Scientific meeting

Clearance and release from regulatory control of radioactive materials

Revision of IAEA Safety Guide RS-G-1.7

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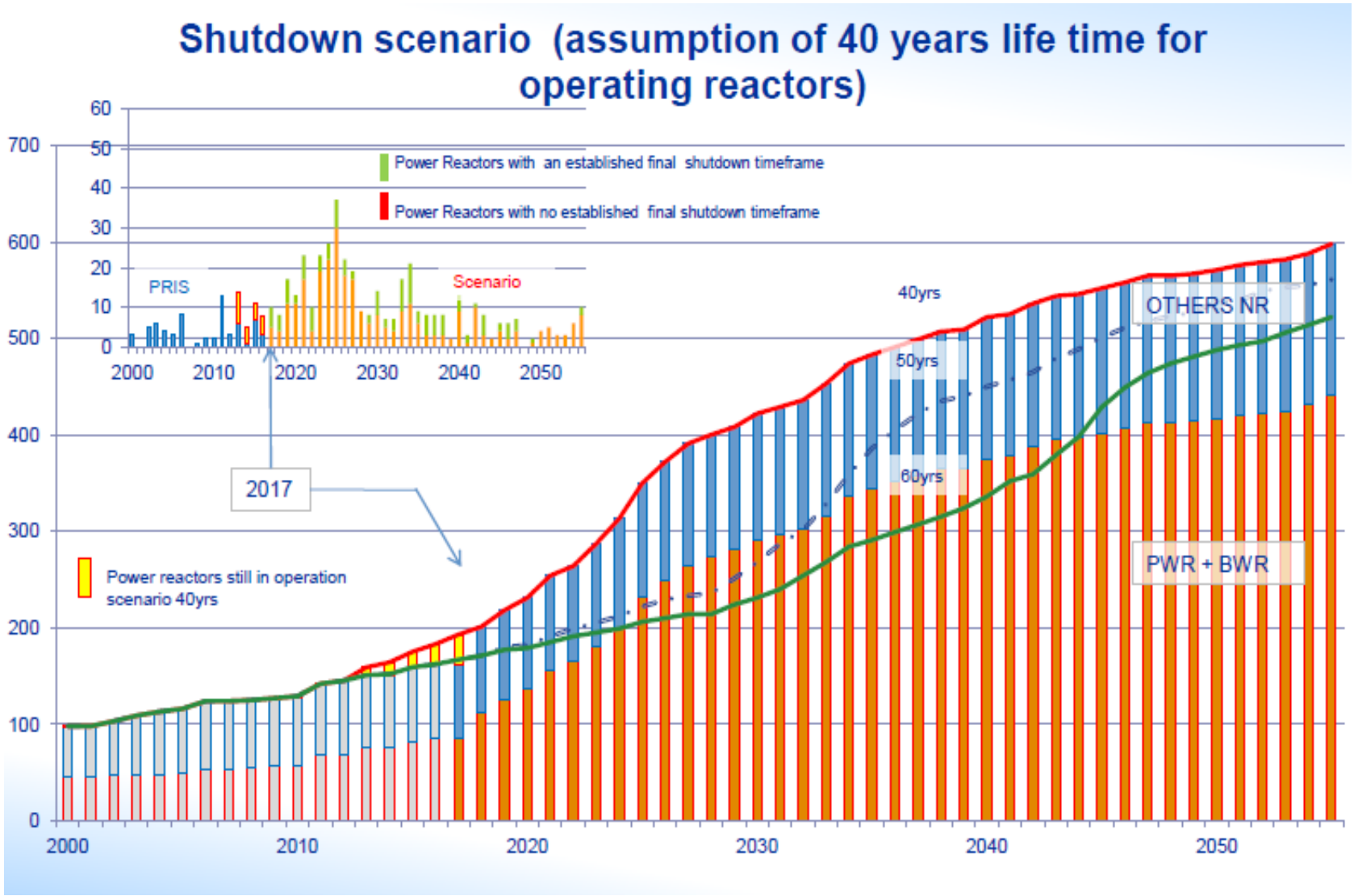
Clearance and Release : Revision of IAEA RS-G-1.7



Clearance and Release : Revision of IAEA RS-G-1.7

- Decommissioning typically generates large amounts of material (potential to be recycled and reused) and waste (no intention for reuse).
- Those amounts are larger than during operation and are generated in a relatively short period of time (several years).
- Most of that material and waste is expected to be radiologically clean or just slightly contaminated.
- It could be practical and economically viable to separate the part that has to be managed as radioactive waste or reused within the nuclear applications (under continual regulatory control), and the part that can be taken out of the regulatory control (through clearance) immediately, after decontamination or after a decay.

Clearance and Radioactive Waste (according to IAEA GSG-1)

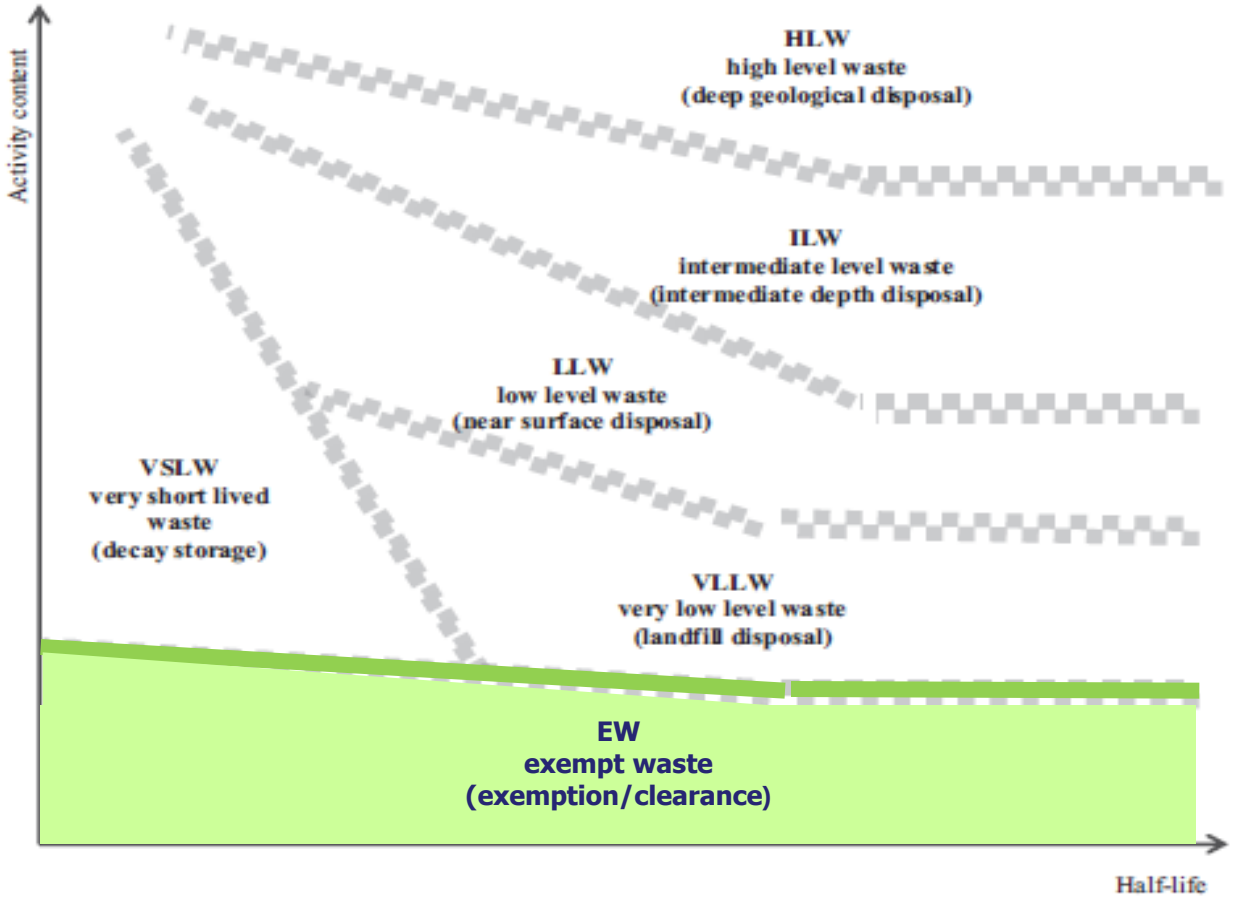
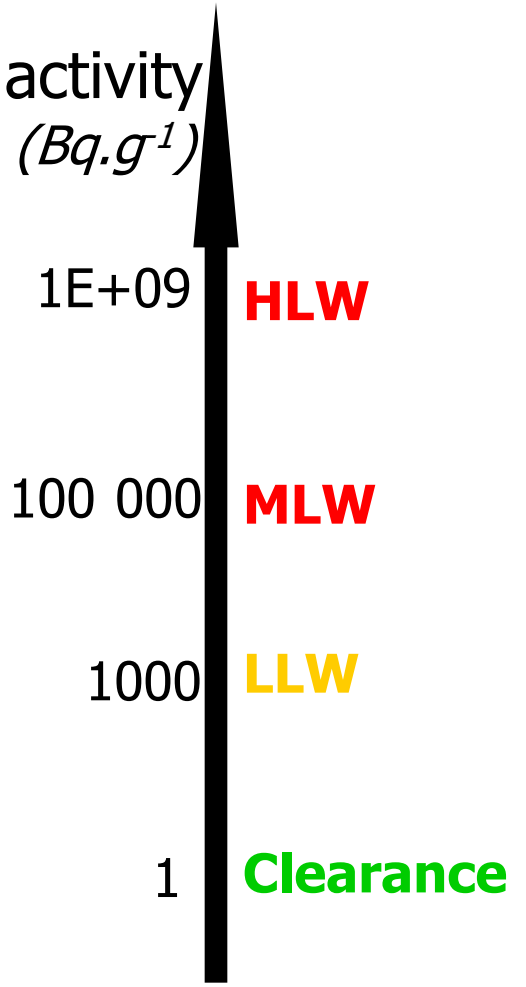
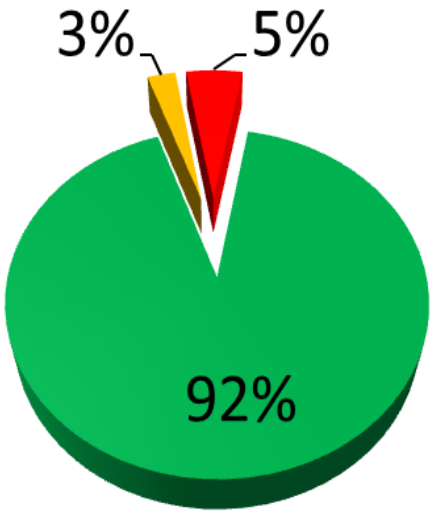


FIG. 1. Conceptual illustration of the waste classification scheme.

Balances of solid materials removed from site excl. fuel, liquids, building *(Source: SCK•CEN. Used by permission)*



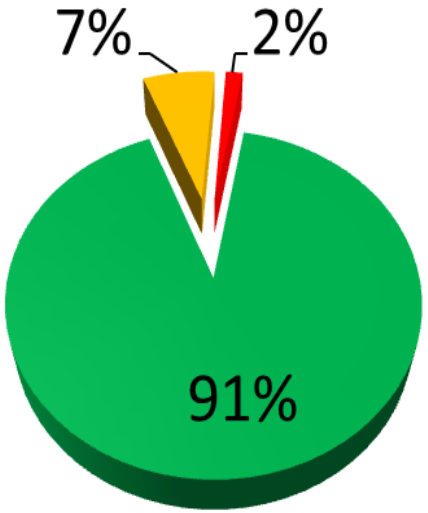
Thetis open pool



Status after full decommissioning

total mass > 30x

BR3 pilot PWR

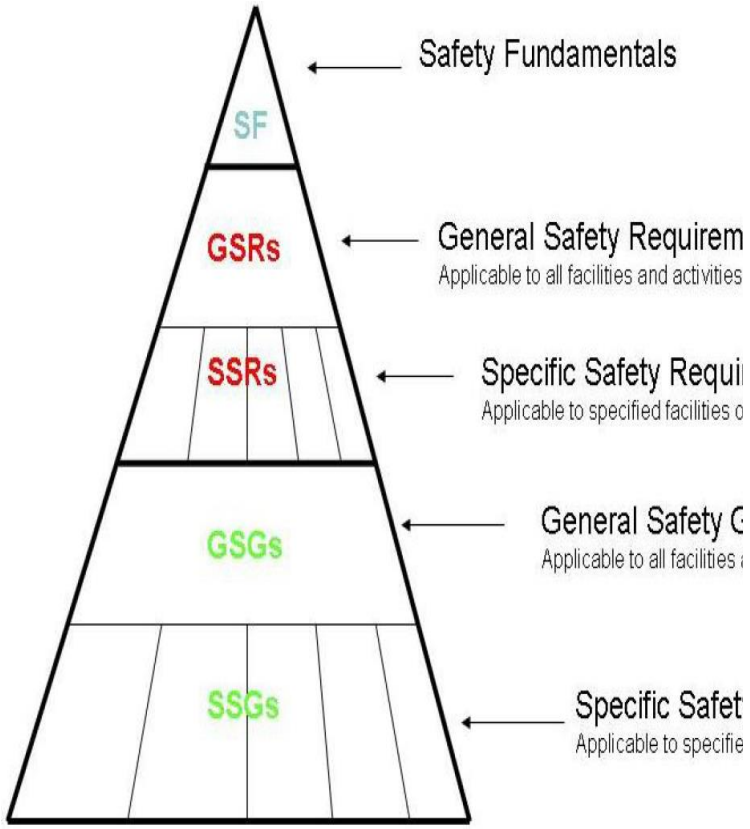


Status after advanced decommissioning

Growing importance of clearance

- Increasing number of Member States requests for assistance in establishing provisions for clearance and in implementing clearance
- Existing guidance in the IAEA Safety Standards (RS-G-1.7) and in supporting publications does not satisfy needs of Member States
- Related IAEA activities are presented

International Standards on Clearance :

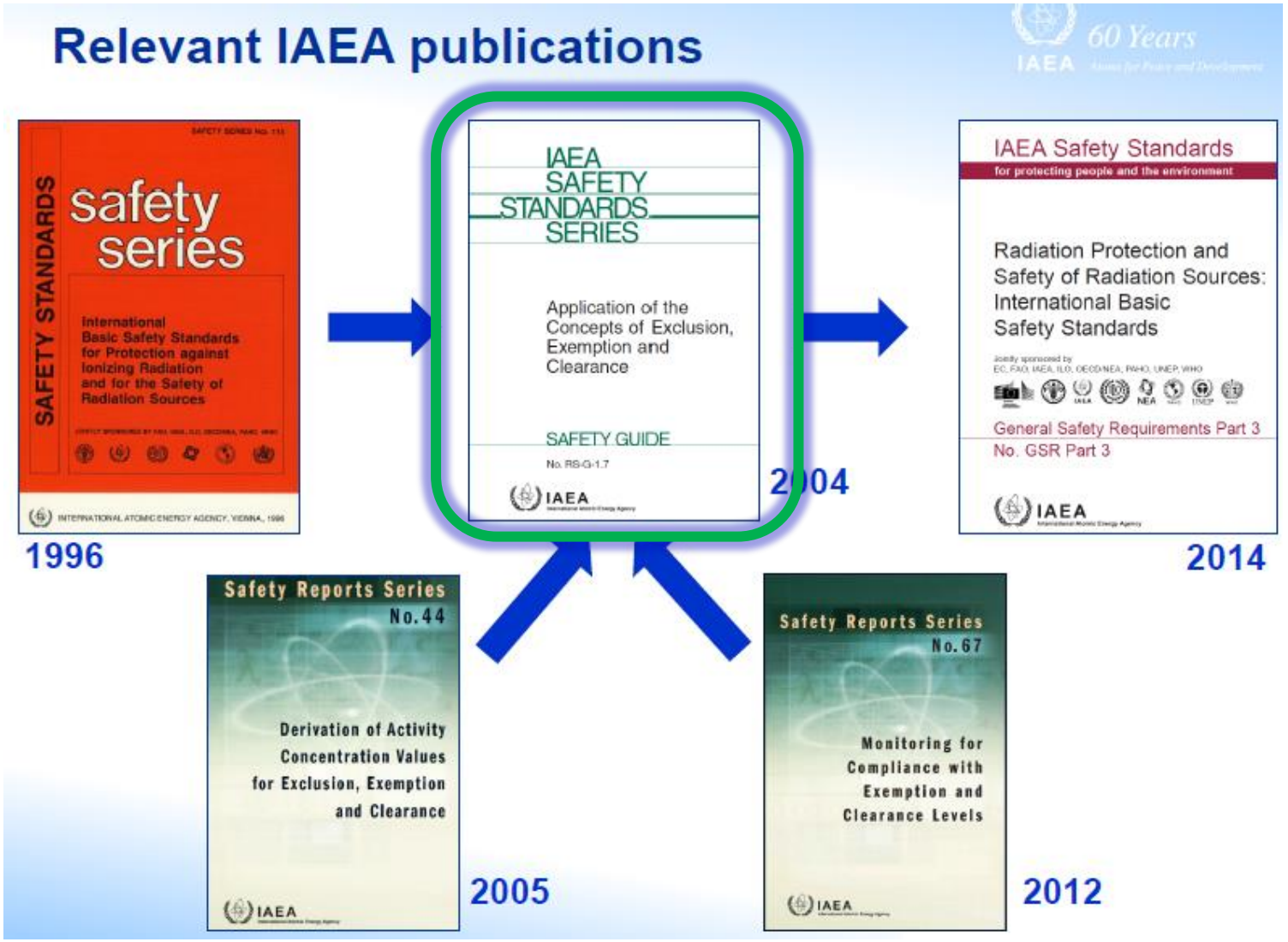


Safety Fundamentals
Fundamental Safety Principles

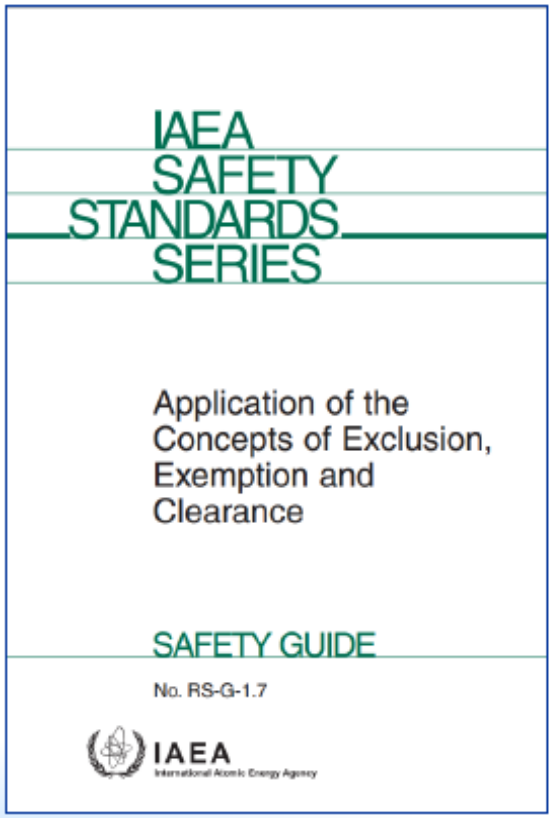
General Safety Requirements	Specific Safety Requirements
Part 1. Governmental, Legal and Regulatory Framework for Safety	1. Site Evaluation for Nuclear Installations
Part 2. Leadership and Management for Safety	2. Safety of Nuclear Power Plants 2.1. Design and Construction 2.2. Commissioning and Operation
Part 3. Radiation Protection and the Safety of Radiation Sources	3. Safety of Research Reactors
Part 4. Safety Assessment for Facilities and Activities	4. Safety of Nuclear Fuel Cycle Facilities
Part 5. Predisposal Management of Radioactive Waste	5. Safety of Radioactive Waste Disposal Facilities
Part 6. Decommissioning and Termination of Activities	6. Safe Transport of Radioactive Material
Part 7. Emergency Preparedness and Response	

Collection of Safety Guides

Clearance and Release : Revision of IAEA RS-G-1.7



Current guidance in RS-G-1.7

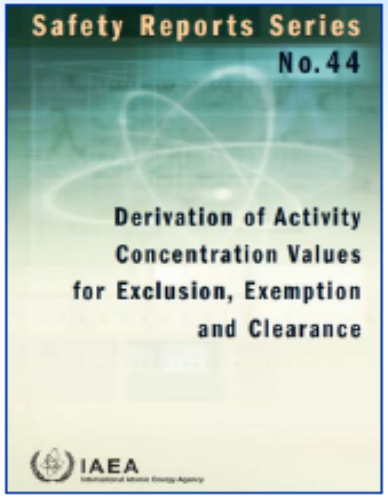


- Provides mass specific values that can be used for exemption or clearance (unconditional), as appropriate, of bulk quantities of solid material.
- Values are provided for both natural and artificial radionuclides.
- The models used in the calculations of individual dose are described in SRS-44. Those scenarios are primarily relevant for clearance, since these were found to be the most restrictive.
- These values for exemption and clearance of bulk amounts of material now appear in GSR Part 3, together with the values for exemption of moderate amounts of material from SS-115.
- Regarding natural radionuclides, the values set out in RS-G-1.7 were selected on the basis of consideration of the upper end of the worldwide distribution of activity concentrations in soil provided by UNSCEAR.

Derivation of clearance and exemption levels

Clearance levels in the IAEA-BSS

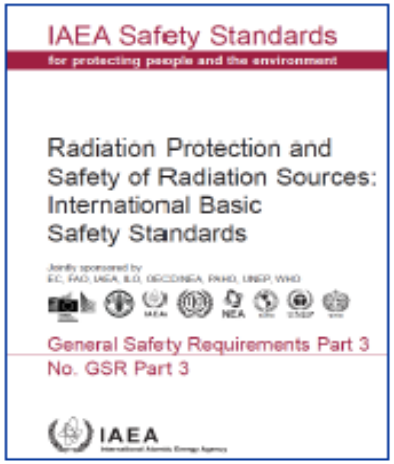
- Determined that the cleared material may be used without any further restrictions
- Based on IAEA SRS-44



IAEA-BSS – Footnote 65

… specific clearance levels may be developed for metals, rubble from buildings and waste for disposal in landfill sites:

"Conditional clearance levels"



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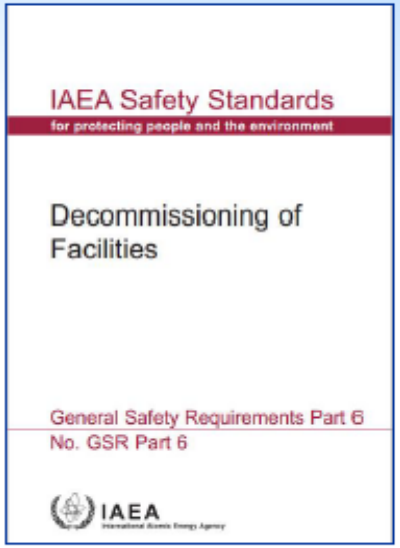
IAEA Safety Guides for decommissioning

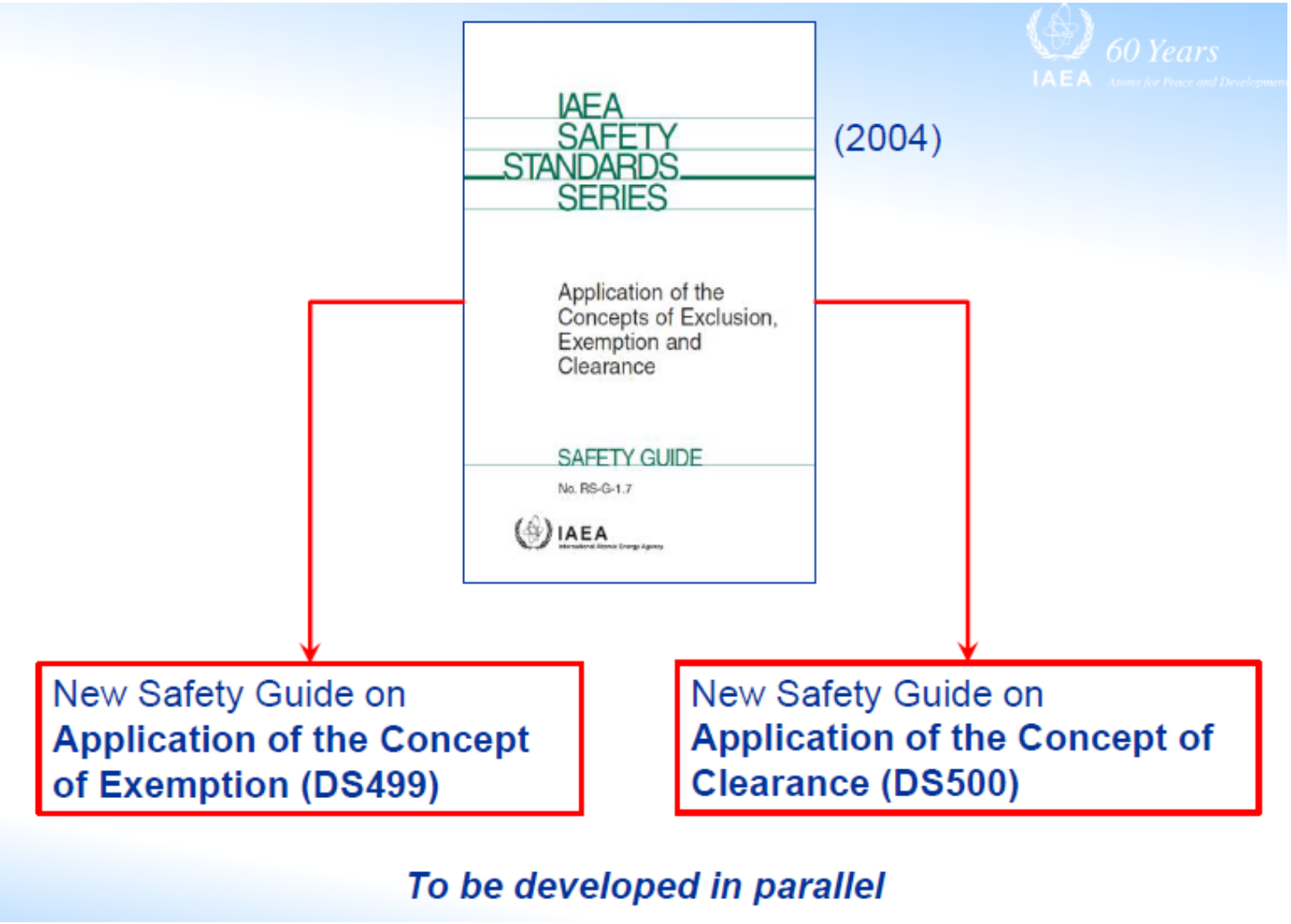
Under Revision



Revision of RS-G-1.7 has just started.

DS499 and DS500

Clearance and Release : Revision of IAEA RS-G-1.7



New Safety Guide on Application of the Concept of Clearance - Justification

- The RS-G-1.7 was based on an older version of the BSS
- Basic information from the RS-G-1.7 incorporated into the new BSS (GSR Part 3), much of the information in RS-G-1.7 is now redundant
- Information in RS-G-1.7 on application of clearance still relevant, but MS noted it should be expanded to provide more details on:
  - clearance process;
  - establishment of national regulations;
  - planning, organization and implementation;
  - technical and safety implications;
  - resources needed to implement the clearance process.
- RS-G-1.7 does not provide guidance on clearance of building and equipment based on surface contamination measurements, on clearance of liquids and gases and on conditional clearance

NEW SAFETY GUIDE IS NEEDED

New Safety Guide on Application of the Concept of Clearance – Objective and Scope

- **The objective of the Safety Guide is to provide detailed guidance on the application of the concept of clearance for materials and buildings that are to be released from regulatory control.**

- There is no intention to revise numerical values provided in GSR Part 3

- Clarification on the use of terminology, especially the use of terms clearance and release;
- Responsibilities of the licensee and the regulatory body;
- All relevant steps of the clearance process including characterization, determination of the nuclide vector, measurement techniques, sampling, management of the clearance process;
- Mass specific and surface specific clearance criteria for unconditional clearance;

New Safety Guide on Application of the Concept of Clearance – Objective and Scope

- Examples of derivation of mass specific and surface specific clearance criteria for conditional clearance (actual values would depend on specific conditions applied, so no universal set of values could be proposed);
- Case by case approach, which can be used for small quantities of material, or for other situations where the assumptions for the generic derivation of clearance levels do not apply;
- Provide explanations on needs for control of conditionally cleared materials (for example during transport), clarify at which point clearance act happens in case of conditional clearance;
- Clearance in an area affected by consequences of a nuclear or radiological accident;
- Considerations of clearance of liquids;
- Consideration of clearance of gases;

New Safety Guide on Application of the Concept of Clearance – Objective and Scope

- Additional considerations for building materials containing naturally occurring radionuclides;
- Considerations of averaging masses and averaging areas;
- Discussion of the degree of homogeneity that was assumed in the calculation of the clearance levels and the implications for application of the clearance levels to non-homogenous material;
- Involvement of interested parties.

- The guide will not address:
  - Application of radiological criteria for international trade of non-food commodities containing radionuclides (separate publication to be prepared)
  - Release of sites from regulatory control (Safety Guide WS-G-5.1, its revision will be discussed soon).

Summary

- Concepts of exemption and clearance are related to graded approach to regulation of sources, practices and materials
- Clearance is an important option for management of material and waste from operation and from decommissioning of facilities, it enables for significant reduction of amounts to be managed as radioactive waste
- Increased interest in Member States and more frequent demands for assistance related to clearance, including conditional clearance
- The IAEA initiated revision of existing guidance on exemption and clearance - two Safety Guides and several supporting publications will be developed

Summary

- General intention with the revision is to bring successful concepts, practices and experiences from some Member States into the IAEA Safety Standards, providing point of reference for other Member States who want to follow such approaches.
- Comments have been provided that the existing exemption and clearance values for artificial radionuclides are unnecessarily restrictive, and that the exposure scenarios used in their derivation are highly conservative.
- The revision process will not include derivation of new mass specific values for exemption and clearance, but will rather provide guidance on how to avoid, to the extent possible, additional layers of conservativism in other steps of the processes.

Thank you for your attention

Any questions?