Waste Safety Standards Committee
41st Meeting

20 and 23 June 2016

Agenda Item W 4.3
Feedback Analysis of the Safety Guide RS-G-1.8 on “Environmental and Source Monitoring for Purposes of Radiation Protection”

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## Background:
Presentation during WASSC 40

### W 4. Topical Session: Remediation Strategies after an Emergency

<table>
<thead>
<tr>
<th>W 4.1</th>
<th>Remediation actions applied after the accidents in Chernobyl, Fukushima and Goiania – Effectiveness and lessons learned</th>
<th>For information and discussion</th>
<th>Mr. G. Proehl</th>
</tr>
</thead>
<tbody>
<tr>
<td>W 4.2</td>
<td>Setting up remediation strategies in affected rural and urban areas focussing on the reduction of radiation doses – results of a dose assessment model</td>
<td>For information and discussion</td>
<td>Ms. T. Yankovich</td>
</tr>
<tr>
<td>W 4.3</td>
<td>Derivation of radionuclide levels in remediation waste that are appropriate for disposal on landfills</td>
<td>For information and discussion</td>
<td>Mr. G. Bruno / ..........Mr. G. Proehl</td>
</tr>
</tbody>
</table>

### W 5. Status and Feedback Reports by the Secretariat

<table>
<thead>
<tr>
<th>W 5.1</th>
<th>Initiation of the review of RS-G-1.8, SG on Environmental and Source Monitoring for Purposes of Radiation Protection</th>
<th>For information and discussion</th>
<th>Ms. T. Yankovich</th>
</tr>
</thead>
<tbody>
<tr>
<td>W 5.2</td>
<td>Advisory function to the London Convention – DB on inventory of RNs entering to the oceans (Ref: TECDOC on Inputs of radionuclides of natural and anthropogenic origin into the oceans)</td>
<td>For information</td>
<td>Mr. D. Telleria</td>
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</table>
Background:

Plans and Path-forward:  
(last slide from presentation at WASSC 40)

• A Consultancy Meeting is being planned to develop a Feedback Analysis Report for the update of RS-G-1.8

• This Report will serve as a basis to initiate the process to gain approvals to proceed with the update of RS-G-1.8.

• A Document Preparation Profiles (DPP) will then be developed and submitted for approval.

A Consultancy Meeting was held from 14-18 March 2016 to develop a Feedback Analysis Report as possible input to the DPP.
Scope of Consultancy Meeting:

- General review of RS-G-1.8 relative to current Safety Standards and good international practice to identify broad issues in the overall document, as relevant.
- Review of the objectives, scope, structure and contents of RS-G-1.8 to:
  - Review the overall structure of the document with respect to its flow, clarity and ease-of-use;
  - Identify information that should be updated to ensure this SG is in line with current standards and international good practices;
  - Identify any gaps in content that should be addressed, with consideration of recent advances and lessons learned in the international and scientific communities.
- Detailed review of document to identify any editorial comments that could improve document readability and clarity.
General Recommendations:

• It was recommended that RS-G-1.8 be revised.
  – RS-G-1.8 [2005] was published before SF-1 [2006], GSR Part 3 [2014], GSR Part 7 [2015], and other key IAEA Safety Standards.
  – Terminology is unclear and out-of-date; e.g.:
    • Usage of “reference level” is not consistent with GSR Part 3
    • Usage of “investigation level”, “recording level”, “action level” and “intervention level”
    • Usage of “critical group”, as opposed to “representative person”
    • Usage of “chronic (prolonged)” as opposed to “existing” exposure situation.
    • Usage of term “practices”
    • Need to capture concept of “protective” vs “remedial actions”
    • etc.
General Recommendations:

– Given that RS-G-1.8 was issued prior to the update of SF-1 and the underlying safety standards, usage of the term “environmental monitoring” needs to be more clearly defined in the SG to reflect its purpose.
  • i.e., the assumed purpose is protection of the public; however, SF-1 states that the “fundamental safety objective is to protect people and the environment from the harmful effects of ionizing radiation”.

– More guidance is needed on how to conduct a dose assessment, and on how to use monitoring data to assess doses to the representative person, and flora and fauna (as required based on national requirements).

– Guidance is needed in how to develop harmonized monitoring programme that demonstrate protection of people and the environment.

– More guidance is needed on how to plan and implement monitoring.

– “Scope” of the document should clarify that non-radiological contaminants are out of scope.
General Recommendations:

– More guidance on application of a graded approach in the design of a monitoring program is needed.
– Section on responsibilities should cover jurisdictional overlap, concept of “single window of reporting”, etc.
– More clear guidance is needed on reporting requirements.
– Document needs to be updated to include more information on data management, quality management, etc. to capture advances made in these areas.
– Responsibilities of different parties to communicate and consult with interested parties is missing.

(Numerous editorial changes and areas where further clarification is needed were also identified, as part of the detailed review.)
Update/Clarification of Figures (and Tables):

- It was suggested that consideration should be given to clarification of figures and tables.
- For example, it was noted that in some cases, pathways are not clear in some figures.
- It was suggested that it could be beneficial to provide figures that can be more easily linked to modelling approaches into which characterization and monitoring data could be used.
- If more “qualitative” depictions are maintained in the SG, it was suggested that sources and pathways be more clearly represented.

*For ocean water, pathways $P_{o1}$, $P_{o2}$, $P_{o3}$, and $P_{o4}$ are not used.
Proposed Structure of Update to RS-G-1.8:

1. INTRODUCTION
   1.1 Background
   1.2 Objective
   1.3 Scope
   1.4 Structure

2. REGULATORY REQUIREMENTS FOR MONITORING
   2.1 Legal and regulatory framework
   2.2 Monitoring needs for different exposure situations
      2.2.1 Monitoring in planned practices
      2.2.2 Monitoring in emergency exposure situations
      2.2.3 Monitoring in existing exposure situations

3. RESPONSIBILITIES FOR MONITORING
   3.1 Responsibilities of the operator
   3.2 Responsibilities of the regulatory body
   3.3 Responsibilities of other agencies

(Also, developed a “cross-walk” to link the proposed sections to those in the current RS-G-1.8)
Proposed Structure of Update to RS-G-1.8:

4. BASIC CONCEPTS RELEVANT TO MONITORING
   4.1 General types of monitoring
   4.2 Human receptors and exposure pathways
       4.2.1 Human exposure groups
       4.2.2 Human exposure pathways
   4.3 Ecological receptors and exposure pathways
       4.3.1 Ecological receptors *(Should bioindicators be covered?)*
       4.3.2 Ecological exposure pathways

*(Need to clarify what is meant by “environmental monitoring” in context of updates to international recommendations and safety standards was noted)*
5. PLANNING A MONITORING PROGRAMME

5.1 Setting objectives
5.2 Background information
5.3 Monitoring design
5.4 Sample collection and field measurements
5.5 Laboratory sample analysis
5.6 Data storage and management
5.7 Quality assurance
5.8 Data analysis, assessment, and interpretation, and reporting
5.9 Management action
5.10 Programme evaluation and redesign

Proposed monitoring framework is consistent with approach developed by the United Nations Environment Programme (UNEP).
6. CONSIDERATIONS FOR MONITORING IN DIFFERENT EXPOSURE SITUATIONS

6.1 Monitoring of radioactive discharges within planned practices
   6.1.1 Baseline Monitoring in the Pre-operational Stage
   6.1.2 Monitoring in the Operation Stage (source and environmental monitoring)
   6.1.3 Monitoring during Facility Decommissioning
   6.1.4 Monitoring of Radioactive Waste Disposal Facilities after Closure

6.2 Monitoring in emergency exposure situations
   6.2.1 Preparedness for Emergency Monitoring
      6.2.2.1 Source Monitoring
      6.2.2.2 Environmental Monitoring
         • Monitoring at the Pre-release and Release Stages
         • Monitoring at the Post-release Stage
      6.2.2.3 Individual Monitoring
         • External Exposure
         • Internal Exposure (ingestion, inhalation)

6.3 Monitoring in existing exposure situation
   6.3.1 Environmental Monitoring
   6.3.2 Individual Monitoring
      6.3.2.1 External exposure
      6.3.2.2 Internal exposure (ingestion, inhalation)
Proposed Structure of Update to RS-G-1.8:

7. CONSIDERATIONS DOSE ASSESSMENT

Paragraph with Introductory text

7.1 Assessment of doses from planned discharges
   7.1.1 External exposure
   7.1.2 Internal exposure (ingestion, inhalation)

7.2 Dose assessment in emergencies
   6.1.1 External exposure
   6.1.2 Internal exposure (ingestion, inhalation)

7.3 Dose assessment in existing exposure situations
   7.1.1 External exposure
   7.1.2 Internal exposure (ingestion, inhalation)

7.4 Uncertainties in dose assessments
Proposed Structure of Update to RS-G-1.8:

8. INTERPRETATION OF MONITORING RESULTS

8.1 Compliance with planned practices with authorized limits and levels
   8.1.1 Compliance with discharge limits
   8.1.2 Compliance with environmental protection criteria
   8.1.3 Compliance with criteria for public exposure

8.2 Monitoring in situations of emergency exposure
   8.2.1 Environmental contamination levels
   8.2.2 Criteria for public exposure
   8.2.3 Time-dependence of radionuclides in environmental media
   8.2.4 Spatial distribution of contamination

8.3 Monitoring in existing exposure situations
   8.3.1 Environmental contamination levels
   8.3.2 Criteria for public exposure
   8.3.3 Time-dependence of radionuclides in environmental media
   8.3.4 Spatial distribution of contamination
   8.3.5 Effectiveness of remedial actions

REFERENCES
GLOSSARY [as needed]
POSSIBLE ANNEXES AND APPENDICES:

- On relationship between characterization and monitoring
- On how to design a monitoring program
- On relationship between monitoring and modelling
- On regulatory instruments associated with characterization and monitoring
- Others?

IAEA Safety Standards
for protecting people and the environment

Environmental and Source Monitoring for Purposes of Radiation Protection

Safety Guide
No. RS-G-1.8
Relevant IAEA Safety Standards Published after RS-G-1.8:

- **SF-1** on *Fundamental Safety Principles* [2006]
- **GSR Part 1 (Rev. 1)** on *Governmental, Legal and Regulatory Framework for Safety, Rev. 1* [2016]
- **GSR Part 3** on *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* [2014]
- **GSR Part 4 (Rev. 1)** on *Safety Assessment for Facilities and Activities, Rev. 1* [2016]
- **GSR Part 5** on *Predisposal Management of Radioactive Waste* [2009]
- **SSR-5** on *Disposal of Radioactive Waste* [2011]
- **GSR Part 6** on *Decommissioning of Facilities* [2014]
- **GSR Part 7** on *Preparedness and Response for a Nuclear or Radiological Emergency* [2015]
Relevant IAEA Safety Guides Published after RS-G-1.8:

- **GS-G-1.2** on *Review and Assessment of Nuclear Facilities by the Regulatory Body* [2002]
- **GS-G-2.1** on *Arrangements for Preparedness for a Nuclear or Radiological Emergency* [2007]
- **GSG-3** on *The Safety Case and Safety Assessment for the Predisposal Management of Radioactive Waste* [2013]
- **Other Safety Guides** – supporting relevant Safety Requirements (discussed earlier)
- **Other Technical Document** – providing more details on implementation of the higher level safety standards
Relevant IAEA Safety Requirements Published after RS-G-1.8:

- **NS-R-5 (Rev. 1)** on *Safety of Nuclear Fuel Cycle Facilities Safety Requirements* [2014]
- **SSR-2/1 (Rev. 1)** on *Safety of Nuclear Power Plants: Design, Rev. 1* [2016]
- **SSR-2/2 (Rev. 1)** on *Safety of Nuclear Power Plants: Commissioning and Operation, Rev. 1* [2016]
Other Potential Interfaces:

• **DS432** on Radiation Protection of the Public and the Environment
• **DS427** on A General Framework for Prospective Radiological Environmental Impact Assessment and Protection of the Public
• **DS442** on Regulatory Control of Radioactive Discharges to the Environment
• **DS468** on Remediation Process for Areas Affected by Past Accidents and Activities
• **DS474** on Arrangements for the Termination of a Nuclear or Radiological Emergency
• **DS484** on Site Evaluation for Nuclear Installations
• Sources of information on approaches from international community (e.g., Fukushima Daiichi Accident and other)
Next Steps in Preparation of Draft Safety Guide

• Based on the outcomes of the review of RS-G-1.8 by the IAEA Secretariat that was presented for information during WASSC 40, and the subsequent independent review during the March 2016 consultancy meeting (presented here), it is recommended that RS-G-1.8 be revised.

• On this basis, it is asked for approval to develop a DPP.
Thank you!