Environmental recovery after a nuclear accident: what are the risks and what do we protect?

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27-28 October 2022, hosted by IRSN in Fontenay-aux-Roses, France
Outline

• Acknowledgement
• Impact thresholds and real-life experience – FDNPP
• Issues for post-accident recovery - is there concern?
• Towards ‘holistic’ environmental RP
• PLANNING (exposure situations)
• Implications for post-accident recovery
Environmental Protection in ICRP

Other relevant publications
Pub 122 Geological Disposal
Pub 138 Ethics
Pub 142 NORM
Pub 146 Large accident

Ongoing work
TG 97 Near-surface disposal
TG 98 Remediation
TG 99 Consolidation of DCRLs, etc.
TG 105 ERP Application
TG 110 RP in vet medicine (approved for publication)
TG 114 Reasonableness and Tolerability
TG 124 Justification (NEW)
TG 125 Ecosystem services (NEW)
The ICRP system (environmental RP)

Core elements (*Publication 108*)

Provides (generic) protection targets:
*Maintain biological diversity, Conservation of species, Protect health and status of Natural habitats, Communities, Ecosystems*

Introduces a set of 12 *Reference Animals and Plants (RAP)* and related *Derived Consideration Reference Levels (DCRL)*

The DCRLs define dose rate bands for RAPs where deleterious effects could occur
Application in exposure situations

Planned

DCRL for relevant RAP
Reference point for the sum of all sources

Existing

Potential for dose rate reduction
Minimum level of ambition
DCRL for relevant RAP

Emergency

Order of magnitude bands of dose rate
Severe Effects Level
Dose rate to relevant biota
Time after event

ICRP Publication 124

Scan with phone camera for link to P124 →
DCRLs in practice – FDNPP case

- Chromosome abnormality (Kawagoshi et al., 2017)
- Morphological abnormalities (Yoschenko et al., 2016)
- No genetic damage but lower survival and reproduction, fledging rate (Bonisoli-Alquati et al., 2015)
- No impact observed (Giraudeau et al., 2019)
Issues for post-accident recovery

- Is there concern for the environment?
- Improved risk assessments
- Holistic definition of ‘environment’ and environmental protection
- Include environment in planning - for all exposure situations
A ‘holistic’ approach

Review of the 2007 Recommendations (*Publication 103*) commenced

Clement et al. 2021, Keeping the ICRP recommendations fit for purpose, *Journal of Radiological Protection, Volume 41, Number 4*:

- “…ICRP largely took the existing approaches to conservation of species as its point of departure, with focus on organisms in the natural environment.”
- “…may not be sufficient when considering ecosystems that are created and managed by people for the purposes of delivering goods, services and cultural value for human populations.”
A ‘holistic’ approach

Environmental radiation protection refers broadly to the protection of both natural and managed environments, prioritizing but not limited to non-human life, from the detrimental effects of ionizing radiation exposure in support of conservation, ecosystem services, sustainable development, and the overall well-being of humanity.
A ‘holistic’ approach

17 interlinked global Sustainable Development Goals (SDGs) designed to be a "blueprint to achieve a better and more sustainable future for all".

Ecosystem services provide us with economic, environmental, social, cultural and spiritual benefits that enrich our lives and underpin our economy. (Environment Agency of England & Wales)
PLANNING for exposure situations

New or planned source/activity → Planned exposure situation including all necessary actions for RP of people and environment → Existing exp. situation

Existing source/activity

Existing exp. situation

Emergency exp. situation
Elements to consider

Planning for post-accident (environmental) recovery

• understanding ‘the prevailing circumstances’
• what is tolerable and reasonable with regard to recovery targets and considering ecosystem services
• responsibilities
• coordination
• communication
• consultation
A defensible outcome

understanding the context

justified and ethically sound controls reasonable (a graded approach) life-cycle risk tolerable

no? activity not acceptable

regulatory licence social licence

activity acceptable
Thank you!

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