ICRP Draft Report:
“Radiological Protection against Radon Exposure”

EARST Workshop 2013

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ICRP Committee 4
ICRP TG 81 (Committee 4)

- Creation in November 2009
- Describe and clarify the application of ICRP 103
- And ICRP 101 (Optimisation)
- Remain in line with ICRP 65
- Take into account the Statement on radon and ICRP 115
- 6 months on the web for public consultation (December 2011 to June 2012)
- Challenged by new dose conversion factors (from C2)
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French mirror group
Characteristics of radon exposure (1)

- Who is exposed, where, when and how?
  - At home (essentially), in workplaces and in mixed-use buildings
  - Global risk due to low and moderate concentrations

- Existing exposure situations
  - Source already exists and cannot be deleted nor modified (control only on the pathways)
  - Some situations already managed as planned exposure situations
Characteristics of radon exposure (2)

- Similarities with other existing exposure situations
  - In particular with exposures in **contaminated territories** (ubiquity, variability, individual behaviour, self-help protective actions, many players, long-term strategies...)

- Many **challenges**
  - Public health dimension, lack of awareness, consistency with other policies, global risk versus highest exposures (equity), responsibilities, efficiency...
Recommended approach

- **Simple and realist**
  - No problem without solution
  - Same approach for smokers and non-smokers

- **Integrated**
  - All buildings whatever their occupants
  - Mainly a public health dimension

- **Graded**
  - According to responsibilities
  - Taking into account specific situations (underground, spas)

- **Ambitious**
  - Addressing both the highest exposures and the global risk
  - Not just below the RL
### Before (ICRP 65, 103, Statement)

#### Dwellings
- Existing exposure situation
- Public exposure

- **RL = 10 mSv/y**
- Derived **RL = 300 Bq/m³ or lower (7,000 h/y)**
- **ALARA**

(new and existing dwellings)

#### Workplaces
- **RL = 10 mSv/y**
- **Entry point = 1,000 Bq/m³ (2,000 h/y)**

- **Below 1,000 Bq/m³**:
  - Existing exposure situation
  - Public exposure
  - **ALARA**

- **Above 1,000 Bq/m³**:
  - Managed as a planned exp sit
  - Occupational exposure
  - Relevant requirements (+DL)
TG81 approach

All buildings
(dwellings, “common workplaces”, mixed-use buildings)

- Existing exposure situations
- Public exposure
- \( RL = 10 \text{ mSv/y} \)
- Derived \( RL = 100 \text{ to } 300 \text{ Bq/m}^3 \)
- ALARA (prevention + mitigation)
- Graded approach (action plan)
  - Specific for workplaces:
    1. Action on concentration
    2. Action on dose
    3. Occupational exposure

Specific workplaces
(mines, spas...)

- Managed as a planned exp sit
- Occupational exposure
- Relevant requirements

Qualitative criterion (national list)

Quantitative criterion (>10 mSv/y)
Application of the principles

• **Justification of protection strategies**
  - Decision by national authorities (high cause of exposure, solutions do exist, improvement of the indoor air quality)

• **Optimisation of protection**
  - RL + Derived RL + Action plan (prevention-mitigation) + graded approach

• **Application of the dose limits**
  - Not a requirement for occupational exposure but a principle applicable only in planned exposure situations
  - Already applied in some situations (U mines)
  - Flexibility at national level (e.g. when occupational expo)
National action plan

- **Prevention**
  - New buildings (building codes)
  - Coherence with energy saving programmes

- **Mitigation**
  - Existing buildings (reduction of exposure, many techniques)

- **Crescendo** of provisions
  - Information, measurements, remediation, support (technical, financial...)
  - Encourage self-help protective actions
  - Priorities (zoning...), more or less enforcement, more or less consequences of failure
Dose / Concentration

- **RL for existing exposure situations**
  - Typically in the band 1-20 mSv/y (ICRP 103)
  - 10 mSv/y for radon exposure (ICRP 65)
- **ICRP 65 (1993) and ICRP 103 (2007)**
  - Epidemiologic approach
  - 10 mSv/y \(\sim \) 600 Bq.m\(^{-3}\)
- **Statement (2009) and ICRP 115 (2010)**
  - Dosimetric approach (a decision of the MC)
  - Risk \(\sim\) doubled; Evidence of radon risk < 200 Bq.m\(^{-3}\)
  - 10 mSv/y \(\sim\) 300 Bq.m\(^{-3}\)
- **TG81**
  - New dose coefficients for Rn (C2)
  - Risk \(\times 2\) in mines; \(\times 4\) in common workplaces (300 Bq.m\(^{-3}\) \(\sim\) 18 mSv/y)
  - Keep 300 Bq.m\(^{-3}\) as the international upper born + WHO approach
  
  \[\Rightarrow\] Wait for C2 publication \(\Rightarrow\) Publication of TG81 report in 2014-15
Discussion (1)

• What means occupational exposure?
  • When radon exposure to workers can reasonably be regarded as being the responsibility of the operating management (Pub 103 § 178)

• What about workers not occupationally exposed?
  • Managed as members of the public (Pub 65 § 86)

• Entry point:
  • Ambiguity of the concept (action level? reference level?)
  • 1,000 Bq.m\(^{-3}\) is too high
Discussion (2)

- Application of dose limits (controversial issue)
  - In all workplaces? Cf. responsibility of employer + consistency of the protection at work
- But problems
  - With adventitious radon exposure (offices, shops, workshops...)
  - In mixed-use buildings (What dose limit? Public/Occupational?)
  - With added dose
  - With other sources of radiation
- Flexibility makes sense
- In any case the upper value of tolerable risk for occupational exposure should not be exceeded (100 mSv/5 years with a maximum of 50 mSv in a year)
Discussion (3)

- Planned vs Existing? Transition?
  - Never planned ES but can be managed like
  - Notably when occupational exposure
  - 2 criteria for occupational exposure (qual + quant)
  - Keep some flexibility

- Smokers / non-smokers:
  - Recommendations for a mixed population
  - Smoking status difficult to take into account managing either buildings and individuals (smokers, never-smokers, past-smokers, passive smokers)

- Building materials:
  - Should be dealt with upstream (TG 76 NORM)
Discussion (4)

• What if dose > 100 mSv?
  • 100 mSv/a is not a regulatory limit
  • Dialogue with stakeholders
  • Graded approach (convince better than enforce)

• Protection of children:
  • No specific recommendations

• Medical exposure to Rn
  • To be deleted (too controversial and not a matter for C4)

• Combination of exposure (as public + as worker)
  • Problem reduced by integrated approach (all buildings whatever their occupants)
Other points

- Exposure to thoron is not a problem

- Uranium mines: waiting for the dose conversion factors from the Committee 2

- Approach expected to be applicable in all existing exposure situations