



Application of the ICRP Recommendations

In Existing Exposure Situations Such as NORM Activities

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A set of Publications

- General Recommendations: ICRP 103 (2007)
+ Optimisation (ICRP 101 part 2, 2006)
- Long-term contaminated areas: ICRP 111 (2009)
- Radon exposure (on the web for public consultation till the 8th of June 2012)
- Cosmic exposure in aviation (in progress)
- NORM activities (in progress)

- A graded, pragmatic, flexible and ambitious approach
- Mainly based on the optimisation principle

ICRP 60 / ICRP 103

- End of the system practices/intervention
- Now: planned, emergency, existing exposure situations
- Existing exposure situation: already exists when a decision on control has to be taken, including natural background and residues from past-practices operated outside the system
- Optimisation below a dose restriction
- Reference level (no more action level nor intervention level)

ICRP 60: a two-speed system

Practices

Limit
(multi-sources **ceiling** level)

Constraints
(single-source **ceiling** level)

↓
Optimisation

Intervention

↓ **Optimisation**

Intervention
Level
(**floor** level)

- What happens below the intervention level?
- No further optimisation?

ICRP 103: common approach

Planned exposure situations

Dose limit

Dose constraint

Optimisation

Existing and Emergency exposure situations

Reference level

Optimisation

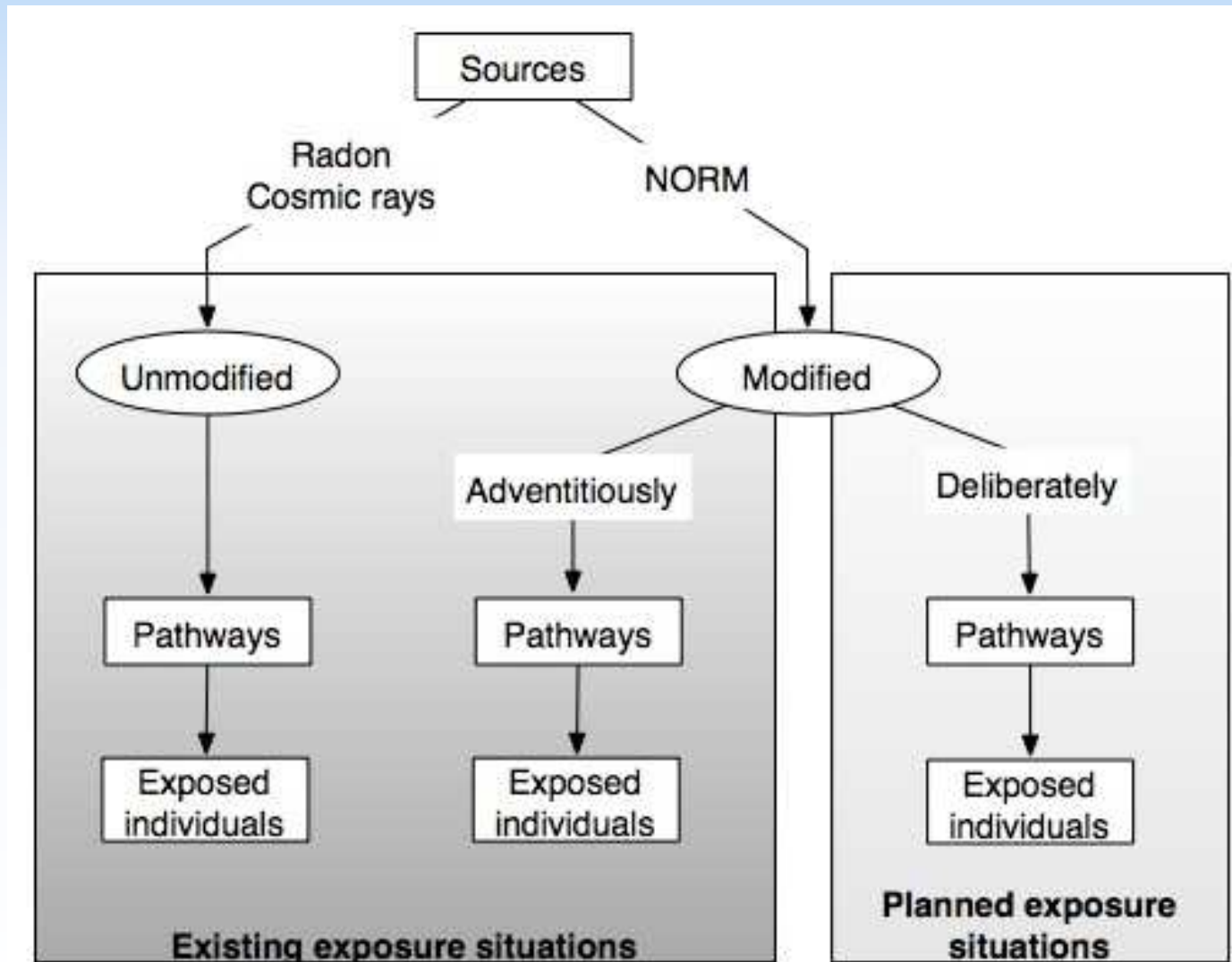
Characteristics of existing exp. sit.

- Ubiquity, variability
- Control mainly through the pathways (source already exists and not always easy to control)
- Large distribution of individual exposures
- Exposure of workers may be adventitious (not part of the job)
- Lack of awareness, lack of RP culture
- Risk reduction depending on personal behaviour (self-help protective actions)
- Long-term perspective

NORM / Types of exposure sit.

- NORM = existing exposure situations
 - Primary source = concentration of ubiquitous natural activity in material from the earth's crust
 - Human activities may create or alter pathways modifying concentrations
 - Pathways can be controlled by preventive or corrective actions
- NORM can be managed as planned exposure sit.
 - When the existing source is removed and noticeably modified to be used as a radiation source
- Same approach (optimisation below a dose restriction)

Exposure to natural radiation



Categories of exposure

- Occupational exposure
 - Incurred at work as a result of situations that can reasonably be regarded as being the responsibility of the operating management (ICRP 103 § 178)
 - Workers not occupationally exposed treated in the same way as members of the public (ICRP 65 § 86)
 - Health and safety remain under the responsibility of the employer
- Medical exposure
 - Not relevant (natural radionuclides no longer used in medicine)

Justification of protection strategies

- Any decision that alters the radiation exposure situation should do more good than harm
- Decision on control of NORM activities by action modifying pathways or acting directly on the source deemed to be justified
- Special attention for the reuse or recycling of residues (e.g. in building materials)

Optimisation below a dose restriction

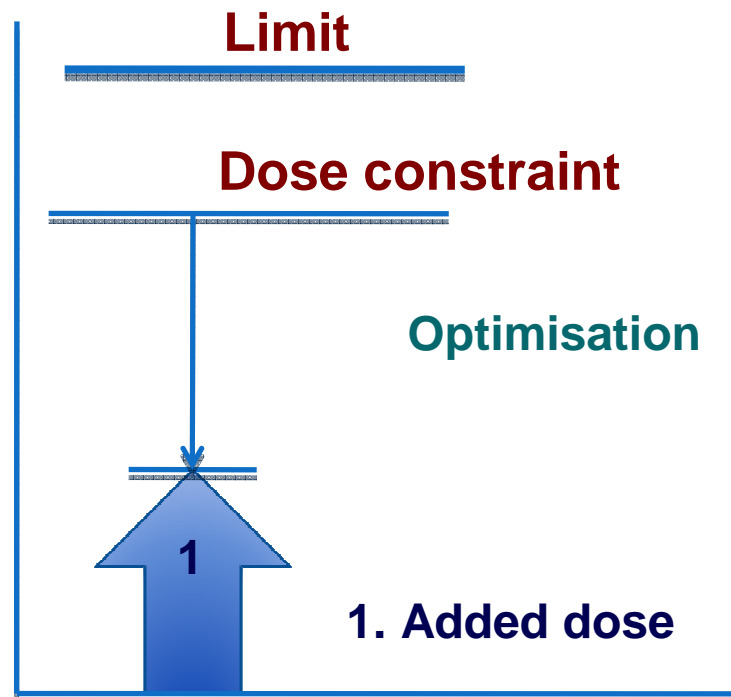
- Reference level (existing) or dose constraint (planned)
- Not to exceed or to remain at these levels; reduce doses ALARA below these levels
- ± 10 mSv/y for existing exposure situations (middle of the band 1-20 mSv/y)
- < 1 mSv/y in case of managed as planned expo sit.

Optimisation process

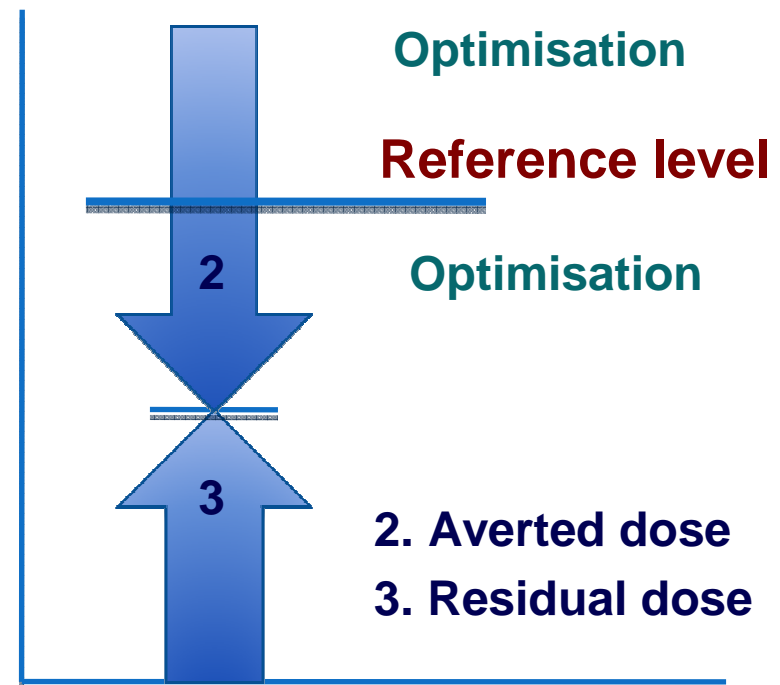
- Selection of the best option under the prevailing circumstances
- Prevention aimed at maintaining exposure ALARA
- Mitigation aimed at reducing exposure ALARA
- Relevant protection strategies
- Involvement of stakeholders

Optimisation / Situations

Planned exposure situations



Emergency and existing exposure situations



Graded approach

- Appropriate and adapted strategies
- Ambition and realism + Effectiveness
- Degree of enforcement related to the ambition
- Legal responsibilities = mandatory provisions, commensurate with the degree and the type of the responsibilities
- Consequence of exceeding the RL also dependant on the situation
- Action may not be warranted
 - Exclusion: not amenable to control
 - Exemption: control unwarranted (disproportionate)

Example of Radon exposure

- A unique dose reference level $\pm 10 \text{ mSv/a}$
- Upper value of RL for dwellings: **300 Bq.m⁻³** (although $> 10 \text{ mSv/a}$)
- Idem for mixed-use buildings and “ordinary” workplaces
- **Graded approach** according to responsibilities (landlord, seller...)
- Specific graded approach for **workplaces**
 - 1st step = idem than dwellings
 - 2nd step = realism $< 10 \text{ mSv/a}$
 - 3rd step : if $> 10 \text{ mSv}$ **or** when national positive list of radon prone work activities (underground, spas...) = occupational exposure (quantitative + qualitative criteria)
- Similar approach (quantitative + qualitative criteria) will be proposed for NORM activities by ICRP

Application of dose limits

- Individual-related principle applicable to planned exposure situations, not a requirement for public/occupational exposure
- Should apply in NORM exposure situations considered or managed as planned exposure situations

ICRP

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