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International Atomic Energy Agency

IAEA Perspectives on Regulatory Aspects of Decommissioning

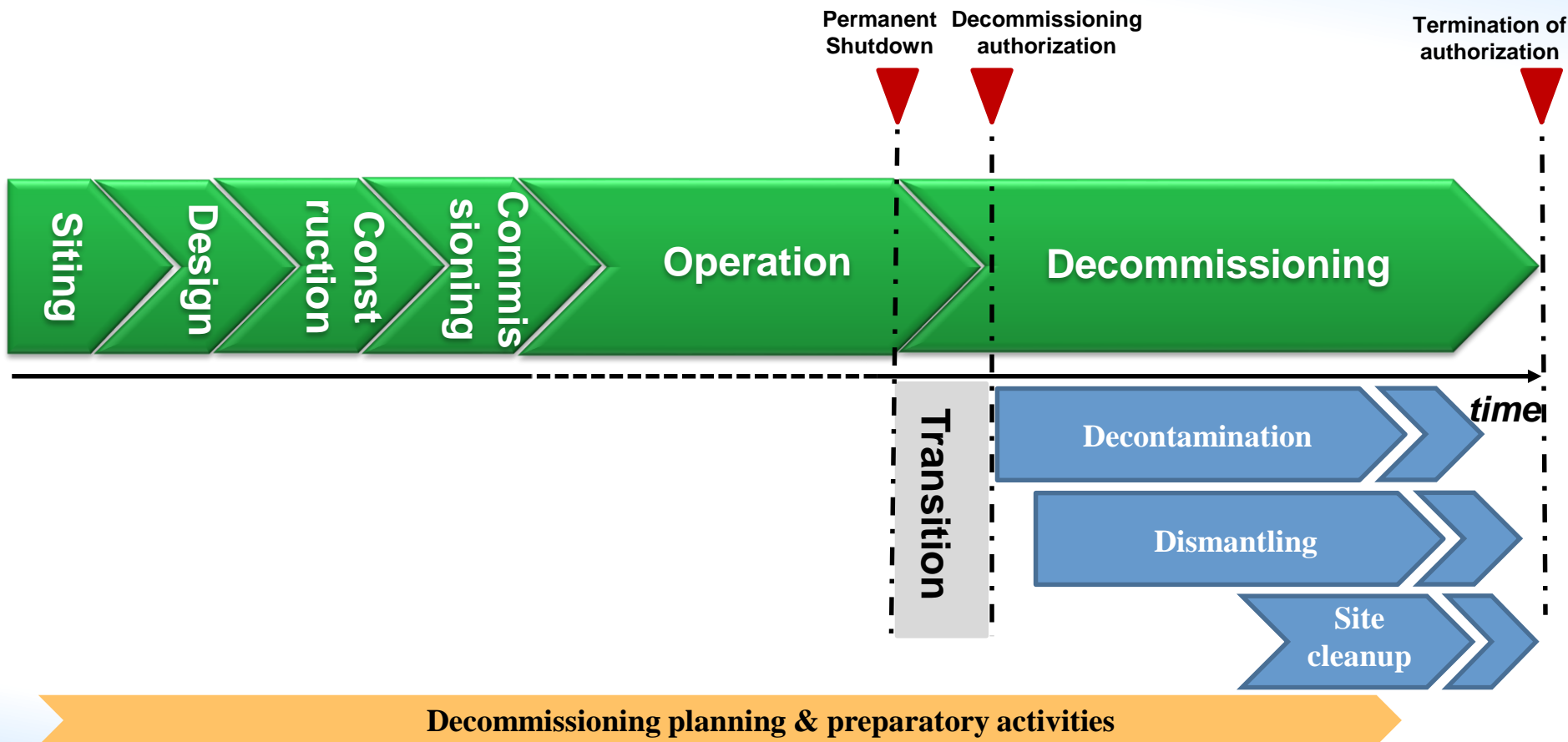
Regional Workshop for Central Governments and Regulatory Bodies of Asia, for the Development of National Strategies and Regulatory Requirements for Decommissioning

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Introduction

Decommissioning is **one of the six major stages** of the lifetime of an authorized facility.



Decommissioning - definition

The IAEA Safety Standards define decommissioning as:

- ✓ *The administrative and technical actions taken to allow the **removal of some or all of the regulatory controls** from a facility (except for the part of a disposal facility in which the radioactive waste is emplaced, for which the term ‘closure’ instead of ‘decommissioning’ is used).*

*Decommissioning is the last phase in the lifetime of a facility. **Aspects of decommissioning have to be considered throughout the other phases** (siting, design, construction, commissioning and operation).*

Key positions

- ✓ Last phase in the facility lifetime, normal phase which can't be avoided
- ✓ Decommissioning differs from operation of facilities
- ✓ Safety driven activity, requires authorization (licensing)
- ✓ Early planning
- ✓ Fund accumulation ("polluter pays")
- ✓ Strategies - preference to immediate dismantling
- ✓ Implemented as a project, often with multiple phases
- ✓ Gradual removal of hazards
- ✓ Protection of workers, public and the environment
- ✓ Technologies available, well developed
- ✓ Management of materials/waste, clearance of material
- ✓ Non-radioactive waste, hazardous material
- ✓ Industrial safety aspects
- ✓ Release of the site from regulatory control

IAEA's General Safety Requirements GSR Part 1



IAEA Safety Standards

for protecting people and the environment

Governmental, Legal and Regulatory Framework for Safety

General Safety Requirements

No. GSR Part 1 (Rev. 1)



IAEA

International Atomic Energy Agency

Published in 2016

Governmental, Legal and Regulatory Framework



- ✓ If a facility is reaching decommissioning (after its operational period), most probably there was already a governmental, legal and regulatory framework in place, including an independent regulatory body
- ✓ That framework needs to take decommissioning into account
- ✓ The main parties involved are **government, regulatory body and the operator/licensee**, all they have specific responsibilities related to decommissioning
- ✓ The framework will depend on the type of facilities that exist in the country - graded approach to the level of structure and resources required
- ✓ Regardless of regulatory arrangements, the **prime responsibility for safety is assigned to the operator/licensee**

Responsibilities of the Government – general (GSR Part 1)



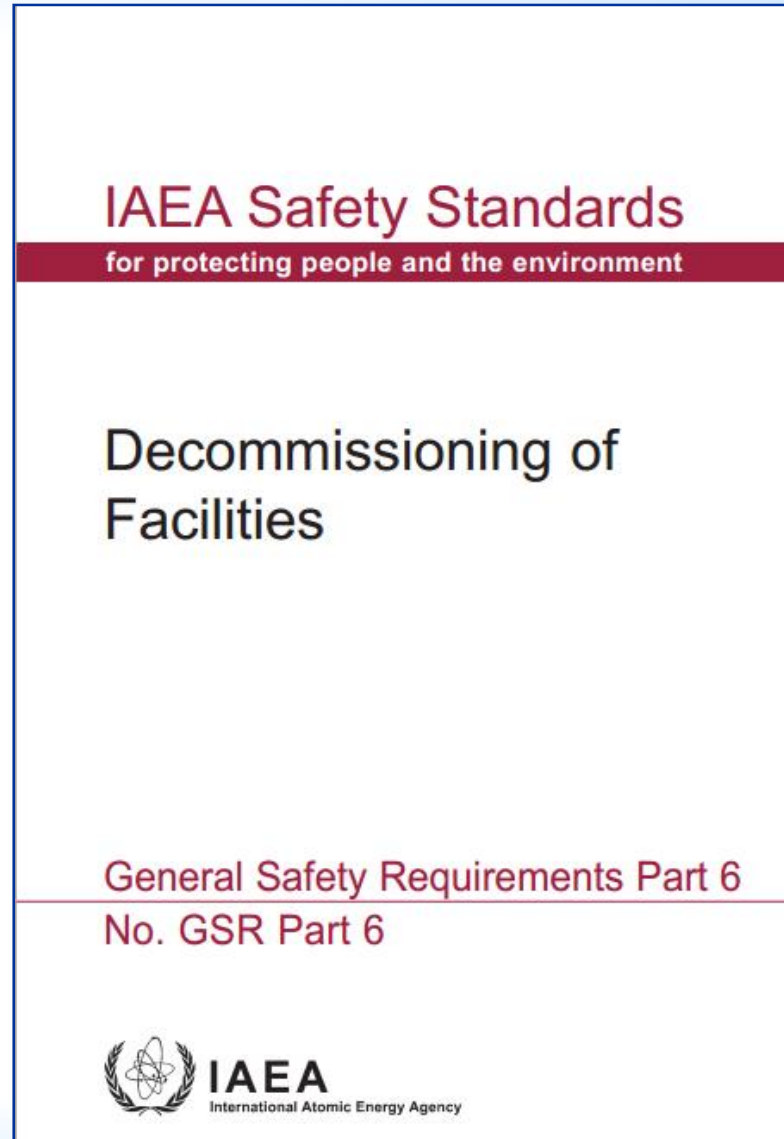
- ✓ **Req. 1:** Establish a **national policy and strategy for safety**
- ✓ **Req. 2:** Establish and maintain an appropriate **governmental, legal and regulatory framework** for safety within which **responsibilities are clearly allocated**
- ✓ **Req. 3:** Establish, through the legal system, and maintain a **regulatory body**, and provide it with the **competence** and the **resources** necessary to fulfil its statutory obligation for the regulatory control of facilities and activities
- ✓ **Req. 4:** Ensure that the regulatory body is **effectively independent** in its safety related decision making

Responsibilities of the Government – general (GSR Part 1)



- ✓ **Req. 5:** Assign the **prime responsibility for safety** to the person or organization responsible for a facility or an activity, and confer on the regulatory body the authority to require such persons or organizations to comply with stipulated regulatory requirements, as well as to demonstrate such compliance
- ✓ **Req. 7:** Where **several authorities have responsibilities for safety** within the regulatory framework for safety, the government shall make **provision for the effective coordination** of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties
- ✓ **Req. 10:** Make **provision for the safe decommissioning**, the safe management and disposal of radioactive waste arising from facilities and activities, and the safe management of spent fuel

IAEA's General Safety Requirements GSR Part 6



Published in 2014

Protection of People and Protection of the Environment



Requirement 1: Optimization of protection and safety in decommissioning

*Exposure during decommissioning shall be considered to be a **planned exposure situation** and the relevant requirements of the Basic Safety Standards shall be applied accordingly during decommissioning.*

- ✓ **Dose limitation** – the same as for operation
- ✓ Protection against exposure during **planned activities**, but also in case of **incidents** during decommissioning
- ✓ Compliance with **environmental protection requirements**

Protection of People and Protection of the Environment



Requirement 2: Graded approach in decommissioning

*A **graded approach** shall be applied in **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.*

- ✓ The range of decommissioning actions is broad, and the scope, extent and level of detail of planning, assessment and demonstration of safety and preparation, review and update of safety related documentation, regulatory oversight, **need to be commensurate with the types and magnitude of hazards, and their potential consequences for workers, the public and the environment.**

Protection of People and Protection of the Environment



Requirement 3: Assessment of safety for decommissioning

Safety shall be assessed for all facilities for which decommissioning is planned and for all facilities undergoing decommissioning.

- ✓ The FDP shall be supported by a **safety assessment** addressing the **planned decommissioning actions and incidents**, including accidents that may occur or situations that may arise during decommissioning.

Responsibilities Associated with Decommissioning

Requirement 4: Responsibilities of the government for decommissioning

*The government shall establish and maintain a **governmental, legal and regulatory framework** within which all aspects of 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 in respect of **financial assurance** for decommissioning.*

Responsibilities Associated with Decommissioning

Requirement 5: Responsibilities of the regulatory body for decommissioning

- ✓ *The regulatory body shall **regulate all aspects of decommissioning** throughout all stages of the facility's lifetime, **from initial planning** for decommissioning during the siting and design of the facility, **to the completion of decommissioning** actions and the termination of authorization for decommissioning. The regulatory body shall **establish the safety requirements** for decommissioning, including requirements for management of the resulting radioactive waste, and shall **adopt associated regulations and guides**. The regulatory body shall also take actions to ensure that the regulatory requirements are met.*

Responsibilities Associated with Decommissioning

Requirement 5: Responsibilities of the regulatory body for decommissioning

- ✓ Establishing requirements and criteria for:
 - ✓ planning for decommissioning
 - ✓ content of decommissioning plans (initial, final) and supporting documents
 - ✓ review process and timeframes
 - ✓ licensee's financial assurance for decommissioning
 - ✓ termination of the authorization for decommissioning (end state)
 - ✓ collection and retention of records relevant to decommissioning, preserving information about activities

Responsibilities Associated with Decommissioning

Requirement 5: Responsibilities of the regulatory body for decommissioning

- ✓ Providing interested parties with an opportunity to comment on the final decommissioning plan and supporting documents before their approval
- ✓ Inspecting and reviewing decommissioning actions and taking enforcement actions in the case of non-compliance
- ✓ **Evaluating the decommissioning end state** and deciding whether the conditions have been met to allow the **termination of authorization** for decommissioning;
- ✓ **Terminating the authorization for decommissioning** when the licensee has demonstrated that the approved end state has been met;

Responsibilities Associated with Decommissioning

Requirement 6: Responsibilities of the licensee for decommissioning

*The licensee shall **plan** for decommissioning and shall **conduct** the decommissioning actions in compliance with the authorization for decommissioning and with requirements derived from the national legal and regulatory framework. The licensee shall be **responsible** for all aspects of safety, radiation protection and protection of the environment during decommissioning.*

Responsibilities Associated with Decommissioning

Requirement 6: Responsibilities of the licensee for decommissioning

- ✓ Selecting a decommissioning strategy
- ✓ Preparing and submitting an initial decommissioning plan
- ✓ Establishing and implementing an integrated management system.
- ✓ Fostering a safety culture
- ✓ Estimating the cost of decommissioning actions and providing financial assurances and resources
- ✓ Notifying the regulatory body prior to the permanent shutdown of the facility;
- ✓ Submitting a final decommissioning plan and supporting documents for review and approval by the regulatory body

Responsibilities Associated with Decommissioning

Requirement 6: Responsibilities of the licensee for decommissioning

- ✓ Managing the decommissioning project and conducting decommissioning actions or ensuring oversight of the actions conducted by contractors;
- ✓ Managing the remaining operational waste from the facility and all waste from decommissioning;
- ✓ Ensuring that the facility is maintained in a safe configuration during the period of transition following permanent shutdown and until the approval of the final decommissioning plan;
- ✓ Performing safety assessments and environmental impact assessments in support of decommissioning actions;
- ✓ Preparing and implementing appropriate safety procedures, including emergency plans;

Responsibilities Associated with Decommissioning

Requirement 6: Responsibilities of the licensee for decommissioning

- ✓ Ensuring that properly trained, qualified and competent staff are available for the decommissioning project;
- ✓ Performing radiological surveys in support of decommissioning;
- ✓ Verifying that end state criteria have been met by performing a final survey;
- ✓ Keeping and retaining records and submitting reports as required by the regulatory body.

Management of Decommissioning

Requirement 7: Integrated management system for decommissioning

The licensee shall ensure that its integrated management system covers all aspects of decommissioning.

- ✓ Provide a **single framework** for the arrangements and processes within the operating organization, including decommissioning (safety, health, security, environmental, quality and economic elements)
- ✓ The **prime responsibility for safety** remains with the licensee
- ✓ Performance of specified tasks can be delegated to contractors; provisions to ensure the **work of contractors** is appropriately specified and controlled and is conducted safely
- ✓ Decommissioning shall be controlled through the use of **written procedures**

Decommissioning Strategy

Requirement 8: Selecting a decommissioning strategy

*The licensee shall **select a decommissioning strategy** that will form the basis for the planning for decommissioning. The strategy shall be **consistent with the national policy** on the management of radioactive waste.*

- ✓ The preferred decommissioning strategy shall be **immediate dismantling**.
- ✓ For sites with more than one facility, a **site strategy for decommissioning** shall be developed to ensure that interdependences between the facilities are taken into account in the planning for individual facilities.

Financing of Decommissioning

Requirement 9: Financing 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 adequate financial resources** and to ensure that they are available when necessary, for ensuring safe decommissioning.*

- ✓ It shall be ensured that adequate **financial resources to cover the costs associated with safe decommissioning**, including management of the resulting waste, are available when necessary.
- ✓ The **cost estimate for decommissioning** shall be updated on the basis of the periodic update of the initial decommissioning plan or on the basis of the final decommissioning plan.
- ✓ If the decommissioned facility is to be released with restrictions on its future use, financial assurances shall be such that **financial resources are available for monitoring, surveillance and control** of the facility throughout the necessary time period.

Planning for Decommissioning During the Lifetime of the Facility

Requirement 10: Planning for decommissioning

*The licensee shall **prepare** a decommissioning plan and shall **maintain it throughout the lifetime of the facility**, in accordance with the requirements of the regulatory body, in order to show that decommissioning can be accomplished safely to meet the defined end state.*

Planning for Decommissioning During the Lifetime of the Facility



Requirement 11: Final decommissioning plan

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

✓ The final decommissioning plan and supporting documents shall cover the following:

- ✓ selected **decommissioning strategy**
- ✓ **schedule**
- ✓ **type and sequence of decommissioning actions**
- ✓ **waste management strategy** applied, including clearance
- ✓ **proposed end state** and how the licensee will demonstrate that the end state has been achieved
- ✓ **storage and disposal of the waste from decommissioning**
- ✓ **timeframe** for decommissioning
- ✓ **financing** for the completion of decommissioning.

Final Planning for Decommissioning

Operation

Decommissioning

Licensee: Submission of a final decommissioning plan

Start to implement the plan

A transition period
(some preparatory actions can be performed in accordance with the operation authorization or a modified authorization)

Regulatory Body:
Review and Approve
(within a period agreed with the regulatory body)



Conduct of Decommissioning Actions



Requirement 12: Conduct of decommissioning actions

The licensee shall implement the final decommissioning plan, including management of radioactive waste, in compliance with national regulations.

Requirement 13: Emergency response arrangements for decommissioning

Emergency response arrangements for decommissioning, 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.

Requirement 14: Radioactive waste management in decommissioning

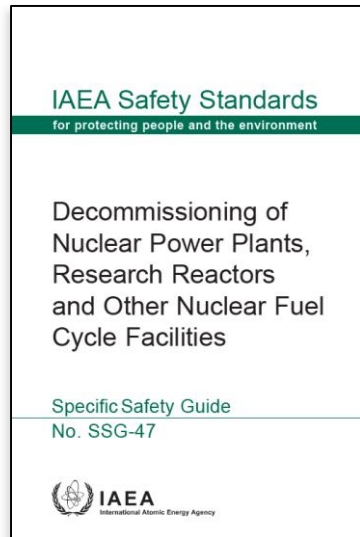
Radioactive waste shall be managed for all waste streams in decommissioning.

Completion of Decommissioning Actions and Termination of the Authorization for Decommissioning

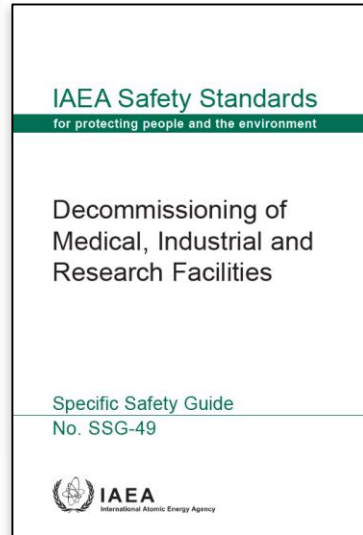
Requirement 15: Completion of decommissioning actions and termination of the authorization for decommissioning

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

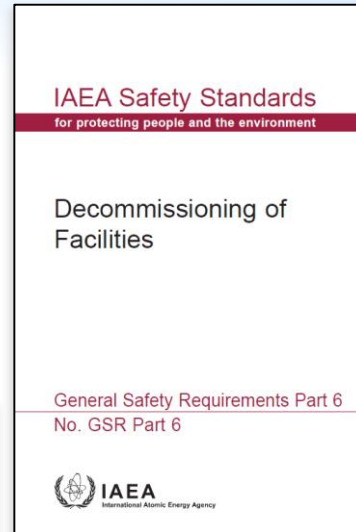
IAEA Safety Standards on decommissioning



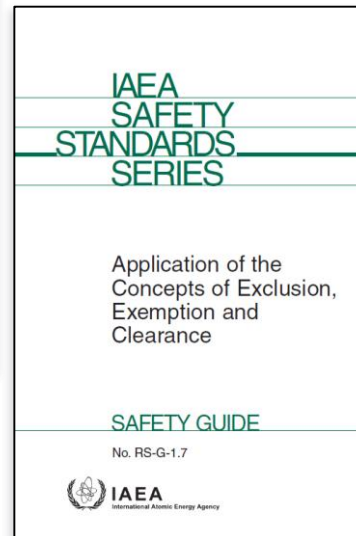
2018



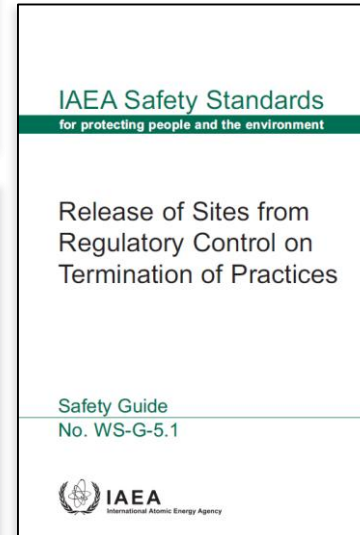
2019



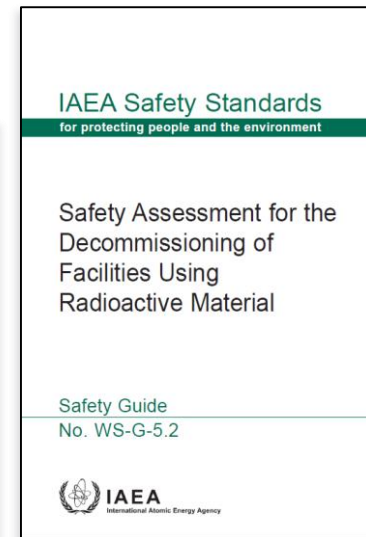
2014



2004

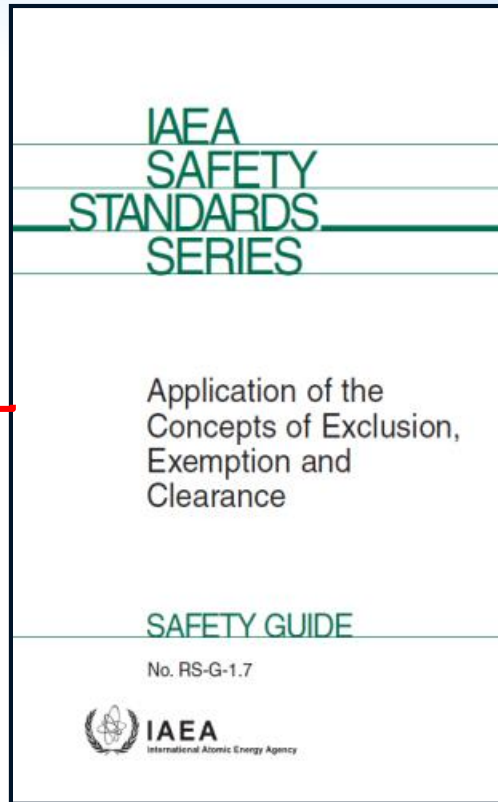


2006



2008

Safety Standards under revision



2004

Draft Safety Guide on
**Application of the Concept of
Exemption (DS499)**

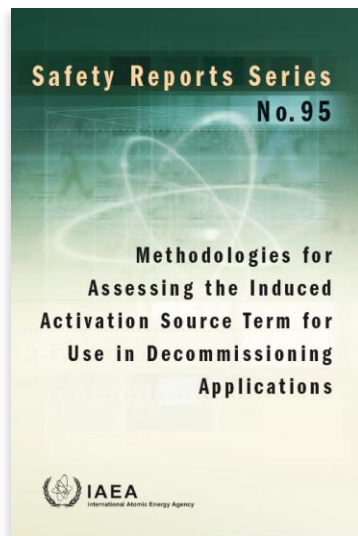
Draft Safety Guide on **Application
of the Concept of Clearance
(DS500)**

Developed in parallel

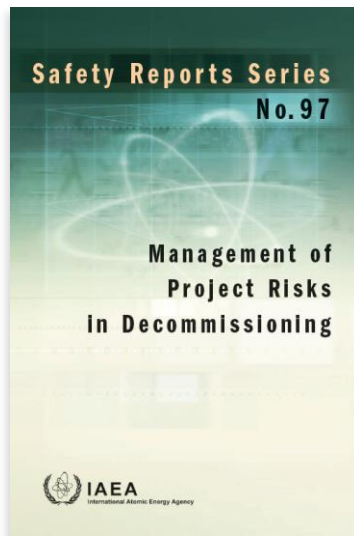
Other safety related publications on decommissioning



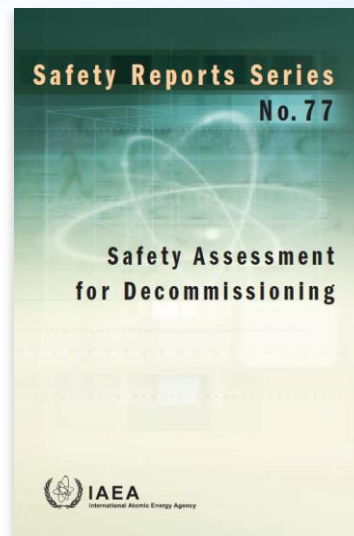
2019



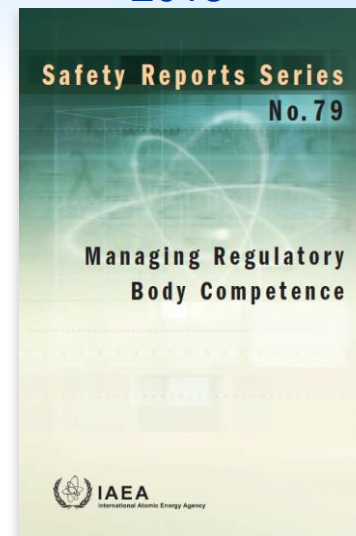
2019



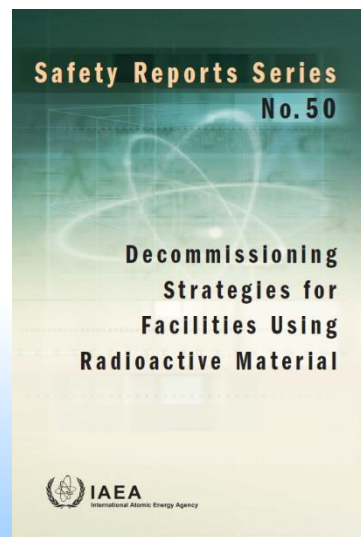
2013



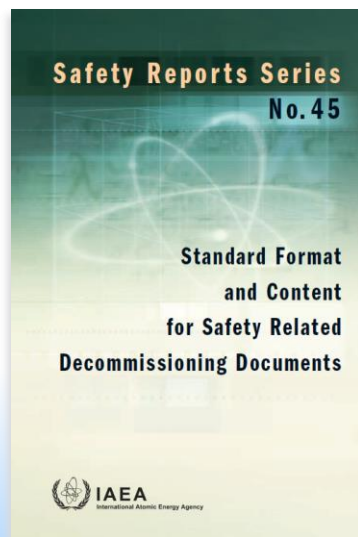
2013



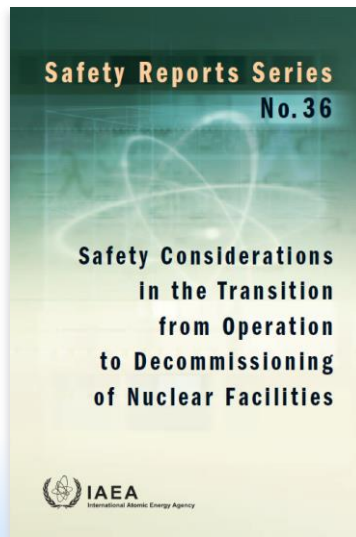
2007



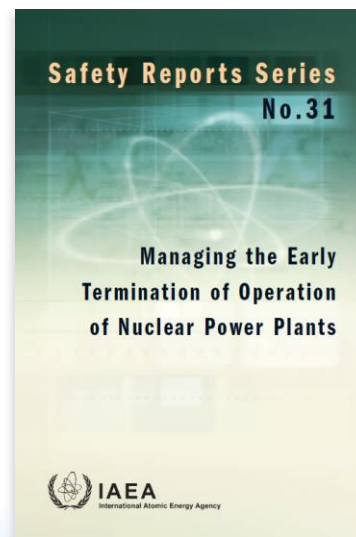
2005



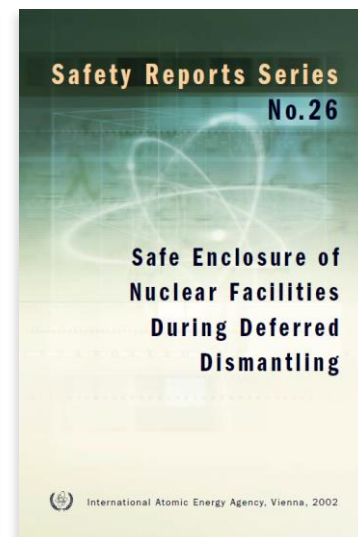
2004



2003



2002



Model Regulations for Decommissioning



IAEA-TECDOC-1816 “Model Regulations for Decommissioning of Facilities” (2018)

- ✓ Designed to assist technical and legal experts in the development of new regulations on all aspects of the decommissioning of facilities and in the assessment of the adequacy of existing regulations and regulatory guides on decommissioning
- ✓ May also be used for decommissioning after an abnormal event that has resulted in serious plant damage or facility contamination
- ✓ Can be applicable to the broad range of regulatory systems in existence and to all types of facilities at all stages of their lifetime (including facilities that are no longer in operation but have yet to be decommissioned)



Summary

- ✓ A governmental, legal and regulatory framework that covers decommissioning needs to be in place, providing with clear allocation of responsibilities for decommissioning
- ✓ Regulatory infrastructure and adequate resources should be in place to ensure proper implementation of regulatory functions and proper control of compliance with regulatory requirements for decommissioning
- ✓ Application of a “graded approach” to the safety requirements for decommissioning is essential
- ✓ IAEA Safety Standards and supporting publications provide a good starting point for development of regulatory framework in the Member States
- ✓ IAEA provides other services and assistance through various mechanisms (TC programme, peer review services, international projects, International Decommissioning Network - IDN)



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Thank you!

