



**Radiation Safety
Institute of Canada**
Institut de radioprotection du Canada

Bridging Frameworks: The International System of Radiological Protection and the Hierarchy of Controls

With Guest: Kelly Fernandes, M.Sc., CIH, WSPS

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Land Acknowledgement





Webinar Functionality

Audio and video

- During the presentation, from the presenters only
- Captions: More>Language and speech>Turn on live captions

Use the Chat feature to talk to discuss with everyone

Use Q&A feature to ask questions for Q&A portion

Posted on webinar page

- Video, answers to questions, copy of the slides

Follow up email will be sent

- Topics covered, time of attendance



Introduction

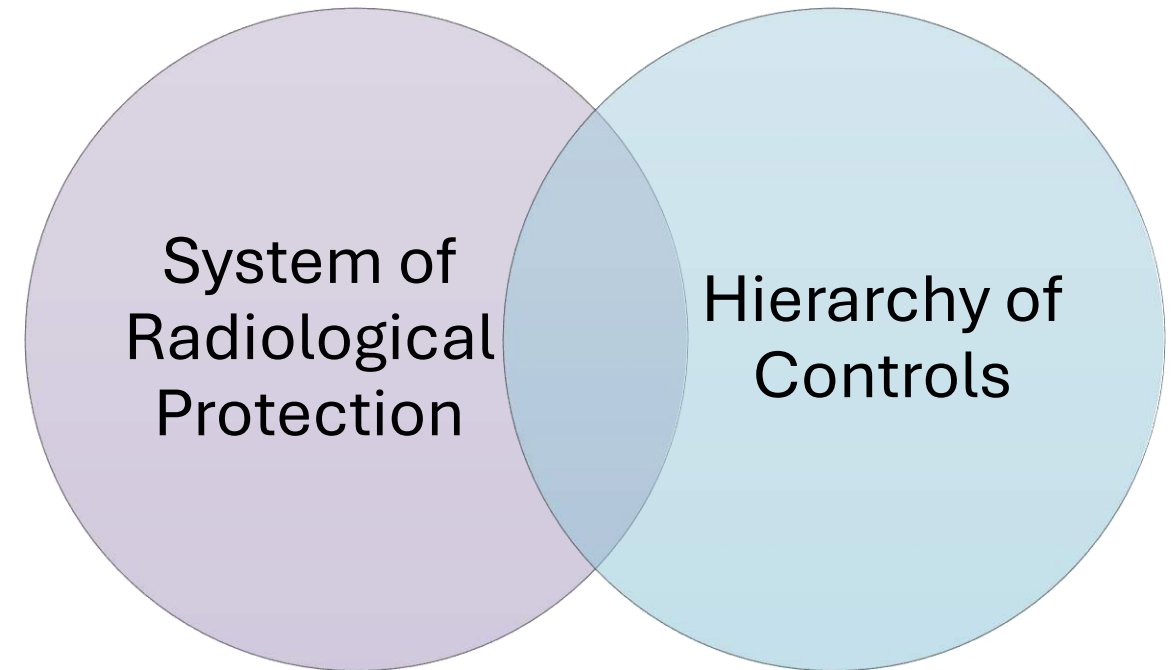
Schema

System of Radiological Protection

Hierarchy of Controls

Comparison

Q&A





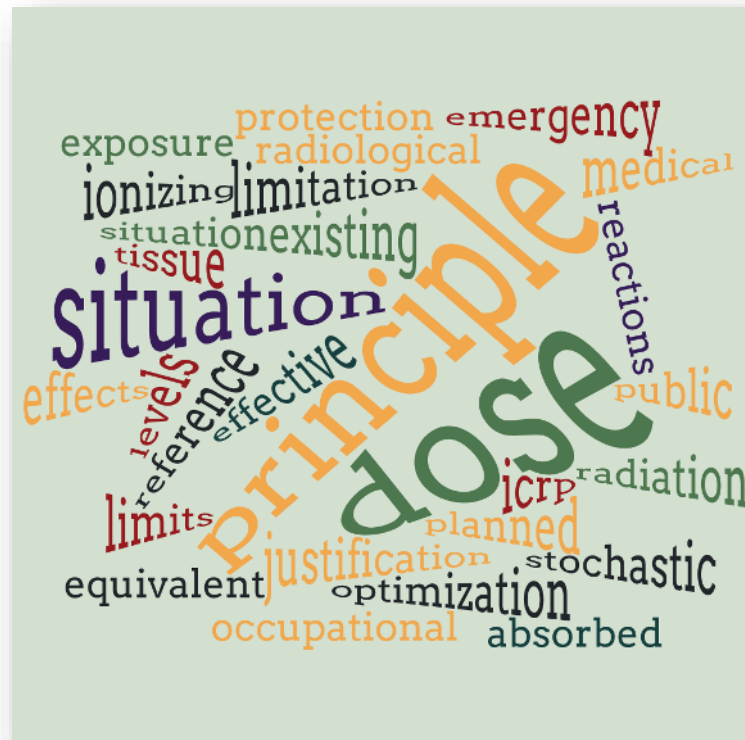
Schema

Bartlett (1932)	Long-term knowledge structures which people use to interpret and make predictions about the world around them
Rutherford and Wilson (2004)	A procedural data structure in memory
Holland et al. (1986)	Inflexible knowledge structures stored in long-term memory provide “predictive knowledge for highly regular and routine situations”
Brewer (1987)	Precompiled generic knowledge structures

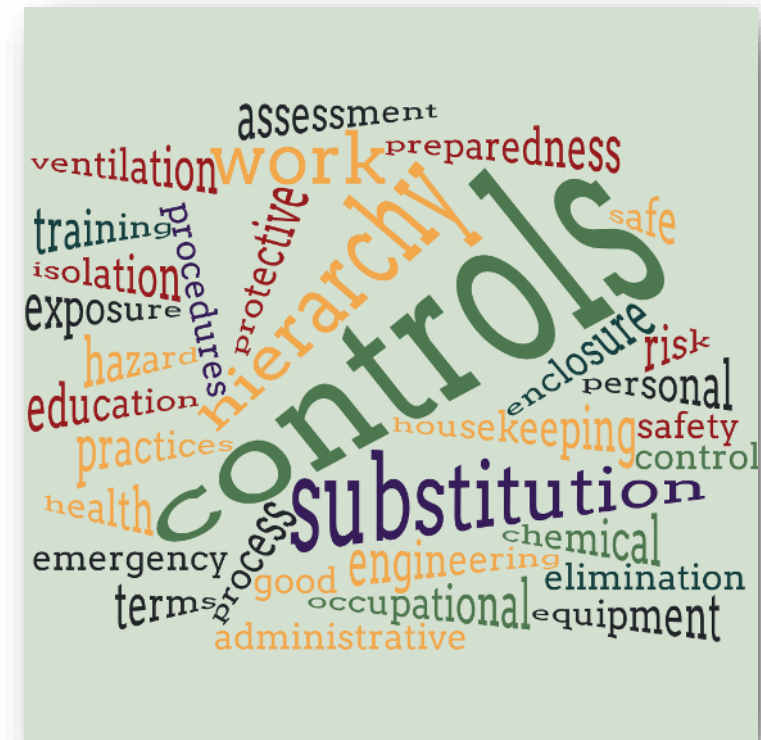


Safety Frameworks

System of Radiological Protection

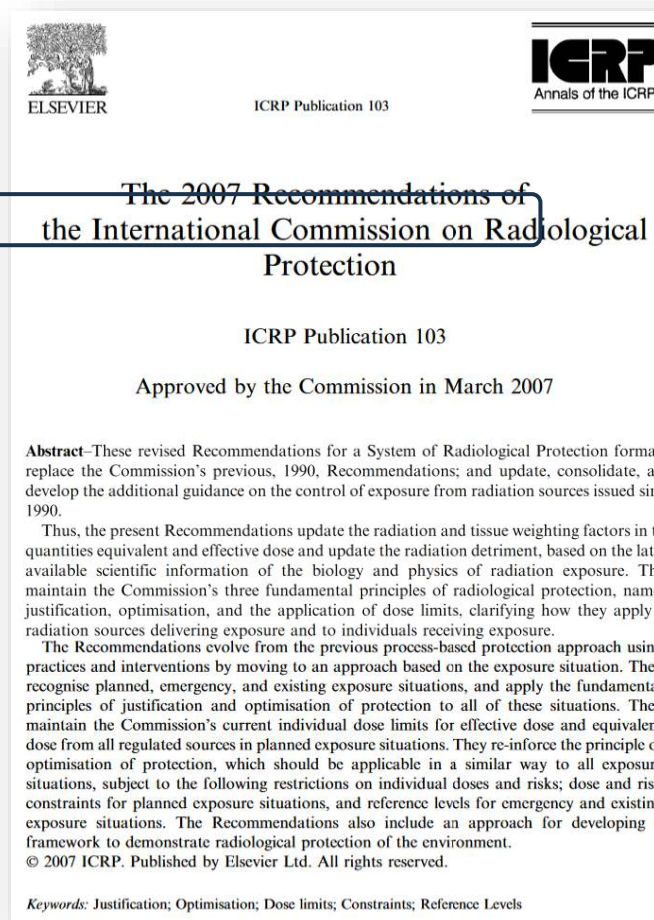
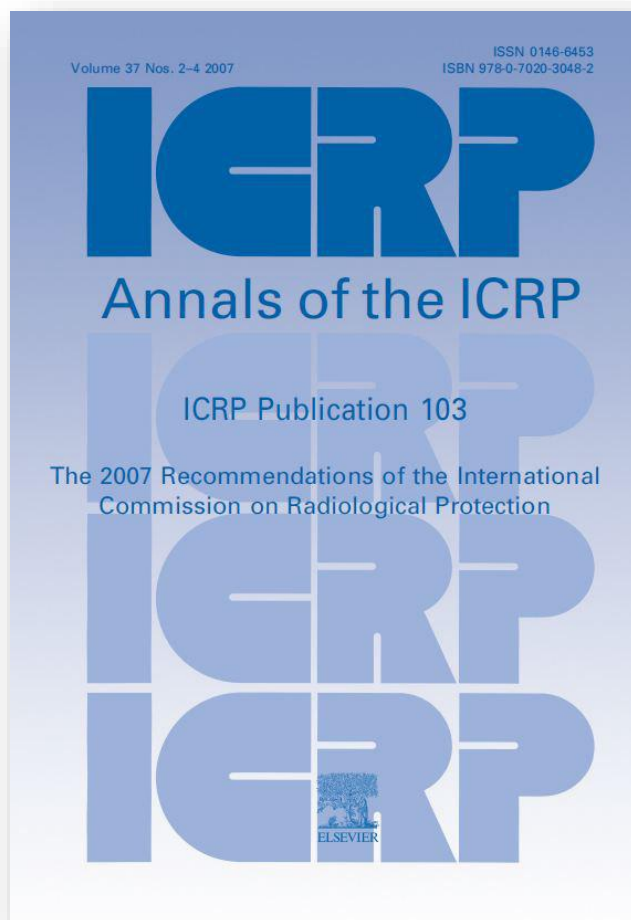


Hierarchy of Controls





System of Radiological Protection





Principles of Radiological Protection



Justification

- Any decision that alters the radiation exposure situation should do more good than harm.



Limitation

- The total dose to any individual from regulated sources in planned exposure situations other than medical exposure of patients should not exceed the appropriate limits specified by the Commission.

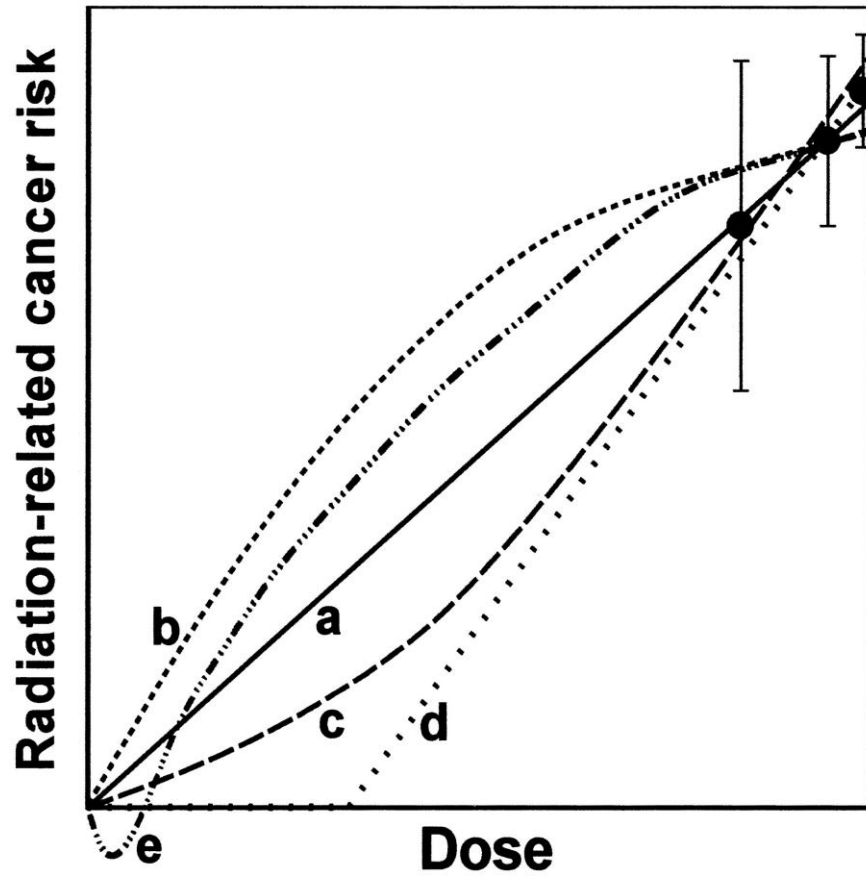


Optimization

- The likelihood of incurring exposure, the number of people exposed, and the magnitude of their individual doses should all be kept **as low as reasonably achievable**, taking into account economic and societal factors.



Linear Non-Threshold



Theoretical model

Not known what happens at low doses

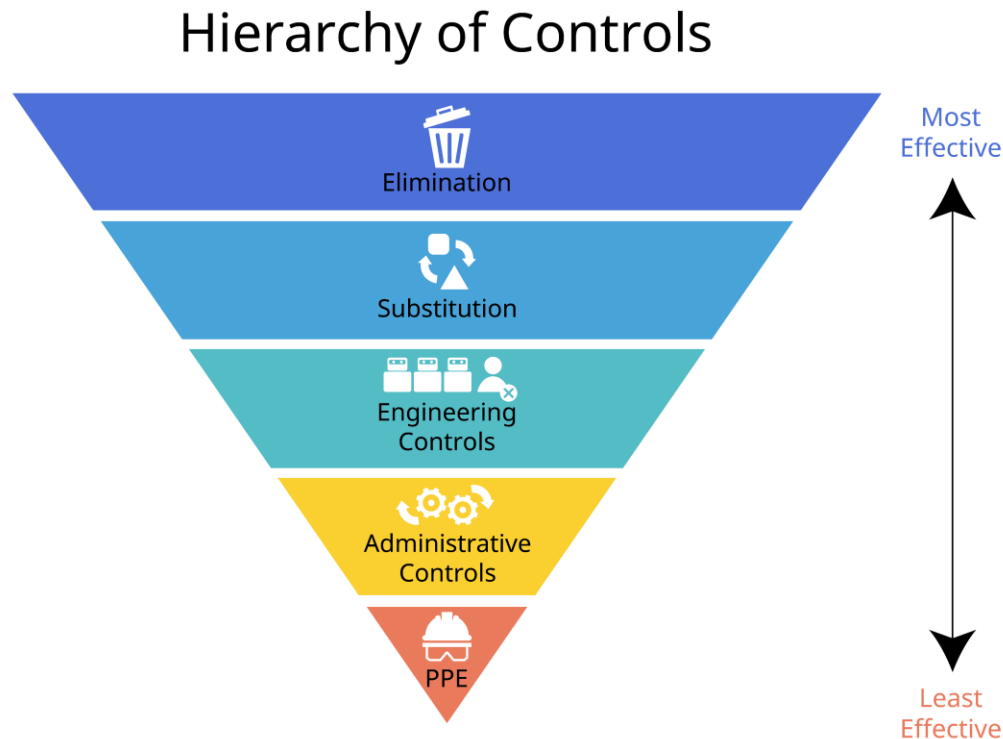
Assumes that linear risk from high doses can be extrapolated back to zero

No threshold

Little dose = small increase in risk



Hierarchy of Controls



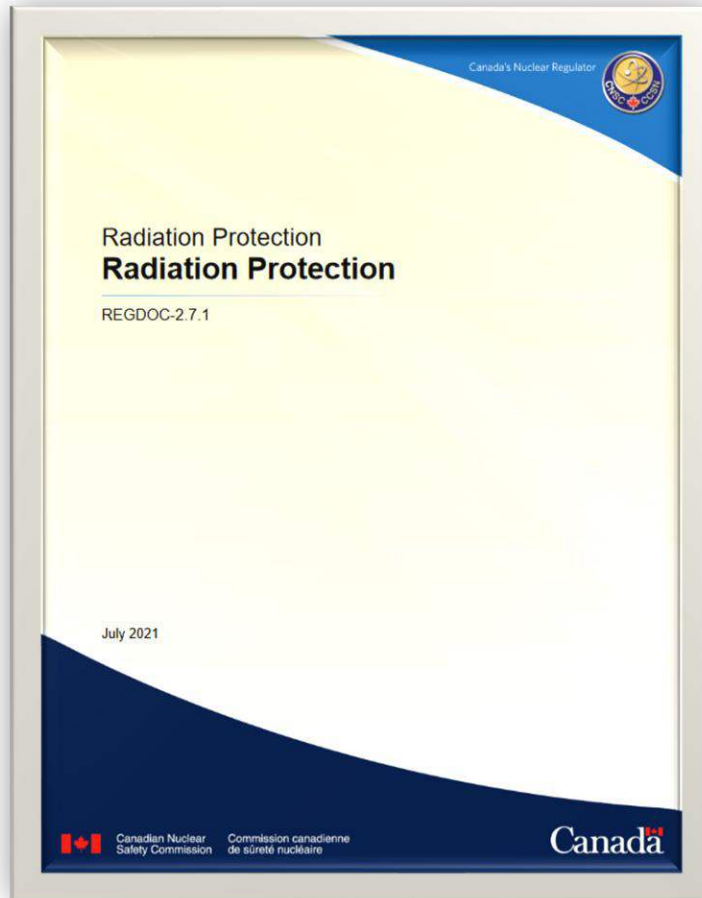
- Identifying and ranking of hazards
- Lower assumed burden on workers at the top; increases as you go down
- Reduce risk of illness and/or injury
- Prevention by design

https://www.ccohs.ca/oshanswers/hsprograms/hazard/hierarchy_controls.html



REGDOC 2.7.1

- Radiation Protection
- Section 4 on ALARA

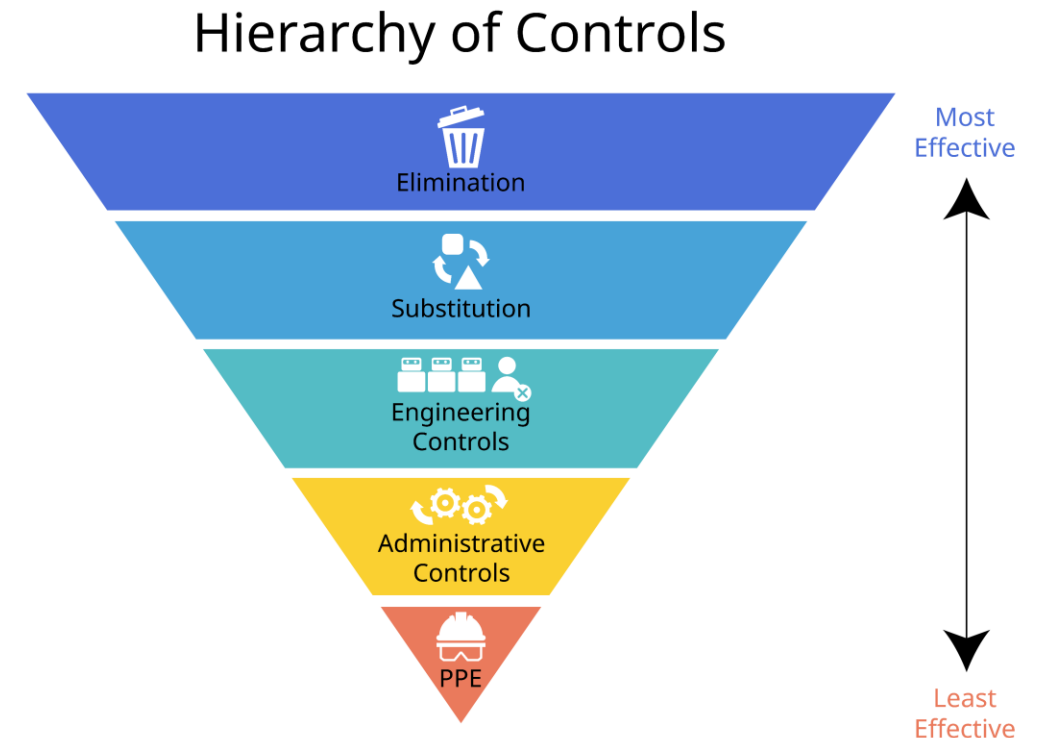


<https://www.cnscccsn.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc2-7-1/>



Control of Exposures

- Preferred methods:
 - Elimination
 - Reduction
- If not possible:
 - Engineering controls
- If impractical or inadequate
 - Administrative controls
- PPE should be provided when engineering and administrative controls are not sufficient





Overlap

Hierarchy of Controls	System of Radiological Protection
Elimination	If a nuclear source is used, the risk will be there. For some applications, there are no alternatives. If alternative is found, then the System of Radiological Protection does not apply.
Substitution	There are examples of substitution: ultrasounds instead of x-ray for pregnant women. Radar or ultrasound density gauges when they can be fit inside a vessel. Again, not always possible.



Overlap Continued

Hierarchy of Controls	System of Radiological Protection
Engineering Controls	Frequently used. “Properly designed workplace as well as appropriate personnel safety, radiation monitoring and emergency response equipment”
Administrative Controls	Frequently used. “Work procedures such as written safety policies, work authorizations (such as radiation work permits) and restrictions, access controls to areas with the potential for radiological hazards, and training”
PPE	Preference for higher level control actions. For example, air exchanges in preference to respirators. “Consideration should be made to determine if the benefit afforded by the PPE is outweighed by the consequence of wearing the equipment. All radiological hazard types, as well as conventional hazards, should be considered when selecting PPE.”

Quotes from <https://www.cnscccsn.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc2-7-1/>



Unique

Hierarchy of Controls	System of Radiological Protection
Protection of workers	Protection for all people and the environment
Applies to any hazard	Specific to Radiological Protection
Many hazards are not dose-related	Focus on doses
If dose-related, often keeping below TLV is appropriate	Driven by the ALARA principle
Can be part of a broad OHS Program, with individual components such as training broken out by specific hazard.	Requirement for training, internal reviews, record-keeping is part of overall Radiation Protection Program. Again, singular focus.



Thoughts

- Radioactive sources are everywhere
- OHS/IH have many great systems to protect workers
- RP and OHS/IH have these parallel, overlapping systems
- Value in breaking down silos, look for common language, share schema





Interview

- During the interview, feel free to post questions in the Q&A.





Questions?

- As time permits, we will address questions posted in the Q&A
- Questions we do not get to
 - Answers will be posted to our website and a link to resources emailed out





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Thank you for listening!

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WSPS

- Workplace Safety & Prevention Services:
 - <https://www.wsps.ca/>
 - For Ontario workplaces



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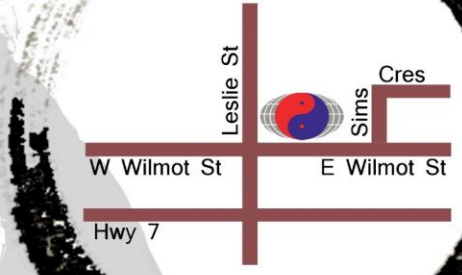
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