

ICRP and NORM exposure: a report in preparation

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ICRP-C4

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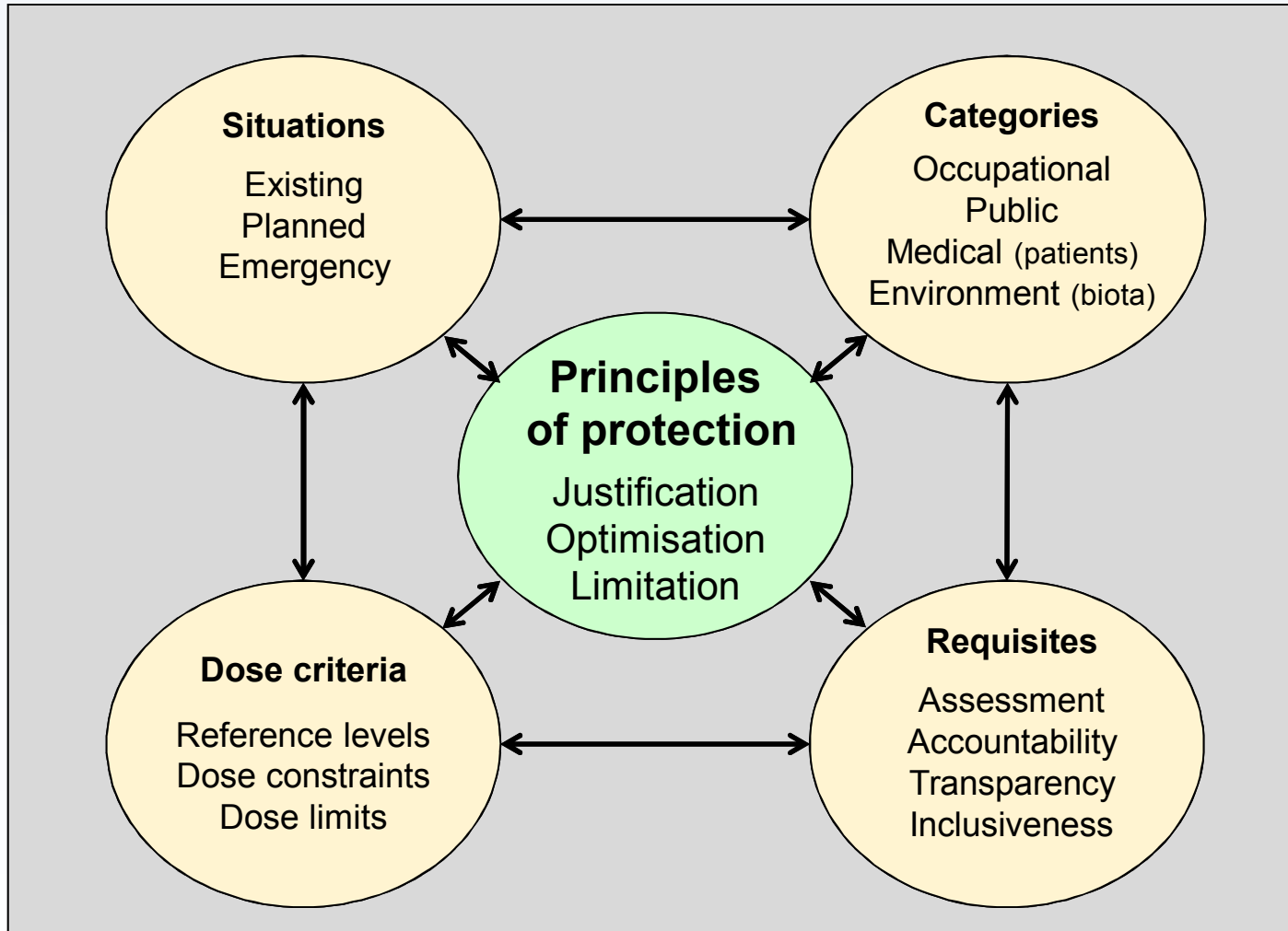
TG 76 on Protection against NORM Exposure

- Launched in 2007 (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 in 2017

TG 76 Membership

- **Members:**
 - Jean-Francois Lecomte – chair (France)
 - Dejanira da Costa Lauria (Brazil)
 - Philip Egidi (USA)
 - Astrid Liland (Norway)
 - Fu-dong Liu (China)
 - Mika Markannen (Finland)
 - Peter Shaw (UK)
- **Corresponding members:**
 - Stefan Mundigl (EC)
 - Haridasan Pappinisseri-Puthanveedu, replaced by Halil-Burçin Hokyar (IAEA)
- **C4 critical reviewers:**
 - Analia Canoba (Argentina)
 - Thiagan Pather (South Africa)
- **MC critical reviewers:**
 - Carl-Magnus Larsson (Australia)
 - Sergey Romanov (Russia)

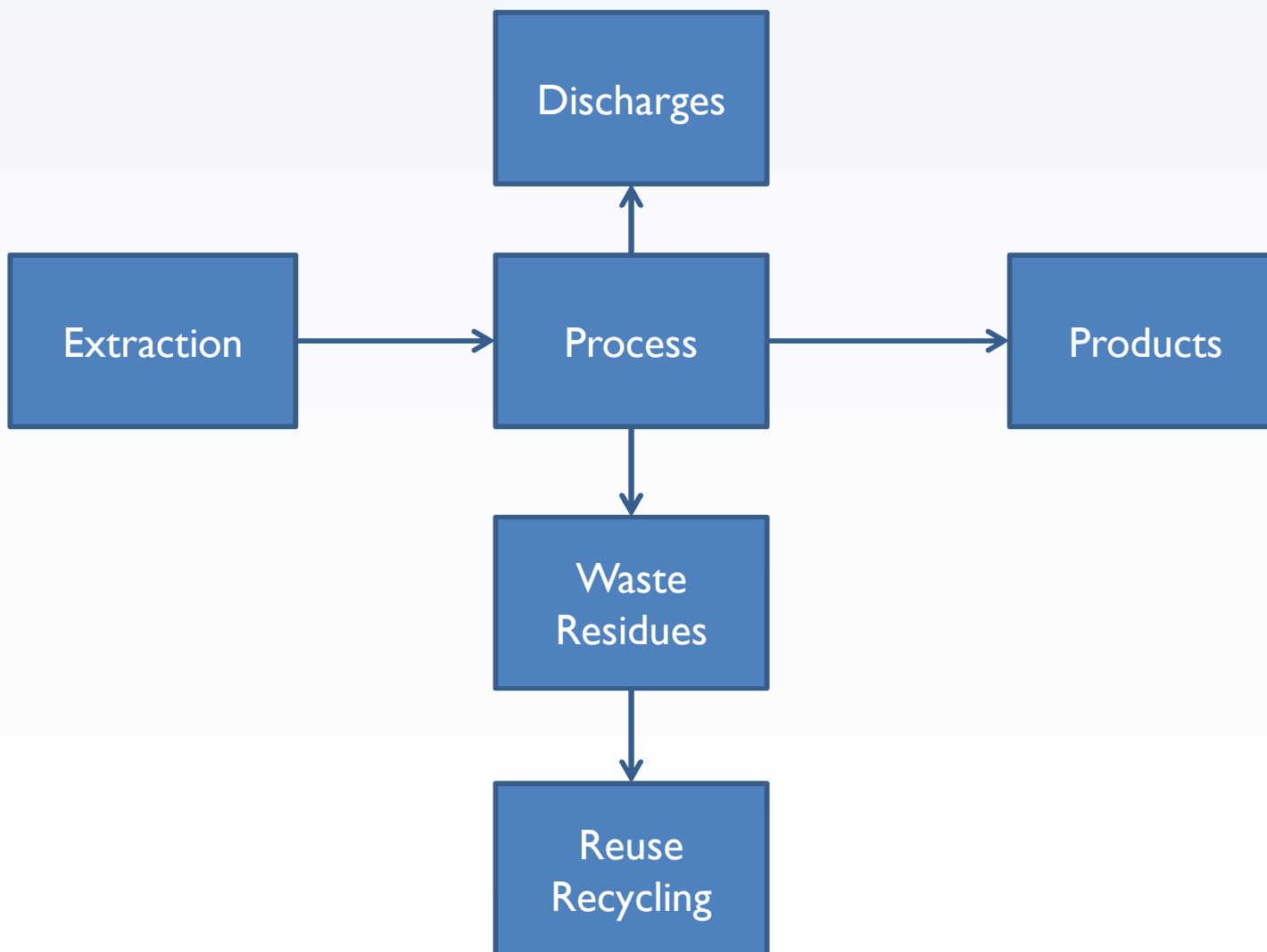
The ICRP System of Protection



NORM in the ICRP system of RP (1)

- NORM are **existing exposure situations** (ES), because the source is not deliberately introduced, it already exists when a decision on control is taken; concentration and dissemination of radionuclides are incidental
- Given the situation, some **control is needed** and should be provided; the level of protection should be **commensurate with the risk**
- A NORM activity **is a planned ES** when the materials are used for their **radioactive properties**
- NORM present **no real prospect of radiological emergency**
- Whatever the ES, ICRP recommends a common approach (although nuances): **optimisation under dose restriction**

NORM cycle



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 to keep doses, number of people exposed and likelihood of incurring exposures ALARA
- RL (or DC) 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 (or DC)

- Selected in one of the **3 following bands** as relevant:
 - $<1\text{mSv/y}$
 - From 1 mSv/y to a few mSv/y
 - From a few mSv/y to 20 mSv/y
- 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)**
- **1 more related to the control of **individuals** (personally)**
- **With a **graded implementation** according to the risk and the context**

Protection of workers: 1st series of requisites

- **Characterisation** of the situation (who is exposed, when, where, how): Sources (materials), pathways, exposed individuals, dose distribution, releases, evolution; \pm detailed, realistic, taking account of existing precautions (for other than radiation)
- Suitable **RP expertise** (internal or external)
- **Initial actions** to prevent or reduce the hazard (e.g. alternatives, change of the process...)
- **Demarcation of areas** (+ signing using or not RP symbols)
- **Engineered control** (to restrict chronic exposure: design and layout of facility, retrieval and containment of materials, ventilation system...)
- **Working procedures** (to restrict time of exposure)

Protection of workers: 2nd series of requisites

- **Instruction and training:** proportionate to the risks and the involvement of worker in their management; not necessarily related to the level of the RL
- **PPE** (as relevant, related to radiation risk)
- **Dose assessment:** in perspective of optimisation
 - Method depending on radionuclides & pathways
 - Workplace/individual monitoring
 - Realistic assumptions
 - 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

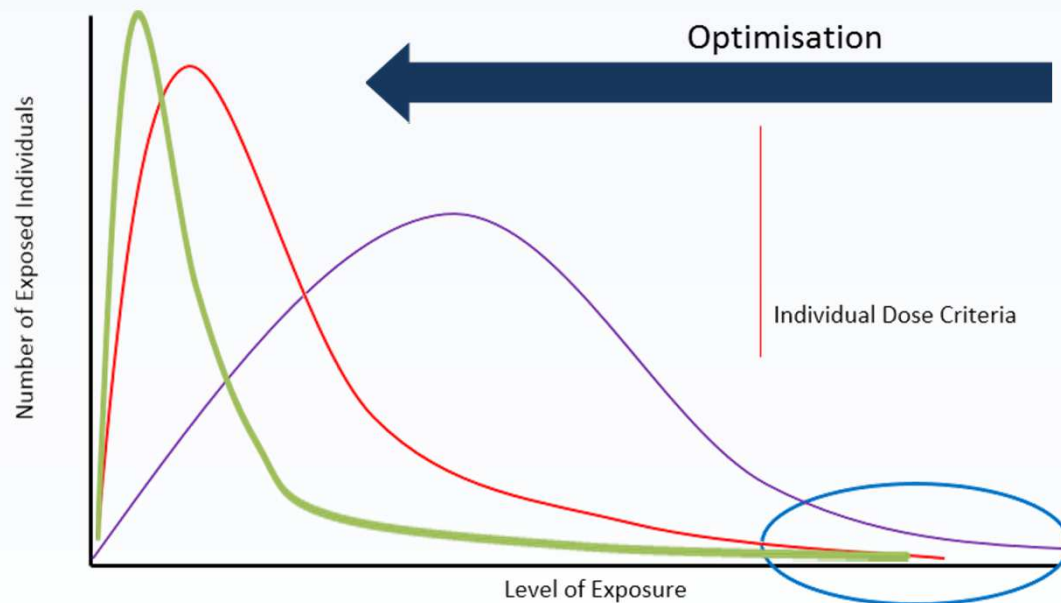
- **Discharges:** Both liquid & gaseous; radioactive or not
- **Waste:** Solid materials with no use planned; radioactive and not; large volume/low concentration + small volumes/high concentration; to be addressed from generation to disposal (if possible)
- **Residues:** Recycled and reused, with economic & 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)
- **Building materials:** Radionuclides from raw materials or NORM residues
- **Legacy sites:** NORM at the origin of many legacy sites; an issue for TG98

Protection of the environment

- **May be an issue** with NORM
- Dealt with **together** with protection of public
- Not only protection of **biota**
- But also protection of the **overall quality** of the environment
- No prospect for emergency but **accidental release** of large volume of NORM can result in **environmental damage**
- In existing ES, protection of public and environment may require **remediation and durable institutional control**

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)

