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1. IDENTIFICATION

Document Category	**Safety Guide**
Working ID:	
Proposed Title:	**Safety Assessment for the Decommissioning of Facilities[1]**
Proposed Action:	**Revision of Safety Guide WS-G-5.2, Safety Assessment for the Decommissioning of Facilities Using Radioactive Material (2008)**
Review Committee(s):	**WASSC, NUSSC and RASSC**
Technical Officer(s):	**Duriem Calderin, Vladan Ljubenov (NSRW/WES)**

2. BACKGROUND

An increasing number of facilities have come or are coming to the end of their operational life and are at present being, or are going to be, decommissioned with the intention of removing their sites from regulatory control.

IAEA Safety Standards Series No. WS-G-5.2, Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, provides recommendations on safety assessment for all phases of decommissioning. This safety assessment ensures that (i) safety aspects are considered in the selection of the decommissioning strategy, in the development of a decommissioning plan and in the elaboration of details of associated decommissioning activities and (ii) exposures of workers and of the public are kept as low as reasonably achievable (ALARA) and do not exceed the relevant dose limits or constraints. In addition, WS-G-5.2provides recommendations on the application of a graded approach, radiological hazards identification and control, defence in depth, application of the optimization principle in safety and on other key topics relevant to safety assessment during decommissioning.

Since the publication of WS-G-5.2, a significant number of related safety standards have been superseded by updated safety requirements publications and Safety Guides – further details are provided in Annex I and the feedback analysis report is provided in Annex II.

3. JUSTIFICATION FOR THE PRODUCTION OF THE PUBLICATION

The Safety Guide WS-G-5.2, published in 2008, is recommended for revision due to several significant updates in General Safety Requirements publications and in Specific Safety Guides. For example, in GSR Part 6, Decommissioning of Facilities (2014), "entombment is not considered a decommissioning

[1] Facility terminology is in alignment with GSR Part 6 Decommissioning of Facilities (2014):

- Applies to nuclear power plants, research reactors, other nuclear fuel cycle facilities, including predisposal waste management facilities, facilities for processing naturally occurring radioactive material (NORM), former military sites, and relevant medical facilities, industrial facilities, and research and development facilities.
- Do not apply to radioactive waste disposal facilities or disposal facilities for NORM or for waste from mining and mineral processing. However, requirements for the decommissioning of supporting buildings and services of such facilities are in scope for decommissioning safety assessments.

strategy and is not an option in the case of planned permanent shutdown~~entombment is no longer considered a decommissioning strategy for facilities with normal operational history~~. The two Specific Safety Guides SSG-47, Decommissioning of Nuclear Power Plants, Research Reactors, and Other Nuclear Fuel Cycle Facilities, and SSG-49, Decommissioning of Medical, Industrial, and Research Facilities, were published in 2018 and 2019, respectively, providing details, which had not been considered in WS-G-5.2.

In addition, over 80% of the references used in WS-G-5.2 are outdated or superseded. Table 1 (Annex I) presents the WS-G-5.2 references crosslinked to their status. This creates a sense of urgency to revise this Safety Guide to reflect the latest IAEA recommendations on aspects relevant to safety assessment for decommissioning of facilities. Annex I provide also a more detailed explanation of the benefit to Member States from making this revision.

Furthermore, since 2008 many decommissioning projects have been completed or are nearing completion, providing practical experiences on aspects related to safety assessment for the decommissioning of facilities. This experience, together with revised IAEA recommendations is not currently reflected in WS-G-5.2.

Finally, a feedback study on WS-G-5.2 was carried out during the ninth term of the WASSC (2021-2023). Reflecting on the results of this study, WASSC requested the Secretariat (action under agenda item W3.2 of the 56th WASSC meeting) to initiate the revision of this Safety Guide (feedback is summarized in Annex II).

In summary, the proposed revision to WS-G-5.2 is supported by feedback and experience gained from Member States and is aimed at ensuring that the IAEA safety standards contain up to date recommendations to enhance safety assessment for decommissioning of facilities. Key benefits include the alignment of decommissioning strategies with GSR Part 6, the implementation of a planned exposure situation (dose constraints and risk constraints) during decommissioning (GSR Part 6, GSR Part 3) and improved recommendations on managing non-radiological and radiological risks. The revision will address the safety challenges of aging infrastructure in long term decommissioning projects, considering factors such as climate change, knowledge preservation, and degradation of structures, systems and components (SSCs): More details are provided in Annex I. Additionally, this revision will provide more recommendations on the implementation of a graded approach to safety assessments, provide practical examples, and clarify the roles of regulatory bodies and operating organizations.

4. OBJECTIVE

The objective of the revised Safety Guide is to provide recommendations on the considerations for safety assessment and the development, ~~revision~~review, and revision ~~review~~ of safety assessments for each phase of decommissioning, which is aligned with the currently valid Safety Requirements and related Safety Guides, and which reflects the latest knowledge and experiences from Member States.

This revised Safety Guide will assist regulatory bodies, operating organizations and supporting technical organizations in the application of a graded approach to the development, revision, and review of safety assessments for decommissioning, helping them in meeting the requirements of the GSR Part 6 and the recommendations provided in the SSG-47 and SSG-49. Also, the revision will address the applicable requirements of the GSR Part 3, GSR Part 4 (Rev. 1), and GSR Part 5, and will reflect relevant updates to Safety Guides.

5. SCOPE

The revised Safety Guide will be applicable to the safety assessment for decommissioning of facilities. The recommendations will address safety of decommissioning and protection of workers, the public and the environment during both planned decommissioning actions and potential unplanned events that may happen during decommissioning, all in the context of planned exposure situations. The revised Safety Guide will provide recommendations to operating organizations conducting decommissioning and regulatory bodies overseeing such activities.

This revised Safety Guide will apply to all types of facilities that are subject to decommissioning, including nuclear power plants and research reactors, nuclear fuel cycle facilities, accelerators, medical facilities, research and university laboratories, and other research or industrial facilities that use radioactive materials or radiation sources and that require a graded approach to regulation. It will also be applicable to industries processing naturally occurring radioactive material (NORM), as far as they are related to planned exposure situations. It will be applicable to auxiliary facilities at such sites, such as milling processing facilities associated with uranium mines or above ground supporting facilities for disposal, which will ultimately require decommissioning.

The revised Safety Guide will not be applicable to disposal facilities for radioactive waste or to tailings from uranium mining and processing. In addition, the revised Safety Guide will not be applicable to the remediation of areas ~~contaminated~~ affected by past activities and ~~accidents~~events that are addressed by the IAEA GSG-15. ~~It will not provide recommendations on environmental impact assessment, which is part of the decommissioning plan; nor will it apply to off-site transport~~. The safety guide will provide recommendations on the consistency between the safety assessment and the assumptions of the Environmental Impact Assessment for normal decommissioning operation. It will not provide recommendations to off-site transportation requirements.

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The revised Safety Guide will apply to the development or review of safety assessments prepared in support of the selection of decommissioning strategies ~~(immediate dismantling, deferred dismantling, or combination thereof)~~, the development of plans for all stages of the lifetime of a facility and for conducting decommissioning actions up to the final release of the site from regulatory control. Specific safety consideration will be given to address graded approach during development of the safety assessment for decommissioning such that the depth of analysis is commensurate with the hazards in the facility. In addition, the level of safety assessment will consider how aging, or deterioration of structures, systems, and components critical to safety are impacted over time. The Safety Guide will consider the importance of a phased approach to long term projects to allow for prioritization of activities, resources or strategies, and emerging innovative technologies. The Safety Guide will address the level of maturity regarding the first phases versus the later ones. The Safety Guide will show how the safety assessment can support the release of a site from regulatory controls and will indicate when engagement with interested parties is necessary.

Nuclear security aspects have to be considered during decommissioning, with due consideration of the interface with safety but they are outside the scope of this Safety Guide.

Although the safety assessment process will support achievement of the end state, recommendations on release of sites from regulatory control is covered in Safety Guide WS-G-5.1 and it will not be addressed here. Recommendations on the release of material and waste from regulatory control (clearance) are provided in the General Safety Guide GSG-18 and will not be repeated here.

The protection of persons and the environment from non-radiological hazards are beyond the scope of the revision of the Safety Guide.

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

In the long term structure of the IAEA safety standards, the proposed publication will be a Specific Safety Guide supporting GSR Part 6.

The following Safety Standards Series publications have identified the importance of establishing safety assessment for decommissioning of facilities:

1. INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal, and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016)
2. INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016)
3. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014).
4. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016)
5. INTERNATIONAL ATOMIC ENERGY AGENCY, Predisposal Management of Radioactive Waste, IAEA Safety Standards Series No. GSR Part 5, IAEA, Vienna (2009) (under revision, DS548).
6. INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Facilities, IAEA Safety Standards Series No. GSR Part 6, IAEA, Vienna (2014).
7. INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. SSG-47, IAEA, Vienna (2018).
8. INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Medical, Industrial and Research Facilities, IAEA Safety Standards Series No. SSG-49, IAEA, Vienna (2019).
9. INTERNATIONAL ATOMIC ENERGY AGENCY, Communication and Consultation with Interested Parties by the Regulatory Body, IAEA Safety Standards Series No. GSG-6, IAEA, Vienna (2017)
10. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection of the Public and the Environment, IAEA Safety Standards Series No. GSG-8, IAEA, Vienna (2018)
11. INTERNATIONAL ATOMIC ENERGY AGENCY, Functions and Processes of the Regulatory Body for Safety, IAEA Safety Standards Series No. GSG-13, IAEA, Vienna (2018)
12. INTERNATIONAL ATOMIC ENERGY AGENCY Leadership, Management and Culture for Safety in Radioactive Waste Management IAEA Safety Standards Series No. GSG-16, IAEA, Vienna (2022)
13. INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Concept of Clearance, IAEA Safety Standards Series GSG-18, IAEA, Vienna (2023).
14. INTERNATIONAL ATOMIC ENERGY AGENCY, Release of Sites from Regulatory Control and Termination of Practice, IAEA Safety Standards Series WS-G-5.1, IAEA, Vienna (2006) (under revision, DS542).

There is no need for consultations with other sections of the NS Department as part of the drafting process, as the topic is clearly within the remit of the WES section of NSRW.

7. OVERVIEW

The provisional Table of Content is provided below. Note that this layout may change during the actual revision of the Safety Guide. A record of changes will be kept for information to the Committee and for approval as necessary.

1. INTRODUCTION

- Background
- Objective
- Scope
- Structure

2. OBJECTIVES OF SAFETY ASSESSMENT FOR DECOMMISSIONING

3. GENERAL CONSIDERATIONS IN SAFETY ASSESSMENT FOR DECOMMISSIONING

- Graded approach
- Hazards identification
- Mitigating strategies
- Defence in depth
- Safety functions
- Optimization
- Periodic Safety Reviews
- Engineering analysis
- Waste and material management
- Uncertainties
- Management system
- Staffing and training considerations
- Emerging technologies

4. DEVELOPMENT OF A SAFETY ASSESSMENT FOR DECOMMISSIONING

- Introduction
- Safety assessment framework
- Description of the facility and of the decommissioning activities
- Hazard identification and screening
- Hazard analysis
- Engineering analysis
- Evaluation of results and identification of safety measures

Independent review of the safety assessment

Evolution of the safety assessment during facility lifetime

5. REGULATORY REVIEW OF THE SAFETY ASSESSMENT FOR DECOMMISSIONING

Regulatory review of the safety assessment

Use of a graded approach by the regulatory body

Conduct of the regulatory review

6. INVOLVEMENT OF INTERESTED PARTIES IN SAFETY ASSESSMENT FOR DECOMMISSIONING

REFERENCES

ANNEX I: EXAMPLE OF A CHECKLIST OF HAZARDS AND INITIATING EVENTS FOR USE IN SAFETY ASSESSMENT FOR DECOMMISSIONING

ANNEX II: EXAMPLE OF A METHODOLOGY FOR GENERIC REGULATORY REVIEW OF DECOMMISSIONING

CONTRIBUTORS TO DRAFTING AND REVIEW BODIES FOR THE ENDORSEMENT OF IAEA

SAFETY STANDARDS

8. PRODUCTION SCHEDULE:

Provisional schedule for preparation of the publication, outlining realistic expected dates for each step:

STEP 1: Preparing a DPP	July 2024
STEP 2: Internal review of the DPP (Approval by the Coordination Committee)	August 2024
STEP 3: Review of the DPP by the review Committee(s) (Approval by review Committee(s))	November 2024
STEP 4: Review of the DPP by the CSS (approval by CSS) or information of the CSS on the DPP	April 2025
STEP 5: Preparing the draft publication	June 2025 – June 2026
STEP 6: First internal review of the draft publication (Approval by the Coordination Committee)	August ~~2025~~2026
STEP 7: First review of the draft publication by the review Committee(s) (Approval for submission to Member States for comments)	November ~~2025~~2026
STEP 8: Soliciting comments by Member States	January 2026 – April 2026
STEP 9: Addressing comments by Member States	May 2026
STEP 10: Second internal review of the draft publication (Approval by the Coordination Committee)	July 2026
STEP 11: Second review of the draft publication by the review Committee(s) (Approval of the draft)	November 2026

STEP 12: Editing of the draft publication in MTCD and endorsement of the draft publication by the CSS	April 2027
STEP 13: Approval by the Board of Governors (for SF and SR only)	N/A
STEP 14: Target publication date	December 2027

9. RESOURCES

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

- 3 consultancy meetings (3 consultants x 5 days for each meeting)
- 6 one-week home based assignments
- 1 Technical Meeting (25 participants x 4 days)
- IAEA staff:
    - 1 Technical Officer – 12 weeks

1 administrative assistant – 3 weeks

ANNEXES

ANNEX I – Detail Analysis on Justification for Revision

Table 1 Crosswalk of Reference Revisions Need in WS-G-5.2

Reference used in WS-G-5.2	Status
Decommissioning of Facilities Using Radioactive Material, IAEA Safety Standards Series No. WS-R-5, IAEA, Vienna (2006)	**Superseded** by GSR Part 6 Decommissioning of Facilities (2014)
Predisposal Management of Radioactive Waste, Including Decommissioning, IAEA Safety Standards Series No.WS-R-2, IAEA, Vienna (2000)	**Superseded** by GSR Part 5 Predisposal Management of Radioactive Waste (2009)
International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, IAEA Safety Series No. 115, IAEA, Vienna (1996).	**Superseded** by GSR Part 3 Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (2014)
Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety,	**Superseded** by GSR Part 1 (Rev1) Governmental, Legal and Regulatory Framework for Safety (2016)

Reference used in WS-G-5.2	Status
IAEA Safety Standards Series No.GS-R-1, IAEA, Vienna (2000)	
Near Surface Disposal of Radioactive Waste, IAEA Safety Standards Series No. WS-R-1, IAEA, Vienna (1999)	**Superseded** by SSR-5 Disposal of Radioactive Waste (2011)
Geological Disposal of Radioactive Waste, IAEA Safety Standards Series No. WS-R-4, IAEA, Vienna (2006)	**Superseded** by SSR-5 Disposal of Radioactive Waste (2011)
Release of Sites from Regulatory Control on Termination of Practices, IAEA Safety Standards Series No. WS-G-5.1, IAEA, Vienna (2006)	**Current (Under Revision)**
The Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-R-3, IAEA, Vienna (2006)	**Superseded** by GSR Part 2 Leadership and Management for Safety (2016)
Decommissioning of Nuclear Power Plants and Research Reactors, IAEA Safety Standards Series No. WS-G-2.1, IAEA, Vienna (1999)	**Superseded** by SSG-47 Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities (2018)
Decommissioning of Medical, Industrial and Research Facilities, IAEA Safety Standards Series No. WS-G-2.2, IAEA, Vienna (1999)	**Superseded** by SSG-49 Decommissioning of Medical, Industrial and Research Facilities (2019)
Decommissioning of Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. WS-G-2.4, IAEA, Vienna (2001).	**Superseded** by SSG-47 Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities (2018)
Application of the Concepts of Exclusion, Exemption and Clearance, IAEA Safety Standards Series No. RS-G-1.7, IAEA, Vienna (2004)	**Superseded** by GSG-17 Application of the Concept of Exemption (2023) **Superseded** by GSG-18 Application of the Concept of Clearance (2023)
Safety Assessment Near Surface Disposal of Radioactive Waste, IAEA Safety Standards Series No. WS-G-1.1, IAEA, Vienna (1999)	**Superseded** by SSG-23 The Safety Case and Safety Assessment for the Disposal of Radioactive Waste (2012)
Remediation of Areas Contaminated by Past Activities and Accidents, IAEA Safety Standards Series No. WS-R-3, IAEA, Vienna (2003)	**Superseded** by GSR Part 3 Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (2014)

Reference used in WS-G-5.2	Status
Remediation Process for Areas Affected by Past Activities and Accidents, IAEA Safety Standards Series No. WS-G-3.1, IAEA, Vienna (2007)	**Superseded** by GSG-15 Remediation Strategy and Process for Areas Affected by Past Activities or Events (2022)
Regulations for the Safe Transport of Radioactive Material, 2005 Edition, IAEA Safety Standards Series No. TS-R-1, IAEA, Vienna (2005)	**Superseded** by SSR-6 (Rev.1) Regulations for the Safe Transport of Radioactive Material (2018)
Defence in Depth in Nuclear Safety, INSAG Series No. 10, IAEA, Vienna (1996)	**Current & Specified** by publication INTERNATIONAL ATOMIC ENERGY AGENCY, Assessment of Defence in Depth for Nuclear Power Plants, Safety Reports Series No. 46 (Rev.1), IAEA, Vienna (2024)~~Current~~
Storage of Radioactive Waste, IAEA Safety Standards Series No. WS-G-6.1, IAEA, Vienna (2006)	**Current**
WS-G-1.2 Management of Radioactive Waste from the Mining and Milling of Ores (2002)	**Superseded** by SSG-60 Management of Residues Containing Naturally Occurring Radioactive Material from Uranium Production and other Activities (2021)

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The feedback from Member States provided useful directions for the revision of WS-G-5.2. The following recommendations will be considered for incorporation into the revision:

- Update safety assessment recommendations relevant to selecting a decommissioning strategy (immediate, deferred, combination of them), to developing a decommissioning plan considering all stages of a lifetime of a facility, and to planning and implementing associated decommissioning actions in alignment with GSR Part 6, other applicable requirements (GSR Part 3, GSR Part 4 (Rev. 1), GSR Part 5), and Safety Guides SSG-47, SSG-49.
    - Revise to remove entombment from safety assessment considerations for decommissioning of facilities.
    - Expand the recommendations in relation to non-radiological ~~risks~~ initiating events that can impact decommissioning and trigger radiological risks, hence jeopardizing human health and the environment.
    - Provide more detailed recommendations on quantification of hazards and on radiation risk analyses for complex decommissioning projects.
    - Expand the recommendations for cases where disposal facilities are not available and will delay or affect the end state of decommissioning. Specifically, how aging, or deterioration of structures, systems, and components critical to safety are impacting safety of these facilities over time, as well as effects related to loss of corporate knowledge, or regulatory history over time.

  - Adapt the recommendations on specific safety aspects, such as the impact of climate change on long term decommissioning projects (for example, when deferred dismantling strategy with a long safe enclosure phase is applied).

- Considering GSR Part 3, increase the detail of recommendations on application of the principles of justification, optimization, and on application of dose limits and dose constraints for occupational and public exposures during decommissioning (planned exposure situation).
- Incorporate recommendations related to safety requirements of the GSR Part 4 (Rev. 1). These safety requirements are not currently considered in WS-G-5.2.
- Enhance the recommendations on applying a graded approach for developing a safety assessment for decommissioning in alignment with GSR Part 6 and other applicable requirements (GSR Part 3, GSR Part 4 (Rev. 1), GSR Part 5), and SSG-47, SSG-49, depending on the type and size of the facility, the number facilities (multi-facility site), and the relevant stage in the lifetime of a facility. Specifically, this will enhance recommendations on a graded approach to the following:
  - Hazard assessment and risk evaluation
  - Safety management for system concepts introduced in GSR Part 6 and GSR Part 5
  - Phased approach to decommissioning, prioritization of activities, resources or strategies as applicable
  - Involvement of interested parties as necessary in accordance with Member States national regulations
- Provide examples of decisional flow charts to assist Member States in implementation of a graded approach to safety assessments for decommissioning and provide examples taking into consideration most common decommissioning facility types in Member States.
- Address safety assessment for decommissioning of a site having more than one facility (site strategy as implemented in GSR Part 6) and how it may impact safety assessment for the decommissioning of each individual facility on the site.
- Revise the recommendations on the roles and responsibilities of the regulator, to align with the requirements of GSR Part 6 and other applicable requirements (GSR Part 3, GSR Part 4 (Rev. 1), GSR Part 5) in the context of safety assessments for decommissioning.
- Address development of safety assessment supporting clean-up actions during completion of decommissioning in alignment with WS-G 5.1 and GSG-18.
- Provide recommendations on optimization of protection and safety, and protection of the environment. when implementing restrictions of use including monitoring and surveillance measures (GSR Part 6).
- Consider the recommendations from GSG-16, which address the development of a safety case and safety assessment for radioactive waste management facilities. It also covers the decommissioning of facilities for predisposal waste management. These recommendations is not currently considered in WS-G-5.2 and will be considered for incorporation as deemed necessary.
- Incorporate lessons learned from decommissioning activities and methodologies described in Safety Report Series No. 77 Safety Assessment for Decommissioning (2015).

ANNEX II – Feedback Analysis Report

Following the 55th WASSC meeting in June 2023, a draft questionnaire on the usefulness, strengths, and weaknesses of WS-G-5.2 was circulated to WASSC members and observers. The need for revision of the WS-G-5.2 has been discussed and requested at the 56th WASSC meeting.

Below is a transcription of the WASCC members' comments related to the revision of WS-G-5.2. These comments have been analysed and suggested for consideration in the revision, where applicable.

Question 4: What do you consider are the main weaknesses of WS-G-5.2?

Member States would like the following points to be included in the future revision:

- Principle of justification, which is very important for decision making for regulators for decommissioning of facilities using radioactive material.
- Also review the title and then we talk about nuclear material and not radioactive sources safety Assessment for the Decommissioning of Facilities Using Nuclear Material.
- Requires updating to provide recommendations on addressing key requirements specified in GSR Part 3, GSR Part 4 and GSR Part 6.
- Decommissioning activities depends on the size of the facility. Similar approaches may not apply for all types of nuclear/radiation facilities. Therefore, different decommissioning strategies may apply for different facilities depending on the size of the facility. Which are not specifically mentioned in the document.
- Several safety standards that affect the content of WS -G-5.2 have been revised since the publication in 2008. The Safety Guide does not incorporate new recommendations, approaches, or lessons learned published after 2008.
- The safety assessment process has been developed in a generic way to address decommissioning actions when the decommissioning project is well defined (sequence, techniques, etc.)
- However, some decommissioning projects can be very complex and may need a specific approach. Complexity is addressed in the WS -G-5.2 but without any detail (reference is made to graded approach). Regarding this issue, the SSG -47, published in 2018, addresses the decommissioning of large facility and multifacility site, referring to the phased approach. Complexity is also addressed in the SRS -77 about safety assessment (which is not an IAEA Safety Standard). For complex projects, a specific approach may be needed.
- A phased approach is often sufficient to address the main challenges. Nevertheless, it raises what kind of level of detail of the safety demonstration is necessary for the first phases and what kind of maturity level should be reached for the dismantling sequence of works and techniques. This is particularly relevant for long term projects.
- In some situations, due to the lack of resources (both human and financial resources), all activities cannot be conducted at the same time. Licensees may have to establish priorities in the frame of long -term projects. Priorities should be “safety oriented” (what has to be

done first to reduce the impact to the workers, public and environment) and should be established considering a sound -based safety demonstration even if they can be influenced by other factors (like availability of waste routes).

- Regarding radioactive waste management, the lack of immediate availability of a waste management route may lead the operator to create intermediate storage or to postpone the production of waste. This situation can impact the dismantling schedule. However, it is important to examine whether a significant delay will lead to a deterioration of the level of safety at the installation over time. Consideration of these types of factors in the safety assessment makes it possible to identify the priorities in terms of carrying out storage and providing the necessary waste management endpoints. For long-term projects, the methodology and approaches to assess safety deterioration would be better addressed to consider all aspects of long term projects.
- The WS -G-5.2 does not provide any approach to cope with these issues (complexity, phased approach, graded approach, priorities) and how safety assessments can support this.
- Regarding para. 6.1: In Germany there is no option for an “input” of interested parties at the end of the decommissioning process. In the course of the licensing procedure public hearings are a mandatory part to involve the public. Since the end state of decommissioning is always a release of the full site from regulatory control under nuclear and radiation protection law, there are no further restrictions to the site after decommissioning. The end state is already defined and planned in the course of the licensing procedure.
- Weakness in providing to systematic illustration of details on decommissioning process.
- There is little information regarding illustration of decommissioning strategies and keeping risks as low as reasonably achievable by licenses.
- No explanation on application of clearance levels, release of material from regulatory control, release of sites after decommissioning (for restricted or unrestricted use). These criteria are mentioned, but only with reference to another IAEA documents (published nearly 20 years ago)
- The very comprehensive guide provides a lot of useful information. What is missing are actual check sheets. New Zealand is seldomly decommissioning facilities that have used radioactive materials in one way or another.
- This document is inconsistent with GSR Part 6 Decommissioning of Facilities, particularly with respect to the decommissioning strategy of entombment which is no longer accepted as a valid decommissioning strategy.
- Currently, WS -G-5.2 only mentions characterization in relation to addressing uncertainties. A more explicit reference in WS -G-5.2 that characterization is also a pre-requisite for developing the safety assessment.
- The document currently focuses on active decommissioning and could be improved for decommissioning facilities in deferred dismantling and projects with extended schedules. Improvements could be made in aging management and changing site conditions/hazards that experience has shown can be significant issues for facilities in deferred dismantlement. These conditions include deterioration of the facility structure, ground water intrusion, and aging management for structures and systems important to maintaining safety of the facility and the environment.

- No references to numerical values for end states (either for restricted use or unrestricted use) are provided.
- One of the problems is that more often than not the decommissioning of facilities is far in the future and therefore certain aspects cannot be planned in such detail as the Safety Guide suggests.
- A weakness is that case studies are missing: the scope is defined and therefore it could be interesting to case studies for NPPs, research reactors, NFC facilities, research laboratories or medical facilities including a time estimation (NB: very interesting would be the delta between planned and actual time of decommissioning in a project).
- According to the scope the guide "addresses the application of the safety assessment methodology throughout the planning and implementation of decommissioning activities, including any deferred dismantling period after final shutdown, up to the final release of the site from regulatory control". However, the guide does not distinguish between e.g. safety assessments performed for the planning of decommissioning and for implementation of decommissioning. As common in the IAEA document, the graded approach should be applied in this case.
- Risk assessment: Safety assessments conducted as per the guide often involve risks assessments. While these assessments primarily address safety risks, they may also identify security vulnerabilities or threats that need to be addressed.
- Conducting a comprehensive safety assessment, as outlined in WS -G-5.2, can be resource intensive in terms of time, expertise, and financial resources. This may pose challenges for smaller facilities or countries with limited resources. It's essential to consider resource implications when applying the recommendations.
- WS-G-5.2 may need periodic updates to address emerging technologies and their associated safety assessment challenges. Staying current with technological advancements is crucial for its continued relevance.

Question 5: Can you share any views on how can WS-G-5.2 be improved to be more applicable and useful to your country?

- Update the document with references to current safety standards while removing superseded references.
- Climate changes affect maybe considered for the assessment of safety in the different phases of decommissioning activities. Consideration of climate changes may be included.
- The guide could provide more detailed recommendations on the safety case and safety assessment during a deferred decommissioning phase (i.e. during the safe storage phase). The Safety Guide could also provide how more detail on how the safety assessment supports the selection of a decommissioning strategy.
- Regarding the phased approach, a methodology could be developed to explain how to develop safety assessment when implementing a phased approach, in particular for the first phases and how to analyse the level of maturity of the proposed actions (some benefit could come from the IAEA FaSa project performed in the past).

- To address the issue on how to establish safety-based priorities for complex decommissioning project, a specific approach and methodology could be proposed. The methodology could explain what the main safety aspects are to be considered (site specificities, inventory, barriers status, released fraction, radiological impact, scenarios to be considered) to identify where are the priorities. This methodology might be different from the one addressed in the Figure 1 of the WS-G-5.2 (without putting into questions the proposed process) but some steps could be similar. For complex decommissioning projects, this priority approach should be addressed before going into the development of safety assessment for decommissioning actions and will necessarily provide inputs to be considered later in the development of the safety assessment.
- As it is explained in the IAEA SRS 97 (Management of project risks in decommissioning), "risks identified during the safety assessment process can serve as important input to the risk identification process". Some recommendations should be provided on the way to implement the results of the safety approaches for the decommissioning phases and for the priorities (by comparison to a safety assessment, the implementation of the safety assessment results can be done into operating rules and procedures that can be inspected by regulators). For phases and priorities, it could be useful to describe oversight processes from both operational and regulatory point of views. These issues might be related to the follow -up and controls of long -term decommissioning projects when driven by safety considerations.
- further development of probabilistic safety assessments (see DS523 and DS528); extended (since 2008) consideration of hazards and their combinations.
- progress on the concept of defence in depth (see DS508). A gap analysis in relation to updating and/or adding new findings relevant Safety Guides.
- WS-G-5.2 states that: "the regulatory body should appoint suitably qualified and experienced staff to manage and undertake such reviews". Issues on regulatory review could be explained more for case when regulatory body is very small and has not capacity to do review itself. How independent review could be used and checked by regulator.
- Adding the chapter on development of the criteria for the release of material and sites from regulatory control as part of decommissioning would be useful and improve this document.
- This document only refers to other guide regarding criteria for release.
    - Case studies may be useful given the practical experience in decommissioning that has been gained since this Safety Guide was published.
    - Several areas could be updated to reflect learning and experience, for example: recognition that non-radiological hazards associated with decommissioning can become a key safety driver,
    - introducing a decommissioning mindset/safety culture
    - greater emphasis that planning for safe decom missioning starts at the design phase and the safety assessment should develop and be informed through the subsequent siting/construction/commissioning/operation etc .
- Include recommendations for conditions/hazards for facilities in deferred dismantling. Update for better consistency with GSR Part 6. Update for better consistency with Draft SRS -50, Decommissioning Strategies.

- In the Czech Republic safety case for different phases of nuclear installation lifetime contain details which may be used for the conduct of specific safety assessments.

In conclusion – the revision of the WS-G-5.2 is necessary as soon as the resources allow. It should address the issues listed in this feedback analysis report.