IAEA
International Atomic Energy Agency
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IAEA International Conference on Radiation Safety: Improving Radiation Protection in Practice (Virtual Event)
9-20 November 2020

Key Issues in Developing Updated Guidance on Clearance

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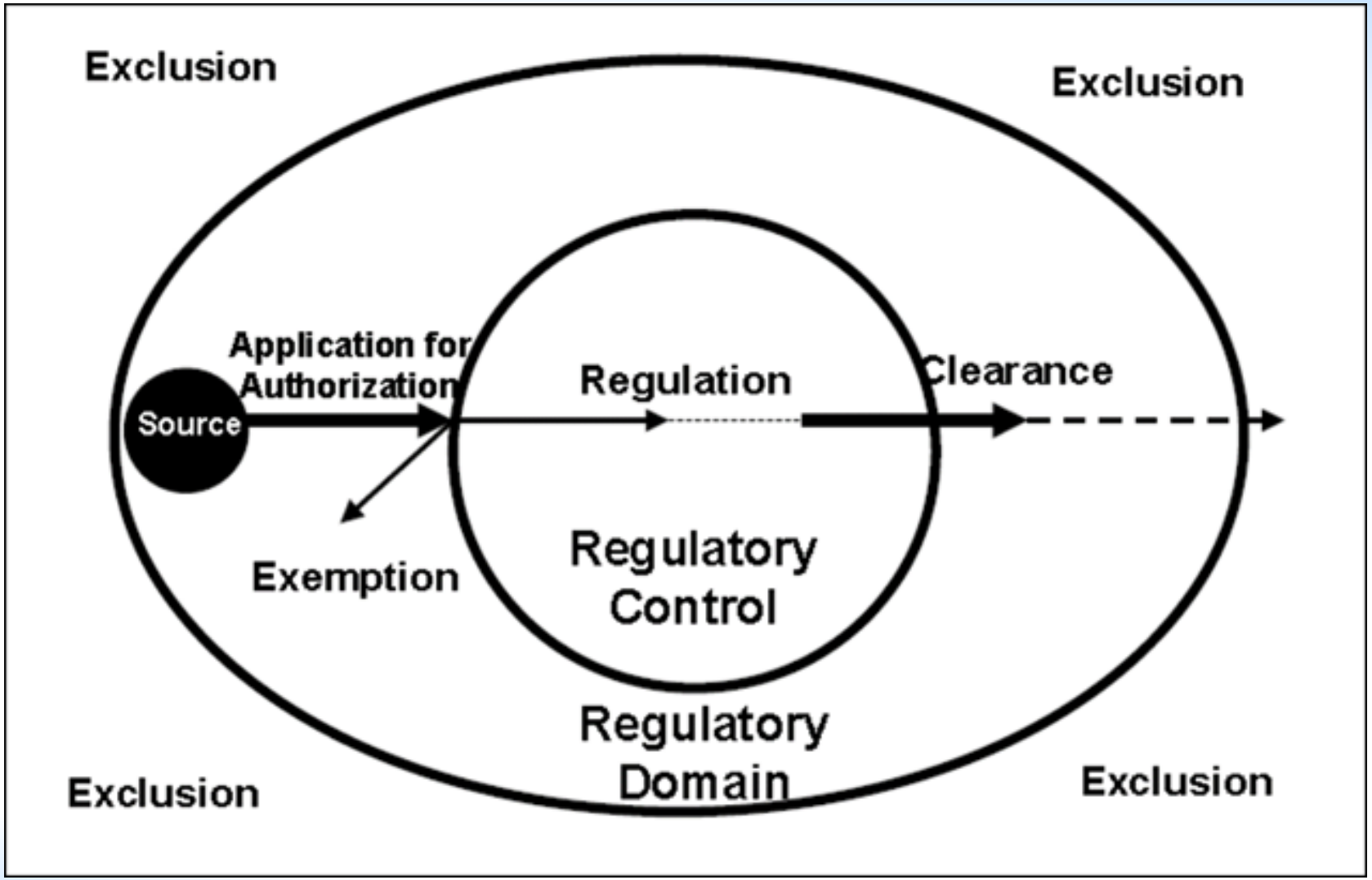
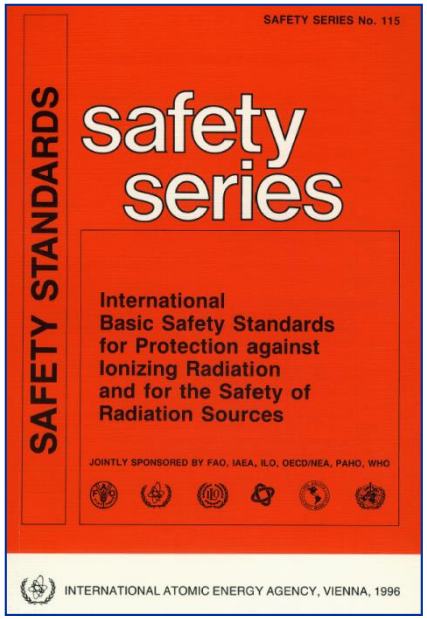
Importance of clearance, needs for guidance

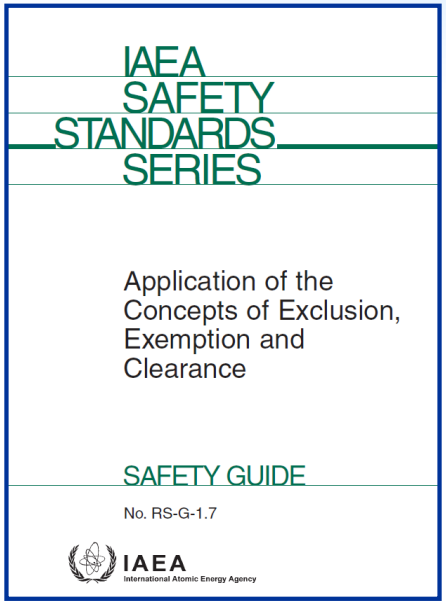
- Large portion of material / waste from operation and from decommissioning of nuclear facilities will have only trivial amount of radioactivity
- Disposal as RAW or continuation of regulatory control (storage as RAW) is not a cost-effective approach and doesn't contribute to safety and protection of people and the environment
- Well-defined exit process from regulatory regime is needed
  - Clearance options
  - Clearance levels
  - Responsibilities
  - Technical aspects - sampling, measurements, dose assessment, decision making / compliance with CLs
- Existing IAEA guidance on clearance from before 2004
- Expectations of Member States - more detailed guidance, to offer multiple clearance options and advices based on existing experiences


Exclusion
Exclusion
Application for Authorization
Source
Regulation
Clearance
Exemption
Regulatory Control
Regulatory Domain
Exclusion
Exclusion

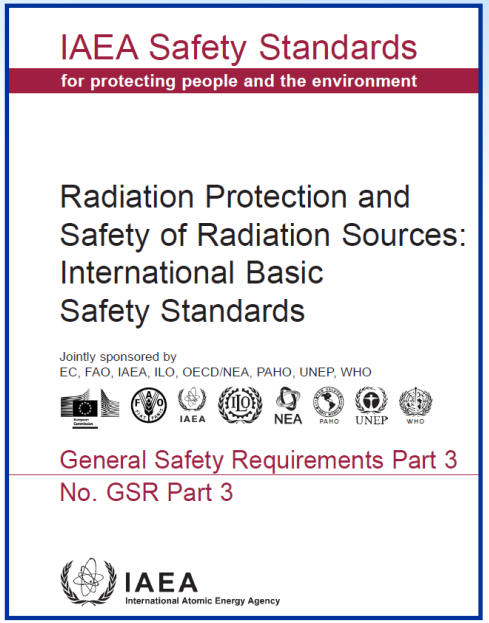
Revision of the existing Safety Guide RS-G-1.7



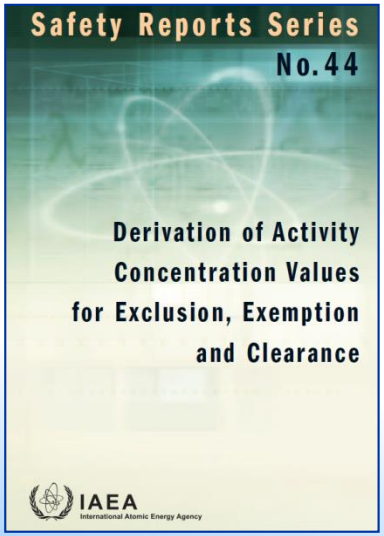
1996



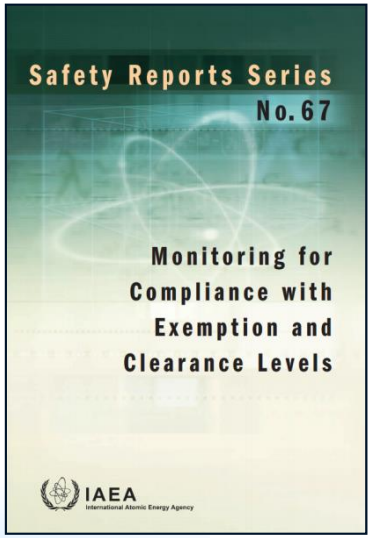
2004



2014

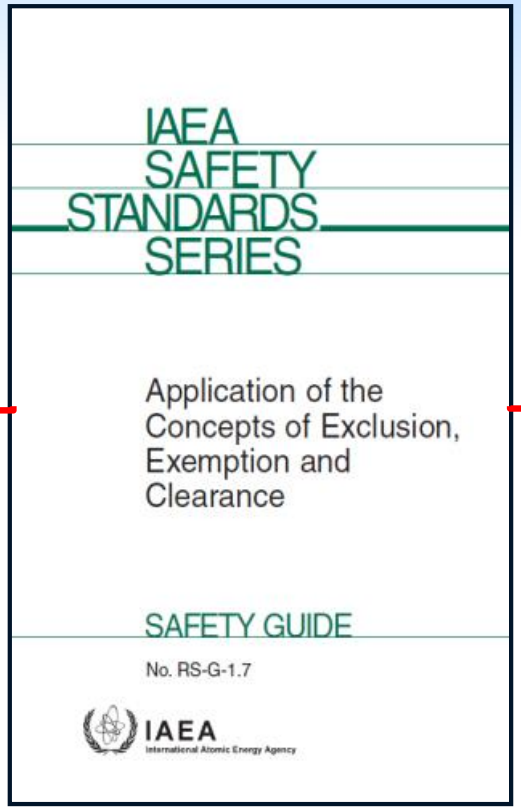


2005



2012

Revision of RS-G-1.7



(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

DS500 status as of November 2020

- 2017: DPP approved
- 2018-2019: Draft developed through 4 consultancy meetings and one Technical Meeting
- Jan-Feb 2020: internal review
- Mar-Apr 2020: Review / approval by the Coordination Committee of the NS Department
- May-Jun 2020: First review by the Safety Standards Committees (WASSC, RASSC, TRANSSC)
  - over 700 comments received
- Jul-Aug 2020: resolution of comments in consultation with experts
- Nov 2020: Awaiting approval by Committees for submission to all Member States for comments

Structure

1. Introduction
2. Regulatory Framework for Clearance
3. General Aspects of Clearance
4. Clearance of Solid Material
5. Clearance of Liquid Material
6. Clearance of Gaseous Material
7. Concept of Conditional Clearance
8. Involvement of Interested Parties and Enhancing Public Understanding

APPENDIX I: Screening Level for Recycle or Disposal on Landfills of Material and Waste after an Emergency

APPENDIX II: Illustration of Typical Conservatism in the Clearance Process

ANNEX I: Dosimetric modelling for derivation of radionuclide specific values for clearance based on surface contamination measurements

ANNEX II: Examples of surface specific values for unconditional clearance

ANNEX III: Examples of mass specific values for conditional clearance

ANNEX IV: Example of the Application of the Clearance Concept in Small Medical Facilities

Issues discussed in DS500

- Clearance options
  - generic and specific clearance
  - unconditional, conditional and case-by-case clearance
- Characterization of material
- Final monitoring for demonstrating compliance with CLs
- Sampling
  - Homogeneity, hot spots, mixing
- Mass-specific (Bq/g) and surface specific (Bq/cm^2) CLs and measurements
- Treatment of radionuclides of natural origin
- Specificities for liquid and gaseous materials
- Uncertainties, conservativism, graded approach
- Application of clearance in post-accident situations

Key issues raised in the comments by the Safety Standards Committees

1. Use of surface-specific criteria for clearance (in Bq/cm^2)

- Contamination on the surface only:
  - Thick materials, direct reuse: large thickness (large mass) might lead to compliance with mass-specific CLs, but the concentration of RNs on the surface might result in higher exposures → compliance with surface-specific CLs to be checked
  - Thin materials, recycling: compliance with surface-specific CLs does not automatically ensure compliance with mass-specific CLs, it needs to be checked
- Application of surface specific measurements to demonstrate compliance with mass-specific CLs (using simple recalculation)
- Compliance with mass-specific CLs should be ensured in all situations

Key issues raised in the comments by the Safety Standards Committees

2. Treatment of radionuclides of natural origin when these materials are used for their radioactive, fertile or fissile properties

- What should be the basis for clearance? 1 Bq/g or dose contribution of the order of 10 µSv in a year?)
- If there is a "background" concentration of 50 Bq/kg of U-238 in the concrete wall of a uranium conversion facility, why would anybody be allowed to contaminate it with additional 950 Bq/kg (consequence of an authorized practice) and still be able to clear it without any decontamination? (resulting contamination would be 1000 Bq/kg = 1 Bq/g)
- Determine the background, disregard it from the clearance measurement result.
- Allowable additional contribution from the practice should correspond to exposure of the order of 10 µSv in a year
- Need for CLs derived on the basis of exposure scenarios, as for artificial RNs (in the spirit of footnote 63 of the GSR Part 3)

Key issues raised in the comments by the Safety Standards Committees

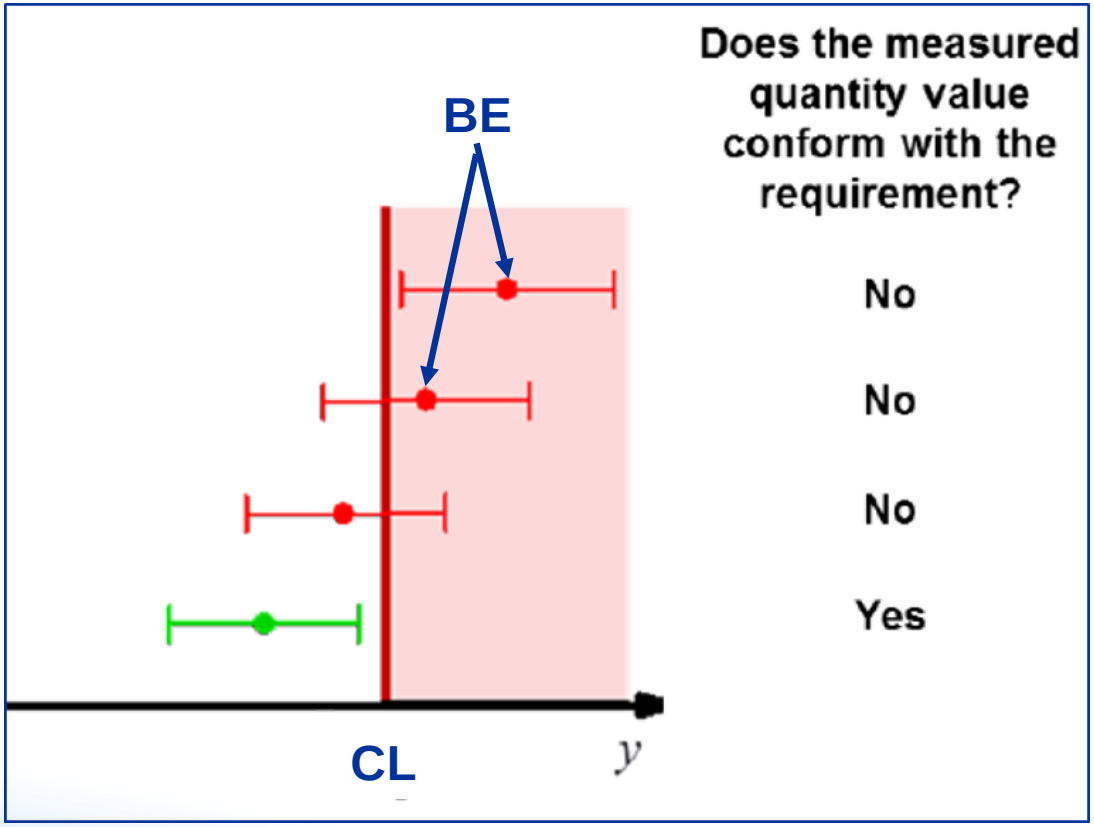
3. Demonstration of compliance with clearance levels taking into account measurement uncertainty and other uncertainties

What is to be compared with the CL:

- the mean value = best estimate BE

or

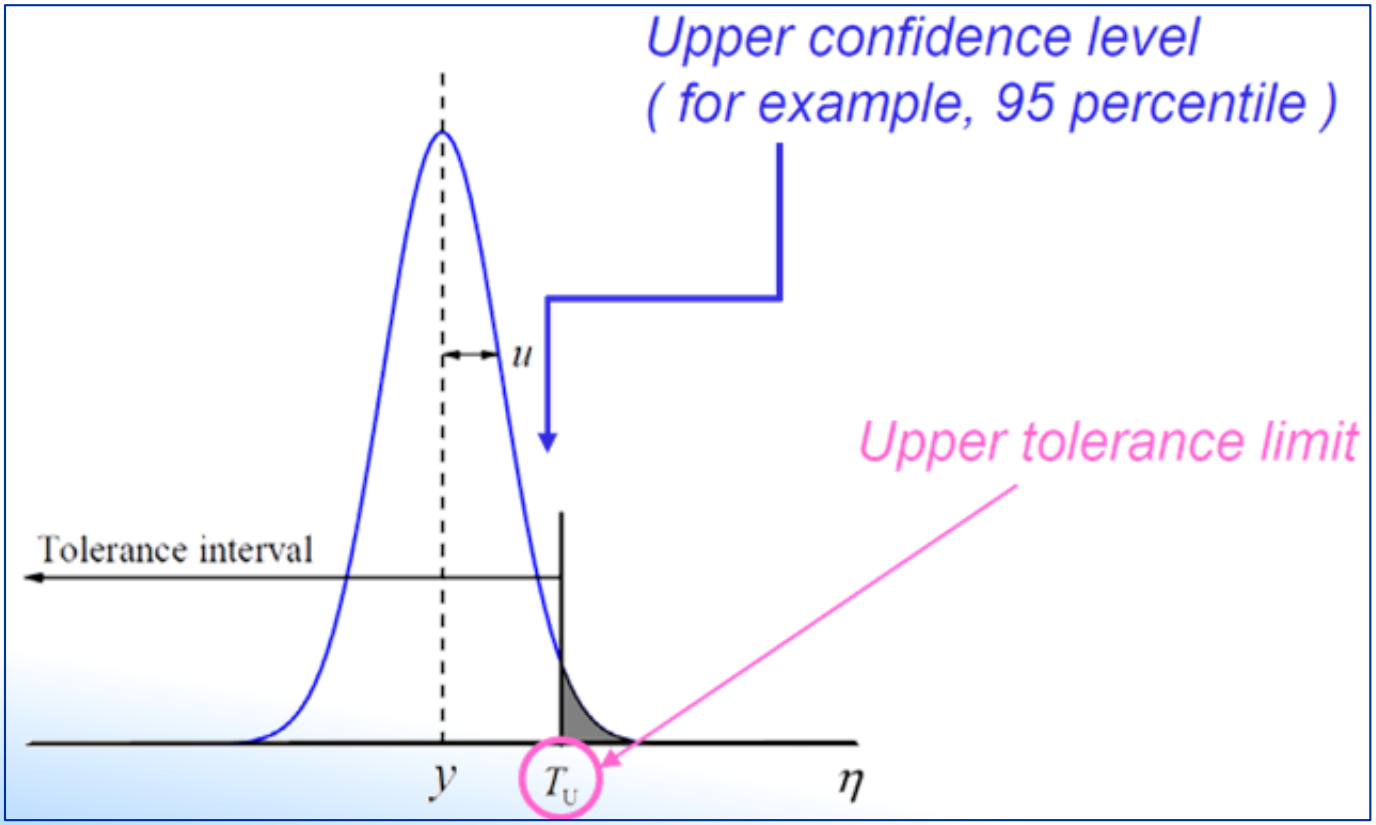
- the upper confidence level = BE + uncertainty?



Current DS500 position

Evaluation of measurement data - role of measurement uncertainty in conformity assessment

The upper confidence level of the measurement must be below the upper tolerance limit taking relevant uncertainties into account



Current DS500 position regarding the issue #3 (cont'd)

- DS500 position: conformity assessment should be done following the standardized way (illustrated on the previous slide)
- Is this approach unnecessarily conservative for activity concentrations close to the CLs (that give raise to exposures ~10 μSv in a year)?
- Should more flexibility be allowed? How to apply graded approach? (Ignore uncertainties? Allow measurement's UCL > CL)?
- DS500 leaves open what the upper confidence level should be: "Appropriately selected upper confidence level of the measurement result has to be below the clearance level…"
- Additional flexibility: "If measurements results do not meet the criteria for generic clearance, … , the authorized party may still consider applying for conditional or case-by-case clearance, and the regulator should assess such an application, taking into account radiological risks associated with the further management or disposition of the material."
- This issue is still being discussed, resolution is needed before submission of DS500 to Member States

Key issues raised in the comments by the Safety Standards Committees

4. Application of clearance in post-accident situations (remediation works)

- Management of waste collected during remediation is an authorized activity (waste is under regulatory regime)
- Consequently, clearance is applicable to check if some of the waste is not contaminated above CLs (on the basis of ~10 μSv criterion)
- If similar processes are used to demonstrate compliance with higher dose criteria (for deciding which option for management of radioactive waste to apply or where to send the waste), that should not be called clearance
- Concept is generally applicable

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Thank you!

Questions?