Application of the Commission’s Recommendations to NORM – ICRP TG76

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ICRP-C4

IAEA RASSC/WASSC meeting – NORM Session
Vienna – 21-23 June, 2016
Launched in 2010 (Peter Burn chair), membership updated in 2013 (J-Francois Lecomte new chair)

To develop a report on the application of the Commission’s recommendations (ICRP 103) on radiological protection against enhanced exposures from industrial processes using NORM

RP System mainly focused on medical staff before WW2 and on nuclear industry after (ICRP 26, 60)

Concerns about accidents, legacy, natural → ICRP 103

From practices/intervention to Existing/Planned/Emergency ES

+ Stakeholder involvement

Series of C4 reports on Existing ES: ICRP 111, 126, 132 + NORM + TG98

Public consultation expected early 2017
TG 76 Membership

- **Members:**
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- **MC critical reviewers:**
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  - Sergey Romanov (Russia)
The ICRP System of Protection

Situations
Existing
Planned
Emergency

Categories
Occupational
Public
Medical (patients)
Environment (biota)

Principles of protection
Justification
Optimisation
Limitation

Dose criteria
Reference levels
Dose constraints
Dose limits

Requisites
Assessment
Accountability
Transparency
Inclusiveness
NORM in the ICRP system of RP (1)

• NORM are existing exposure situations (ExES), because the source already exists when a decision on control is taken

• Given the situation, some control is needed and should be provided

• A NORM activity should be managed like a PES when the materials are used for their radioactive properties

• It could also be managed like a PES for regulatory purpose

• Whatever the ES, common approach (although nuances): optimisation under restriction, with the aim to achieve an equivalent standard of protection

• Key words: controllability, proportionality, equivalence
NORM in the ICRP system of RP (2)

- NORM can lead to public exposure, occupational exposure, environmental exposure
- Justification of establishing control is necessary
- If control justified, exposures are managed by optimisation of protection using restriction on individual doses to reduce inequity, identify exposures which warrant specific attention to reduce their magnitude, and to guide reduction in the entire dose distribution ALARA
- RL in the 1-20 mSv/y band or below, as appropriate
- Characterisation of the situation is the 1st step, to determine the need for control and the level of control
- A graded approach is needed
- Radon and thoron exposures should be managed separately according to ICRP 126
Protection of workers: the approach

- **Multi-hazard** situation; radiation generally not the dominant risk → integrated approach (all risks)

- **Graded approach** according to:
  - Selection of the RL
  - Selection of the requisites
  - Implementation of selected requisites

- Workers can be **occupationally exposed or not**

- If not, treated in the same way as members of the public
Protection of workers: RL

- Selected in one of the **3 following bands** as relevant:
  - <1 mSv/y
  - From 1 mSv/y to a few mSv/y
  - From a few mSv/y to 20 mSv/y

- **Realistic** assessments

- The selection of the RL does not preclude whether workers are occupationally exposed or not (depending on the requisites needed), except the 3rd band (occup.)

- RL is the **starting point** of the optimisation, not the goal
Protection of workers: Requisites

- 2 series:

  - 1 more related to the control of the **workplace** and the **conditions of work** (whatever who is the worker)
    - For simple situations, notably (but not exhaustively) when workers are not considered as occupationally exposed

  - 1 more related to the control of **individuals** (personally)
    - With graded implementation according to risk and context
Protection of workers: 1\textsuperscript{st} series of requisites

- **Characterisation** of the situation (who is exposed, when, where, how): Sources (materials), pathways, exposed individuals, dose distribution, releases, evolution; ±detailed, realistic, taking account of existing precautions (for other than radiation)

- **Initial preventive/mitigation actions** to eliminate or reduce hazard (e.g. alternatives, change of the process…)

- Provision of suitable **RP expertise** (internal or external)

- **Demarcation of areas** (+ signing using or not RP symbols)

- **Information** (right to know), instructions

- **Engineering control** (design and layout of facility, retrieval and containment of materials)

- **Working procedures** (arrangements of work, common IPE, record keeping of actions…)

**Regular review** of the situation
Protection of workers: 2nd series of requisites

- **Education and training** (level depending on the risks and the involvement of worker in their management; not necessarily related to the level of the RL)
- **IPE** (as relevant, related to radiation risk)
- **Dose assessment**: In perspective of optimisation; method depending on radionuclides & pathways; workplace/individual monitoring, realistic assumptions; relatively easy for external expo; internal expo often already assessed for other purposes, periodic reassessments
- **Dose record** (both workplace data and individual data)
- **Health surveillance** (if relevant, presumably in a few cases, sometime for other hazards)
Protection of public (and environment)

- **Discharges**: Both liquid & gaseous; radioactive or not; assessment (exposures + environmental impact); treatment as relevant; RL in the band 0-1 mSv/y; derived RL may be appropriate; optimisation depending on radionuclides and pathways; environmental monitoring to check no-deviation.

- **Waste**: Solid materials with no use planned; radioactive and not; large volume/low concentration + small volumes/high concentration; dealt with from generation to disposal (if possible); characterisation to determine way of management; treatment as relevant (minimization of volumes or activity); mixing of material may be considered; type of disposal proportionate to the type and hazard (as hazardous waste or as radioactive waste); reinjection in the ground may be possible; generally waste disposal is a PES; RL or DC in the band 0-1 mSv/y.
Protection of public (and environment)

- **Residues**: Recycled and reused, with economic & ecological arguments; may be a new process (with occupational exposure); result is either consumer products or a new ES; may be an issue (easiest to manage as residue than as waste); justification (based on level of doses, pollution, alternatives, future of products, acceptance…); process rarely stopped; RL in the band 0-1 mSv/y (lower range AFAP); no warning or labelling.

- **Building materials**: Radionuclides from raw materials or NORM residues; a national list of typical materials of concern should be done; RL in the band 0-1 mSv/y; derived RL already exist (e.g. concentration index); characterisation and control upstream AFAP; strategy encouraging use of BM with concentration < derived RL; difficult to ensure compliance.
Protection of public (and environment)

- **Legacy sites:** NORM at the origin of many legacy sites; an issue for TG98; should be avoided; proper decommissioning and dismantling; durable administrative control as necessary; RP and other considerations; RL in the lower range of the band 1-20 mSv/y or below (RL ≠ endpoint); endpoint on case by case; optimisation is a challenge

- **Stakeholder involvement, communication, ethical values:** To be integrated in the report; ethical values: beneficence/non-maleficence, prudence, justice, dignity; open and transparent control; involvement of stakeholders as necessary; dialogue organised to address controversial issues
Optimisation and Dose Criteria

- Identify exposures which warrant specific attention to reduce their magnitude
- Influence the entire dose distribution and shift exposures towards lower values
- Reduce inequity
Emergency and Existing Situations: (step by step process)

Step 1

Step 2

Step 3

Individual dose level

Nb of persons

Reference level