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1. IDENTIFICATION

Working ID: DS500

Proposed Title: Specific Safety Guide: Application of the Concept of Clearance

Proposed Action: Revision of RS-G-1.7 Application of the Concepts of Exclusion, Exemption and Clearance, 2004

**Review Committee(s)
or Group:** WASSC (leading committee), RASSC, TRANSSC

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2. BACKGROUND

Exclusion, exemption and clearance define the scope of regulatory control as it applies to planned exposure situations. Exclusion applies to those planned exposures that are not deemed amenable to control, regardless of the magnitude of the exposures in question. Exemption refers to the determination by a regulatory body that a source or practice need not be subject to some or all aspects of regulatory control. Clearance is the removal of regulatory control by the regulatory body from radioactive material or radioactive objects within notified or authorized practices.

Requirement 8 of *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* (GSR Part 3) makes provision for the exemption of practices and sources within practices and for the clearance of sources within notified or authorized practices, consistent with the use of a graded approach. Similar provisions for exemption and clearance were given in SS-115, the previous edition of GSR Part 3 that was published in 1996. SS-115 also provided values (in terms of both activity concentration and total activity) for exemption of moderate amounts of material from regulatory control.

The Safety Guide RS-G-1.7 explained the links between exclusion, exemption and clearance and also provide mass specific values that can be used for exemption or clearance, 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 — these 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 for 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.

3. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT

The safety guide RS-G-1.7 was published in 2004, prior to the publication of the Safety Fundamentals SF-1 and the Basic Safety Standards (GSR Part 3). Other key related safety requirements are *Predisposal Management of Radioactive Waste* (GSR Part 5) and *Decommissioning of Facilities* (GSR Part 6). There are some differences in terminology and approach between SS-115 and GSR Part 3 that necessitate revision of RS-G-1.7. Specifically, the requirements in SS-115 apply to practices and interventions while GSR Part 3 is structured around three different types of exposure situations

(planned, emergency, and existing). The concept of clearance in planned exposure situations is included in GSR Part 3, but supporting guidance has not yet been developed. RS-G-1.7 needs to be updated to take account of this change.

The information in Safety Guide RS-G-1.7 regarding the application of the clearance concept is still relevant, however it has been noted by the Member States that the guidance should be expanded to provide more details on the clearance process; establishment of national regulations; planning, organization and implementation; technical and safety implications; and resources needed to implement the clearance process. The process of clearance is a regulated process and, hence, the procedures and processes leading to the act of clearance need to be well defined. The Safety Guide RS-G-1.7 does not contain guidance on clearance of buildings (typically, clearance of buildings is part of the site release, but sometimes it is needed to be done during decommissioning, before the release of the site), on clearance of items based on surface contamination measurements and on conditional clearance (sometimes called specific clearance, or release of material with restrictions on the future use). Hence, there is a need for this to be addressed during the revision of the RS-G-1.7. The new guidance should also address the concept of clearance for liquids and gases, and the boundary between clearance and discharge should be explained. The new guidance should also discuss whether the existing clearance levels for solid material could be relevant to liquids and gases.

The calculation scenarios and models described in the Safety Report 44 are still valid and therefore there is no need to repeat this information in the revised guidance.

Addressing in one document all the above mentioned aspects related to clearance presents a significant challenge. In addition, providing guidance on exemption in the same document would additionally increase the complexity and the volume of the document. Thus, development of two Safety Guides dealing with clearance and exemption is proposed. The aspects related to international trade of contaminated non-food commodities would be addressed separately.

Therefore, based on the feedback from international meetings and discussions taking place in WASSC and RASSC committees and in several consultancy meetings regarding the revision of Safety Standards pertaining to clearance and exemption, it was proposed that a new Safety Guide on the Application of the Concept of Clearance (DS500) be prepared to expand on the application of this concept as defined in the BSS (GSR Part 3) to address the issues identified above. In parallel, another Safety Guide on the Application of the Concept of Exemption (DS499) is proposed to be developed. As a result of the development of these two new Safety Guides, the existing Safety Guide RS-G-1.7 would be superseded. Guidance related to the application of radiological criteria for international trade of non-food commodities containing radionuclides will be dealt with in a separate publication (Safety Report Series or TECDOC series). The aspects related to the control of contaminated non-food commodities that can be traded freely will be addressed in a separate publication, outside of the two new Safety Guides. All these three documents will need to be developed in a coordinated manner to ensure consistency of the approach and information presented.

The new Safety Guide on clearance therefore needs to provide guidance on the clearance process and on the application of the clearance levels, in particular on the organisation and regulation of the process, and its verification. It also needs to address conditional clearance and the use of surface contamination levels, as well as clearance of liquid and gaseous materials.

It is recognized that the values for exemption and clearance currently defined for artificial radionuclides are unnecessarily restrictive in that the exposure scenarios used in their derivation are highly conservative. It is not intended that the new Safety Guide on clearance will include the derivation of new mass specific values for exemption, but will rather provide guidance on how to avoid additional layers of conservatism in other steps of the process.

Section 5 of RS-G-1.7 on the application of the values for clearance needs to be updated to reflect use of the graded approach, in particular in the light of the conservative nature of the values.

4. OBJECTIVE

The objective of the Safety Guide is to provide guidance on exemption issues in the framework of planned exposure situations.

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. The safety guide will cover similar subject matter to that in RS-G-1.7, but use the newer concepts and definitions, such as exposure situations given in GSR Part 3. The document will be of particular value for regulatory bodies in Member States to assist them the applying the GSR Part 3 requirements on the clearance of materials and objects from regulatory control.

5. SCOPE

The scope of this new Safety Guide is to describe the process of clearance from regulatory control. It will include the following aspects:

- 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;
- 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 (e.g. where the water pathway is not relevant), or for radionuclides for which clearance values have not been given in GSR Part 3, or e.g. for cases where it is proposed that the rounding procedure or other features from the model in Safety Report 44 are not applied or are modified;
- Clearance in an area affected by consequences of a nuclear or radiological accident
- Considerations of clearance of liquids;
- Consideration of clearance of gases;
- Additional requirements 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 new Safety Guide will address the transport of conditionally cleared material (material released with restrictions on its future use).

The guidance will be especially applicable during decommissioning to assist in the minimization of waste that will require disposal as radioactive waste. However, the guidance will also be applicable for releasing material for unconditional reuse or for non-radiological disposal during the normal operation of a facility, and may be applicable to other situations.

The information presented in this new Safety Guide is applicable to facilities that use, manufacture, process or store radioactive material. The types of facilities that may be included under this category are nuclear power plants, research reactors, other nuclear fuel cycle facilities, industrial plants, medical facilities, research facilities and accelerators. It also applies to industries processing naturally occurring radioactive material (NORM).

The aspects of exemption are outside the scope of this Safety Guide, as they will be addressed in the Safety Guide DS499. The issue of exclusion will be addressed in the introductory sections of the proposed new safety guide using text that will be duplicated in the new safety guide on exemption.

The aspects related to the control of contaminated non-food commodities that can be traded freely are outside the scope of this Safety Guide, and will be addressed in a separate publication.

The aspects related to release of sites from regulatory control are outside the scope of this Safety Guide, as they are addressed in the Safety Guide WS-G-5.1.

6. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

The proposed Safety Guide will be one of the documents supporting GSR Part 3 *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* and *GSR Part 6 Decommissioning of Facilities*. In particular, the following documents have identified the importance of establishing clearance criteria and of their application:

1. Decommissioning of Facilities, IAEA General Safety Requirements Part 6 (GSR Part 6)
2. Radiation Protection and Safety of Radiation Sources: International Safety Standards, IAEA General Safety Requirements Part 3 (GSR Part 3)
3. Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities, Draft IAEA Safety Guide DS452
4. Decommissioning of Medical, Industrial and Research Facilities, Draft IAEA Safety Guide DS403
5. Management of Radioactive Residues from Uranium Production and Other NORM Activities, Draft IAEA Safety Guide DS459;
6. Remediation Process for Areas Affected by Past Activities and Accidents, Draft IAEA Safety Guide DS468 (Revision of Safety Guide WS-G-3.1)

The following documents are also relevant to the context of the new Safety Guide:

1. Application of the Concepts of Exclusion, Exemption and Clearance, IAEA Safety Guide RS-G-1.7;
2. Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance, IAEA Safety Report Series No. 44;
3. Monitoring for Compliance with Exemption and Clearance Levels, IAEA Safety Report Series No. 67;

4. Application of the Concept of Exemption, New IAEA Safety Guide DS499;
5. Regulatory Control of Radioactive Discharges to the Environment, Draft IAEA Safety Guide DS442;
6. Clearance Levels for Landfill Disposal, IAEA TECDOC in preparation;
7. ICRP Publication 104, Scope of Radiological Protection Control Measures;
8. Set of guidance documents issued by European Commission, in particular RP 89/101/113/114/122-I/122-II.

Being part of the revision of RS-G-1.7, the present Safety Guide development should be closely coordinated with the proposed new Safety Guide on the Application of the Concept of Exemption.

7. OVERVIEW

The provisional Table of Content is provided below in this Section.

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 - 3.1 Radiological basis
 - 3.2 Options for management of material
4. Clearance of solid material
 - 4.1 General
 - 4.2 Characterisation of the material to be cleared
 - 4.3 Mass specific criteria for clearance
 - 4.4 Surface criteria for clearance
 - 4.5 Case by case approach
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5. Clearance of liquid material
 - 5.1 General
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 - 6.1 General
 - 6.2 Application of concept
7. Involvement of interested parties

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

8. PRODUCTION SCHEDULE

Provisional schedule for preparation of the document, outlining realistic expected dates:

STEP 1: Preparing a DPP	July 2016
STEP 2: Approval of DPP by the Coordination Committee	September 2016
STEP 3: Approval of DPP by the relevant review Committees	November 2016
STEP 4: Approval of DPP by the CSS	November 2017
STEP 5: Preparing the draft	December 2017 - June 2019
STEP 6: Approval of draft by the Coordination Committee	August 2019
STEP 7: Approval by the relevant review Committees for submission to Member States for comments	November 2019
STEP 8: Soliciting comments by Member States	December 2019 – March 2020
STEP 9: Addressing comments by Member States	April 2020
STEP 10: Approval of the revised draft by the Coordination Committee Review in NS-SSCS	October 2020
STEP 11: Approval by the relevant review Committees	June 2021
STEP 12: Endorsement by the CSS	November 2021
STEP 13: Establishment by the Publications Committee and/or Board of Governors (for SF and SR only))	March 2022
STEP 14: Target publication date	August 2022

9. RESOURCES

Estimated resources involved by the Secretariat (person-weeks) and the Member States (number and type of meetings)

- 6 CS meetings (3 consultants x 5 days for each CS meeting)
- 3 TM meeting (20 participants x 5 days)
- IAEA staff:
 - 1 Technical Officer – 30 weeks
 - 1 administrative assistant – 10 weeks