of any radioactive decommissioning waste and material removed from regulatory control. The records shall be kept in accordance with national records retention requirements.

*Related **IAEA** safety standards:*

On completion of decommissioning, appropriate records should be retained. In accordance with the national legal framework, these will be held and maintained for purposes such as confirmation of completion of decommissioning activities in accordance with the approved plan, recording the disposal of wastes, materials and premises, and responding to possible liability claims. (WS-G-2.1, para 8.1)

A final decommissioning report shall be prepared (Ref. [2], para. 6.13), on the basis of the records assembled, and should contain the following information:

(a) ...

(g) An inventory of radioactive materials, including amounts and types of waste generated during decommissioning and their locations for storage and/or disposal;

(h) An inventory of non-radioactive materials, including amounts and types of waste generated during decommissioning and their locations for storage and/or disposal;

(i) An inventory of materials, equipment and premises released from regulatory control;

(o) ... (WS-G-2.4, para 8.2)

2.3.5 Safety issue: On-site and off-site monitoring

DE-41: Due to the changes of the facility, specific hazards and effluents associated with decommissioning, the licensee shall apply, review and modify as necessary its on- and off-site monitoring program.

*Related **IAEA** safety standards:*

The radiation protection programme should be clearly set out in the decommissioning plan. Those involved in its execution should be properly trained and have access to appropriate equipment for carrying out radiation surveys, including equipment for measuring external dose rates and surface contamination levels and for sampling air concentrations. (WS-G-2.1, para 7.14)

All decommissioning work should be planned and carried out using work order procedures and radiation work permits, with adequate involvement of radiation protection expertise to determine the required radiation protection measures. Moreover, the promotion of awareness of safety issues should be accorded high emphasis in planning and implementation. Those charged with the day to day responsibility for radiation protection should have the resources, access to decommissioning management and independence necessary to effect an adequate radiation protection programme. (WS-G-2.1, para 7.15)

The decommissioning plan should specify the requirement for on-site and off-site monitoring during decommissioning. On-site monitoring should provide information to identify and assist in mitigating the radiological hazards. It should also be used in the planning of specific decommissioning activities. It should ensure that all potential release points are monitored. On-site monitoring should consist not only of personnel monitoring but also of spatial monitoring for airborne contaminants, such as, having:

(a) appropriate monitoring equipment for dose rate and contamination surveys for workplaces, components and materials during decontamination, dismantling and handling;

(b) appropriate monitoring protocols and equipment for packaging and handling of radioactive waste within the site, as well as for transportation of the waste offsite;

(c) appropriate monitoring equipment for airborne contaminants;

(d) appropriate monitoring equipment for timely screening of large quantities of low level radioactive material for clearance purposes; and

(e) appropriate equipment and protocols to monitor the distribution of radionuclides in the installation(WS-G-2.1, para 7.16).

The off-site monitoring programme inherited from the operational period will require modification appropriate to the conditions existing during decommissioning. Discharges of radionuclides via airborne and liquid pathways should be controlled, monitored and recorded, as required by the regulatory body or other relevant competent authority. Relevant recommendations are provided in Refs [11, 12, 22]. (WS-G-2.1, para 7.17)

2.3.6 Safety issue: Maintenance, Testing and Inspection

DE-42: The licensee shall prepare, and implement documented programmes for maintenance, testing, surveillance and inspection of SSCs and other equipment significant to safety to ensure that their availability, reliability and functionality remain in accordance with the safety case for decommissioning. The programmes shall take into account operational limits and conditions (OLCs) and be re-evaluated in the light of experience and the continuous changes of the facility during decommissioning.

*Related **IAEA** safety standards:*

The operating organization shall prepare and implement a programme of maintenance, testing, surveillance and inspection of those structures, systems and components which are important to safety. This programme shall be in place prior to fuel loading and shall be made available to the regulatory body. It shall take into account operational limits and conditions as well as any other applicable regulatory requirements and it shall be re-evaluated in the light of experience. (NS-R-2, para 6.1)

The maintenance, testing, surveillance and inspection of all plant structures, systems and components important to safety shall be to such a standard and at such a frequency as to ensure that their levels of reliability and effectiveness remain in accordance with the assumptions and intent of the design throughout the service life of the plant. (NS-R-2, para 6.2)

Effective maintenance, surveillance and inspection (MS&I) are essential for the safe operation of a nuclear power plant. They ensure not only that the levels of reliability and availability of all plant structures, systems and components (SSCs) that have a bearing on safety remain in accordance with the assumptions and intent of the design, but also that the safety of the plant is not adversely affected after the commencement of operation. (NS-G-2.6, para 1.1)

The maintenance programme for a nuclear power plant should cover all preventive and remedial measures, both administrative and technical, that are necessary to detect and mitigate degradation of a functioning SSC or to restore to an acceptable level the performance of design functions of a failed SSC. The purpose of maintenance activity is also to enhance the reliability of equipment. The range of maintenance activities includes servicing, overhaul, repair and replacement of parts, and often, as appropriate, testing, calibration and inspection. (NS-G-2.6, para 2.1)

DE-43: The licensee shall address the ageing of SSCs and other equipment significant to safety by establishing, if necessary, provisions for their maintenance, testing and inspection.

*Related **IAEA** safety standards:*

The safety assessment in itself cannot achieve safety. Safety can only be achieved if the input assumptions are valid, the derived limits and conditions are implemented and maintained, and the assessment reflects the facility or activity as it actually is at any point in time. Facilities and activities change and evolve over their lifetimes (e.g. through construction, commissioning, operation, and decommissioning and dismantling or closure) and with modifications, improvements and effects of ageing. Knowledge and understanding also advance with time and experience. The safety assessment has to be updated to reflect such changes and to remain valid. Updating of the safety assessment is also important in order to provide a baseline for the future evaluation of monitoring data and performance indicators and, for facilities for the storage and disposal of radioactive waste, to provide an appropriate record for reference with regard to future use of the site. (GSR-Part 4, para 5.2)

Ageing management of SSCs important to safety should be implemented proactively (with foresight and anticipation) throughout the plant's lifetime, i.e. in design, fabrication and construction, commissioning, operation (including long term operation and extended shutdown) and decommissioning. (NS-G-2.12, para 3.1)

DE-44: The licensee shall record, store, analyse and review data on maintenance, testing, surveillance, inspection of SSCs and other equipment relevant for safety. Where necessary corrective measures such as repair, replacement or changes in the maintenance programme shall be implemented.

*Related **IAEA** safety standards:*

Data on maintenance, testing, surveillance and inspection shall be recorded, stored and analysed to confirm that performance is in accordance with design assumptions and with expectations on equipment reliability. (NS-R-2, para 6.10)

The operating organization should monitor the performance or condition of SSCs against the goals it has set to provide reasonable assurance that the SSCs are capable of performing their intended function.(NS-G- 2.6, para 2.7)

A brief but complete review of the repairs carried out should be made and documented. This review should explicitly identify the cause of failure, the remedial action taken, the component that failed and its mode of failure, the total repair time and, if different, the outage time and, finally, the state of the system after repair. Even if a system is found to be within its calibration limits, this fact should be recorded, together with details of any replacement or any adjustment carried out at the discretion of maintenance personnel. (NS-G-2.6, para 5.32)

... For major failures of components important to safety, a root cause analysis should be carried out in order to prevent recurrence. (NS-G-2.6, para 8.47).

A common database should be established in order to share relevant data and evaluations of results among the organizations that are involved in the planning and implementation of MS&I activities. (NS-G-2.6, para 2.16)

An adequate condition monitoring programme should be established in support of optimisation of the maintenance programme. Such a monitoring programme should be based on the following assumptions as a minimum:

- *that the monitored parameters are appropriate indicators for the condition of the SSCs,*
- *that acceptance criteria are available,*
- *that all potential failure modes are addressed,*
- *that the behaviour of the potential failure is traceable and predictable. (NS-G-2.6, para 2.8)*

The maintenance group should periodically review the maintenance records for evidence of incipient or recurring failures. When a need for remedial maintenance is identified, either in this review or during preventive maintenance of the plant, the maintenance group should initiate remedial maintenance in accordance with the administrative procedures mentioned above. If appropriate, the preventive maintenance programme should be revised accordingly (NS-G-2.6, 8.48).

2.3.7 Safety issue: Control of decommissioning activities

DE-45: The licensee shall control decommissioning operations through the use of written and approved procedures. The licensee shall make and implement arrangements for issuing, modifying and terminating work procedures as part of the management system.

*Related **IAEA** safety standards:*

Decommissioning tasks shall be controlled through the use of written procedures. These procedures shall be subject to review and approval by the appropriate organizations responsible for ensuring safety and practicability. A methodology for issuing, modifying and terminating work procedures shall be established. (WS-R-5, para 7.5)

DE-46: No decommissioning activity shall be undertaken without a prior assessment of its impact on safety taking into account the postulated initiating events with internal causes included in the safety case for decommissioning. Due consideration shall be given to different decommissioning activities executed in parallel which might adversely effect safety of each other.

DE-47: The licensee shall control modifications of planned decommissioning activities according to their safety significance thereby ensuring that they do not compromise the safety of decommissioning activities.

*Related **IAEA** safety standards:*

In order to control all decommissioning activities, the operating organization should implement an effective management control system. This should include control of preparatory decommissioning activities (such as the installation of new safety systems) and recognition of the risks associated with the changing conditions that arise during decommissioning (WS-G-2.4, para 7.7).

... The management system should provide assurance that:

...

(h) Appropriate updating and maintenance of safety assessments are performed with due consideration of: changes in the state of the facility as decommissioning progresses; the decommissioning plan; the acquisition of new knowledge; new regulatory concerns; updates of the inventory on the basis of data from sampling and environmental monitoring; measurements of occupational doses; and radioactive releases during decommissioning activities; (WS-G-5.2, para 3.34)

2.3.8 Safety issue: Period of Deferment

DE-48: In case of deferred dismantling the licensee shall make the facility passively safe as far as it is reasonably practicable before entering the period of deferment, so as to minimize the need for active safety systems, monitoring, and human intervention in order to ensure safety.

*Related **IAEA** safety standards:*

If the deferred dismantling strategy has been selected, it shall be demonstrated in the decommissioning plan that such an option will be implemented safely and will require minimum active safety systems, radiological monitoring and human intervention and that future requirements for information, technology and funds have been taken into consideration. The potential aging and deterioration of any safety related equipment and systems shall also be considered (WS-R-5, para 5.14).

DE-49: Before the start of the period of deferment, the licensee shall develop an adequate care-and-maintenance program, the implementation of which ensures safety and does not impair future decommissioning.

*Related **IAEA** safety standards:*

Maintenance may be important during deferred decommissioning since part of the safety of the installation may rely on systems that have to retain their capability to perform for extended periods of time. Periodical monitoring of all the safety related components of the installation should be incorporated into the decommissioning plan. *(WS-G-2.1 para 6.21)*

2.4
Safety area: Safety verification

-

2.4.1 Safety issue: Contents, review and update of the safety case for decommissioning[3]

DE-50: The licensee shall provide a safety case, which addresses all issues relevant for safety during decommissioning (for typical contents refer to appendix A). It shall be used as the basis for assessing the safety implications of changes to the facility or to decommissioning practices.

In particular the safety case shall address:

- dynamic changes in facility state,
- new or modified installations, systems and equipment,
- management of large quantities of radioactive material,
- conventional safety and radiation protection issues from demolition and dismantling and also the unusual working environment.

*Related **IAEA** safety standards:*

The decommissioning plan shall be supported by an appropriate safety assessment covering the planned decommissioning activities and abnormal events that may occur during decommissioning. The assessment shall address occupational exposures and potential releases of radioactive substances with resulting exposure of the public. (WS-R-5, para 5.2)

The experience from previous decommissioning should be appropriately taken into account as a matter of principle. The following list of items to be considered for the final decommissioning plan should thus be updated whenever previous decommissioning experience permits:

(a) a description of the nuclear reactor, the site and the surrounding area that could affect, and be affected by, decommissioning;

(b) the life history of the nuclear reactor, reasons for taking it out of service, and the planned use of the nuclear installation and the site during and after decommissioning;

(c) a description of the legal and regulatory framework within which decommissioning will be carried out;

(d) explicit requirements for appropriate radiological criteria for guiding decommissioning;

(e) a description of the proposed decommissioning activities, including a time schedule;

(f) the rationale for the preferred decommissioning option, if selected;

[3] *For explanations on the relation between the final decommissioning plan and the safety case for decommissioning please refer to appendix C*

(g) safety assessments and environmental impact assessments, including the radiological and non-radiological hazards to workers, the public and the environment; this will include a description of the proposed radiation protection procedures to be used during decommissioning;

(h) a description of the proposed environmental monitoring programme to be implemented during decommissioning;

(i) a description of the experience, resources, responsibilities and structure of the decommissioning organization, including the technical qualification/skills of the staff;

(j) an assessment of the availability of special services, engineering and decommissioning techniques required, including any decontamination, dismantling and cutting technology as well as remotely operated equipment needed to complete decommissioning safely;

(k) a description of the quality assurance programme;

(l) an assessment of the amount, type and location of residual radioactive and hazardous non-radioactive materials in the nuclear reactor installation, including calculational methods and measurements used to determine the inventory of each;

(m) a description of the waste management practices, including items such as:

- identification and characterization of sources, types and volumes of waste;

- criteria for segregating materials;

- proposed treatment, conditioning, transport, storage and disposal methods;

- the potential to reuse and recycle materials, and related criteria; and

- anticipated discharges of radioactive and hazardous non-radioactive materials to the environment;

(n) a description of other applicable important technical and administrative considerations such as safeguards, physical security arrangements and details of emergency preparedness;

(o) a description of the monitoring programme, equipment and methods to be used to verify that the site will comply with the release criteria;

(p) details of the estimated cost of decommissioning, including waste management, and the source of funds required to carry out the work; and

(q) a provision for performing a final confirmatory radiological survey at the end of decommissioning. (WS-G-2.1, para 5.11)

As part of the operator's responsibility for all aspects of safety and environmental protection during all phases of decommissioning, as required in Ref. [1], para. 3.8, an appropriate safety assessment should be performed:

(a) To support the selection of the decommissioning strategy, the development of a decommissioning plan and associated specific decommissioning activities;

(b) To demonstrate that exposures of workers and of the public are as low as reasonably achievable (ALARA) and do not exceed the relevant limits or constraints [3]. (WS-G-5.2, para 2.1)

The safety assessment for decommissioning should:

(a) Document how regulatory requirements and criteria are met to support the authorization5 of the proposed decommissioning activities;

(b) Include a systematic evaluation of the nature, magnitude and likelihood of hazards and their radiological consequences for workers, the public and the environment for planned activities and for accident conditions;

(c) Quantify the systematic and progressive reduction in radiological hazards to be achieved through the conduct of the decommissioning activities;

(d) Identify the safety measures, limit controls and conditions that will need to be applied to the decommissioning activities to ensure that the relevant safety requirements and criteria are met and maintained throughout the decommissioning;

(e) Where relevant, demonstrate that the institutional controls applied after decommissioning will not impose an undue burden on future generations;

(f) Provide input to on-site and off-site emergency planning and to safety management arrangements;

(g) Provide an input into the identification of training needs for decommissioning and of competences for staff performing decommissioning activities. (WS-G-5.2, para 2.3)

DE-51: The safety case shall be consistent with the final decommissioning plan and its subsequent updates.

*Related **IAEA** safety standards:*

The safety assessment for decommissioning should be consistent with the decommissioning plan [1, 9–11] and with other relevant national and site specific strategies and requirements, for example, with requirements for radioactive waste management and for the release of material and sites from regulatory control. (WS-G-5.2, para 2.2)

DE-52: The safety case for decommissioning and any updates of the final decommissioning plan shall be submitted to the regulatory body.

*Related **IAEA** safety standards:*

Prior to the implementation phase of decommissioning activities, a final decommissioning plan shall be prepared and submitted to the regulatory body for approval. This plan shall define how the project will be managed, including: the site management plan, the roles and responsibilities of the organizations involved, safety and radiation protection measures, quality assurance, a waste management plan, documentation and record keeping requirements, a safety assessment and an environmental assessment and their criteria, surveillance measures during the implementation phase, physical protection measures as required, and any other requirements established by the regulatory body. (WS-R-5, para 5.10)

The safety assessment should employ a systematic methodology to demonstrate compliance with safety requirements and criteria for decommissioning throughout the decommissioning process, including the release of material, buildings and sites from regulatory control. In addition, the safety assessment should be used to help ensure that interested parties are confident of the safety of decommissioning. Once developed by the operator, the safety assessment should be reviewed by the regulatory body to ensure compliance with the relevant safety requirements and criteria. (WS-G-5.2, para 1.3)

DE-53: To support the safety case for decommissioning, the licensee shall examine records and conduct surveys and measurements to verify the inventory and locations of radioactive, fissile or other hazardous materials in the facility and the surrounding potentially affected areas.

*Related **IAEA** safety standards:*

The responsibilities of the operating organization include:

- ...
- Performing safety assessments and environmental impact assessments related to decommissioning;
- Performing appropriate radiological surveys in support of decommissioning;
- ... (WS-R-5, para 3.8)

During the preparation of the final decommissioning plan, the extent and type of radioactive material (irradiated and contaminated structures and components) at the facility shall be determined by means of a detailed characterization survey and on the basis of records collected during the operational period. If nuclear material or operational waste remains at the facility, this radioactive material shall be included in the characterization survey. (WS-R-5, para 5.11)

DE-54: The licensee shall review and as appropriate update the safety case for decommissioning

- at major steps in the decommissioning project and
- when changes of the decommissioning plan are intended or changes of regulatory requirements or other safety relevant information arise

to ensure the safety case is still valid and appropriate to support the safe conduct of the decommissioning work.

*Related **IAEA** safety standards:*

The safety assessment for decommissioning should be consistent with the decommissioning plan [1, 9–11] and with other relevant national and site specific strategies and requirements, for example, with requirements for radioactive waste management and for the release of material and sites from regulatory control. (WS-G-5.2, para 2.2)

The safety assessment for decommissioning should be reviewed and updated, as appropriate, to ensure that it remains an accurate representation of the physical, chemical and radiological state of the facility as the decommissioning activities proceed. (WS-G-5.2, para 2.4)

At facilities for which a phased (step by step) approach to decommissioning has been selected, account should be taken in the safety assessment of the phases, the nature of the decommissioning activities and the hazards they entail, which may differ for each phase. A graded approach should be applied to each decommissioning phase. (WS-G-5.2, para 3.4)

DE-55: The licensee shall carry out at regular intervals a review of the safety of the facility under decommissioning at a frequency established by the regulatory body.
An update of the safety case according to DE-54 that also fulfils the requirements of DE-56 is equivalent to the review required above.

DE-56: The review according to DE-55 shall confirm the compliance of the decommissioning activities and states with regulatory requirements and any deviations shall be resolved. It shall also identify and evaluate the safety significance of deviations from applicable current safety standards and best practices and take into account the cumulative effects of changes to procedures, modifications to the facility and the decommissioning organization, technical developments, decommissioning experience accumulated and ageing of SSCs. The safety case shall be updated accordingly.

2.4.2 Safety issue: Decommissioning reporting

DE-57: The licensee shall review the progress in decommissioning against the plan and shall report periodically on the results to the regulator as required.

Related IAEA safety standards:

The responsibilities of the operating organization include:

- ...
- Keeping records and submitting reports as required by the regulatory body (WS-R-5, para 3.8)

DE-58: The licensee shall prepare a final decommissioning report to demonstrate, that the decommissioning has been completed and the proposed end state of the facility or site has been achieved.

*Related **IAEA** safety standards:*

A final decommissioning report shall be prepared that documents, in particular, the end state of the facility or site, and this report shall be submitted to the regulatory body for review. (WS-R-5, para 9.3)

On completion of decommissioning, appropriate records should be retained as specified by the regulatory body. These records should be held and maintained for purposes such as confirmation of the completion of decommissioning in accordance with the approved plan. The confirmation of the completion of decommissioning should include information on the disposition of waste, materials and premises. (WS-G-2.4, para 8.1)

DE-59: The licensee shall ensure that relevant records and the final decommissioning report are available and accessible at the end of decommissioning according to the national regulatory system.

*Related **IAEA** safety standards:*

A system shall be established to ensure that all records are maintained in accordance with the records retention requirements of the quality assurance system and the regulatory requirements. (WS-R-5, para 9.4)

On completion of decommissioning, appropriate records should be retained as specified by the regulatory body. These records should be held and maintained for purposes such as confirmation of the completion of decommissioning in accordance with the approved plan. The confirmation of the completion of decommissioning should include information on the disposition of waste, materials and premises. (WS-G-2.4, para 8.1)

2.4.3 Safety issue: License termination conditions

DE-60: Before a facility or site can be released from regulatory control, the licensee shall perform a final survey to demonstrate that the end-state, as approved by the regulatory body, has been met.

*Related **IAEA** safety standards:*

The responsibilities of the operating organization include:

- *...*
- *Ensuring that end state criteria have been met by performing a final survey;*
- *... (WS-R-5, para 3.8)*

The facility shall not be released from regulatory control, nor shall authorization be terminated until the operating organization has demonstrated that the end state in the decommissioning plan has been reached and that any additional regulatory requirements have been met. The regulatory body shall evaluate the end state of the site by performing a thorough inspection of the remainder of the facility after decommissioning activities have been completed to ensure that the end point criteria have been met. (WS-R-5, para 9.2)

DE-61: At the completion of decommissioning, the licensee shall not be relieved of responsibility for the facility or site unless the regulatory body has agreed.

*Related **IAEA** safety standards:*

On completion of decommissioning it shall be demonstrated that the end state criteria as defined in the decommissioning plan and any additional regulatory requirements have been met. The operating organization shall only be relieved of further responsibility for the facility after approval by the regulatory body. (WS-R-5, para 9.1)

DE-62: In the case of restricted use the licensee shall provide a long term impact assessment, an appropriate surveillance regime and any proposed land use restrictions.

*Related **IAEA** safety standards:*

If a facility cannot be released for unrestricted use, appropriate controls shall be maintained to ensure the protection of human health and the environment. These controls shall be specified and shall be subject to approval by the regulatory body. Clear responsibility shall be assigned for implementing and maintaining these controls. The regulatory body shall ensure that a programme has been established to apply the remaining regulatory requirements and to monitor compliance with them. (WS-R-5, para 9.6)

Appendix A
Example for a safety case for decommissioning

A typical safety case for decommissioning includes:

- description of the site, the facility layout (including the radiological characterisation plan of the facility) and facility performance during decommissioning activities,
- demonstration how safety is achieved (for normal operation and accidental situations, addressing radiological hazards and conventional hazards[1)], that may result in radiological consequences, and related scenario[2)]),
- detailed descriptions of the safety functions; all safety systems and safety-related SSCs; their design basis and functioning in all decommissioning states including anticipated decommissioning occurrences and accidents identify applicable regulations codes and standards,
- description of the relevant aspects of the decommissioning organization and the management of safety,
- documentation on the evaluation of the safety aspects related to the site,
- outline of the general safety objectives of decommissioning, design concept and the approach adopted to meet the fundamental safety objectives,
- description of the safety analyses performed to assess the safety of the facility in response to postulated initiating events against safety criteria and radiological release limits (see Appendix B),
- description of the on-site emergency operation procedures and accident management guidelines, the inspection and testing provisions, the qualification and training of personnel, the decommissioning experience feedback programme, and the ageing management,
- technical bases for and description of the operational limits and conditions (OLCs),
- description of the policy, strategy, methods and provisions for radiation protection,
- description of the emergency preparedness arrangements,
- description of the on-site radioactive waste management provisions.

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1) *Significant conventional hazards that are of particular importance in the case of decommissioning are e.g. include: lifting and handling of heavy loads, use of hazardous materials for decontamination, stability of decontaminated structures, demolition.*

2) *Scenario related to radiological hazards that are of particular importance in the case of decommissioning are e.g. include: extensive cutting of activated and contaminated material, modification of safety barriers, entry into areas of the plant that were normally inaccessible, decontamination of large items, dispersion of contamination during demolition.*

Appendix B
Postulated initiating events

As part of the safety assessment for decommissioning the consequences from postulated initiating events (PIE) will be addressed. Following is a typical list of postulated initiating events:

External postulated events

Natural phenomena

- Extreme weather conditions (precipitation: rain, snow, ice, frazil, 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)
- Possible combinations of such conditions

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)
- Possible combinations of such conditions

Special attention should be given to complex sites, where external events are likely to affect also neighbouring installations which could cause additional stress on the safety of the facility under decommissioning.

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), leaks (corrosion), plugging
- Instrumentation and control, human failures
- Internal fires and explosions (gas generation, process hazards)
- Flooding, vessel overflows

*Related **IAEA** safety standards:*

EXAMPLE OF A CHECKLIST OF HAZARDS AND INITIATING EVENTS (WS-G-5.2, Annex I):

Internal initiating events

Radiological initiating events

Criticality

- *Residue of fissile material in equipment and process lines*
- *Residue of fissile radioactive liquid in tanks*
- *Presence of moderators (e.g. water, polyvinylchloride) in the vicinity of fissile material*

Spread of contamination

- *Loss of containment integrity, loss of barriers*
- *Dismantling of containment or barriers*
- *Dropping of radioactive material and packages and radioactive waste*
- *Cleanup of buildings (e.g. activated or contaminated)*

External exposure

- *Activated material and equipment*
- *Direct radiation sources*

Internal exposure

- *Physical and chemical state of the radioactive material*

Contamination, corrosion, etc.

- *Spectrum, activity, emitters (e.g. presence of alpha emitters)*
- *Gaseous and liquid effluents*

Non-radiological initiating events

Fire

- *Thermal cutting techniques (e.g. using zircaloy)*
- *Decontamination process (e.g. chemical, mechanical or electrical methods or mixed methods for removing contamination from metal, concrete or other surfaces)*
- *Accumulation of combustible materials and radioactive waste*
- *Flammable gases and liquids*

Explosion

- *Decontamination process*
- *Dust (e.g. graphite, zircaloy)*
- *Radiolysis (e.g. in the storage or transport of radioactive waste)*
- *Compressed gases*
- *Explosive substances*

Flooding

- *Leakage of liquid storage*
- *Leakage of pipes*
- *Pipe breaks*

Toxic and hazardous materials

- *Asbestos, glass wool in thermal insulation systems*
- *Lead in paint shielding*
- *Beryllium and other hazardous metals*
- *Polychlorinated biphenyls*
- *Oils*
- *Pesticides in use*
- *Biohazards*

Electrical hazards

- *Loss of power supply*
- *High voltage*
- *Non-ionizing radiation (e.g. lasers)*

Physical hazards

- *Falling of heavy loads*
- *Loads falling on SSCs important to safety*
- *Loads falling on radioactive material (e.g. packages)*
- *Collapse of structures (e.g. due to ageing)*
- *Demolition activities*
- *Working at heights*
- *High noise levels*

Human and organizational initiating events

- *Operator errors, violations*
- *Inadvertent entry into radiation areas*
- *Misidentification of actions*
- *Actions by contractors and subcontractors*
- *Performance of incompatible actions*
- *Disabling of services to other facilities*
- *Poor ergonomic conditions*

External initiating events

Earthquake

External flooding

- *River*
- *Sea*
- *Infiltration of groundwater*

External fire (e.g. oil storage)

Extreme weather conditions (e.g. temperature, winds, snow)

Industrial hazards (e.g. explosion)

Other initiating events

High temperatures and pressures

Corroded barriers

Unknown or unmarked materials

SELECTED POSTULATED INITIATING EVENTS (NS-R-5, Appendix 1)

External postulated initiated events

Natural phenomena

Natural phenomena would include:

(a) *Extreme weather conditions:*
precipitation including rain, hail, snow, ice; frazil ice; wind including tornadoes, hurricanes, cyclones, dust storms or sand storms; lightning, extreme high or low temperatures; extreme humidity;
(b) *Flooding;*
(c) *Earthquake and eruption of volcanoes;*
(d) *Natural fires;*
(e) *Effect of terrestrial and aquatic flora and fauna (leading to blockages of inlets and outlets and damages to structures)*

Human induced phenomena

Human induced phenomena would include:

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

Internal postulated events

Internal events would include:

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

Appendix C
Explanation of the relationship between Final Decommissioning Plan and Safety Case

The WENRA WGWD applies in its reference levels for the safety during decommissioning a concept of decommissioning plan and safety case for decommissioning to address aspects of importance for safety of decommissioning in all phases of a facility lifetime.

During the operational period the initial and updated decommissioning plan is addressing on a low level of details basic aspects of a future decommissioning of the facility. At the time of application for authorisation the aspects of planning of the individual decommissioning activities are addressed in the final decommissioning plan. Typical elements of the final decommissioning plan are:

- a detailed description of the intended decommissioning activities,
- information on the timeframe for the decommissioning,
- a description of the end-state of decommissioning,
- description of the content of phases, in case of a decommissioning project structured in different phases, and
- a description of the waste management programme.

Those parts relevant for safety during decommissioning, e.g. description of the intended decommissioning activities, are subject to a safety assessment and become part of the safety case for decommissioning which is the collection of arguments and evidence in support of the safety during decommissioning. An example of a safety case for decommissioning is already provided in Appendix A. Typical elements of a safety case are:

- a description of the legal framework,
- a facility description (incl. the radioactive and hazardous materials inventory),
- a description on the safety assessment for normal operation and accident situations and its results,
- a description of structures, systems and components and operational limits and conditions,
- the radiation protection programme,
- description of the on-site emergency planning.

Often large decommissioning projects are divided into different phases. In such cases the final decommissioning plan addresses in detail the first phase while the subsequent phases are addressed on a lower level; following figure illustrates this situation. Accordingly, the level of detail for future phases needs further evolution during conduct of decommissioning resulting in updates of the decommissioning plan for the specific phases. The safety relevant elements of the updated decommissioning plan become subject to related safety assessments which might result in revisions of the safety case for decommissioning.

Part 3
NAP Benchmarking Results

Part III of the Decommissioning Report provides information on the process of benchmarking, i.e. the verification of the application of decommissioning SRLs in WENRA Member States using a systematic appraisal procedure in the working group taking into account the national action plans (NAPs), a process for carrying out corrective actions when-ever any deficiencies had been identified in the previous benchmarking process.

3.1 Benchmarking of original decommissioning SRLs (V.1)

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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 (SRLs). In accordance with WENRA's Reactor Harmonisation Working Group (RHWG) a code of three degrees for evaluation has been applied:

A – The requirement is covered explicitly by national regulatory system.
B – A difference exists, but can be justified from the safety point of view.
C – A difference exists and should be addressed for harmonisation 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 regulatory requirement in an evaluation table.

In the second step of the benchmarking the results of the self-assessment were reviewed by other countries. In order to review the rating and justifications, the seventeen participating WENRA Member States were subdivided in the same four sub-groups already established during the Radioactive Waste Storage benchmarking exercise. 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 19th meeting in Den Haag end of November 2007 and formally ending at the 22nd meeting in Brussels in April 2009.

The evaluation process outlined here above in brief shortness is referred to as **legal benchmarking**. With respect to the benchmarking exercise performed for spent fuel and radioactive waste storage, in the case of decommissioning the benchmark addressing the implementation of the SRLs in existing facilities was not carried out. The WGWD took this decision having considered that in some countries the decommissioning activity is not well developed.

3.2
Benchmarking Results of SRLs (V.1)

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The summary of results presented in the following tables is based on the summary tables, which were prepared by the secretaries of the sub-groups.

Table 1 gives an overview of the legal benchmarking results by country and SRL for decommissioning. The results of legal benchmarking are presented for each country. The rating is represented by the colours green for A, blue for B and red for C.

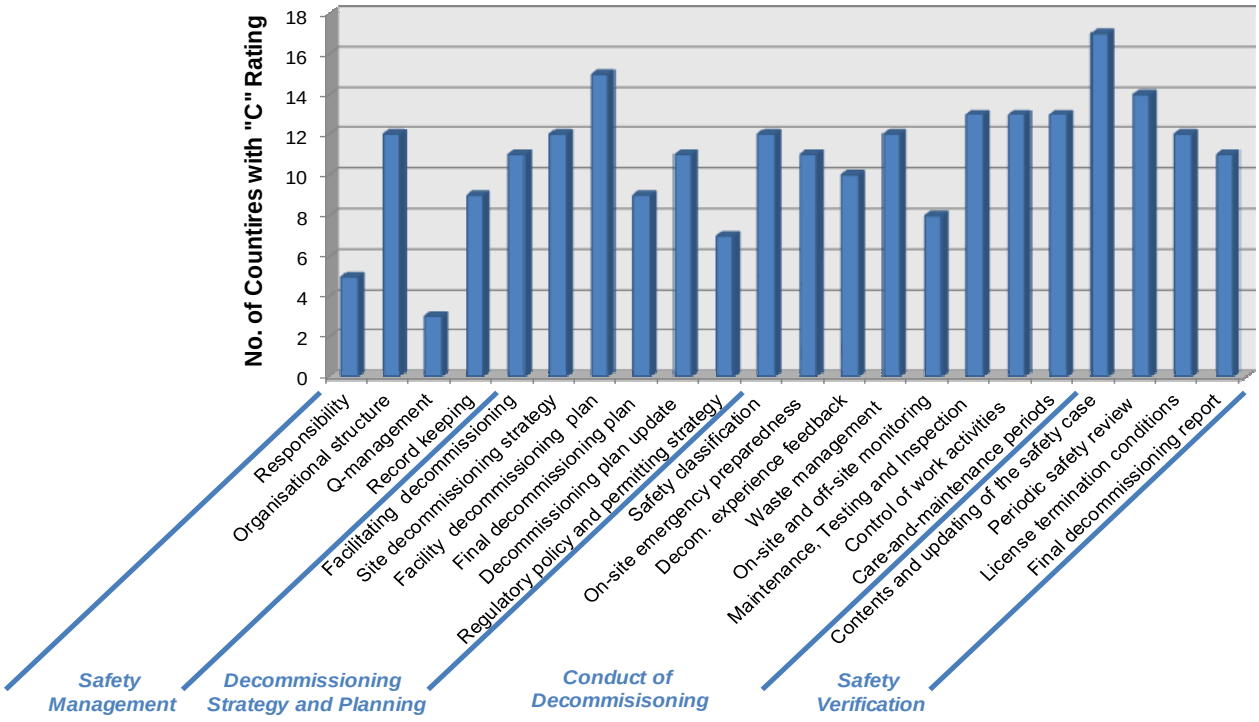
As agreed by the WGWD, the C-ratings of the regulatory benchmarking for each country are listed in the table without further comment. The compilation of the C-ratings is the basis for development of the national action plans.

Figure 1 provides a compilation 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 figure that for the safety issues “Contents and updating of the safety case” (D-60 to D-70) all countries received at least one C-rating. It emphasised again that the benchmarking results presented here are reflecting the SRLs and the legal and licensing status as of the year 2007.

Table 1 Overview on the legal benchmarking results for decommissioning by countries (SRLs V.1 as of March 2007**)**

		SRL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Safety Management	responsibility	1																	
		2																	
		3																	
	organisational structure	4																	
		5																	
		6																	
		7																	
		8																	
	Q-management	9																	
	record keeping	10																	
		11																	
Decommissioning strategy and planning	Facilitating decommissioning	12																	
		13																	
	Site decommissioning strategy	14																	
		15																	
		16																	
		17																	
		18																	
		19																	
	Facility decommissioning plan	20																	
		21																	
		22																	
		23																	
		24																	
		25																	
	Final decommissioning	26																	
		27																	
	Decommissioning plan update	28																	
		29																	
		30																	
	Regulatory policy and permitting strategy	31																	
		32																	
		33																	
		34																	
		35																	
Conduct of decommissioning	Safety classification	36																	
	On-site emergency preparedness	37																	
		38																	
		39																	
		40																	
	Decom. experience feedback	41																	
		42																	
	Waste management	43																	
		44																	
		45																	
		46																	
	On-site and off-site	47																	
	Maintenance, Testing and Inspection	48																	
		49																	
		50																	
		51																	
		52																	
		53																	
		54																	
	Control of work activities	55																	
		56																	
		57																	
	Care-and-maintenance periods	58																	
		59																	
Safety Verification	contents and updating of the safety case	60																	
		61																	
		62																	
		63																	
		64																	
		65																	
		66																	
		67																	
		68																	
		69																	
		70																	
	Periodic safety review	71																	
		72																	
		73																	
		74																	
		75																	
	License termination conditions	76																	
		77																	
		78																	
		79																	
	Final decommissioning	80																	
		81																	
	sum	A	35	13	39	13	46	40	58	19	77	28	35	62	55	36	44	42	76
	sum	B	2	5	2	0	0	3	4	0	1	0	0	0	3	0	2	2	0
	sum	C	44	63	40	68	35	38	19	62	3	53	46	19	23	45	35	37	5

Figure 1 Number of countries with C-ratings sorted by safety issues



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 harmonising their national regulatory requirements with the WENRA safety reference levels (SRLs). The need for harmonisation was derived from the results of the legal benchmarking for each country, where existing differences in the national regulatory requirements with respect to the WENRA SRLs have been identified.

The NAP initially had to provide information on planned modification and amendments of relevant national regulatory requirements. It had to be treated as a "living document" and be improved and completed stepwise in line with ongoing process for harmonisation of the national regulatory requirements. Finally, it provides a document that demonstrates the respective national regulatory requirements being in line with the WENRA SRLs. 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, for instance a review of the decommissioning report. 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 at the end of 2012 but was by later decision of WENRA directors extended to the end of 2013 and later until 2014. This extension was deemed necessary because the requirements in the original draft set of 81 decommissioning V.1-SRLs (referred to as V.1) had been reworded and rearranged resulting in a finally approved set of only 62 decommissioning V.2-SRLs. It is to be emphasised that in doing so no basic objective of requirements of the original V.1-SRLs had been lost. In some cases, however, the degree of detail was adjusted to the general character of WENRA SRLs. For some SRLs, the details of the requirements have been transferred to Appendix A and B. 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"). This resulted in the formulation of several new SRLs in V.2.

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 (Table 2) indicating the relation between old and new SRLs and providing information on changes of the addressed requirements.

Table 2 Cross reference table indicating the relation between SRLs V.1 and SRLs V.2; SRLs with relevant modifications are highlighted in green colour coding

SRL V.1	Requirement (short description)	SRL V.2
D-01	Responsibilities	DE-01
	Prime responsibilities, safety policy	DE-02
D-02	Maintaining safety, controlling contractors	DE-03
D-03	Ownership	DE-04
D-04	Organisational structure	DE-05
D-05	Licensee's capabilities	DE-06
D-06	Allocation of authorities	DE-07
D-07	Defining qualification	DE-08
D-08	Knowledge keeping during life time	DE-09
D-09	Application of management system	DE-12
D-10	Knowledge keeping during life time	DE-09
D-11	Record system	DE-10
	Implementation of management system	DE-11
	Procurement and quality	DE-13
	Documentation of management system	DE-14
D-12	Need to decommissioning	DE-15
D-13	Baseline survey	DE-16
D-14	Establishing decommissioning strategy, multi-facility site	DE-17, DE-22
D-15	Documentation of decommissioning strategy	DE-18
D-16	Establishing decommissioning strategy	DE-17
D-17	Initial decommissioning strategy	
D-18	Proposition of end-state	
D-19	Review of decommissioning strategy	
D-20	Establishing initial decommissioning plan	DE-19
D-21	Submitting initial decommissioning plan	DE-20
D-22	Content of initial decommissioning plan	DE-21
D-23	Review of decommissioning plan	DE-23
D-24	Safety assessment, graded approach	DE-24
D-25	Classification of systems	DE-25
D-26	Informing regulatory body of planned shut down	DE-26
D-27	Submitting final decommissioning plan	DE-27
	Content of final decommissioning plan	DE-28
D-28	Review of final decommissioning plan	DE-29
D-29	Modification of planned activities	DE-47
D-30	Procuring safety	

SRL V.1	Requirement (short description)	SRL V.2
D-31	Regulatory framework	
D-32	Licensing decommissioning	
D-33	Permitting commencement of decommissioning	
D-34	Permitting decommissioning operations	
D-35	Review of progress	DE-57
D-36	Re-classification of systems	DE-30
D-37	Responding to events, preparing on-site emergency plan	DE-31, DE-32
D-38	Responding to events, preparing on-site emergency plan	DE-31, DE-32
D-39	Performing on-site emergency exercises	DE-34
D-40	Review of on-site emergency plan	DE-33
D-41	Implementing experience feedback arrangements	DE-35
D-42	Pro-active implementation of corrective actions	DE-36
D-43	Waste characterisation	DE-38
D-44	Waste segregation	DE-39
D-45	Record keeping of waste	DE-40
D-46	Record keeping of waste	DE-40
D-47	Review of monitoring program	DE-41
D-48	Inspection of SSCs	DE-42
D-49	Aging management	DE-43
D-50	Periodic inspections of SSCs	
D-51	Record keeping of inspections	DE-44
D-52	Repairs to SSCs	
D-53	Implementing corrective actions after events	DE-37
D-54	Record keeping of inspections	DE-44
D-55	Assessing decommissioning activities	DE-46
D-56	Work authorisation procedures	DE-45
D-57	Work authorisation procedures	DE-45
D-58	Passive-safety of deferment	DE-48
D-59	Care-and-maintenance of deferment	DE-49
D-60	Content of safety case	DE-50
D-61	Content of safety case	DE-50
D-62	Content of safety case	DE-50
D-63	Content of safety case	DE-50
D-64	Safety case and decommissioning plan	DE-51
	Submitting safety case	DE-52
D-65	Radiological characterisation	DE-53

SRL V.1	Requirement (short description)	SRL V.2
D-66	Comparing survey results with records	
D-67	Review of safety case	DE-54
D-68	Reviewing operational limits and conditions	
D-69	Update of safety case	
D-70	Consolidating the safety case	
D-71	Review of safety of facility under decommissioning	DE-55
D72	Expected results of review	DE-56
D-73	Taking improvement measures	
D-74	Periodic safety review	
D-75	Content of safety review	
D-76	Relieving responsability of facility or site	DE-61
D-77	Final survey of facility or site	DE-60
D-78	Possible enDE-states of decommissioning	
D-79	Ending decommissioning with restrictions	DE-62
D-80	Preparation of final decommissioning report	DE-58
D-81	Record keeping at the end of decommissioning	DE-59

3.4 Benchmarking of 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 (Table 1)
2. For each C-rated SRL of V.1:
    a. Find corresponding new SRL of V.2 (Table 2)
    b. Use the new V.2 text of this SRL for updating national regulatory system
3. Follow step 2b also for any new SRLs 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 performed 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. The first group benchmarking of NAPs took place at the 30th meeting in Prague on 26th – 28th February 2013. In total eight NAPs ready for benchmarking had been submitted in advance of or during this meeting. After discussion and agreement on the rules for evaluation, the benchmarking was commenced in plenary. Further evaluations of NAPs have been done in the following WGWD meetings until the 34th meeting in Paris in March 2015. Some countries were not able to fulfil their NAP within this time frame, in particular due to time-consuming procedures needed to implement the requirements of the SRLs in their national regulatory systems.

In the following section 5, the results of the NAP benchmarking are presented for each country as far as available in two parts. The first part (text) consists of a short description on the measures taken for fulfilment 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 columns two and three show the status of harmonisation. An A-rating in the second column indicates that the required harmonisation has been implemented in the national regulatory system 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 March 2015 information as provided by the respective country representative is presented.

3.5
Country Implementation Reports

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3.5.1 BELGIUM

Regulatory changes taken for the National Action Plan

In Belgium, many of the WENRA decommissioning safety reference levels are covered by the generic chapter 2 of the Royal Decree "Safety requirements for nuclear installations", published on 30th November 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 installations in decommissioning.

To comply with the remaining decommissioning safety reference levels, an addition to this Royal Decree was drafted. Its publication is expected around the end of 2014.

At the 32nd WGDW meeting in Rome in February 2014, 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, except for reference level DE-20. Regarding this reference level DE-20, basic expectation are included in the Royal Decree "Safety requirements for nuclear installations", Ch. 2, Art. 7.6, but expectations for an actual initial decommissioning plan, while existing, need to be formalised.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-02	**A**	Royal Decree "Safety requirements for nuclear installations", Ch. 2, Art. 3
DE-07	**A**	Royal Decree, Ch. 2, Art. 4.1
DE-08	**A**	Royal Decree, Ch. 2, Art. 4.3
DE-09	**A**	Royal Decree, Ch. 2, Art. 4.3; Royal Decree, Ch. 2, Art. 7.6
DE-11	**A**	Royal Decree, Ch. 2, Art. 5
DE-12	**A**	Royal Decree, Ch. 2, Art. 5
DE-13	**A**	Royal Decree, Ch. 2, Art. 5
DE-14	**A**	Royal Decree, Ch. 2, Art. 5
DE-15	**A**	Royal Decree, Ch. 2, Art. 7.6
DE-16	**A**	Royal Decree, Ch. 2, Art. 7.6
DE-20	**C**	
DE-30	**C**	Royal Decree, Ch. 2, Art. 20 (not yet published)
DE-33	**C**	Royal Decree, Ch. 2, Art. 24; Royal Degree, Ch. 2, Art. 26 (not yet published)
DE-35	**C**	Royal Decree, Ch. 2, Art. 24 (not yet published)
DE-36	**C**	Royal Decree, Ch. 2, Art. 24 (not yet published)
DE-37	**A**	Royal Decree, Ch. 2, Art. 11
DE-38	**C**	Royal Decree, Ch. 2, Art. 22 (not yet published)
DE-39	**C**	Royal Decree, Ch. 2, Art. 22 (not yet published)
DE-40	**C**	Royal Decree, Ch. 2, Art. 23; Royal Degree, Ch. 2, Art. 29 (not yet published)
DE-42	**A**	Royal Decree, Ch. 2, Art. 12
DE-43	**A**	Royal Decree, Ch. 2, Art. 12
DE-44	**A**	Royal Decree, Ch. 2, Art. 12
DE-45	**A**	Royal Decree, Ch. 2, Art. 5
DE-46	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published); Royal Degree "General Regulations for the Protection from Ionizing Radiation", Ch. 2, Art. 17.2
DE-47	**A**	Royal Decree, Ch. 2, Art. 15
DE-48	**C**	Royal Decree, Ch. 2, Art. 19 (not yet published)
DE-49	**C**	Royal Decree, Ch. 2, Art. 19 (not yet published)
DE-50	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published)
DE-51	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published)
DE-52	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published)
DE-53	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published)
DE-54	**C**	Royal Decree, Ch. 2, Art. 27 (not yet published)
DE-55	**C**	Royal Decree, Ch. 2, Art. 28 (not yet published)
DE-56	**C**	Royal Decree, Ch. 2, Art. 28 (not yet published)
DE-58	**C**	Royal Decree, Ch. 2, Art. 29 (not yet published)
DE-59	**C**	Royal Decree, Ch. 2, Art. 29 (not yet published)
DE-60	**C**	Royal Decree, Ch. 2, Art. 29 (not yet published)
DE-61	**C**	Royal Decree, Ch. 2, Art. 29 (not yet published); Royal Degree "General Regulations for the Protection from Ionizing Radiation", Ch. 2, Art. 17.2
DE-62	**C**	Royal Decree, Ch. 2, Art. 29 (not yet published)

3.5.2 BULGARIA

Regulatory changes taken for the National Action Plan

In connection with the amendment of the Act on the Safe Use of Nuclear Energy (ASUNE) (amended 86/02.08.2013) a review of the existing secondary legislation for its implementation has been carried out, which has imposed the development of a new Regulation on Safety during Decommissioning of nuclear facilities.

The ASUNE contains the general safety requirements for decommissioning of nuclear facilities.

Some of the specific requirements for safe decommissioning are included in the Regulation on the Procedure for Issuing Licenses and Permits or Safe Use of Nuclear Energy (amended 76/05.10.2012) and mainly in the draft Regulation on Safety in Decommissioning of nuclear facilities. All the requirements necessary for the achievement of the WENRA safety reference levels are included in the draft regulation. The regulation has been developed and at present discussions are being held on its internal approval in the BNRA. Due to the complicated procedure of amendments to the legislation and the ongoing discussions with stakeholders its promulgation is expected this year.

Although the Regulation on Safety during Decommissioning has not been promulgated, the process of issuing by the BNRA of licenses for decommissioning of Kozloduy NPP Units 1 and 2 takes into account the WENRA SRLs.

The license conditions are in compliance with the SRLs and address some requirements, which have not been yet introduced in the legislation.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-02	C	Art. 3 of the ASUNE and Draft Regulation on Decom of NF (not yet in force)
DE-06	C	Art. 40 (3) and Art. 45 (1) of the Draft Regulation on Decom of NF (not yet in force)
DE-11	C	Art. 31, Art. 32 (1) and Art. 38 (1), (2), (4) of the Draft Regulation on Decom of NF (not yet in force)
DE-13	C	Art. 32 (4) of the Draft Regulation on Decom of NF (not yet in force)
DE-14	C	Art. 36 (1) , points: 4, 5, 6, 7, 8 of the Draft Regulation on Decom of NF (not yet in force)
DE-16	C	Art. 30 (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-17	C	Art. 10 (1), (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-18	C	Art. 10 (3) of the Draft Regulation on Decom of NF (not yet in force)
DE-19	C	Art. 12 (1) of the Draft Regulation on Decom of NF (not yet in force)
DE-20	C	Art. 12 (5) of the Draft Regulation on Decom of NF (not yet in force)
DE-21	C	Art. 12 (4) and (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-22	C	Art. 10 (9) of the Draft Regulation on Decom of NF (not yet in force)
DE-23	C	Art. 13 (1) and (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-24	C	Art. 17 (1) of the Draft Regulation on Decom of NF (not yet in force)
DE-25	C	Art. 16 (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-26	C	Art. 16 (1) of the Draft Regulation on Decom of NF (not yet in force)
DE-27	C	Art. 16 (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-28	C	Art. 16 (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-30	C	Art. 19 (3) of the Draft Regulation on Decom of NF (not yet in force)
DE-35	C	Art. 38 (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-36	C	Requirements will be added in the Draft Regulation on Decom of NF (not yet in force)
DE-37	C	Art. 40 (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-40	C	Art. 27 (30) of the Draft Regulation on Decom of NF (not yet in force)

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-42	C	Art. 19 (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-43	C	Art. 19 (8) of the Draft Regulation on Decom of NF (not yet in force)
DE-44	C	Art. 19 (7) of the Draft Regulation on Decom of NF (not yet in force)
DE-45	C	Art. 44 (4) of the Draft Regulation on Decom of NF (not yet in force)
DE-46	C	Art. 17 (9) of the Draft Regulation on Decom of NF (not yet in force)
DE-47	C	Art. 12 (10) of the Draft Regulation on Decom of NF (not yet in force)
DE-48	C	Art. 20 (3) of the Draft Regulation on Decom of NF (not yet in force)
DE-49	C	Art. 20 (1) of the Draft Regulation on Decom of NF (not yet in force)
DE-50	C	Art. 17 (2) and (3) of the Draft Regulation on Decom of NF (not yet in force)
DE-52	C	Art. 16 (4) of the Draft Regulation on Decom of NF (not yet in force)
DE-53	C	Requirements will be added in the Draft Regulation on Decom of NF (not yet in force)
DE-54	C	Art. 13 (2) of the Draft Regulation on Decom of NF (not yet in force)
DE-56	C	Draft Regulation on Decom of NF (not yet in force)
DE-58	C	Atr. 16 (1), (2), (3), (4), (5), (6) of the Draft Regulation on Decom of NF (not yet in force)
DE-59	C	Art. 30 (10) of the Draft Regulation on Decom of NF (not yet in force)
DE-60	C	Art. 30 (4) of the Draft Regulation on Decom of NF (not yet in force)
DE-61	C	Requirements will be added in the Draft Regulation on Decom of NF (not yet in force)
DE-62	C	Art. 30 (6) Draft Regulation on Decom of NF (not yet in force)

3.5.3 CZECH REPUBLIC

Regulatory changes taken for the National Action Plan

From 2009 the national legal framework in the Czech Republic undergoes substantial changes. Current Atomic Act (Act No. 18/1997 Coll.) and related decrees will be completely replaced by new Atomic Act and decrees, incl. a decree on decommissioning. It is expected that the new legal framework will enter into the force in 2017.

The Czech Republic has reported the implementation of safety reference levels in currently valid legal documents during the WGWD meeting in the Den Haag in November 2007. The benchmarking process identified that less than a half of safety reference levels are not implemented and that for two safety reference levels difference exists, but can be justified from the safety point of view.

Considering the results of benchmarking process national action plan has been defined. The plan had to consider the timeframe for the preparation of new legal documents. The process has started in 2009 and due to the complex legal and governmental approval procedures it is expected not to end sooner than in 2016. As these documents are still under preparation they are not ready for the benchmarking process (no English translation available). Despite of these difficulties the new benchmarking has been performed internally by the regulatory body however the results could not be discussed and approved within the WGWD.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	C	New Atomic Act, Article 5, Sect. (2), (5) (not yet in power)
DE-02	C	Decree on Management System, Article 4, Sect. (1) letter a) (not yet in power)
DE-03	C	New Atomic Act, Article 5, Sect. (4), Article 29, Sect. (4) (not yet in power)
DE-04	C	New Atomic Act, Article 51, Sect. (2), (3), Article 53, Sect. (1), letter d); Article 75, Sect. (2), letter b) (not yet in power)
DE-05	C	Decree on Management System, Article 5, Sect. (1) letter b) (not yet in power)
DE-06	C	Decree on Management System, Article 3, Sect. (2), (3) (not yet in power)
DE-07	C	Decree on Management System, Article 3, Sect. (4) letter d) (not yet in power)
DE-08	C	New Atomic Act, Article 49, Para 1, letter a) (not yet in power)
DE-09	C	Decree on Decommissioning, Article 4 (not yet in power)
DE-10	C	Decree on Decommissioning, Article 4 (not yet in power)
DE-11	C	New Atomic Act, Article 28 (not yet in power)
DE-12	C	New Atomic Act, Article 28, Sect. (1) letter a) (not yet in power)
DE-13	C	New Atomic Act, Article 28; Decree on Management System, Article 3, Sect. (4) (not yet in power)
DE-14	C	New Atomic Act, Article 28; Decree on Management System, Article 5, Sect. (1) (not yet in power)
DE-15	C	New Atomic Act, Annex 2, Para 1, letters a) 7., b) 12., e) 11.,12., f) 15., 16., Para 2., letters a) 4., b) 11. (not yet in power)
DE-16	C	New Atomic Act, Article 46 Sect. (3); Annex 2, Para 1. letter a) item 7. (not yet in power)
DE-17	C	Decree on Decommissioning, Article 5 (1) (not yet in power)
DE-18	C	Decree on Decommissioning, Article 5, Para (2), letters a) - c) (not yet in power)
DE-19	C	Decree on Decommissioning, Article 6, Sect. (1) letter a) (not yet in power)
DE-20	C	New Atomic Act, Annex 2, Para 1., item 12 (not yet in power)
DE-21	C	Decree on Decommissioning, Article 6 Sect. (1) letters b) & d); Sect. (2) f) & i) (not yet in power)
DE-22	C	Decree on Decommissioning, Article 6, Sect. (1) c) (not yet in power)
DE-23	C	Decree on Decommissioning, Article 6, Sect. (3) letters a) & d), Decree on Safety Assessment, Article 9 Sect. (3) (not yet in power)
DE-24	C	Decree on Decommissioning, Article 6, Sect. (2) letter h) (not yet in power)
DE-25	C	Decree on Decommissioning, Article 6, Sect. (2) letters c) & d) (not yet in power)

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-26	C	New Atomic Act, Article 54, Para 1, letter b) (not yet in power)
DE-27	C	New Atomic Act, Article 54, Para 1, letter f) (not yet in power)
DE-28	C	Decree on Decommissioning, Article 6 Sect. (2) letters b) - f) & k), Sect. (3) (not yet in power)
DE-29	C	Decree on Decommissioning, Article 7 Sect. (1) (not yet in power)
DE-30	C	Decree on Decommissioning, Article 7 Sect. (2) letter c) (not yet in power)
DE-31	C	New Atomic Act, Article 137, Para (1); (2) (not yet in power)
DE-32	C	New Atomic Act, Annex 2, Part 1, letter g) item 10., Part 2. letter d) item 12., Article 133 Sect. (1), Article 134 Sect. (1), (2) (not yet in power)
DE-33	C	Decree on Decommissioning, Article 7, Sect. (2) letter d) (not yet in power)
DE-34	C	New Atomic Act, Article 135 Sect. (1) letter f); Sect. (2) letter d) (not yet in power)
DE-35	C	New Atomic Act, Article 5 Sect. (8), Decree on Safety Assessment, Article 12 letter i) items 1. & 2. (not yet in power)
DE-36	C	New Atomic Act, Article 5 Sect. (6) (not yet in power)
DE-37	C	Decree on Safety Assessment, Article 13 letter m) 1. - 4. (not yet in power)
DE-38	C	Decree on Decommissioning Article 6, Sect. (3), Sect. (2), letter f) (not yet in power)
DE-39	C	Decree on Decommissioning Article 6, Sect. (3), Sect. (2), letter f) (not yet in power)
DE-40	C	Decree on Radioactive Waste, Article 11 Sect. (1) (not yet in power)
DE-41	C	Decree on Decommissioning, Article 6 Sect. (2) letter j), Article 6, Sect. (3) (not yet in power)
DE-42	C	Decree on Decommissioning, Article 6, Sect. (3) (not yet in power)
DE-43	C	Decree on Safety Assessment, Article 8 Sect. (3); New Atomic Act Annex 2, Part 1. letter (g) 11 (not yet in power)
DE-44	C	Decree on Safety Assessment; Article 12, letter b) items 1. - 3. (not yet in power)
DE-45	C	Decree on Management System; Article 7, Sect. (1) & (2) (not yet in power)
DE-46	C	New Atomic Act; Annex 2, Part 1., letter g), item 3 (not yet in power)
DE-47	C	Decree on Decommissioning; Article 7, Para 7, letter b) (not yet in power)
DE-48	C	New Atomic Act; Article 55, Sect. (1), letter c) (not yet in power)
DE-49	C	New Atomic Act; Article 55, Sect. (1), letter a), item 3 (not yet in power)
DE-50	C	New Atomic Act; Annex 2, Part 1., letter g) items 1. - 14. (not yet in power)

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-51	C	Decree on Decommissioning; Article 7, Para 2 (not yet in power)
DE-52	C	New Atomic Act; Article 15, Sect. (2) letter d); Sect. (3) (not yet in power)
DE-53	C	Decree on Decommissioning, Article 2, Sect. (2) (not yet in power)
DE-54	C	Decree on Decommissioning, Article 7, Sect. (1) (not yet in power)
DE-55	C	Decree on Nuclear Safety Assessment of Nuclear Installations, Article 8, Sect. (1) (not yet in power)
DE-56	C	Decree on Nuclear Safety Assessment of Nuclear Installations, Article 8 - 12 (not yet in power)
DE-57	C	New Atomic Act, Article 55, Sect. (1), letter b) (not yet in power)
DE-58	C	New Atomic Act; Annex 2, Part 7. (not yet in power)
DE-59	C	New Atomic Act, Article 55, Sect. (1), letter e); Article 104, Para (1) (not yet in power)
DE-60	C	New Atomic Act; Annex 2, Part 7., letter d) (not yet in power)
DE-61	C	New Atomic Act, Article 9, Sect. (7); Decree on Decommissioning; Article 3 Sect. (1) (not yet in power)
DE-62	C	Decree on Decommissioning, Article 3, Sect. (2); New Atomic Act; Annex 2, Part 7., letter d) (not yet in power)

3.5.4 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 decommissioning were published, 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 finalised in 2013 and they came into force at 1st December 2013. Decommissioning is handled by Guide YVL D.4.

Finland reported its regulatory implementations of the benchmarking based on drafts of the Guides at the 30th, 31th and 32th WGDW meetings in Prague and Trnava in 2013 and in Rome 2014. The requirements presented in the new YVL Guides were approved and the Finnish regulations were found to be in agreement with the requirements mandated by the WGWD SRLs.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-02	A	YVL A.3, 310
DE-05	A	YVL A.3, 302, 610; YVL A.4, 369; GD-733/2008, § 30
DE-06	A	YVL A.3, 701; YVL A.4, 369; YVL D.4, 511
DE-07	A	YVL A.3, 302, 606
DE-08	A	YVL A.4, 301, 369
DE-09	A	YVL D.4, 369, 405, 408
DE-10	A	YVL D.4, 408, 419, 422, 423, 424
DE-11	A	YVL A.3 103, 301, 302GD 733/2008, §§ 28, 29
DE-12	A	YVL A.3, 202, 301, 608; GD 733/2008, § 29
DE-13	A	YVL A.3, 202, 301, 608; GD 733/2008, § 29
DE-14	A	YVL A.3, 302, 328, 411, 412, 413
DE-17	A	NEA, §§ 6 a, 7 g, 9; NED, §§ 32, 34, 75; YVL D.4, 404
DE-18	A	NEA, § 7 g; YVL D.4, 404, 405
DE-21	A	NED, §§ 24 f, 32.10; YVL D.4, 404, 405, 406
DE-22	A	NEA, § 7 g ; NED §§ 32, 34; YVL D.4, 404
DE-23	A	NEA § 28; YVL A.3, 352; YVL D.4, 405, 408, 502
DE-24	A	YVL D.4, 605 a-h
DE-25	A	YVL D.4, 605 d
DE-27	B	YVL D.4, 709
DE-28	A	YVL A.3, 202; YVL D.4, 405, 605 a, d, e, f
DE-29	A	YVL D.4, 507, 606
DE-30	A	YVL D.4, 432, 606
DE-35	A	YVL D.4, 502
DE-36	A	YVL D.4, 502
DE-37	A	YVL A.10, 502, 512
DE-38	A	YVL D.4, 402, 430
DE-39	A	YVL D.4, 402, 407
DE-40	A	YVL D.4, 402, 430
DE-41	A	YVL D.4, 509
DE-42	A	YVL A.8, 722; YVL D.4, 432; GD 717/2013, § 26
DE-43	A	YVL A.8; GD 717/2013 § 26
DE-44	A	YVL A.8, 705, 708, 709
DE-45	A	YVL A.3, 605, 607, 613; GD 717/2013, § 23
DE-46	A	NED, § 112; YVL D.4, 507, 605
DE-47	A	NED, § 112
DE-48	A	YVL D.4, 438
DE-49	A	YVL D.4, 438
DE-51	A	YVL D.4, 606
DE-52	A	YVL D.4, 709
DE-53	A	YVL D.4, 425
DE-54	A	NED, § 36; YVL D.4, 501
DE-55	A	NED, § 36; YVL D.4, 501
DE-56	A	YVL A.1, Appendix A.4; YVL D.4
DE-57	A	YVL D.4, 709, 711
DE-58	A	YVL D.4, 713, 718
DE-59	A	YLV A.9; YVL D.4, 713, 718, GD 736/2008, § 9
DE-60	A	YVL D.4, 718
DE-61	A	YVL D.4, 712

3.5.5 FRANCE

Regulatory changes taken for the National Action Plan

Since the publication of the WGWD safety reference levels for decommissioning, France has continued to fulfil its obligations to implement necessary changes into its national regulations.

The ministerial order of 7th February 2012 setting general rules relative to basic nuclear installations entered into effect on 1st July 2013. This order – which follows the "Transparency and Nuclear Safety" act of 2006 – enables an important update of the French regulatory framework that used to rely mainly on two older texts: the "quality" order of 1984 and the "environment" order of 1999.

The order of 7th February 2012 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 contains a dedicated title on waste management and requirements for decommissioning of 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, storage facilities, periodic safety review, integrated management system, decommissioning, 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, and ASN Resolution of 28th January 2014 on fire protection) but others won't be fully approved before the end of year 2014 or 2015. This is the case for the decision on decommissioning, which is currently under preparation. This decision will address the three remaining SRLs with a C-rating.

At the 30th WGWD meeting in Prague in February 2013, France reported its regulatory implementations for benchmarking, relying on provisions of the Ministerial order of 7th February 2012 and on early drafts of the decisions under validation or preparation. This benchmarking enabled France to check that its obligations will be fulfilled once these decisions are finally approved.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-06	**A**	ASN, Art. 4.1.1, 4.1.3
DE-07	**A**	ASN, Art. 4.2.6
DE-09	**A**	Ministerial Order of 7 February 2012, Art. 8.3.4; Art. 8.3.1.II; Guide n° 6, § 3, Appendix 1
DE-10	**C**	
DE-15	**A**	Decree of 2007, Art. 8-I-10; Guide n° 6, §§ 3, 6.2
DE-16	**A**	Decree of 2007, Art. 9, 37, 40; Decision on Environment, Art. 3.3.7, 3.3.8
DE-17	**A**	Ministerial Order of 7February 2012, Art. 8.3.1.III; Guide n° 6, § 3; Decree of 2007, Art. 9
DE-18	**A**	Decree 2007, Art. 8.10; ASN policy concerning the decommissioning and delicensing of basic nuclear installations in France; Guide n° 6, § 3
DE-21	**A**	Decree 2007, Art. 8.10; Guide n° 6, Appendix 1; Law 2006-739, Art. 20.I, II
DE-22	**C**	
DE-23	**A**	Ministerial Order of 7 February 2012, Art. 8.3.1
DE-24	**A**	Decree of 2007, Art. 37.2; Decision on safety report, § 3.2, 3.4, 5.2.1.3
DE-25	**A**	Decree 2007, Art. 37.I; Guide n° 6, § 6.1., Appendix 1, §7.2.1
DE-29	**A**	Ministerial Order of 7 February 2012, Art. 8.3.1.II; Decree of 2007, Art. 20.VII, 37.I, 39
DE-30	**A**	Guide n° 6, § 7.2.2
DE-34	**A**	Ministerial Order of 7 February 2012, Art. 7.6.I.
DE-35	**A**	Ministerial Order of 7 February 2012, Art. 2.7.2.
DE-37	**A**	Ministerial Order of 7 February 2012 Art. 2.6.2, 2.6.3.I.
DE-43	**A**	Ministerial Order of 7 February 2012, Art. 2.5.1.II; Guide n° 6, 7.2.2
DE-44	**A**	Ministerial Order of 7 February 2012, Art. 2.5.1.II, 2.5.6; Guide n° 6, 7.2.3; Decision on safety report, § 5.2.6.3
DE-46	**A**	Decree of 2007, Art. 37-II; Ministerial Order of 7 February 2012, Art. 8.3.3; Decision on safety case, §§ 5.3.5.4.1, 5.2.7.1"
DE-48	**C**	
DE-49	**A**	Ministerial Order of 7 February 2012, Art. 2.5.1.II
DE-50	**A**	Decree of 2007, Art. 37.2; Decision on safety case, V.2.10
DE-53	**A**	Decree of 2007, Art. 37.2, 9; Decision on environment, Art. 3.3.7; Guide n° 6, § 6.2
DE-59	**A**	Decree of 2007, Art. 40
DE-62	**A**	Decree of 2007, Art. 37.2, 40, 51

3.5.6 GERMANY

Regulatory changes taken for the National Action Plan

The implementation of the decommissioning dafety deference devels (SRLs) was assessed with respect to their consideration during licensing and supervision of nuclear facilities, which are based on § 7 of the German Atomic Energy Act (AtG).

The regulations of nuclear law are basically geared to the requirements of the operation of nuclear power plants, but they apply to the decommissioning of nuclear power plants, research reactors and facilities of the fuel cycle as well. WGWD considered SRLs DE-15, DE-19, DE-20 - DE-24 to be fulfilled by the German Decommissioning Guide, which classifies all elements of the nuclear regulatory framework with respect to their relevance and analogous application to the decommissioning of any nuclear facility that is licensed under § 7 AtG.

For the SRLs DE-26, DE-27, DE-55, and DE-56, the C-ratings remain after re-assessment. However, no deficiency at all with respect to safety is existent in practice, as the licensee has to ensure the safety of the facility at any time by fulfilling the requirements of the license as well as of the nuclear technical regulations, which is checked within the regulatory supervision according to § 19 AtG on both a regular and an event-driven basis.

Due to the regulations of § 19 Para. 1 Sentence 2 AtG the competent supervisory authority is obliged to supervise that all legal provisions and ordinances, the orders of the competent supervisory authority, the terms and conditions of the license and subsequently imposed conditions are followed. Due to the continuous change of the status of the nuclear facility with regard to dismantling activities, nuclear facilities under decommissioning and dismantling are subject to frequent supervisory measures. As a consequence, the frequency of the assessment of the planning of the decommissioning and dismantling measures is high and exceeds that of a periodic concept, which is proposed by WENRA. The competent supervisory authority satisfies itself appropriately that the dismantling is performed according to the license and that safety is ensured all the time. Therefore, the requirements of the remaining SRLs rated as C are implemented in substance within the German regulatory system in the regulatory bodies' supervision.

The results of the German self-assessment were reported and agreed on during the 32nd WGDW meeting in Rome and the 33rd WGWD meeting in Vilnius.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-15	**A**	Decommissioning Guide, Ch. 3
DE-19	**A**	Decommissioning Guide, Ch. 3
DE-20	**A**	Decommissioning Guide, Ch. 3
DE-21	A	Decommissioning Guide, Ch. 3
DE-22	**A**	Decommissioning Guide, Ch. 3
DE-23	**A**	Decommissioning Guide, Ch. 3
DE-24	**A**	Decommissioning Guide, Ch. 3
DE-26	**C**	
DE-27	**C**	
DE-55	**C**	
DE-56	**C**	

3.5.7 HUNGARY

Regulatory changes taken for the National Action Plan

The Hungarian Atomic Energy Authority (HAEA) regulates the decommissioning of nuclear facilities in Hungary and provides detailed regulation.

The WENRA safety reference levels for decommissioning are covered in the "Govt. Decree 118/2011. (VII.11.) on the nuclear safety requirements of nuclear facilities" and in the "Act CXVI of 1996 on Atomic Energy". There is a specific Volume for decommissioning – "Annex 8 of Govt. Decree 118/2011. (VII.11). Nuclear Safety Code Decommissioning of nuclear facilities" – which came into force on 11th July 2011 and was modified on 6th July 2013. These regulations are defining the nuclear safety requirements applicable during the planning and execution of a nuclear facility decommissioning, as well as dismantling of safety important structures, systems and components and demolishment of nuclear facility buildings in order to cease operations and to terminate the supervision of the nuclear safety authority.

HAEA performed the self-benchmarking of the Hungarian legal system to the WGWD safety reference levels for decommissioning and it was found that the SRLs are fully included in the Hungarian national regulatory system. All of the decommissioning SRLs were evaluated by HAEA as A-ratings.

At the 33rd WGWD meeting in Vilnius in September 2014 HAEA reported its regulatory implementations and compliances for benchmarking to the WENRA members. Most of our requirements were found to be in agreement with the requirements mandated by the WGWD SRLs. For 15 SRLs WENRA members asked for some corrections. HAEA reported on improvements during the 34th WGWD meeting in Paris in March 2015, which resulted in A-ratings for all of the mentioned SRLs.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	A	Govt. Decree 118/2011, (VII. 11.) on the nuclear safety requirements of nuclear facilities and on related regulatory activities, 5. § (1)
DE-02	A	Govt. Decree 118/2011, (VII. 11.) 8. § (1)
DE-03	A	Govt. Decree, Annex, 2.5.2.0500.
DE-04	A	Act CXVI of 1996 on Atomic Energy 41. §, 62. § (1), 63. § (1)
DE-05	A	Govt. Decree, 12. § (1), (4), 118/2011. (VII. 11.)
DE-06	A	Govt. Decree, Annex, 2.3.4.0100., 2.2.1.0100.
DE-07	A	Govt. Decree, Annex, 2.3.1.0300., 2.5.1.0400.
DE-08	A	Govt. Decree, 12. § (3), Govt. Decree, Annex, 2.4.2.0100.
DE-09	A	Govt. Decree, Annex, 8.2.1.0100., 8.2.3.0700., 8.3.3.0100.
DE-10	A	Govt. Decree, Annex, 4.11.2.0300., 4.11,2.0400., 8.3.4.0300.
DE-11	A	Govt. Decree, Annex, 2.2.1.0100.
DE-12	A	Govt. Decree, Annex, 2.5.2.01., 2.5.2.02., 2.5.2.03., 2.5.2.04.
DE-13	A	Govt. Decree, Annex, 2.5.1.01., 2.5.1.02.
DE-14	A	Govt. Decree, Annex, 2.2.4.0100., 118/2011, (VII. 11.) 8. § (4)
DE-16	A	Govt. Decree, Annex, 8.2.1.02.
DE-17	A	Govt. Decree, Annex, 8.2.2.01., 8.2.2.03.
DE-18	A	Govt. Decree, Annex, 8.2.2.02., 8.2.2.05.
DE-21	A	Govt. Decree, Annex, 8.2.3.04.
DE-22	A	Govt. Decree, Annex, 8.2.2.01.
DE-24	A	Govt. Decree, Annex, 8.2.3.08.
DE-25	A	Govt. Decree, Annex, 8.2.3.09.
DE-28	A	Govt. Decree, Annex, 1.2.8.1500., 8.2.3.0100.
DE-29	A	Govt. Decree, Annex, 8.2.5.01.
DE-30	A	Govt. Decree, Annex, 8.3.1.01.
DE-31	A	Govt. Decree, 43. § (2), Annex, 8.3.2.03.
DE-32	A	Govt. Decree, 43. § (2), Annex, 8.3.2.03.
DE-33	A	Govt. Decree, Annex, 8.3.2.01., 8.3.2.05., 8.3.2.06.
DE-34	A	Govt. Decree, Annex, 8.3.2.05.
DE-35	A	Govt. Decree, Annex, 8.3.3.01., 8.3.3.02., 8. § (4), 14. § (3)
DE-36	A	Govt. Decree, Annex, 8.3.3.02.
DE-37	A	Govt. Decree, Annex, 8.3.3.02.
DE-38	A	Govt. Decree, Annex, 8.3.4.01.
DE-39	A	Govt. Decree, Annex, 8.3.4.02.
DE-40	A	Govt. Decree, Annex, 8.3.4.03., 8.3.4.04.
DE-41	A	Govt. Decree, Annex, 8.3.5.01.
DE-42	A	Govt. Decree, Annex, 8.3.6.01., 8.2.5.01.
DE-43	A	Govt. Decree, Annex, 8.3.6.02.
DE-44	A	Govt. Decree, Annex, 8.3.6.04.
DE-45	A	Govt. Decree, Annex, 2.5.1.0100., 2.5.2.0400.

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-46	A	Govt. Decree, Annex, 8.2.3.0700., 8.3.8., 1.6.2.2000.
DE-47	A	Govt. Decree, Annex, 8.2.5.02., 8.2.5.03.
DE-48	A	Govt. Decree, Annex, 8.3.7.01.
DE-49	A	Govt. Decree, Annex, 8.3.7.02.
DE-50	A	Govt. Decree, Annex, 8.3.8.0100., 8.3.8.0200., 8.3.8.0300.
DE-51	A	Govt. Decree, Annex, 8.2.5.01., 8.3.8.1000.
DE-52	A	Govt. Decree, Annex, 1.2.8.0500., 8.2.2.0700.
DE-53	A	Govt. Decree, Annex, 8.3.8.08.
DE-54	A	Govt. Decree, Annex, 8.3.8.10., 8.3.8.13.
DE-55	A	Govt. Decree, Annex, 1.7.3.01.
DE-56	A	Govt. Decree, Annex, 1.7.3.03., 1.7.3.09.
DE-57	A	Govt. Decree, Annex, 1.7.10100.
DE-58	A	Govt. Decree, Annex, 8.4.1.0200.
DE-59	A	Govt. Decree, Annex, 1.2.9.06.
DE-60	A	Govt. Decree, Annex, 1.2.8.1500. g), 1.2.9.0100., 1.2.9.0200. a), 8.3.8.0800.
DE-61	A	Govt. Decree, Annex, 1.2.9.0600., 1.2.9.0200.
DE-62	A	Govt. Decree, Annex, 1.2.9.0400., 1.2.9.0700., 8.4.1.0300., 8.4.1.04.

3.5.8 ITALY

Regulatory changes taken for the National Action Plan

After benchmarking the Italian legal system to the WGWD safety reference levels for decommissioning Italy had a total of 32 of C-ratings.

To comply with the remaining decommissioning safety reference levels, a Technical Guide has been drafted within the Nuclear Department of ISPRA, which regulates the use of nuclear energy in Italy and gives detailed guidance in the form of guides. The publication of the final guide is foreseen by mid 2015.

At the 32th WGDW meeting in Rome in February 2014, Italy reported the regulatory implementations of the 32 SRLs for benchmarking. All (proposed) changes were endorsed by the WENRA WGWD.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-04	C	Reg. Guide (not yet published)
DE-09	C	Reg. Guide (not yet published)
DE-14	C	Reg. Guide (not yet published)
DE-15	C	Reg. Guide (not yet published)
DE-17	C	Reg. Guide (not yet published)
DE-19	C	Reg. Guide (not yet published)
DE-20	C	Reg. Guide (not yet published)
DE-21	C	Reg. Guide (not yet published)
DE-22	C	Reg. Guide (not yet published)
DE-23	C	Reg. Guide (not yet published)
DE-24	C	Reg. Guide (not yet published)
DE-25	C	Reg. Guide (not yet published)
DE-26	C	Reg. Guide (not yet published)
DE-27	C	Reg. Guide (not yet published)
DE-29	C	Reg. Guide (not yet published)
DE-30	C	Reg. Guide (not yet published)
DE-35	C	Reg. Guide (not yet published)
DE-36	C	Reg. Guide (not yet published)
DE-37	C	Reg. Guide (not yet published)
DE-40	C	Reg. Guide (not yet published)
DE-41	C	Reg. Guide (not yet published)
DE-42	C	Reg. Guide (not yet published)
DE-43	C	Reg. Guide (not yet published)
DE-44	C	Reg. Guide (not yet published)
DE-48	C	Reg. Guide (not yet published)
DE-49	C	Reg. Guide (not yet published)
DE-50	C	Reg. Guide (not yet published)
DE-54	C	Reg. Guide (not yet published)
DE-55	C	Reg. Guide (not yet published)
DE-56	C	Reg. Guide (not yet published)
DE-59	C	Reg. Guide (not yet published)
DE-61	C	Reg. Guide (not yet published)

3.5.9 LITHUANIA

Regulatory changes taken for the National Action Plan

After benchmarking Lithuanian legal system to the WGWD safety reference levels for decommissioning Lithuania had 4 of C-ratings (DE-15, DE-25, DE-46, DE-50). Two remaining issues of this benchmarking are related with the planning of decommissioning and the two others with the safety case for decommissioning.

In 2013 the Requirements for decommissioning of nuclear facilities P-2009-02 had been revised, and a new version of nuclear safety requirements for decommissioning of nuclear facilities has been prepared in 2014 (BSR-1.5.1-2014 Regulation on the Decommissioning of nuclear facilities) in order to meet the requirements of WENRA safety reference levels for the decommissioning of nuclear facilities. At this moment a draft version of these new requirements (BSR-1.5.1-2014) is in the process of harmonisation with organisations, which are involved in the process of decommissioning of nuclear facilities in Lithuania. We are planning that the new requirements for decommissioning of nuclear facilities (BSR-1.5.1-2014) will come into force on 1st May 2015.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	**A**	The Law on Nuclear Safety of the Republic of Lithuania, 2011, Art. 3, 16, 17; The Law on Nuclear Energy of the Republic of Lithuania, 2011, Art. 30, 32
DE-04	**A**	The Law on Nuclear Energy of the Republic of Lithuania, 2011, Art. 32, 47, 48
DE-15	**C**	
DE-17	**A**	Requirements for decommissioning of nuclear facilities P-2009-02, VATESI, 2009, Art. 7, 9
DE-18	**A**	Requirements for decommissioning of nuclear facilities P-2009-02, VATESI, 2009, Art. 10, 11
DE-19	**A**	Requirements for decommissioning of nuclear facilities P-2009-02, VATESI, 2009, Art. 7, 17, 19, 25, 25.1
DE-22	**A**	Requirements for decommissioning of nuclear facilities P-2009-02, VATESI, 2009, Art. 8
DE-24	**A**	Requirements for decommissioning of nuclear facilities P-2009-02, VATESI, 2009, Art. 20, 50, 51
DE-25	**C**	
DE-31	**A**	General regulations for ensuring the safety of the RBMK-1500 NPPs, BSR-2.1.2-2010, VATESI, 2010, Art. 191; The Law on Nuclear Safety of the Republic of Lithuania, 2011, Art. 38
DE-32	**A**	General regulations for ensuring the safety of the RBMK-1500 NPPs, BSR-2.1.2-2010, VATESI, 2010, Art. 187, 189, 190; Emergency preparedness and response requirements for the operators of nuclear facilities, VATESI, 2008, Art. 5, 23.2.3, 24.2, 24.2.1-5, 24.5, 24.5.3, 26; Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 85, 86, 87
DE-34	**A**	The Law on Nuclear Safety of the Republic of Lithuania, 2011, Art. 38; Emergency preparedness and response requirements for the operators of nuclear facilities, VATESI, 2008, Art. 24.6, 24.6.1-4, 26; Rules for training of civil protection, 2010 m. September 8 d. Nr. 1295, Art. 9.1, 9.3.1, 9.3.2; General regulations for ensuring the safety of the RBMK-1500 NPPs, BSR-2.1.2-2010, VATESI, 2010, Art. 194, 195
DE-37	**A**	The Law on Nuclear Safety of the Republic of Lithuania, 2011, Art. 37; Requirements on operational experience feedback in the field of nuclear energy P-2009-04, VATESI, 2009, Art. 35, 37; Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 55, 59
DE-40	**A**	BSR–3.1.2–2010 Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities, VATESI, 2010, Art. 112, 112.19; Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 65, 132

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-46	C	
DE-48	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 119
DE-49	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 120, 120.1-10
DE-50	C	
DE-54	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 32, 32.9, 34, 51, 52
DE-56	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 95, 96, 97, 98, 98.1-16
DE-58	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 129, 130, 130.1-16
DE-59	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 43, 44, 45, 132
DE-62	A	Requirements for decommissioning of nuclear facilities P-2009-02; VATESI, 2009, Art. 134

3.5.10 ROMANIA

Regulatory changes taken for the National Action Plan

Nuclear safety legislation in Romania was subject to a continuous development process both due to the planning of new nuclear facilities and due to implementation of European legislation. Romania committed itself to implement the WGWD safety reference levels on decommissioning in its legal system.

The most relevant Romanian legislation is given by Law 111/1996 on the safe deployment, regulation, licensing and control of nuclear activities as well as by CNCAN Order 14/2000 approving the Radiological Safety Fundamental Regulation and CNCAN Order 56/2005 on the safe management of radioactive waste and spent nuclear fuel. Specific safety requirements for decommissioning are foreseen in the CNCAN Order 181/2001 approving the safety requirement for decommissioning as well as in the set of CNCAN orders on management system. Both of them establish also the licensing requirements.

Romania has in progress the revision of the entire regulatory framework on the safety of predisposal and disposal of radioactive waste and on the safety of decommissioning of nuclear facilities. The finalisation process is foreseen at the end of 2015.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-02	C	CNCAN Order 75/2003, Art. 11, CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-05	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-06	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-07	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-08	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-09	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-10	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-11	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-12	C	CNCAN Order 75/2003, Art. 6, CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-13	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-14	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-15	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-16	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-17	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-18	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-19	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-20	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-21	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-22	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-23	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-24	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-25	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-26	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-27	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-28	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-29	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-30	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-31	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-32	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-33	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-35	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-36	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-37	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-38	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-39	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-40	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-41	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-42	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-43	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-44	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-46	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-47	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-48	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-49	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-50	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-51	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-52	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-53	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-54	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-55	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-56	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-57	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-58	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-59	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-60	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-61	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)
DE-62	C	CNCAN Order approving the regulation on the safety requirements for decommissioning (not yet published)

3.5.11 SLOVAKIA

Regulatory changes taken for the National Action Plan

Slovakia started up legal benchmarking of decommissioning SRLs at the 19th meeting in Den Haag in the end of November 2007 and ended up this legal benchmarking at the 22nd meeting in Brussels in April 2009. During this legal benchmarking 5 SRLs were evaluated with rating C and Slovakia consequently prepared NAP to address these differences.

During first plenary benchmarking of NAPs for decommissioning, which took place in Prague on 26 - 28 February 2013, Slovakia submitted its NAP.

Since Slovakia has already an extensive decommissioning programme in place, only 5 SRLs were identified to be addressed in its NAP.

All differences were harmonised by the update of Atomic Act No. 541/2001 as amended in 2013 (amendment No. 143/2013) and update of respective regulations:

- Regulation No. 58/2006 on details concerning the scope, content and method of preparation of nuclear installation documentation needed for certain decisions, which came into force in March 2012 (No. 31/2012) and
- Regulation No. 430/2011 on details on nuclear safety requirements for nuclear facilities, which valid from 1st January 2012.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	**A**	Amendment of Atomic Act No. 541/2004, § 10 (2), § 20 (1), § 23 (1)
DE-19	**A**	Amendment of Atomic Act No. 541/2004, § 2 u), § 3 (4); Amendment of Regulation No. 58/2006, § 3; Regulation No. 430/2011 Coll. Annex 4, C (3)
DE-24	**A**	Amendment of Atomic Act No. 541/2004, § 2 u), § 3 (4); § 20 (3); Amendment of Regulation No. 58/2006, § 26; Regulation No. 430/2011 Coll. Annex 4, C (3)
DE-50	**A**	Amendment of Atomic Act No. 541/2004, § 20 (3); Amendment of Regulation No. 58/2006, §§ 26, 28
DE-62	**A**	Amendment of Atomic Act No. 541/2004, § 20 (5), Annex 1

3.5.12 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 Programme 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 published two new regulations namely Rules on radiation and nuclear safety factors (JV5) and the Rules on operational safety of radiation and nuclear facilities (JV9). The rules set detail requirements for design bases, contents of applications and main safety documentation, management system, modification management, periodic safety reviews and others.

At the 31th WGWD meeting in Trnava, Slovenia reported on the implementation of decommissioning SRLs and its action plan. The majority of the SRLs were implemented through new rules JV5 and JV9. Therefore all changes were approved except for two SRLs, where better reference was required. The DE-22 refers to decommissioning plan in case several facilities are located at the same site. The requirement will be implemented with modifications of Article 47 of JV5. A new paragraph will be added. It is expected that this amendments will be published in 2015.

The DE-33 refers to updates of the emergency plan. The amendment of the Art. 107 of the Law was proposed. During the finalization of the new text of the Law, it was found out that the requirement is implemented through the Decree on the contents and elaboration of protection and rescue (Official Gazette of RS, No. 24/2012 – in Slovene language). Therefore the amendments of the Law were not necessary anymore.

Beside the above identified deficiency the Slovenian regulations were found to be in full agreement with the requirements mandated by the WGWD SRLs.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	**A**	ZVISJV, Art. 3, It. 72, Art. 4, Para. 6, Art. 79, Para. 1, It. 5
DE-07	**A**	JV5, Art. 51, Para. 2
DE-08	**A**	ZVISJ, Art. 62, Para. 1; JV4, Art. 3; JV5, Art. 52, Para. 1
DE-09	**A**	JV5, Art. 46
DE-18	**B**	JV5, Art. 48, Para. 1; It. 2
DE-19	**A**	JV5; Art. 47
DE-21	**B**	JV5, Art. 11, Art. 47, Para. 1, Art. 48
DE-22	**C**	JV5, Art. 47, Para. 4 (not yet published)
DE-23	**A**	JV5, Art. 47; Para. 4
DE-24	**A**	JV5, Art. 47, Para. 1, 2
DE-25	**B**	JV5, Art. 4, Para. 2, Art. 11, 16, 48
DE-29	**A**	JV5, Art. 47, Para. 4
DE-30	**A**	JV5, Art. 7, Art. 39, Para. 5, Art. 40, Para. 1, It. 5
DE-31	**A**	JV9, Art. 59, Para. 2
DE-32	**A**	ZVISJV, Art. 104
DE-33	**A**	JV9, Art. 64, Para. 6; Decree on the contents and elaboration of protection and rescue, Para.5/Art. 14
DE-36	**A**	Art. 6, Para. 3
DE-42	**A**	JV9, Art. 18, Para. 1, 2
DE-43	**A**	JV9, Art. 15, Para. 1, 2
DE-44	**A**	JV9, Art. 18, Para. 5, 6
DE-45	**A**	ZVISJV, Art. 47, Para. 3, Art. 80a, Para. 1, It. 2, JV5, Art. 49, Para. 6; JV9, Art. 5, Art. 31., Para. 1, Art. 33, Para. 4
DE-48	**A**	JV5, Art. 47, Para. 6, 7
DE-49	**A**	JV5, Art. 47, Para. 7
DE-50	**A**	JV5, Art. 40
DE-53	**A**	JV5, Art. 11, 29, Para. 1, It. 7, Art. 46
DE-56	**A**	ZVISJV, Art. 83, Para. 1, 2, 3, 4; JV5, Art. 31, Para. 1, 2, Art. 39, Para. 4, 5
DE-59	**A**	ZVISJV, Art. 79, Para. 1, It. 5, 6; JV5, Art. 30, Para. 1
DE-60	**A**	ZVISJV, Art. 56, 79, Para 1, It. 5, 6; JV5, Art. 30, Para. 1, It. 2
DE-62	**A**	ZVISJV, Art. 127, Para. 1

3.5.13 SPAIN

Regulatory changes taken for the National Action Plan

The new benchmarking exercise of version 2.1 WGWD Decommissioning Safety Reference Levels Report resulted with 22 decommissioning SRL's already harmonised in Spain, covered by generic requirements of regulations applicable to all nuclear installations, which includes installations under decommissioning. In total 40 SRLs were rated as C, and need to be harmonised in the field of decommissioning.

The Spanish National Action Plan to comply with these 40 remaining SRLs is focused mainly in two new CSN (Nuclear Safety Council) Safety Instructions. Spain reported at the 32nd WGWD meeting in Rome 2014 the requirements wording for implementing 34 SRL in the Safety Instruction IS-XX "On the Safe Decommissioning of Nuclear Facilities and Nuclear Fuel Cycle Radioactive Facilities" that will cover all decommissioning SRLs to be implemented during decommissioning activities. All but one (DE-22) of the proposed wording were endorsed by the WGWD.

The draft of this IS-XX Safety Instruction is now in a consultation period in CSN and external stakeholders before being into force. It is supposed that the instruction will be in force next year.

The remaining six SRL that were rated as C, and the rejected DE-22, have to be implemented during the operating period in order to facilitate the future safe decommissioning of these facilities. These SRLs will be implemented in another Safety Instruction addressed to operators and is also in a draft condition.

The Spanish regulations will be in full agreement with WGWD safety reference levels for decommissioning, once these two Safety Instructions are finally approved.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	C	IS-XX, 3.1.1 (not yet published)
DE-02	A	IS-19, 4.1.2
DE-09	C	IS-for-Operators (not yet published)
DE-10	C	IS-XX, 5.4.1 (not yet published)
DE-11	A	IS-19, 4.1.1
DE-13	A	IS-19, 7.1.1; IS-19, 7.2.4
DE-14	A	IS-19, 4.4.2
DE-17	C	IS-XX, 4.1.1 (not yet published)
DE-18	C	IS-XX, 4.1.2 (not yet published)
DE-19	C	IS-for-Operators (not yet published)
DE-20	C	IS-for-Operators (not yet published)
DE-21	C	IS-for-Operators (not yet published)
DE-22	C	IS-for-Operators (not yet Published)
DE-23	C	IS-for-Operators (not yet published)
DE-25	C	IS-for-Operators (not yet published)
DE-28	C	IS-XX, 4.2.1 (not yet published)
DE-29	C	IS-XX, 4.2.2 (not yet published)
DE-30	C	IS-XX, 5.2.1 (not yet published)
DE-31	C	IS-XX, 5.8.1 (not yet published)
DE-32	C	IS-XX, 5.8.2 (not yet published)
DE-33	C	IS-XX, 5.8.3 (not yet published)
DE-34	C	IS-XX, 5.8.4 (not yet published)
DE-35	C	IS-XX, 5.3.1 (not yet published)
DE-36	C	IS-XX, 5.3.2 (not yet published)
DE-37	C	IS-XX, 5.3.3 (not yet published)
DE-39	C	IS-XX, 5.4.3 (not yet published)
DE-40	C	IS-XX, 5.4.4 (not yet published)
DE-42	C	IS-XX, 5.6.1 (not yet published)
DE-43	C	IS-XX, 5.6.2 (not yet published)
DE-44	C	IS-XX, 5.6.3 (not yet published)
DE-45	C	IS-XX, 5.1.2 (not yet published)
DE-46	C	IS-XX, 5.1.3 (not yet published)
DE-47	C	IS-XX, 5.1.4 (not yet published)
DE-48	C	IS-XX, 5.7.1 (not yet published)
DE-50	C	IS-XX, 6.1.1 (not yet published)
DE-51	C	IS-XX, 6.1.3 (not yet published)
DE-52	C	IS-XX, 6.2.4 (not yet published)
DE-54	C	IS-XX, 6.2.2 (not yet published)
DE-55	C	IS-XX, 6.2.2 (not yet published)
DE-56	C	IS-XX, 6.2.3 (not yet published)
DE-57	C	IS-XX, 6.2.1 (not yet published)
DE-58	C	IS-XX, 7.1.2 (not yet published)
DE-59	C	IS-XX, 7.1.3 (not yet published)
DE-62	C	IS-XX, 7.1.2 (not yet published)

3.5.14 SWEDEN

Regulatory changes taken for the National Action Plan

When the WENRA Decommissioning Reference Levels Report revision 1.0 was issued in November 2007 there were 16 safety reference levels which the Swedish regulations on nuclear decommissioning did not fully cover (i.e. they were rated C). Subsequently one additional SRL was proposed to be rated as C by the Swedish Radiation Safety Authority. When the WENRA Decommissioning Safety Reference Levels Report was reviewed and updated to version 2.1 in December 2012, three of the 17 C-rated SRLs were deleted as part of the revision.

New Swedish regulations on decommissioning came into force on the 1st November 2012 whereby nine of the remaining C-rated SRLs were addressed and covered. Also, new Swedish regulations on clearance came into force in January 2012, whereby one of the remaining SRLs was addressed and covered. Benchmarking of the 14 SRLs against the WENRA Decommissioning Safety References Report version 2.1, took place at the 33rd WGWD meeting in Vilnius in September 2014. This resulted in eleven of the SRLs agreed as A, and three C-rated SRLs remaining.

The Swedish Radiation Safety Authority is currently (2015) working on major changes to its regulations, both with regard to content and structure. The WENRA SRLs are considered in this work which will continue at least until 2018. The three remaining C-rated SRLs concerning decommissioning will be considered and included in the review and update of the revised Swedish regulations.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-15	**A**	SSMFS 2008:1 (rev. 2011:3)
DE-16	**C**	The outstanding issue will be covered in new regulations under development.
DE-25	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 5, Appendix 5
DE-29	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 7, Appendix 5
DE-39	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 6, Sec. 1, 3
DE-40	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 6, Sec. 10, Ch. 9, § 9
DE-41	**C**	This SRL will be covered in the new regulations covering all activities with ionising radiation, scheduled to come into force in 2016/2017.
DE-45	**C**	The outstanding issue will be covered in new regulations under development.
DE-48	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 5
DE-49	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 5
DE-57	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 8, 9
DE-58	**A**	SSMFS 2008:1 (rev. 2011:3), Ch. 9, Sec. 10
DE-60	**A**	SSMFS 2011:2, Sec. 7, 8, 16
DE-62	**A**	Environmental Act, Sec. 15, 16, 17

3.5.15 SWITZERLAND

Regulatory changes taken for the National Action Plan

The basis for the Swiss benchmarking exercise was the updated nuclear legislation as of February 2005. In this legislation quite elaborated requirements for decommissioning projects had already been implemented, especially regarding the planning for decommissioning during design, construction and operation. Detailed requirements on the conduct of decommissioning activities (3rd safety area), however, led to a number of C-ratings, as well as those on the safety verification (4th safety area) during ongoing decommissioning. ENSI decided to cover most of the C-ratings in a new regulatory guide (ENSI G17: "Decommissioning of Nuclear Facilities") which was finally published in April 2014. A smaller number of C-ratings had already been covered by an update of the regulatory guide ENSI G07: "Organization of Nuclear Facilities" in July 2013.

According to ENSI procedures the draft of ENSI G17 had been published for stakeholder involvement before the final editing. Response and subsequent discussions were more extensive than with any previous guideline project, the reason for this being a consequence of a change in Swiss energy policy. This change caused the decision of one of the NPP operators to declare the final shutdown of their plant by 2019. As this will be the first commercial NPP decommissioning project and the first application of the newly implemented WENRA SRLs on decommissioning in Switzerland, the draft of ENSI G17 was biased against the most up to date planning of this decommissioning project by a great number of utility personnel. The process of stakeholder involvement added about one year to the total project duration.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-02	**A**	ENSI G-07, Art. 4.1, 4.2
DE-06	**A**	ENSI G-07, Art. 4.1, 4.2; ENSI G-17, Art. 4.9
DE-07	**A**	ENSI G-07, Art. 5.2
DE-09	**A**	NEO, Art. 41
DE-11	**A**	ENSI G-07, Art. 4.1, 4.2
DE-13	**A**	ENSI G-07, Art. 4.1, 4.2
DE-14	**A**	ENSI G-07, Art. 4.1, 4.2, 5.2; ENSI G-17, Art. 4.9
DE-16	**B**	RPO, Art. 81.4
DE-17	**A**	ENSI G-17, Art. 6.1
DE-22	**A**	ENSI G-17, Art. 6.1
DE-24	**A**	ENSI G-17, Art. 6.2
DE-26	**A**	ENSI G-17, Art. 4.2
DE-28	**A**	ENSI G-17, Ch. 6.4
DE-30	**A**	ENSI G-17, Ch. 6.5
DE-31	**A**	ENSI G-17, Ch. 6.4.6
DE-32	**A**	ENSI G-17, Ch. 6.4.6
DE-33	**A**	ENSI G-17, Art. 6.5
DE-34	**A**	ENSI G-17, Art. 4.9; ENSI B-11; ENSI B-12
DE-40	**A**	ENSI B-02, Ch. 6
DE-41	**A**	ENSI G-17, Art. 6.5
DE-42	**A**	ENSI G-17
DE-43	**A**	NEO, App. 3; ENSI G-17, Ch. 5
DE-44	**A**	ENSI G-17, Ch. 4.11
DE-45	**A**	ENSI G-07, Art. 4.1, 4.2
DE-48	**A**	ENSI G-17, Ch. 5
DE-49	**A**	ENSI G-17, Ch. 4.11, 5
DE-50	**A**	ENSI G-17, Ch. 6.4, App. 3
DE-51	**A**	ENSI G-17
DE-52	**A**	ENSI G-17, Ch. 4.1
DE-53	**A**	ENSI G-17, Ch. 4.4
DE-55	**A**	ENSI G-17, Ch. 5
DE-56	**A**	ENSI G-04; ENSI G-17

3.5.16 THE NETHERLANDS

Regulatory changes taken for the National Action Plan

The Netherlands committed itself in 2011 to implement the WGWD safety reference levels on decommissioning 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, the Nuclear Installations, Fissionable Materials and Ores Decree, the ordinance on implementation of the Nuclear Safety Directive and the ordinance on decommissioning. This legislation provides for a system of mainly general goal oriented rules and regulations. It also establishes a licensing system.

The implementation of the SRLs into the Dutch legal system was benchmarked for the first time at the 21st WGWD meeting.

At the 29th WGWD meeting in Stockholm in September 2012, the Netherlands reported its progress in the legal implementations for re-benchmarking. In total, 26 SRLs were rated as C. The majority of these SRLs will be implemented upon the establishment of the ordinance on Management & Organisation planned in 2015. The remaining SRLs (if any) will be implemented by means of licence conditions in individual decommissioning licenses.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-01	C	
DE-02	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 5
DE-03	C	
DE-04	A	Nuclear Energy Act, Art. 15f; Bkse-decree, Art. 44b; De-commissionig ordinance, Art. 3.1
DE-05	A	Decommissioning Ordinance, Art. 4, 9; Bkse-decree, Art. 27.1, Art. 29.1
DE-06	A	Decommissioning Ordinance, Art. 4; Bkse-decree, Art. 27.1, Art. 29.1
DE-07	A	Decommissioning Ordinance, Art. 4
DE-08	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 6; Decommissioning Ordinance, Art. 4
DE-09	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 6; Decommissioning Ordinance, Art. 3, 5; Bkse-decree, Art. 26
DE-10	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 6; Decommissioning Ordinance, Art. 4, Art. 3, sub 1, Art. 5, sub 2; Bkse-decree, Art. 26, sub 1
DE-11	C	
DE-12	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 5
DE-13	C	
DE-14	C	
DE-15	A	Decommissioning Ordinance, Art. 2, sub 2; Bkse-decree, Art. 25
DE-16	A	Decommissioning Ordinance, Art. 2
DE-17	A	Bkse-decree, Art. 25, 26, 30
DE-19	C	Bkse-decree, Art. 27, 29
DE-20	A	Bkse-decree, Art. 25, 27
DE-21	A	Decommissioning Ordinance, Art. 3; Bkse-decree, Art. 26, 44
DE-22	C	
DE-23	A	Bkse-decree, Art. 27, 29
DE-25	A	Bkse-decree, Art. 6, 10, 26
DE-28	A	Decommissioning Ordinance, Art. 3, 4, 6, 9; Bkse-decree, Art. 26, sub 1
DE-30	C	
DE-31	C	
DE-32	C	
DE-33	C	
DE-34	C	
DE-35	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 2
DE-36	C	

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-37	C	
DE-38	A	Radiation Protection decree, Art. 36; Decommissioning Ordinance, Art. 3
DE-39	A	Radiation Protection decree, Art. 36; Decommissioning Ordinance, Art. 3
DE-40	A	Decommissioning Ordinance, Art. 4, 5
DE-41	C	
DE-42	C	
DE-43	C	
DE-44	C	
DE-45	A	Decommissioning Ordinance, Art. 4, 9; Bkse-decree, Art. 27.1
DE-46	C	
DE-47	C	
DE-48	B	Bkse decree, Art. 30
DE-49	B	Bkse decree, Art. 30
DE-50	C	
DE-51	C	
DE-52	C	
DE-53	C	
DE-54	C	
DE-55	A	Ordinance on the implementation of the Nuclear Safety Directive, Art. 2
DE-56	C	
DE-57	A	Decommissioning Ordinance, Art. 8
DE-58	A	Decommissioning Ordinance, Art. 10
DE-60	A	Decommissioning Ordinance, Art. 10
DE-61	A	Nuclear Energy Act, Art. 20a
DE-62	B	

3.5.17 UNITED KINGDOM

Regulatory changes taken for the National Action Plan

The initial benching for the decommissioning SRLs showed that the UK regulatory system was largely compliant with the SRLs, as there were only 2 SRLs rated C out of a total of 81. Since the original benchmarking the Office for Nuclear Regulation (ONR) has reviewed and updated its Technical Assessment Guides (TAGs) and Technical Inspection Guides (TIGs), in particular its Technical Assessment Guide on decommissioning (NS-TAST-GD-026). ONR has also reviewed and updated its Safety Assessment Principles.

The table below shows how the two decommissioning SRLs originally rated as C have been addressed. One has been incorporated in the updated Technical Assessment Guide on decommissioning. Evidence for compliance with the second SRL was obtained from the consolidated guidance on emergency planning prepared by the UK Nuclear Emergency Planning Liaison Group. The evidence to support the categorisation has been peer reviewed by the WGWD. The UK's regulatory system is therefore fully compliant with the decommissioning SRLs.

Results of the NAP Benchmarking

# SRL (new or changes req.)	Current status	Actions taken / relevant regulations
DE-27	A	NS-TAST-GD-026, Para. 5.9.19
DE-34	A	NEPLG