The Review of the ICRP System of Protection and The Impacts for Uranium Mining and NORM

Jim Hondros ARPS 2023

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Disclaimer

- Presentation based on...
- Do not represent or speak on behalf of ICRP
- ICRP recommendations form the basis of work for all practitioners
- Need to consider the ICRP changes from the perspective of the practitioner

Update on the ICRP Review and Revision of the System of Radiological Protection

25th April 2023 Dr Pete Bryant

ICRP Task Group 120 Member



International Commission on Radiological Protection Registered with the Charity Commission for England and Wales (#1166304)

Content

- Overview of the System of Protection
- The ICRP review
- Timeframes
- Potential impacts on resources industry
- Closing comments

Components of the System of Protection



The ICRP

- An independent, non-governmental organisation registered as a charity
- Interface between science and policy for almost a century
- High level of expertise
- Largely voluntary work of its members from across the world,
- Establishes recommendations for protection against the harmful effects of ionising radiation to humans and the environment
- Recommendations form the basis of standards, regulations, legislation, and the practice of radiological protection worldwide.

https://icrp.org/publication.asp?id=ICRP%20Publication%20103%20(Users%20Edition)

Who Is The ICRP ?





- University/Research
- Regulators
- IRSN
- Operators Medical
- Operators Other
- ICRP Administration / Mentees

Unknown

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Maturing the System of Protection

- The first general recommendations were produced in 1928 (ICR 1929).
- Subsequent intermediate updates in 1931, 1934, 1937, 1950, 1954, and 1956,
- 1959 ICRP 1
- 1964 ICRP 6
- 1966 ICRP 9
- 1977 ICRP 26
- 1991 ICRP 60
- 2007 ICRP 103
- 2020 -> the current review...

The Current Review

- ICRP has initiated a review and revision of the System of Radiological Protection, for new General Recommendations to supersede the 2007 Recommendations
- This will be the foundation of RP standards, regulations, guidance, and practice world-wide for the next generation
- ICRP recognizes that input, cooperation and collaboration is essential, across borders and generations
- Involvement of all sectors affected, and practitioners is important

Conduct of the Review

- Establish the "building blocks" of the review (occurred over the last few years)
- Initial views from ICRP Liaison Organizations
- Discussion papers
- 'Research Priorities' paper outlining research needs
- Major feedback events 'Future of RP Workshop' & ICRP 2021+1 & ICRP2023
- Many additional presentations/workshops
- Identification of topics and research areas
- Establishment of task groups to develop recommendations on the topics
- Intent is extensive consultation opportunities

The Timeframe for the Review

- Current -> ICRP 2007 General Recommendations (ICRP 103)
- Now to ~2028 -> Review occurs
- Early 2030's -> Next General Recommendations published
- Mid/Late 2030's -> Reflected in international standards, etc.
 - Late 2030's -> Reflected in national regulations, etc.
- 2050 or 2060 -> Next Review of Recommendations ???

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- Should the industry worry ?
- Does it matter given the timeframes ?
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• Before answering – some additional details

Initial Overarching Considerations (2021)

- Ethical aspects of radiological protection
- Communications and stakeholder involvement
- Education and training
- Dose quantities
- Effective dose, including age-, sex-, and individual-specific doses
- Use of effective dose in medicine
- Effective dose coefficients
- Dose quantities for non-human biota and ecosystems
- Classification of radiation-induced effects
- Tissue reactions
- Cancer at low doses and dose rates
- Individual response of people
- Heritable effects
- Radiation weighting for different effects
- Radiation detriment
- Effects and risks in non-human biota and ecosystems

OPEN ACCESS

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Journal of Radiological Protection

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Memorandum

Keeping the ICRP recommendations fit for purpose

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ICRP Task Groups – Currently 31 Task Groups

- TG36 Radiopharmaceutical Doses
- TG91 Low-dose and Low-dose Rate Exposure
- TG95 Internal Dose Coefficients
- TG96 Computational Phantoms and Radiation Transport
- TG97 Surface and Near Surface Disposal
- TG98 Contaminated Sites
- TG99 Reference Animals and Plants Monographs
- TG103 Mesh-type Computational Phantoms
- TG105 The Environment in the System of RP
- TG106 Mobile High Activity Sources
- TG108 Optimisation in Medical Imaging
- TG109 Ethics in RP in Medicine
- TG110 Veterinary Practice (P153 in press)
- TG111 Individual Response to Radiation
- TG112 Emergency Dosimetry
- TG113 Dose Coefficients for X-ray Imaging

- TG114 Reasonableness and Tolerability **Risk and Dose for Astronauts** TG115 TG116 Imaging for Radiotherapy TG117 PET and PET/CT TG118 RBE, Q, and $W_{\rm R}$ Diseases of the Circulatory System TG119 **Radiation Emergencies and Malicious Events** TG120 TG121 Offspring and Next Generations Detriment Calculation for Cancer TG122 Classification Radiation-induced Effects TG123 TG124 The Principle of Justification TG125 **Ecosystem Services** TG126 Human Biomedical Research **Exposure Situations and Categories** TG127
 - TG128 Individualisation and Stratification in RP

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18 Potential New Topics Identified

May initiate this term (ca 2023/2024)

- Dose limits / protection of the individual
- Non-cancer effects beyond cardiovascular
- Sources and impacts of uncertainties
- RP in space

May initiate early next term (ca 2025/26)

- Primary aim, human & environment objectives
- The principle of optimisation of protection
- Protection of other non-human biota
- Integration of RP of the environment
- Practical implications of ethics in RP
- Revised detriment & its application

- Dosimetry system consolidation
- Justification in medicine
- Justification and optimisation for the fetus, premature infant & neonate

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- RP in medicine (new P105)
- Education and training
- Communication
- Compendium of dose coefficients
- Dose/risk coefficients for molecular radiotherapy

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Industry Challenges

- Practical involvement in parallel with academic involvement
- Terminology
- Applicability of the system in countries new to resources
- Managing the complexity of the "system"
- Radiation risk messaging
- Views of the public
- Future proofing new mines and facilities
- Many different task groups and targeted industry input
- Inclusivity of the consultation
- Ensuring that any changes can be practically implemented

The Timeframe for a Resource Operation



Chemicals & Resources > Mining, Metals & Minerals

Average lead times for mineral resources worldwide from discovery to production between 2010 and 2019

(in years)

Phase	Years
Discovery, exploration to feasibility	12.5
Construction planning	2
Construction to operations	2.5
Project Approvals	3+
Total	~20

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- Ignoring is an industry risk

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- Involvement in ICRP Task Groups
- Contributing to ARPS Task Group
- Development of thoughts and solutions
- Practical examples

Summary

- 10-year review period
- Implementation in late 2030's
- Will be in place for a generation
- Responsibilities:
 - Keeping radiation hazards/risks in perspective
 - No increase in fear of radiation
 - Any changes result in improved safety
 - Any changes are not unnecessary constraints
- Complexity -> simplicity -> practicality

Thanks for your time

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