Application of the Commission's Recommendations to NORM

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Jean-François Lecomte
ICRP Committee 4

TG 76 on Protection against NORM Exposure

- Launched in 2010 (Peter Burn chair), membership updated in 2013 (J-François Lecomte new chair)
- To develop a report on the application of the Commissionôs recommendations (ICRP 103) on radiological protection against enhanced exposures from industrial processes using NORM
- To complete the series of reports on existing exposure situations (Pub. 111, TG 81, TG 83)
- Publication expected in late 2015

Wide range of industrial practices

- Mining and mineral processing industries
- Coal, oil and gas production
- Some of the metal production industries (thorium, niobium, zircon, titaniumé)
- Phosphate industry & Production of some building materials
- Water treatment
- Etc.
- Exposures may occur during **various stages** of production or from the use of products, residues and waste

Characteristics of NORM Exposure

- Related to **industrial processes**
- **Wide range** of practices
- Source is **natural** (already existing) but may be **modified**
- **Deliberate / unintended** concentration of radioactive material
- Large **variation** of activity concentrations
- Large **distribution** of individual exposures
- Large **populations** exposed to low doses
- Exposure of workers may be **adventitious** (not part of the job)

Challenges for NORM exposure situations

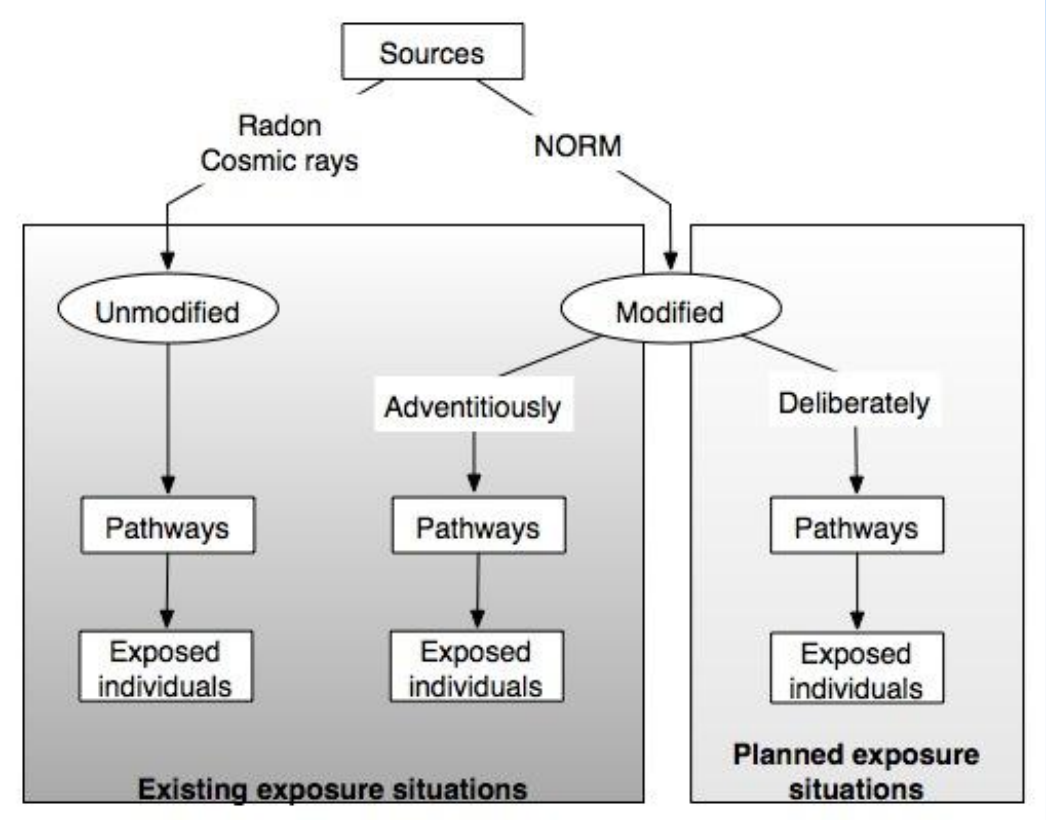
- Primary source **not or partially** controllable (concentration of ubiquitous natural activity in material from earthôs crust)
- Ubiquity, variability: **what is enhanced?**
- **Impossible to adopt a simple generic approach** for the safe management of all NORM industries
- Lack of **RP culture**
- Progress may **take time** in some cases

- Draft publication on radon exposure as a model

Types of exposure situations

- A priori **existing** exposure situations
  - Primary source not or partially controllable
  - NORM industry create or alter pathways modifying concentrations
  - Use of material with activity concentration significantly higher than natural background
  - Consequential and unintended concentration of NORM
- May be **planned** exposure situations
  - When existing source is removed and noticeably modified
  - Deliberate concentration of NORM
  - Modification of the source is controllable
- Do not seem to lead to **emergency** exposure situations

Exposure from Natural Sources



Categories of exposure

- **Occupational** exposure
  - Exposures of workers incurred at work as a result of situations that can reasonably be regarded of being the responsibility of the operating management
  - Both in planned and existing exposure situations

- **Public** exposure
  - Other exposures
  - Members of the public and workers not occupationally exposed (adventitious exposure in workplaces)

Justification

- Do more good than harm

- Justification of:
  - Industrial **processes**
  - **Reuse or recycling** of residues (building materials)
  - **Strategies** of protection

Optimization of the protection

- Prudence: **ALARA**
- NORM **management plan**
  - Identification of industrial activities
  - Development of appropriate strategies
  - Characterisation of the exposure situations
  - Who is exposed, where, when, how?
    - Identification of sources
    - Assessment of exposure and impact on environment
  - Responsibilities
  - Stakeholder involvement
  - Prevention, mitigation
  - Graded approach
  - Monitoring program

Dose restrictions

- **Equity** in the individual dose distributions
- **Reference level** (RL) and **Dose constraints** (DC)
  - Source related
  - In all types of situations
  - DC < 1 mSv/y for public exposure and < 20 mSv/y for occupational exposure
  - RL in the lower range of the band 1-20 mSv/y, maximum of the order of 10 mSv/y
  - **Derived RL** in activity concentration
- Application of the **Dose limits**
  - Individual related
  - In planned exposure situations
  - Occupational dose limit and public dose limit

Graded approach

- Strategy **commensurate** to risk and responsibilities
- **Ambition, realism, effectiveness**
- Degree of enforcement related to the ambition
- Consequence of exceeding the RL depending on situation
- Sometime not appropriate to start a process of optimization (**exemption**)
- **Stepped approach** where exposure is adventitious
  1. Action on concentration
  2. Action on dose
  3. Occupational exposure

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