



Office of Federal and State Materials and Environmental Management Programs

Safety and Security in the Beneficial Applications of Nuclear Materials

Advance Notice of Proposed Rulemaking 10 CFR Part 20

NRC Public Meeting - October 2, 2014

**Issue 1- Update 10 CFR Part 20 to align
with ICRP Publication 103**

Methodology and Terminology

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History of Methodology and Terminology

- **ICRP Recommendations – Publication 60 (1990)**
adopted updated dose calculation methodology and terminology
- **ICRP Recommendations – Publication 103 (2007)**
further revised factors used in dose calculation, but did not change methodology or terminology

Updated Methodology and Terminology

- **Commission Direction:**
 - Develop a draft regulatory basis for a revision to 10 CFR Part 20 to align with the most recent methodology and terminology for dose assessment.
- **Proposal:**
 - TEDE becomes TED
 - New W_T and W_R values incorporated into definitions
 - Age and Gender average dose coefficient for reference member of public
 - Appendix B revised with new ALI and DAC values

Changes to Terminology

- **Changes to methodology resulted in changes in terms:**
 - **Effective Dose**
 - **Total Effective Dose**
 - **Equivalent Dose**
- **Compliance would remain based on combination of internal and external exposure**

Changes to Methodology

- Quality factors in 20.1004 would be replaced by Radiation weighting factors w_R

Table 2. Recommended radiation weighting factors.

Radiation type	Radiation weighting factor, w_R
Photons	1
Electrons ^a and muons	1
Protons and charged pions	2
Alpha particles, fission fragments, heavy ions	20
Neutrons	A continuous function of neutron energy (see Fig. 1 and Eq. 4.3)

All values relate to the radiation incident on the body or, for internal radiation sources, emitted from the incorporated radionuclide(s).

^a Note the special issue of Auger electrons discussed in paragraph 116 and in Section B.3.3 of Annex B.

Changes to Methodology

- **Tissue Weighting Factors, w_T , updated to include more organs, and numerical values revised to reflect relative contributions to total risk**

Table 3. Recommended tissue weighting factors.

Tissue	w_T	$\sum w_T$
Bone-marrow (red), Colon, Lung, Stomach, Breast, Remainder tissues*	0.12	0.72
Gonads	0.08	0.08
Bladder, Oesophagus, Liver, Thyroid	0.04	0.16
Bone surface, Brain, Salivary glands, Skin	0.01	0.04
	Total	1.00

* Remainder tissues: Adrenals, Extrathoracic (ET) region, Gall bladder, Heart, Kidneys, Lymphatic nodes, Muscle, Oral mucosa, Pancreas, Prostate (δ), Small intestine, Spleen, Thy-mus, Uterus/cervix (♀).

Age and Gender Average Reference

- **Models are now available for infant, 1 yr, 5 yr, 10 yr, 15 yr. old male and female, and adult male and female**
- **To more accurately reflect a person born and growing up in an area, these models can be combined based on the percentage represented in U.S. census data rather than just adult**
- **Approach currently used by DOE, documented in Technical Standard DOE-STD-1196-2011**
- **Calculations would be updated using ICRP Publication 103 values and 2010 Census Data.**

Changes for Appendix B

- **NRC considering revisions to Tables 1, 2, and 3 of Appendix B**
 - **Table 1, Occupational ALI and DAC, based on adult reference person as defined by ICRP, and number of working hours**
 - **Table 2, Effluent Concentrations, based on age and gender averaged approach**
 - **Table 3, Sewer concentrations, based on age and gender averaged approach**

Updated Methodology and Terminology Questions

- **Q1-1 What are the implications of terminology change? Specifically, what are the associated costs of the change?**
- **Q1-2 What would be an appropriate implementation time frame and an approach to transition into the new terminology?**
- **Q1-3 How should the calculations of effluent concentration be modified to reflect advances in modeling that are now available? What are your views on age and gender weighted composite?**
- **Q1-4 What dose level should be used for effluent concentrations to demonstrate compliance?**

Summary

- **Comments will be accepted until November 24, 2014**
 - Federal e-Rulemaking portal at <http://www.regulations.gov> under Docket ID NRC-2009-0279
 - email to Rulemaking.Comments@nrc.gov
 - fax to Secretary, U.S. Nuclear Regulatory Commission, 301-415-1101
 - mail to Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff
- **Public Meetings / Webinars scheduled for:**
 - October 9, 2014
 - October 16, 2014
 - October 23, 2014

<http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/opt-revise.html>