



**ICRP Draft Report:
“Radiological Protection against Radon Exposure”**

EARST Workshop 2013

Bouillon (Belgium), 29 May 2013

Jean-François Lecomte
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)

Membership

J-François Lecomte (France) *Chair*

Thomas Jung (Germany)

Sergey Kiselev (Russia)

Christophe Murith (Switzerland)

Stephen Solomon (Australia)

Per Strand (Norway)

John Takala (Canada)

Weihai Zhuo (China)

Corresponding members:

Renate Czarwinski, Tony

Colgan (IAEA)

Augustin Janssens (EC)

Bill Long (USA)

Shengli Niu (ILO)

Ferid Schannoun (WHO)

Secretary

Céline Bataille (France)

Critical Reviewers: Senlin Liu (China) + Werner Zeller (Switzerland)

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

Qualitative criterion (national list)

Specific workplaces

(mines, spas...)

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

Quantitative criterion ($>10 \text{ mSv/y}$)

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 ~ 600 Bq.m⁻³
- Statement (2009) and ICRP 115 (2010)
 - Dosimetric approach (a decision of the MC)
 - Risk ~ doubled; Evidence of radon risk < 200 Bq.m⁻³
 - 10 mSv/y ~ 300 Bq.m⁻³
- TG81
 - New dose coefficients for Rn (C2)
 - Risk x 2 in mines; x 4 in common workplaces (300 Bq.m⁻³ ~ 18 mSv/y)
 - Keep 300 Bq.m⁻³ as the international upper bound + WHO approach

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**

ICRP

www.icrp.org



INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION