Waste Safety Standards Committee
41st Meeting

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Agenda Item W 4.1
Status of DS468 on “Remediation Process for Areas Affected by Past Activities and Accidents”

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Outline:

- Background
- Objectives of DS468
- Key issues being addressed
- How key issues are being addressed
  - Terminology
  - Residual materials and waste
  - Setting of Reference Levels
- Document structure
- Relationship of DS468 to other IAEA Safety Standards
- Plans and path-forward
Background:

• There is significant discussion internationally to resolve the pragmatic/practical implementation of international recommendations (e.g., ICRP) and safety standards (e.g., GSR Part 3).

• For example, with respect to remediation planning and implementation, concepts, such as how the radiological protection principles of justification and optimization can be applied in the selection of remedial options and the establishment of reference levels, is a topic of broad interest.

• In addition, characterization and classification of residual materials generated during remediation is a fundamental concept in waste minimization and the application of sustainable practices, such as recycling and reuse.

• Integral to the planning and implementation of remediation is ensuring adequate communication and consultation with interested parties (including members of the public) throughout the process.
Background - Endorsement of DPP468


• WS-G-3.1 had been developed based on the Safety Requirements in WS-R-3 on *Remediation of Areas Contaminated by Past Activities and Accidents* (2003).

• WS-R-3 was later superseded by the Safety Requirements now found in GSR Part 3 (Section 5) on Existing Exposure Situations, and applicable Safety Requirements from more recent waste safety standards.
Objectives of DS468:

To provide guidance on implementing the requirements on remediation of:

- Areas contaminated by residual radioactive material arising from past activities that:
  1) were never subject to regulatory control; or
  2) were subject to regulatory control but not in accordance with the requirements of the existing IAEA and national safety standards.

- Areas affected by a nuclear or radiological emergency, after the release and deposition has finished and adequate information is available to initiate remedial actions.
Key Issues Being Addressed:

– Consistency with the BSS (2014) requirements for control of public and occupational exposure in existing exposure situations
– Strategic planning for severe accident recovery (including remediation preparedness) [to address Action W.7.1 from WASSC 37]
– Application of a risk-based approach in the management of remediation and prioritization of remedial options
– Graded approach to dose assessment (including appropriate level of conservatism, such that effort is commensurate with risk)
– Application of principles of optimization, justification and limitation to existing exposure situations, as defined in GSR-Part 3 (2014)
– Application of the principle of optimization in the establishment of reference levels for existing exposure situations
– Integration of the optimization process in decision-making in the remediation process
– Considerations regarding the implications of relatively short-term protective actions and countermeasures taken just following an emergency on the long-term situation and remediation
Key Issues Being Addressed:

- Remediation planning and implementation as it relates to the potential generation of large amounts of low-level waste following an emergency
- Distinction between radioactive waste and residual materials in the context of remediation
- Exemption and clearance of radioactive waste as it relates to remediation
- Remediation planning with consideration of end-use and end-state, and institutional control (e.g., restricted vs. unrestricted land-use)
- Strengthened guidance on involvement of interested parties, including communication and consultation during remediation planning, implementation, and post-remediation management in the context of perceived versus actual risk [to address Action W.7.1 from WASSC 37]
- Guidance on self-help in the context of remediation
- Experience gained in light of the Fukushima-Daiichi accident
Remediation:

- is defined as “Any measures that may be carried out to reduce the radiation exposure due to existing contamination of land areas through actions applied to the contamination itself (the source) or to the exposure pathways to people”.
- Is undertaken as part of an “existing exposure situation” or may be initiated during the transition of an “emergency exposure situation” to an “existing exposure situation” [linkage to DS474].
- Is focused on bringing a situation under control that is not normal under regulatory control.

Decommissioning:

- is defined as “Administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility”.
- Is undertaken as part of a “planned exposure situation”.
- Is focused on transitioning a planned (normal) situation, such that it is no longer under regulatory control (as control is no longer needed).

TERMINOLOGY: Distinction between ‘Decommissioning’ and ‘Remediation’
TERMINOLOGY: Distinction between ‘Protective Action’ and ‘Remedial Action’

Protective Action:
• is defined as “An emergency response action for the purposes of avoiding or reducing doses that might otherwise be received in an emergency exposure situation or an existing exposure situation”.

Remedial Action:
• is defined as “The removal of a source or the reduction of its magnitude (in terms of activity or amount) for the purposes of preventing or reducing exposures that might otherwise occur in an emergency or in an existing exposure situation”.

(interfaces with emergency exposure situations - e.g., DS474)
TERMINOLOGY: Residual Materials

- There has been detailed discussion on relevant concepts related to planning and implementation of remediation to minimize the generation of radioactive waste.
- The definition of residual materials, and the associated concepts of waste classification, clearance, recycling and reuse are integral aspects of this concept.
- For the purposes of DS468, it is proposed that ‘residual materials’ should be a comprehensive term, which includes:
  - Radioactive waste
  - Conventional waste
  - Materials that can be reused; and
  - Materials that can be recycled.
- Classification of ‘residual materials’ is considered an important step in radioactive waste minimization.
TERMINOLOGY: Residual Materials

(from GSG-1 on “Classification of Radioactive Waste”)
Guidance on Setting of Reference Levels (with an example):

1. Conduct radiological surveys [i.e., characterization] of each area to be remediated.
2. Conduct a dose assessment to predict doses to workers and members of the public.
3. Review outcomes of the dose assessment and select remedial actions to be undertaken.
4. Identify possible remedial options to meet Reference Level.
5. Make a decision regarding end-state and end-use of land and determine if remediation can be justified [this was important because legally, it can affect the reference level that would be appropriate for the situation]
6. Set the Reference Level [which represents the start point for the optimization of protection], as well as corresponding measurable or ‘operational’ Derived Reference Levels [e.g., ambient dose rate, activity concentrations in dietary items, etc.].
7. Development of a plan to optimize protection [i.e., through process of optimization and applying the graded approach].
8. Conduct monitoring to verify that doses and Derived Reference Levels fall within the predicted/authorized values.
Process-based Document Structure:

- Step-wise process-based document structure:
  - Preliminary evaluation (characterization)
  - Planning
  - Conduct (implementation)
  - Post-remediation management
Structure of DS468:

1. INTRODUCTION
   1.1 Background
   1.2 Objective
   1.3 Scope
   1.4 Structure

2. FRAMEWORK FOR REMEDIATION
   2.1 Governmental, legal and regulatory framework
   2.2 Remediation strategy
   2.3 Regulatory oversight
   2.4 Funding of remediation
   2.5 Involvement of interested parties [covered throughout remediation process]

3. THE REMEDIATION PROCESS [flow diagram]
   3.1 Application of the principles of radiation protection

4. SITE EVALUATION
   4.1 Initial site characterization and problem formulation
   4.2 Detailed site survey

5. PLANNING OF REMEDIATION
   5.1 Evaluation of remedial options
   5.2 Safety and environmental assessments
   5.3 Application of principles of justification and optimization in selection of remedial options
   5.4 Development of remedial action plan
Structure of DS468:

6. IMPLEMENTATION OF REMEDIATION
   6.1 Radiation protection during remediation
   6.2 Monitoring and ongoing surveys during remediation
   6.3 Emergency preparedness and advance planning
   6.4 Site security
   6.5 Management system
   6.6 Release of areas
      6.6.1 Unrestricted use
      6.6.2 Restricted use
      6.6.3 Restricted access
   6.7 Final remediation report
   6.8 Record keeping and information management

7. MANAGEMENT OF RESIDUAL MATERIALS GENERATED DURING REMEDIATION
   7.1 General approach
   7.2 Characterization and classification of materials
      7.2.1 Exemption and exclusion
      7.2.2 Clearance of materials
   7.3 Recycling and reuse of residual materials
   7.4 Management of remediation radioactive waste

8. POST-REMEDIATION MANAGEMENT
   8.1 Removal of restrictions
   8.2 Record keeping and information management
   8.3 Interested parties aftercare, public communication, and consultation
   8.4 Monitoring and surveillance programme

REFERENCES
Structure of DS468: ANNEXES (no Appendices)

ANNEX I: FACTORS INFLUENCING REMEDIATION PLANNING AND IMPLEMENTATION [including ‘prevailing circumstances’]

ANNEX II: EXAMPLE TABLE OF CONTENTS FOR A SITE REMEDIATION PLAN

ANNEX III: DOSE ASSESSMENT FOR REMEDIATION PURPOSES

ANNEX IV: OPTIMIZATION OF SITE REMEDIATION: PRACTICAL ASPECTS AND EXAMPLE [including example of establishment of Reference Levels]

ANNEX V: SELF HELP
Interfaces with Existing Safety Standards:

- Fundamental Safety Principles (SF-1)
- General Safety Requirements (and underlying Safety Guides):
  - Part 2: Leadership and Management for Safety Radiation (DS456)
  - Part 4: Safety Assessment for Facilities and Activities, Rev. 1 (2016)
  - Part 6: Decommissioning of Facilities (2014) [e.g., covers termination of activities, but with focus on decommissioning]
  - Part 7: Preparedness and Response for a Nuclear or Radiological Emergency (2015)
- Disposal of Radioactive Waste (SSR-5).
- Release of Sites from Regulatory Control on Termination of Past Practices (WS-G-5.1).
- Application of the Concepts of Exclusion, Exemption and Clearance (RS-G-1.7).
Complementary Draft Safety Guidance:

- Safety Guide (SG) on *Radiation Protection of the Public and the Environment* (DS432)
- SG on *Occupational Radiation Protection* (DS453)
- SG on *Communication and Consultation with Interested Parties* (DS460)
- Draft TECDOC on *Management of large amounts of waste arising from a nuclear or radiological emergency* (see WASSC Report 38)
- SG on *Arrangements for the termination of a nuclear or radiological emergency* (DS474)
Other Relevant (Draft) Safety Guides

• Generic aspects of SG on *Protection of the public against exposure indoors due to radon and other natural sources of radiation* (SSG-32)

• Generic aspects related to existing situations and residual materials in draft SG on *Management of radioactive residues from uranium production and other NORM activities* (DS459)

• Verification of consistency of DS468 with SG on *Radiation safety for consumer products* (SSG-36)
Next Steps in Preparation of Draft Safety Guide

- Editorial review of draft document by Scientific Secretariat (currently underway)
- Review and incorporate key recommendations from recent international conferences, such as
  - the *International Conference on Advancing the Global Implementation of Decommissioning and Environmental Remediation Programmes* that was held from 23-27 May 2016 in Madrid
  - the IAEA Technical Meeting (TM-52829) on *Remediation Techniques and Strategies in Post-Accident Situations* that was held in Vienna from 13-17 June 2016 [materials from TM can be accessed using the following web-link: https://gnssn.iaea.org/RTWS/general/Shared%20Documents/Environmental%20Assessment/TM-52829%202013-17%20June%202016]
- Identification of any remaining issues for clarification
- Resolution of any issues with appropriate experts
- Submission of DS468 for Committee review
Thank you!