

Date: 11 September 2012

IAEA SAFETY STANDARDS
for protecting people and the environment

Status: STEP 8

Submitted to MS comments

Decommissioning of Facilities

General Safety Requirements Part 6
No. GSR Part 6

Draft Safety Requirements
DS450



CONTENTS

1. INTRODUCTION.....	1
Background.....	1
Objective.....	3
Scope.....	3
Structure.....	5
2. PROTECTION OF HEALTH AND PROTECTION OF THE ENVIRONMENT	5
3. RESPONSIBILITIES ASSOCIATED WITH DECOMMISSIONING.....	6
4. MANAGEMENT OF DECOMMISSIONING	10
5. DECOMMISSIONING STRATEGY	11
6. FUNDING.....	11
7. THE PLANNING OF DECOMMISSIONING DURING THE LIFETIME OF THE FACILITY 12	
8. CONDUCT OF DECOMMISSIONING ACTIONS	15
9. COMPLETION OF DECOMMISSIONING ACTIONS AND TERMINATION OF AUTHORIZATION.....	18
REFERENCES.....	20
CONTRIBUTORS TO DRAFTING AND REVIEW.....	21

1. INTRODUCTION

BACKGROUND

1.1. The terms ‘siting’, ‘design’, ‘construction’, ‘commissioning’, ‘operation’, and ‘decommissioning’ are normally used to delineate the six major stages of the lifetime of an authorized facility and of the associated licensing process. The term ‘decommissioning’ refers to the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility (except for a disposal facility for radioactive waste, for which the term ‘closure’ instead of ‘decommissioning’ is used). Aspects of decommissioning have to be considered throughout the other five major stages.

1.2. Aspects of decommissioning typically include planning for decommissioning, conducting decommissioning actions and terminating the authorization. There may be a period of transition between permanent shutdown¹ and the time when authorization to begin decommissioning actions is granted.

1.3. ‘Decommissioning actions’ are the procedures, processes and work activities as described in the approved final decommissioning plan.

1.4. ‘Facility’ means buildings, and their associated land and equipment, in which radioactive material is produced, processed, used, handled or stored on a scale with such a degree of hazard and risk that consideration of protection and safety is required. ‘Land’ includes the surface, subsurface soil horizons and any surface or subsurface water or aquifers potentially affected by the radioactive material.

1.5. Decommissioning is performed using an optimized approach to achieve a progressive and systematic reduction in radiological hazards. Decommissioning is undertaken on the basis of planning and assessment to ensure the protection and safety of workers and the public and protection of the environment.

1.6. Decommissioning actions are considered completed when the approved end state of the facility has been reached. Subject to national legal and regulatory requirements, this end state is a

¹ The term ‘permanent shutdown’, as used in this publication, is when the facility has ceased operation and will not be restarted.

result of conducting decontamination and/or dismantlement, leading to the release of the facility from regulatory control with or without restrictions on future use.

1.7. Planning for decommissioning begins at the design stage and includes the collection of information and data relevant to decommissioning to facilitate future decommissioning, selection of a decommissioning strategy, performance of radiological characterization of the facility, preparation of a final decommissioning plan, submission of the plan to the regulatory body for review and approval and any activities for public communication and consultation required by national requirements. Conducting decommissioning actions includes managing the project, implementing the approved final decommissioning plan, managing radioactive waste and non-radioactive waste, conducting of oversight activities by the regulatory body and demonstrating that the facility meets the end state criteria specified in the final decommissioning plan.

1.8. Termination of the authorization involves the demonstration of compliance with the conditions of the authorization for decommissioning of the facility (i.e. meeting the end state criteria), withdrawal of this authorization for the facility, and release of the facility for restricted or unrestricted use.

1.9. Strategies for decommissioning that have been adopted or are being considered by Member States include immediate dismantling and deferred dismantling. In principle, these two possible decommissioning strategies are applicable for all facilities.

- *Immediate dismantling* is the strategy in which the equipment, structures, systems and components of a facility containing radioactive material are removed and/or decontaminated to a level that permits the facility to be released for unrestricted use, or released with restrictions on its future use. In this case, decommissioning actions begin shortly after the permanent cessation of operations. This strategy implies promptly conducting decommissioning actions and involves the processing of radioactive material for either storage or disposal.
- *Deferred dismantling* (sometimes called safe storage, safe store or safe enclosure) is the strategy in which, after removal of the nuclear fuel from the facility (for nuclear installations), all or part of a facility containing radioactive material is either processed or placed in such a condition that it can be put in safe storage and the facility maintained until it is subsequently decontaminated and/or dismantled.

- A combination of these two strategies may be considered practicable on the basis of safety requirements or environmental requirements, technical considerations and local conditions such as the intended future use of the site, or financial considerations.

1.10. Deferred dismantling allows for the processing of some radioactive material and its removal from the facility.

1.11. Entombment, in which all or part of the facility is encased in a structurally long lived material, is not considered a decommissioning strategy and is not an option in case of planned permanent shutdown. It may be considered a solution only under exceptional circumstances (e.g. following a severe accident) for an existing facility.

1.12. IAEA Safety Requirements publications establish international consensus requirements that apply the fundamental safety objective and fundamental safety principles established in the Safety Fundamentals [1].

1.13. The terms used in this publication have the meanings ascribed to them in the IAEA Safety Glossary, 2007 Edition [2], where applicable.

1.14. This publication supersedes Decommissioning of Facilities Using Radioactive Material, IAEA Safety Series No. WS-R-5, issued in 2006².

OBJECTIVE

1.15. The objective of this publication is to establish the general safety requirements to be met during planning for decommissioning, conduct of decommissioning actions and termination of authorization.

SCOPE

1.16. This publication establishes the safety requirements for all aspects of decommissioning from the siting and design of a facility to the termination of the regulatory authorization.

² INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Facilities Using Radioactive Material, IAEA Safety Standards Series No. WS-R-5, IAEA, Vienna (2006).

1.17. This publication applies to most types of facilities, including nuclear power plants, research reactors, other nuclear fuel cycle facilities, facilities for the processing and storage of waste that is not from the nuclear fuel cycle, facilities for processing naturally occurring radioactive material (NORM), and relevant medical facilities, industrial facilities and research facilities. It does not apply to radioactive waste disposal facilities or disposal facilities for NORM or for waste from mining and mineral processing. Requirements for the closure of such facilities are established in Ref. [3]. Requirements for the decommissioning of supporting buildings and services of these facilities are established in the present publication, however.

1.18. The definition of decommissioning (para. 1.1) makes it clear that decommissioning is concerned with 'facilities', i.e. buildings, including their associated land and equipment. There may be areas of land that have become contaminated as a result of the normal operation of the facility; which would not constitute an incident or an emergency exposure situation. The cleanup of these areas would also be included as part of decommissioning. This publication does not address the remediation of areas contaminated by residual radioactive material arising from past activities that (1) were never subject to regulatory control or (2) were subject to regulatory control but not in accordance with the requirements of the safety standards. It also does not address the remediation of areas affected by a nuclear or radiological emergency, after an emergency has been declared to be over. However, most of the requirements established in this safety standard can also be applied to decommissioning after an incident has occurred or a situation has arisen that has resulted in serious damage to, or the contamination of, a facility, or simply after a premature shutdown. The requirements for the remediation of such areas are established in Ref. [4] and recommendations are provided in Ref. [11].

1.19. The management of fresh nuclear fuel, spent nuclear fuel and radioactive waste generated during operations is not usually considered part of decommissioning. It is addressed as part of operations and is outside the scope of this publication.

1.20. This publication addresses the radiological hazards resulting from decommissioning. Non-radiological hazards, such as industrial hazards or hazards due to chemical waste, can also be significant during decommissioning. Such hazards also require due consideration in the planning and implementation process, in the safety assessments and environmental assessments, and in the estimation of costs and the provision of financial resources for the decommissioning project. However, these issues are outside of the scope of this publication and are not explicitly addressed here.

1.21. These Standards do not deal with security measures. The IAEA issues recommendations on nuclear security in the IAEA Nuclear Security Series.

STRUCTURE

1.22. Section 2 establishes the requirements for the protection and safety of workers and the public and for the protection of the environment. The responsibilities of the major parties associated with decommissioning are discussed in Section 3. Section 4 establishes the requirements for the management of decommissioning and Section 5 establishes the requirements for selecting a decommissioning strategy. Section 6 establishes the requirements for the funding of decommissioning and Section 7 discusses the planning for decommissioning that is done during the facility's lifetime. Section 8 establishes the requirements to be followed when conducting decommissioning actions. Section 9 establishes the requirements for determining when decommissioning has been completed, including for surveys to demonstrate the completion of decommissioning actions and the termination of authorization.

2. PROTECTION OF HEALTH AND PROTECTION OF THE ENVIRONMENT

Requirement 1: Radiation protection and safety

Exposure during decommissioning shall be considered to be an authorized planned exposure situation and the relevant requirements of the Basic Safety Standards [4] shall be applied accordingly during decommissioning.

2.1. The relevant dose limits for the exposure of workers and members of the public shall be applied during decommissioning. Radiation protection and safety of persons who are exposed as a result of decommissioning actions shall be optimized with due regard to the relevant dose constraints.

2.2. In addition to provisions to protect against exposure during planned activities, provision shall be made during decommissioning for protection against, and for mitigation of, exposure due to an incident. However, if the incident or the particular situation is of such a nature as to warrant remediation, other IAEA safety standards apply [4, 11].

2.3. Compliance with environmental protection standards shall be maintained during decommissioning and beyond if a facility is released with restrictions on future use.

Requirement 2: Graded approach

A graded approach shall be used for all aspects of decommissioning in determining the scope and level of detail for any particular facility, consistent with the magnitude of the possible radiation risks arising from the decommissioning [4, 5].

2.4. The type of information and the level of detail in the decommissioning plans and supporting documents shall be commensurate with the type, scale, complexity, status and stage in the lifetime of the facility and with the hazards associated with the decommissioning of the facility.

Requirement 3: Assessment of safety

Safety shall be assessed for all facilities that are to undergo decommissioning.

2.5. The final decommissioning plan shall be supported by a safety assessment addressing the planned decommissioning actions and incidents that may occur or situations that may arise during decommissioning.

2.6. A safety assessment shall be prepared in accordance with Ref. [6].

3. RESPONSIBILITIES ASSOCIATED WITH DECOMMISSIONING

3.1. Requirements for general responsibilities within the governmental, legal and regulatory framework with respect to all matters concerning facilities and activities are established in Ref. [7]. These requirements apply in establishing the appropriate infrastructure.

Requirement 4: Responsibilities of the government

The government shall establish and maintain a governmental, legal and regulatory framework within which decommissioning, including management of the resulting radioactive waste, can be planned and carried out safely. This framework shall include a clear allocation of responsibilities, provision of independent regulatory functions and requirements for funding mechanisms for decommissioning. All aspects of decommissioning shall be subject to authorization and regulatory oversight, from the siting and design of a facility to the termination of authorization.

3.2. The responsibilities of the government shall include:

- establishing a national policy for decommissioning and for the management of the resulting radioactive waste;

- establishing and maintaining the legal, technical and financial responsibilities for organizations involved in decommissioning and for the management of the resulting radioactive waste;
- ensuring that the necessary scientific and technical expertise remains available for both the operator and for the support of independent regulatory review and other national review functions;
- establishing a mechanism to ensure the availability of adequate financial resources for safe and timely decommissioning and for the management of the resulting radioactive waste.

Requirement 5: Responsibilities of the regulatory body

The regulatory body shall regulate all aspects of decommissioning, from the siting and design of the facility to the completion of decommissioning actions and the termination of authorization. The regulatory body shall establish the safety standards and requirements for decommissioning, including management of the resulting radioactive waste, and shall take actions to ensure that the regulatory requirements are met.

3.3. The responsibilities of the regulatory body shall include:

- establishing criteria and the time frame for the commencement of decommissioning;
- establishing criteria for protection and safety, security and protection of the environment for the decommissioning of facilities, including criteria for clearance of material during decommissioning in accordance with national policy and criteria for end states for decommissioning and termination of authorization;
- establishing requirements for financial assurance for the funding of decommissioning and for a mechanism to ensure that adequate resources will be available when necessary for safe and timely decommissioning, in the case where the government has delegated this to the regulatory body;
- establishing requirements for planning of decommissioning;

- establishing the review process for decommissioning plans and supporting documents (which are prescribed in national requirements);
- identifying the typical content of the decommissioning plans and supporting documents for review or approval;
- reviewing the initial decommissioning plan and updates, review and approval of the final decommissioning plan and supporting documents, and review and approval of updates after the final decommissioning plan has been approved;
- inspecting and reviewing decommissioning actions and taking enforcement actions in case of non-compliance with the authorization or licence conditions and safety requirements derived from the national legal framework;
- fostering a safety culture in order to encourage a questioning and learning attitude towards safety and to discourage complacency [4, 5];
- establishing requirements and mechanisms for the collection and retention of records and reports relevant to decommissioning;
- evaluating the end state of a decommissioned facility and deciding whether the conditions have been met to allow the termination of authorization;
- terminating the authorization when the operator has demonstrated that the approved end state has been met;
- giving interested parties an opportunity to provide comments on the final decommissioning plan and supporting documents before approval based on national requirements.

Requirement 6: Responsibilities of the operator

The operator shall implement planning for decommissioning and shall carry out the decommissioning actions in compliance with the authorization and with safety standards and requirements derived from the national legal framework. The operator shall be responsible for all aspects of safety and protection of the environment during decommissioning.

3.4. The responsibilities of the operator shall include:

- selecting a decommissioning strategy as the basis for preparing and maintaining decommissioning plans (initial and final) throughout the lifetime of the facility;
- establishing and implementing an integrated management system [5];
- fostering a safety culture in order to encourage a questioning and learning attitude towards safety and to discourage complacency [4, 5];
- estimating the cost of decommissioning actions and providing financial assurances and resources to cover the costs associated with safe decommissioning, including management of resulting radioactive waste;
- notifying the regulatory body prior to permanent shutdown of the facility;
- submitting a final decommissioning plan and supporting documents for review and approval by the regulatory body, in accordance with national regulations, in order to obtain authorization for decommissioning;
- managing the decommissioning project and performing decommissioning actions;
- identifying a destination for all waste arising from decommissioning actions and for any waste arising from the operation of the facility and processing the waste appropriately;
- ensuring that the facility is maintained in a safe configuration during transition and until the approval of the final decommissioning plan;
- performing safety assessments and environmental impact assessments in relation to decommissioning actions;
- preparing and implementing appropriate safety and security procedures, including emergency plans;
- ensuring that properly trained, qualified and competent staff are available for the decommissioning project;
- performing radiological surveys in support of decommissioning;

- ensuring that end state criteria have been met by performing a final survey;
- keeping records and submitting reports as required by the regulatory body.

4. MANAGEMENT OF DECOMMISSIONING

Requirement 7: Integrated management system

An integrated management system shall be applied to all aspects of decommissioning [5].

4.1. An integrated management system shall provide a single framework for the arrangements and processes necessary to address all the goals of the operating organization. These goals shall include safety, health, environmental, security, quality and economic elements.

4.2. An integrated system for the management and implementation of decommissioning shall be established as part of the operator's organization with the prime responsibility of ensuring that decommissioning will be conducted safely. The reporting hierarchy and lines of authority of the management for decommissioning shall not create conflicts between organizations and activities that could compromise safety during decommissioning.

4.3. The prime responsibility for safety shall remain with the operator. It shall be permissible to delegate the performance of specific tasks to contractors and the management for decommissioning shall ensure that the work of contractors is appropriately controlled and that it shall be conducted safely. If the operator changes during the lifetime of the facility, procedures shall be put into place to ensure the transfer of responsibility for decommissioning to the new operator.

4.4. Individuals made responsible for performing decommissioning shall have the necessary skills, expertise and training to perform decommissioning safely. Provisions 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.

4.5. All individuals responsible for performing decommissioning actions shall have the responsibility to inform the decommissioning management of any concerns about safety. The decommissioning management also shall ensure that appropriate authority for suspending decommissioning actions is granted to such individuals.

4.6. Decommissioning shall be controlled through the use of written procedures. These procedures shall be subject to review and approval by the operator's organizations responsible for ensuring safety and practicability. A methodology for issuing, modifying and terminating work procedures shall be established.

5. DECOMMISSIONING STRATEGY

Requirement 8: Selecting a decommissioning strategy

The operator shall select a decommissioning strategy, which will form the basis for the planning for decommissioning. The strategy shall be consistent with national policy on decommissioning and waste management.

5.1. The selection of a decommissioning strategy shall be justified by the operator. The strategy selected could be a combination of the two strategies of immediate dismantling and deferred dismantling.

5.2. The preferred decommissioning strategy shall be immediate dismantling. However, there may be situations in which immediate dismantling is not a practicable strategy when all relevant factors are considered.

5.3. The operator shall demonstrate that, for the strategy selected, the facility will be maintained in a safe configuration at all times and will be decommissioned, and that no undue burdens will be imposed on future generations.

5.4. If the shutdown of a facility is sudden (e.g. as a consequence of a severe accident), the decommissioning strategy shall be reviewed on the basis of the situation that initiated the sudden shutdown to determine whether revision of the strategy is required. The facility shall be brought to a safe configuration before an approved final decommissioning plan is implemented.

5.5. For sites with more than one facility, a site strategy for decommissioning shall be developed to ensure that the interdependences of the facilities are taken into account in the planning for individual facilities which will lead to final decommissioning plans for each facility (e.g. by means of partial site release).

6. FUNDING

Requirement 9: Funding of decommissioning

Responsibilities in respect of financial provisions for decommissioning shall be set out in national legislation. These provisions shall include establishing a mechanism to provide and ensure adequate financial resources for safe and timely decommissioning.

6.1. Adequate financial resources to cover the costs associated with safe decommissioning, including management of the resulting waste, shall be available when needed, even in the event of premature shutdown of the facility (e.g. as a consequence of a severe accident).

6.2. The cost estimate shall be updated on the basis of the periodic update of the initial or final decommissioning plan. The financial assurance instrument shall be maintained consistent with the facility's specific cost estimate and shall be changed if appropriate.

6.3. If financial assurance for the decommissioning of an existing facility has not yet been obtained, suitable funding provision shall be put in place as soon as possible. Approval of a renewal or extension of the authorization shall include provisions for financial assurance.

6.4. If the decommissioned facility is released with restrictions on its future use, financial assurance shall ensure that funding covers the facility and monitoring, surveillance and control of the facility throughout the necessary time period.

7. THE PLANNING OF DECOMMISSIONING DURING THE LIFETIME OF THE FACILITY

Requirement 10: Planning of decommissioning

The operator shall prepare decommissioning plan and maintain it throughout the lifetime of the facility, unless otherwise required by the regulatory body, in order to show that decommissioning can be accomplished safely to meet the defined end state.

7.1. For new facilities, consideration of decommissioning shall begin early in the siting stage and shall continue through to termination of the authorization. The regulatory body shall ensure that operators take decommissioning into account in the siting, design, construction, commissioning and operation of the facility, including by means of features to facilitate decommissioning, maintenance of records of the facility, and consideration of physical and procedural methods to limit contamination and/or activation.

7.2. For existing facilities where there is no initial decommissioning plan, a suitable plan for decommissioning shall be prepared as soon as possible once the regulatory body has provided requirements and guidance, and the plan shall be periodically reviewed and updated.

7.3. If permanent shutdown occurs before a final decommissioning plan is prepared, adequate arrangements shall be made to ensure the safety of the facility until a final decommissioning plan can be implemented.

7.4. A background survey of the site, including obtaining information on radiological conditions, shall be performed prior to the construction of a new facility and the baseline data shall be updated prior to its commissioning. This information shall be used to determine background radiological conditions. For those activities for which no such background survey has been made in the past, data from analogous and undisturbed areas with similar characteristics shall be used instead of pre-operational baseline data.

7.5. The operator shall prepare and submit an initial decommissioning plan together with the application for authorization to operate the facility. This initial decommissioning plan shall be required in order to ensure that sufficient funds will be available for decommissioning, to facilitate early planning for minimization of decontamination, to identify categories and to estimate quantities of waste.

7.6. The initial decommissioning plan shall be updated by the operator and shall be reviewed by the regulatory body periodically, at least every five years or as prescribed by the regulatory body; or when specific circumstances warrant, such as if changes in an operational process lead to significant changes to the plan. The initial plan shall be updated as necessary in the light of operational experience gained, lessons learned from the decommissioning of similar facilities, new or revised safety requirements, or technological developments relevant to the selected decommissioning strategy. If an incident occurs or a situation arises with consequences relevant for decommissioning, the initial decommissioning plan shall be updated by the operator as soon as possible and shall be reviewed by the regulatory body.

7.7. Appropriate records and reports that are relevant to decommissioning (e.g. records and reports of events) shall be retained during the lifetime of the facility. In this way, the design of and modifications to the facility and its operating history shall be identified and shall be considered in preparing the decommissioning plans.

7.8. Between the permanent shutting down of operations at the facility and approval of the final decommissioning plan, there may be a period of transition. During this period, some preparatory decommissioning actions may be performed subject to authorization.

7.9. During the transition, operation of the facility shall be subject to authorization. All applicable requirements for the facility shall remain in place, unless the regulatory body has approved reductions of the requirements on the basis of a reduction in the hazards associated with the facility (e.g. due to the removal of nuclear material from the facility).

Requirement 11: Final decommissioning plan

Prior to conducting decommissioning actions, a final decommissioning plan shall be prepared and shall be submitted to the regulatory body for approval.

7.10. The operator shall inform the regulatory body prior to permanently shutting down the facility. If a facility is permanently shut down and/or is no longer used for its intended purpose, a final decommissioning plan shall be submitted to the regulatory body for approval within two years of the cessation of authorized activities, unless an alternative schedule is prescribed by the regulatory body.

7.11. The final decommissioning plan and supporting documents shall include the decommissioning strategy; decommissioning actions; the proposed end state and how the operator will demonstrate that the end state has been achieved; the timeframe for decommissioning; and details of the funding for the completion of decommissioning.

7.12. Large and complex decommissioning projects may benefit from having decommissioning actions divided into several phases. All phases to reach the end state shall be described in the final decommissioning plan and supporting documents. Updates of the final decommissioning plan shall include additional information for subsequent phases.

7.13. If the final decommissioning plan or updates to it include new technologies and concepts for decommissioning actions, the operator shall demonstrate prior to their use that the use of such methods is safe and can effectively achieve the desired result.

7.14. Updates of the final decommissioning plan shall be made as necessary in the light of experience gained in decommissioning, new or revised safety requirements, or new or revised national regulations. Updates of the final decommissioning plan by the operator shall be subject to review and approval by the regulatory body.

7.15. During the preparation and update of the final decommissioning plan, the extent and type of radioactive material (e.g. activated 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 contamination or radioactive waste from operations remains at the facility (including in subsurface soils and groundwater), this radioactive material shall be included in the characterization survey. Additional characterization of the site for the purpose of evaluating and preventing potential migration shall be considered.

7.16. If the deferred dismantling strategy has been selected, the operator shall demonstrate in the final decommissioning plan and/or supporting documents that such an option will be implemented safely. The availability of adequate funding for the maintenance of the facility during the deferral period and for subsequent decontamination and/or dismantlement shall be demonstrated.

7.17. Interested parties shall be provided with an opportunity to examine the final decommissioning plan and, as appropriate, supporting documents, and to provide comments prior to its approval subject to national requirements.

8. CONDUCT OF DECOMMISSIONING ACTIONS

Requirement 12: Conduct of decommissioning actions

The operator shall implement the final decommissioning plan including management of radioactive waste in compliance with national safety standards and requirements.

8.1. The operator shall implement the final decommissioning plan once the regulatory body has approved it.

8.2. In the case of deferred dismantling, the operator shall ensure that the facility has been placed, and will be maintained, in a safe configuration and that subsequent decontamination and/or dismantlement will be performed in the future. An adequate programme for maintenance, monitoring and surveillance, which shall be subject to the approval of the regulatory body, shall be developed to ensure safety during the period of deferment.

8.3. On the basis of the final decommissioning plan, decontamination and dismantling techniques shall be used such that the protection and safety of workers and the public is optimized, the environment is protected and the generation of waste is minimized, as far as reasonably practicable. Decommissioning actions such as decontamination, cutting and handling of large equipment, and the

progressive dismantling or removal of safety systems have the potential for creating new hazards. The implications for safety of such actions shall be assessed and managed so that the consequences of these hazards are mitigated, and exposures of workers shall be kept within established dose limits and dose constraints shall not be exceeded.

8.4. The regulatory body shall make arrangements for and shall implement the inspection and review of the decommissioning actions to ensure that they are being carried out in accordance with the final decommissioning plan and the authorization and with other requirements derived from the national legal framework for which the regulatory body has responsibility for oversight. If safety requirements and conditions for authorization are not met, the regulatory body shall take appropriate enforcement actions.

Requirement 13: Emergency planning

Emergency planning arrangements, commensurate with the hazards, shall be established and maintained and events significant to safety shall be reported to the regulatory body in a timely manner.

8.5. Requirements for preparedness and response for a nuclear or radiological emergency are established in Ref. [8].

Requirement 14: Radioactive waste management

Management of radioactive waste shall be established for all waste streams.

8.6. Disposal shall be the preferred option for radioactive waste arising from operational activities that remains at the facility and radioactive waste that is generated during decommissioning. If disposal capacity is not available, radioactive waste shall be stored safely in accordance with the relevant requirements [3, 9].

8.7. Prior to starting decommissioning, the operator shall ensure the availability of adequate processing, storage and transport package(s) for the radioactive waste resulting from the decommissioning.

8.8. If operational radioactive waste or nuclear fuel remains in the facility to be decommissioned after its permanent shutdown, such material shall be removed and transported to another authorized

facility (e.g. for interim storage) in compliance with the applicable regulations; or otherwise the approved final decommissioning plan shall address the management of these materials [10].

DRAFT

9. COMPLETION OF DECOMMISSIONING ACTIONS AND TERMINATION OF AUTHORIZATION

Requirement 15: Completion of decommissioning actions and termination of authorization

On the completion of decommissioning actions, the operator shall demonstrate that the end state criteria as defined in the final decommissioning plan and any additional regulatory requirements have been met. The regulatory body shall verify the compliance with end state criteria and shall decide on termination of the authorization.

9.1. A final decommissioning report shall be prepared to demonstrate that the end state of the facility as specified in the approved final decommissioning plan has been met and this report shall be submitted to the regulatory body for review and approval.

9.2. The facility shall be released from regulatory control once the operator has demonstrated that the end state of the facility as specified in the approved final decommissioning plan has been reached and that any additional regulatory requirements have been met. The regulatory body shall evaluate the end state to ensure that the criteria have been met and shall decide on the termination of the authorization.

9.3. If the approved end state is to release the facility with restrictions on its future use, appropriate controls and programmes for monitoring and surveillance shall be maintained to ensure protection and safety and protection of 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 and programmes. The regulatory body shall ensure that a mechanism is in place to ensure compliance with the restrictions on the release of the facility.

9.4. A system shall be established to ensure that all records are maintained in accordance with the records retention requirements of the integrated management system and the regulatory requirements.

9.5. If radioactive waste is stored on the site after decommissioning has been completed, a revised or new, separate authorization, including requirements for decommissioning, shall be issued for the storage facility, if appropriate.

9.6. In the case of the partial release of the site, a revised or new, separate authorization shall be issued, as appropriate.

DRAFT

REFERENCES

- [1] EUROPEAN ATOMIC ENERGY COMMUNITY, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, WORLD HEALTH ORGANIZATION, Fundamental Safety Principles, IAEA Safety Standards Series No. SF-1, IAEA, Vienna (2006).
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, IAEA Safety Glossary: Terminology Used in Nuclear Safety and Radiation Protection, 2007 Edition, IAEA, Vienna (2007).
- [3] INTERNATIONAL ATOMIC ENERGY AGENCY, Disposal of Radioactive Waste, IAEA Safety Standards Series No. SSR-5, IAEA, Vienna (2011).
- [4] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3 (Interim), IAEA, Vienna (2011).
- [5] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-R-3, IAEA, Vienna (2006) (under revision).
- [6] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4, IAEA, Vienna (2009).
- [7] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety Part 1, IAEA Safety Standards Series No. GSR Part 1, IAEA, Vienna (2010).
- [8] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GS-R-2, IAEA, Vienna (2002) (under revision).
- [9] INTERNATIONAL ATOMIC ENERGY AGENCY, Predisposal Management of Radioactive Waste, IAEA Safety Standards Series No. GSR Part 5, IAEA, Vienna (2009).
- [10] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. SSR-6, IAEA, Vienna (2012).
- [11] INTERNATIONAL ATOMIC ENERGY AGENCY, Remediation Process for Areas Affected by Past Activities and Accidents, IAEA Safety Standards Series No. WS-G-3.1, IAEA, Vienna (2007).

CONTRIBUTORS TO DRAFTING AND REVIEW

Francois, P.	Institut de radioprotection et de sûreté nucléaire, France
Ljubenov, V.	International Atomic Energy Agency
Orlando, D.	U.S. Nuclear Regulatory Commission, United States of America
Rehs, B.	Bundesamt für Strahlenschutz, Germany
Reisenweaver, D.	Alion Science and Technology, United States of America
Rowat, J.	International Atomic Energy Agency
Verseemann, R.	RWE Power AG, Germany
Wong, M.	International Atomic Energy Agency
Yamamoto, M.	Radioactive Waste Management Funding and Research Centre (RWMC), Japan

DRAFT