1. IDENTIFICATION

Document Category: Safety Guide
Working ID: DS453
Proposed Title: Occupational Radiation Protection
Proposed Action: New document

To revise existing guidance on Occupational Radiation Protection, based on the revised Basic Safety Standards (BSS), and to bring all the relevant safety guides on protection of workers into a single comprehensive safety guide on Occupational Radiation Protection.

Propose to combine and supersede the following Safety Guides;

- RS-G-1.1 Occupational Radiation Protection (1999),
- RS-G-1.2 Assessment of Occupational Exposure Due to Intakes of Radionuclides (1999),
- RS-G-1.3 Assessment of Occupational Exposure Due to External Sources of Radiation (1999),
- RS-G-1.6 Occupational Radiation Protection in the Mining and Processing of Raw Materials (2004) and

Review Committee(s) or Group: RASSC (Leading),
WASSC, TRANSSC, NUSSC

Technical Officer(s): Pappinisseri Puthanveedu Haridasan (NSRW)

2. BACKGROUND/RATIONALE

The International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS No.115, 1996) broadly covers three categories of exposure. These are occupational exposure, public exposure and medical exposure. The revised BSS (DS379) also endorses these three categories. The revised BSS also makes use of this categorisation to define the relevant radiation protection requirements, as appropriate according to the exposure situation whether planned, emergency or existing.

Occupational exposure is all radiation exposure of workers incurred in the course of their work with the exception of excluded exposures and exposures from exempt practices or exempt sources, as a result of situations that can reasonably be regarded as being the responsibility of the operating management. Occupational exposure to ionizing radiation can occur in a range of medical, research and academic establishments, industries and nuclear installations. Adequate radiation protection of workers is essential for the safe and acceptable use of radiation, radioactive material and nuclear
energy. Guidance on the BSS requirements is currently provided generically in three Safety Guides RS-G-1.1, RS-G-1.2 and RS-G-1.3 and specifically for the mining and processing of raw materials in RS-G-1.6.

The long term structure of the Safety Standards contains a Safety Guide on Occupational Radiation Protection combining the above mentioned safety guides, along with any other relevant material from other safety guides in one comprehensive Safety Guide which will provide generic guidance on how to meet the requirements on occupational exposure established in the new Basic Safety Standards.

It is foreseen to produce, in parallel to this Safety Guide two other generic Safety Guides, the first covering radiation protection in medical exposure (Safety in medical uses of ionizing radiation – DS399 a new safety guide that will supersede RS-G-1.5 and associated Safety Report Series 38, 39 and 40) and the second on public exposure (Radiation protection of the public and the environment - DS432) which will encompass all exposures of the public.

3. OBJECTIVE
The objectives of the Safety Guide on Occupational Radiation Protection are;

(a) Provide updated guidance on occupational radiation protection in planned, emergency and existing exposure situations as defined in the revised BSS. The Safety Guide will provide guidance on the control of occupational exposures including the assessment of doses from external sources of radiation and from intakes of radioactive materials. The Safety Guide is intended for regulatory bodies, employers, workers, licensees and registrants, management authorities, and health and safety committees concerned with the radiation protection of workers.

(b) Provide detailed explanations on the new technical terms which are used in the new BSS and provide guidance on the revised concepts related to occupational radiation protection.

(c) To update the IAEA safety guides with respect to the publications made after 1999 (year of the publication of the current Safety Guide RS-G-1.1) in the area of radiation protection. The most important of these publications is the ICRP recommendation number 103 (2007).

(d) To bring together in one document the main Safety Guides which are relevant to occupational radiation protection.

(e) To provide new guidance on protection of pregnant workers

(f) To provide new guidance on protection of itinerant workers

4. JUSTIFICATION
The revision of the Safety Guide on Occupational Radiation Protection is justified as the existing guidance on occupational radiation protection was developed during the period 1996-1999 and major changes have occurred since then in the area of occupational radiation protection including external and internal exposure assessment methodologies and techniques. The revision of the BSS and the 2007 recommendations of the International Commission on Radiation Protection also lead to the updating and revision of all the relevant safety guides on radiation protection of workers. Currently the relevant guidance documents are scattered and there are many repetitions in the texts of those guides. Bringing of all those guides into a comprehensive single Safety Guide will help the users in the practical applications of the guidance in a more systematic way.
5. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

This is a generic Safety Guide which is included in the document “Long Term Structure of the IAEA Safety Standards and Current Status” (2010) paralleling the proposed Safety Guides on radiation protection of the public and medical exposures. It belongs to the Thematic Areas of radiation protection and will provide guidance on the requirements on occupational radiation protection established in the revised BSS.

This Safety Guide will supersede the following Safety Guides:


This Safety Guide will interface with the following Safety Standards:


5. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiological Protection for Medical Exposure to Ionizing Radiation, Safety Guide RS-G-1.5 (2002).


**Draft Standards**

The following draft standards also interface with the proposed Safety Guide;

1. International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (Revised BSS – In preparation), DS379


5. Safety in medical uses of ionizing radiation, DS399.

**Relevant ICRP Publications since 1999**


*ICRP recommendations on radon, air crew exposure and changes in the dose conversion coefficients are also expected in due course.*

**Relevant ISO and IEC Standards related to occupational radiation protection**

(eg: ISO27048, 2011)
6. OVERVIEW
The Safety Guide will provide updated guidance on protection of the workers in all exposure situations (Planned, Emergency and Existing Exposure Situations). The Guide will address the technical and organisational aspects of the control of occupational exposures, methods for the assessment of external radiation doses, methods to assess intakes of radionuclides in all the exposure situations in terms of normal as well as potential exposures. Consideration will also be given to guidance on occupational exposure to natural sources including the mining and processing of raw materials. The Safety Guide will provide new guidance on protection of the pregnant workers and itinerant workers.

The details of the proposed table of contents are provided in the Annex.

The current Safety Guides RS-G-1.1, RS-G-1.2, RS-G-1.3 and RS-G-1.6 are co-sponsored by the International Labour Organisation (ILO). The involvement of ILO as a co-sponsor of the new Safety Guide on Occupational Radiation Protection is considered essential for the application of the Safety Guide in the Member States.

7. PRODUCTION SCHEDULE: Provisional schedule for preparation of the document, outlining realistic expected dates for:

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<th>STEP</th>
<th>Activity Description</th>
<th>Expected Date</th>
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<td>Preparing a DPP</td>
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<td>2</td>
<td>Approval of DPP by the Coordination Committee</td>
<td>November 2010</td>
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<td>3</td>
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<td>June 2011</td>
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<td>4</td>
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<td>November 2011</td>
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<td>5</td>
<td>Preparing the draft</td>
<td>November 2011 - January 2013</td>
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<tr>
<td>6</td>
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<td>February 2013</td>
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<tr>
<td>7</td>
<td>Approval by the Safety Standards Committees for submission to Member States for comments</td>
<td>June 2013</td>
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<td>8</td>
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<td>9</td>
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<td>December 2013</td>
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<td>10</td>
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<td>January 2014</td>
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* Column A for Safety Fundamentals, Safety Requirements and Safety Guides.

8. RESOURCES

1 CM during 2011
1 TM and 1 CM during 2012
2 CMs during 2013.
ANNEX: Proposed Table of Contents

1. INTRODUCTION
   - Background
   - Objective
   - Scope
   - Structure

2. FRAMEWORK FOR OCCUPATIONAL RADIATION PROTECTION
   - Radiation protection principles
   - Responsibilities – Government, Regulatory Bodies, Registrants or Licensees, Employers, Workers, Other parties
   - Exposure situations
   - Occupational exposure
   - Reference levels
   - Regulatory aspects
   - Graded approach
   - General radiation protection requirements
   - Administrative requirements
   - Dosimetric quantities

3. DOSE LIMITATION
   - Dose limits in Planned Exposure Situations
   - Limits on exposure for radon progeny and thoron progeny
   - Verification of compliance with dose limits

4. OPTIMIZATION OF RADIATION PROTECTION FOR PRACTICES
   - Optimisation of protection - ALARA
   - Use of Decision Aiding Techniques
   - Dose constraints
   - Investigation levels

5. RADIATION PROTECTION PROGRAMMES IN PLANNED EXPOSURE SITUATIONS
   - Objectives
   - Prior radiological evaluation and safety assessment
   - Scope
• Responsibility assignments
• Classification of areas
• Local rules and supervision
• Personal protective equipments
• Work planning and work permits
• Monitoring and dose assessment
• Workers qualification and certification
• Information, instruction and training
• Quality assurance
• Audits and reviews

6. EXPOSURE OF EMERGENCY WORKERS
• Emergency planning and responsibilities
• Application of Radiation Protection Principles
• Optimisation of protection
• Dose guidance values
• Protection of emergency workers
  - Occupational exposure of rescures

7. EXPOSURE OF WORKERS IN EXISTING EXPOSURE SITUATIONS
• Application of Radiation Protection Principles
• Optimisation of protection - ALARA
• Reference levels
• Radon at work
• Cosmic rays exposure
• Exposure to NORM

8. PROTECTION OF WORKERS IN CERTAIN CASES
• Pregnant workers
• Minors (apprentices between 16 to 18 years of age)
• Itinerant workers

9. ASSESSMENT OF OCCUPATIONAL EXPOSURES
• DOSIMETRIC QUANTITIES
  - Individual monitoring
• Workplace monitoring

• EXTERNAL EXPOSURE ASSESSMENT
  o Individual dose assessment
  o Specifications for personnel dosimetry
  o Specifications for work place monitoring
  o Routine, performance and periodic testing
  o Emergency exposure situations

• INTERNAL EXPOSURE ASSESSMENT
  o Direct methods - detection, geometry effects, measurement procedures
  o Indirect methods
    – biological samples
    – physical samples
    – analytical methods
  o Biokinetic models
    – routes of entry
    – systemic activity
    – excretion
    – dose coefficients
    – workplace specific assessments
  o Interpretation of results
  o Dose coefficient and Derived Air Concentrations

• WORKPLACE MONITORING
  o Monitoring for external radiation
  o Monitoring for air contamination
  o Monitoring for surface contamination
  o Interpretation of results

• DOSE RECORDS
  o Individual monitoring reports
  o Workplace monitoring reports
  o Reporting
10. MANAGEMENT SYSTEMS

- Safety culture
- System documentation and control
- Management responsibility
- Process implementation and assessment
- Guidance for calibration and testing services

11. ENGINEERING AND ADMINISTRATIVE PROTECTION MEASURES

- General
- Shielding
- Ventilation
- Dust control
- Surface contamination
  - Decontamination facilities (equipment and personnel)
- Release of materials
- Personnel protective equipment
- Personal hygiene
- First aid
- Job rotation

12. HEALTH SURVEILLANCE

- Responsibilities
- Medical examination of workers
- Education and training
- Counselling
- Management of overexposed workers

APPENDICES

REFERENCES

ANNEXES

DEFINITIONS (if necessary)