Radiation Safety Institute of Canada
Institut de radioprotection du Canada

Radiation Safety & Wellness Webinars

April 13, 2022

Global Systems of Radiation Protection

Addressing the radiation safety concerns raised by the war in Ukraine

With Guest Mike Haynes, Health Physicist

Followed by Mandel Fraser from PowerYoga West

Good Science in Plain Language®

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Webinar Functionality

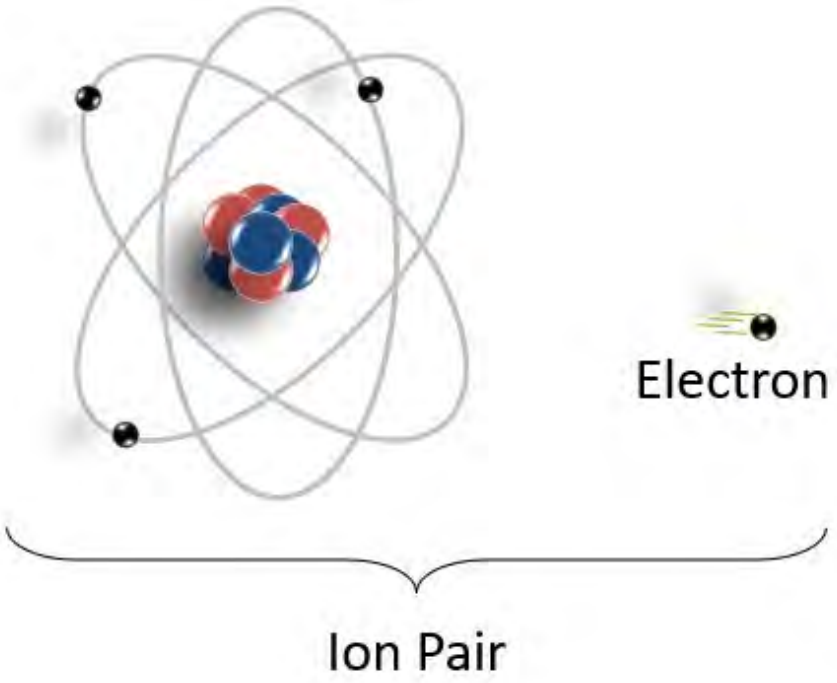
- Audio and video
  - During the presentation, from the presenters only
  - Use computer or telephone (call in)
  - Computer seems to give the best sound quality
  - Technical difficulties: 1-800-263-5803 x321
- Use the “Chat” feature to enter comments and questions
- Posted on webinar page
  - Video, answers to questions, copy of the slides
- Follow up email will be sent
  - Topics covered, time of attendance
- It may be possible to change your Zoom view if the controls are hiding the closed captioning.

Outline

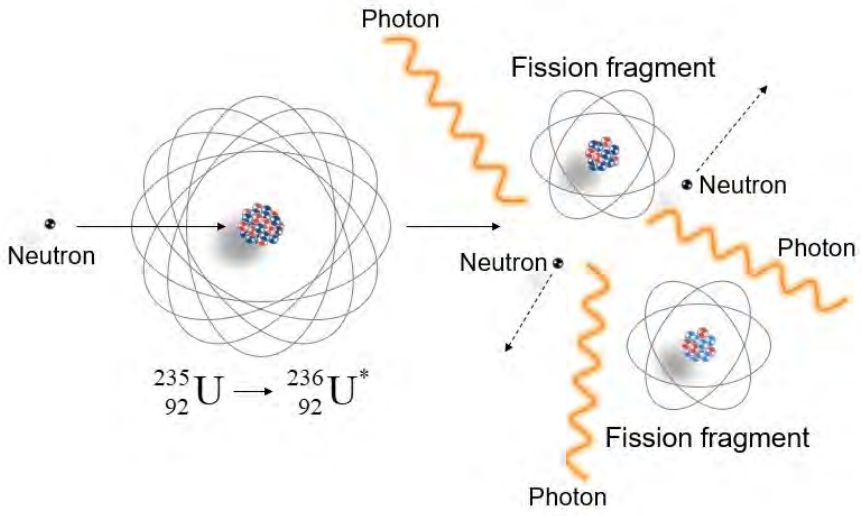
- Ionizing Radiation
- Fission Reactions
- Nuclear Energy
- International Agencies
- CNSC/CRPA
- Radiation Monitoring
- Radiation Protection

Ionizing Radiaton

- Radiation is energy travelling out from a source
- Energy is the ability to change matter
- Ionizing radiation has enough energy to remove electrons from atoms or molecules
- Includes alpha, beta, gamma, neutron, x-rays
- Biological effects
  - Large doses: radiation sickness
  - Increased risk of cancer



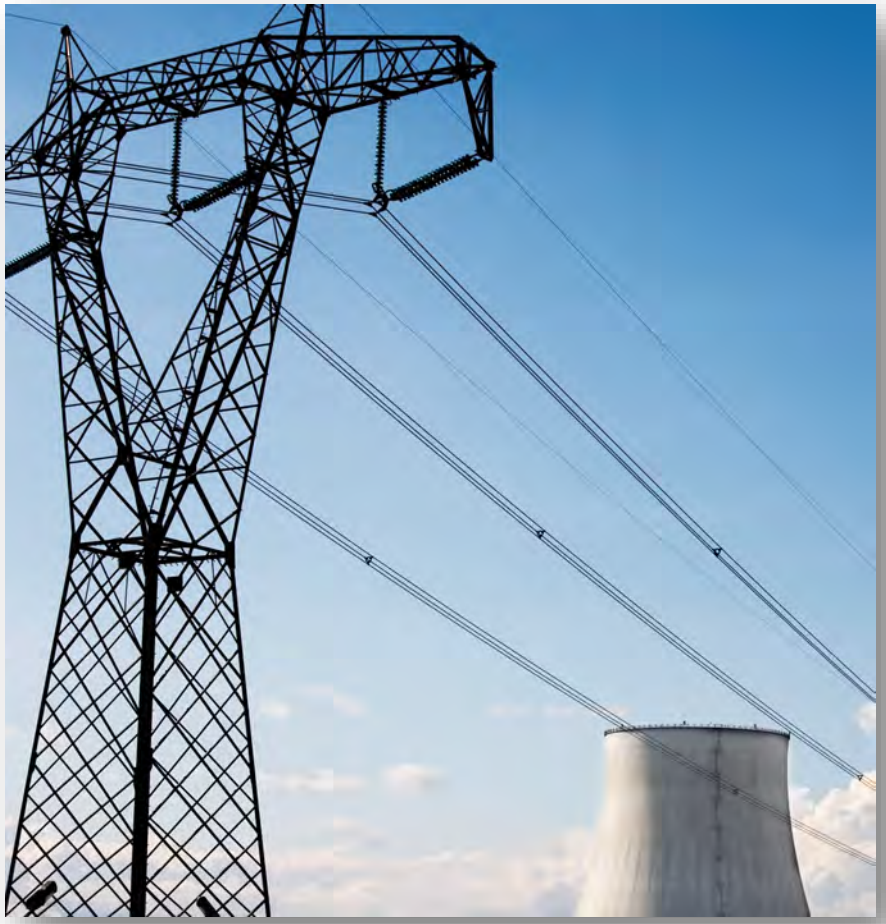
Fission Reactions



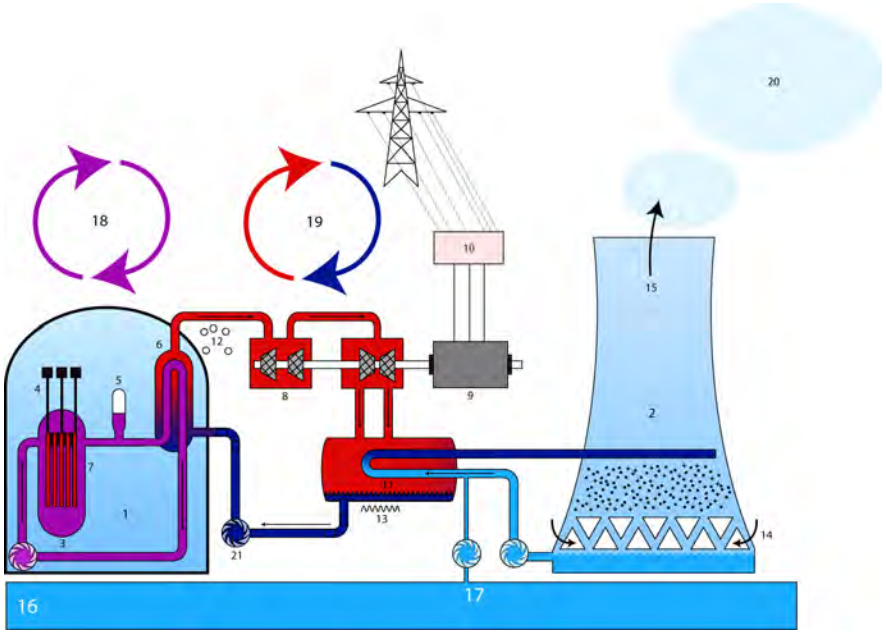
- Splitting of the nucleus of an atom
- Some mass is converted into energy
- Large amounts of energy released for small amount of mass
- In nuclear reactors, the most common fuel is uranium
- When split
  - Fission fragments
  - Neutrons
  - Gamma photons

Nuclear Reactors

- Fission fragments have large KE
- Neutrons can cause fission of other uranium atoms
- Nuclear reactors start, maintain, and control fission reactions
- Convert released energy into heat
- Heat converts liquid water into steam
  - Turn turbines
  - Generate electricity



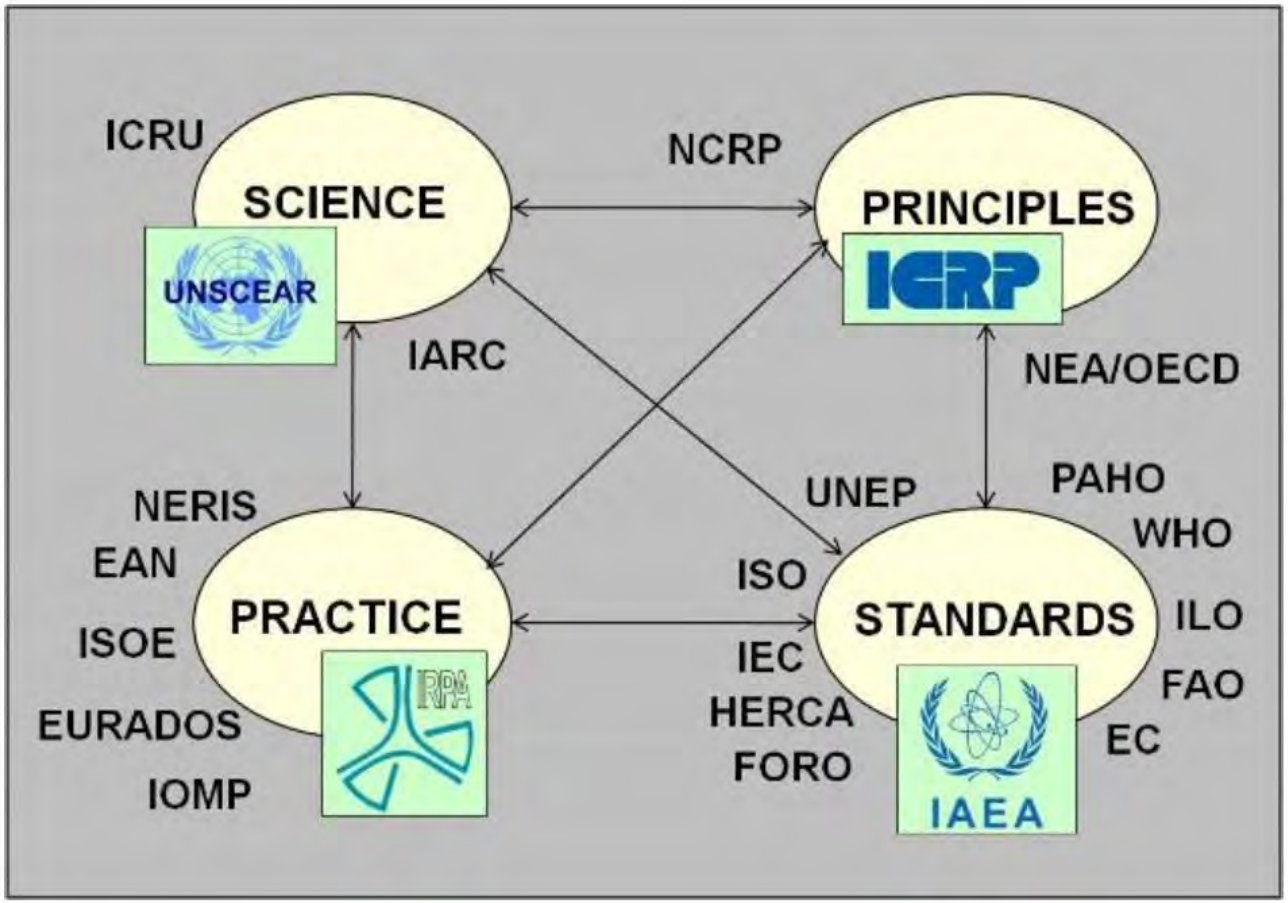
Nuclear Reactors



Steffen Kuntoff, CC BY-SA 2.0 DE, via Wikimedia Commons

- Nuclear reactors come in different formats
- Have common components
  - Fuel
  - Moderator
  - Control rods or blades
  - Coolant
  - Pressure vessel or pressure tubes
  - Steam generator
  - Automatic shut down systems
  - Containment

International Agencies



IRPA Executive Council Report for the Term 2016-2020

Science

ICRU

UNSCEAR

IARC

RP Principles, Practice, and Standards

Principles

- ICRP

Practice

- IRPA

Standards

- IAEA

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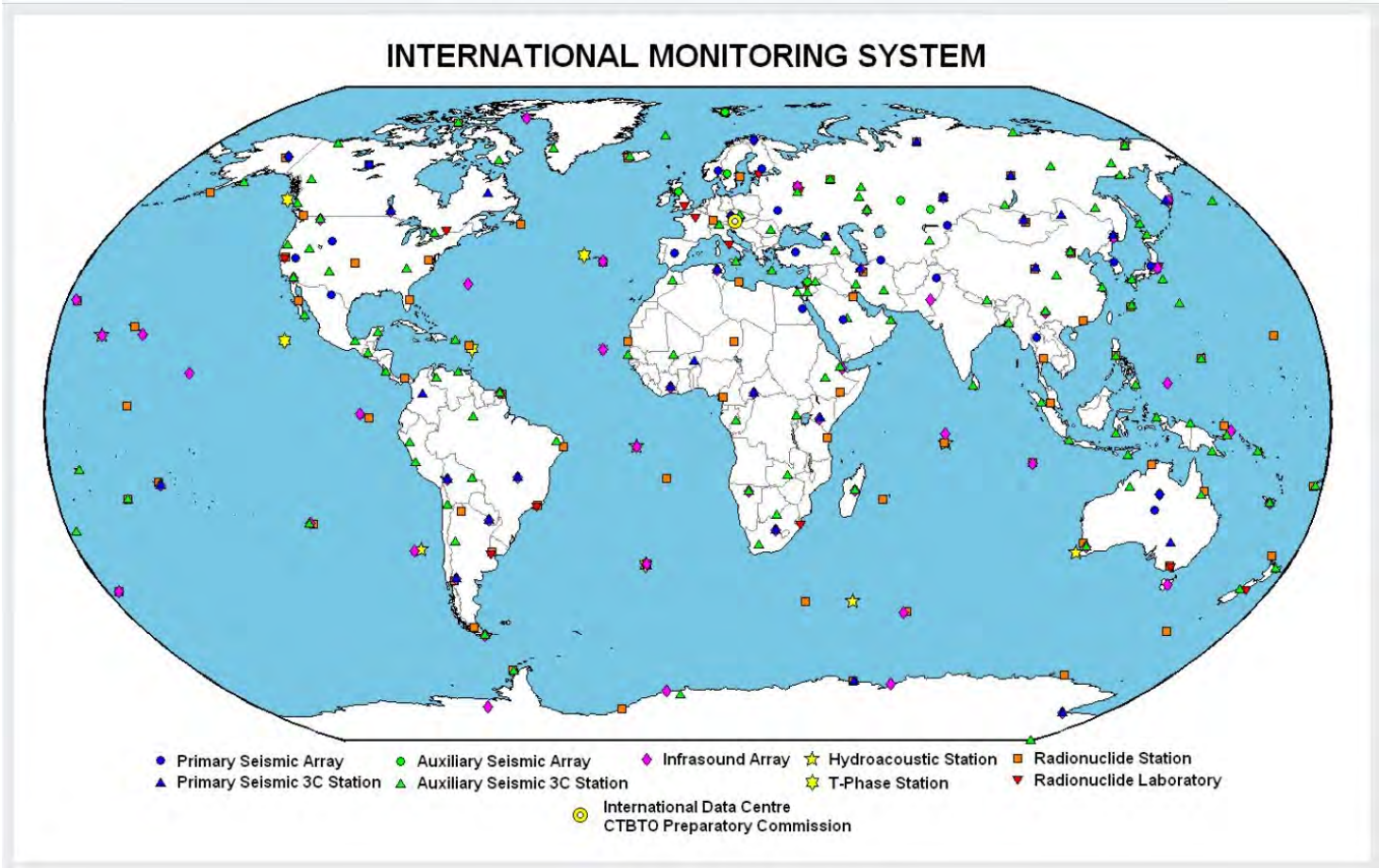
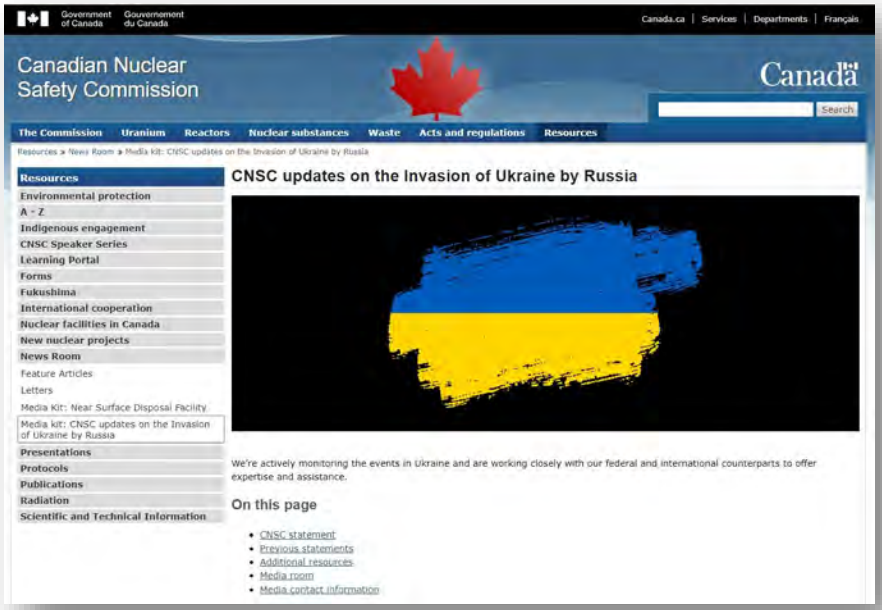
International Monitoring System



https://can-ndc.nrcan.gc.ca/index-en.php

CNSC

- Canada's Nuclear Regulator
- Updates on the Invasion
- Links to Federal and International Partners
- Information about ionizing radiation and radiation protection
- https://nuclearsafety.gc.ca/



CRPA

- Professional organization for those involved with radiation protection
- Supports development and implementation of radiation safety programs in Canada
- Advance development and communication of scientific knowledge for protecting people and the environment
- http://crpa-acrp.ca/

Radiation Protection in the Nuclear Industry

- Nuclear industry takes radiation protection seriously
- Global organizations
  - WANO
  - COG
  - HPS
- Follow guidance of IRPA, ICRP, IAEA
- Regulatory compliance

Questions?

- Interview Questions
- Questions posted in the chat room
- To ask a question verbally
  - use “raise hand” button
  - When asked, press spacebar or unmute to speak
- Questions we do not get to
  - Answers will be posted to our website and link to resources emailed out

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Thank you for listening!

www.radiationsafety.ca

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References/Resources

- https://can-ndc.nrcan.gc.ca/index-en.php, https://www.ctbto.org/map/
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- https://www.ctbto.org/
- https://www.foronuclear.org/en/nuclear-power/questions-and-answers/on-nuclear-power/how-does-a-nuclear-reaction-take-place/
- http://hps.org/
- https://www.iaea.org/
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- https://www.icrp.org/
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- https://www.irpa.net/docs/IRPA%20Guiding%20Principles%20on%20RP%20Culture%20(2014).pdf
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References/Resources

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- https://nuclearsafety.gc.ca/eng/resources/news-room/ukraine-media-kit.cfm
- https://www.unscear.org/
- https://www.wano.info/
- https://world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/nuclear-power-reactors.aspx