



**THE INFLUENCE OF ICRP PUB. 103 ON CURRENT  
ACTIONS OF THE U.S. ENVIRONMENTAL  
PROTECTION AGENCY**

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## EPA's Radiation Standards

- Radiation protection standards for the uranium fuel cycle – 13 January 1977
  - Require ICRP Pub. 2 methodology
  - 250  $\mu\text{Sv/a}$  to whole body or any organ, 750  $\mu\text{Sv/a}$  to the thyroid
- ICRP introduced the effective dose equivalent concept in Pub. 26 – 17 January 1977



## EPA's Radiation Standards

- Standards for management and disposal of spent nuclear fuel, high level, and transuranic waste issued in 1993
  - Based on ICRP Pub. 26 dosimetry
- Most recent EPA regulations have used ICRP Pub. 60 dosimetry (e.g., Yucca Mountain)



## Evolution of Dosimetry Methodology

- Standard Man (adult) used in ICRP 2
  - Chalk River Conference on Permissible Dose (1949)
- Reference Man (adult) used in ICRP 26
  - Defined in ICRP Publication 23 (1975)
- Age- and gender-specific dose coefficients were developed for 6 ages (3 mos., 1 y, 5 y, 10 y, 15 y, adult) – ICRP 72
- Ongoing work by ICRP to develop age- and gender-specific voxel phantoms



## EPA Federal Guidance Technical Reports

- Provide standard methods for performing radionuclide-specific dose and risk assessments
- Scientific basis is consistent with ICRP recommendations at the time they are issued
- Three technical reports now being revised



## Current Technical Reports

<b>Technical Report 11</b>	<b>Technical Report 12</b>	<b>Technical Report 13</b>
Internal Dose Coefficients - Ingestion - Inhalation	External Dose Coefficients	Cancer Risk Coefficients
ICRP 26/30	ICRP 26/30	ICRP 72



## Planned New Federal Guidance

- FGR 12 is being revised to give age- and gender-specific external dose coefficients for ~ 1200 radionuclides
  - Work performed at Oak Ridge National Lab (Eckerman and Leggett)
  - Will incorporate ICRP Pub. 107 decay data
- FGR 13 is being revised to update age- and gender-specific cancer risk coefficients
  - Will reflect latest science – UNSCEAR and BEIR VII
  - Will update U.S. baseline health data to 2000



# Proposed Updates to Technical Reports

<b>Technical Report ?</b>	<b>Technical Report 15</b>	<b>Technical Report 16</b>
Age- and gender-specific internal dose coefficients - Ingestion - Inhalation	Age- and gender-specific external dose coefficients	Age- and gender-specific cancer risk coefficients
ICRP 103+	ICRP 103+	ICRP 103+





## EPA Proposed Regulatory Actions

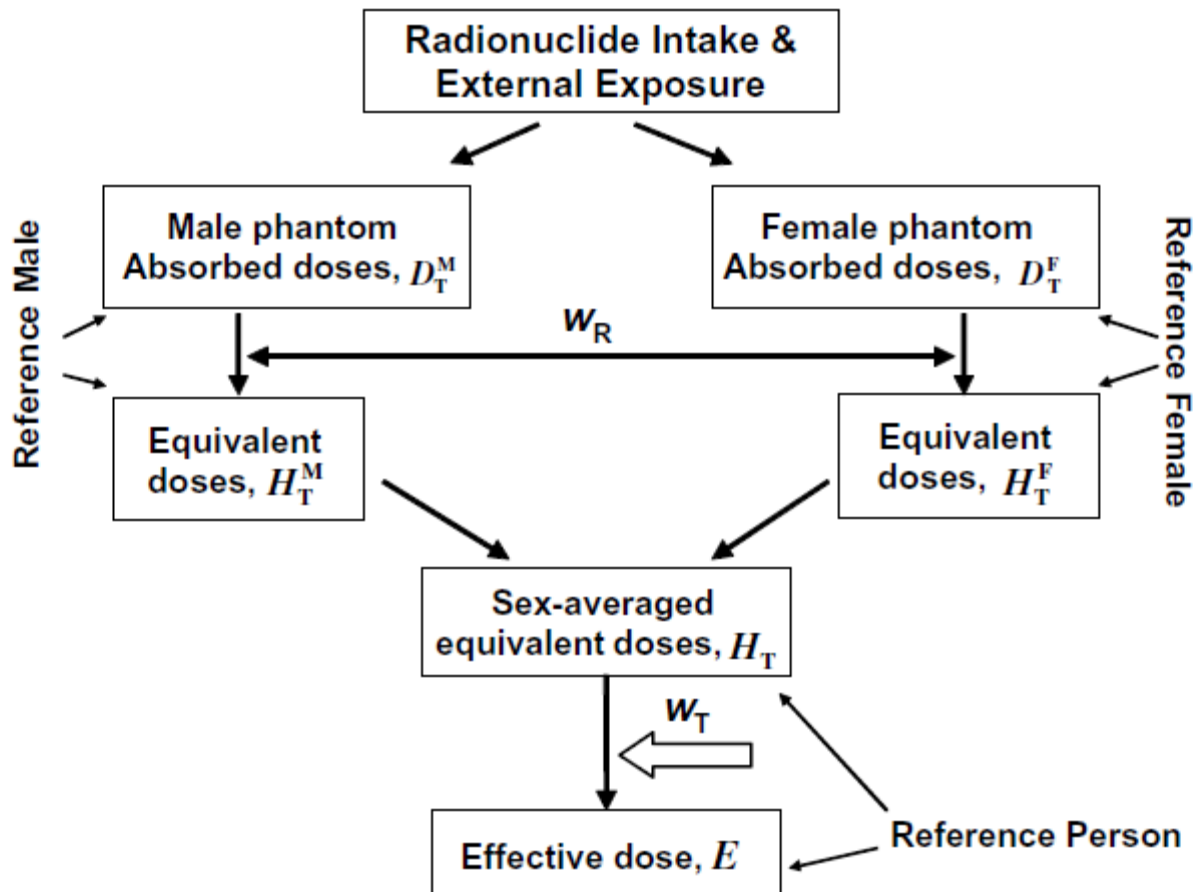
- Uranium recovery operations update – 40 CFR 192
  - Uranium Mill Tailings Radiation Control Act (UMTRCA)
- Air toxics – 40 CFR 61 Clean Air Act Subpart W
  - Air emission standard for radon releases at uranium mills
- Developing advanced notice of proposed rulemaking (ANPR) for revising 1970's era fuel cycle regulations (40 CFR 190)



## How to specify dose in new rules?

- 2003 – Publication 89 gives anatomical and physiological data for 6 ages (newborn, 1, 5, 10, and 15 year-olds, and adult) for males and females
  - Reference Man terminology retained, but in the sense of “reference human”
- 2007 – Publication 103 defines a reference person as the average of the adult male and the adult female using computational voxel phantoms adjusted to ICRP Pub. 89 data

# Reference Person (from Pub. 103)





## Doses to Children

- Age-specific effective doses from intakes of radionuclides are available for children at 5 ages (ICRP Publication 72)
  - Committee 2 will be updating this information
- Age-specific external dose coefficients will soon be available for these radionuclides
- But, the definition for effective dose given in Publication 103 uses  $W_t$  that are independent of age and sex



## Option for Modifying E

- Using age-specific DCFs expected from ICRP, age-averaged dose conversion factors (DCFs) could be calculated for chronic intake and exposure to radionuclides at environmental levels
  - Age-specific DCFs would be used for assessing doses from larger acute intakes



## Reference Person: Summary

- Further guidance from ICRP on assessing lifetime doses to the general population and setting dose constraints for chronic childhood exposures (e.g., occurring from birth to age 15) would be welcome
- The tools needed to address this challenge already exist or will be available in the near future (using age-specific voxel phantoms)



## A Final Note

- However EPA defines effective dose in its new rules, the metric will be SI
- Fukushima event demonstrated the pitfalls of operating in a different system of units from the rest of the world
- Many others in U.S. agree – HPS, NRC staff



## Questions?

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