U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Is It Time to Update NRCs Regulations for Radioactive Effluents?

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Background

- NRC regulations use:
  - ICRP-2 Recommendations, 1959 (Appendix I)
  - ICRP-26 Recommendations, 1977 (10 CFR 20)
  - ICRP-60 Recommendations, 1990 (Decommissioning)
  - Still protective of the public
- Issues of concern:
  - Multiple methods of calculating dose
  - Multiple definitions of dose
- Opportunity to align Part 20, Appendix I, & all regulations

Commission Direction

- NRC Direction – in SRM-SECY-12-0064 (17-Dec-12)
  - "…Develop a regulatory basis…"
  - "…for a revision of …Part 20 and … Appendix I, to align with the most recent methodology and terminology…"
- ICRP-103, "The 2007 Recommendations of the International Commission on Radiological Protection"
- Commission had specific instructions for Part 20
- No explicit instructions for Appendix I
- Central theme of SRM is for alignment

Regulatory Basis

- What is a Regulatory Basis?
  - Options for proposed changes
  - Evaluation of proposed changes
  - Justification for proposed changes
  - Staff recommendations to Commission
- What is the process?
  - NRC staff to engage stakeholders, public, industry, others
  - NRC will collect the input and evaluate options
  - One regulatory basis for Appendix I effort
  - One regulatory basis for the Part 20 effort
  - Commission to review merits of bases
  - Commission vote for rulemaking (proceed or not)

Logistics

- NRO is leading the Appendix I effort at the NRC
- FSME is leading the Part 20 effort at the NRC
- SRM/SECY call for separate rulemaking & bases
- Coordination
  - Part 20 Working Group (WG) and Appendix I WG
  - Reg Guide Upgrade Project
  - Oak Ridge National Laboratories (ORNL)
  - Cost-benefit analysis criteria ($1000 per man-rem value)
  - Federal family (EPA, DOE, & others)

Opportunities – Dose Concepts

- Replace terminology/concepts
  - Total body dose → effective dose
- Replace terminology/concepts/numerical values
  - Organ dose → organ dose (or) effective dose (?)
  - Air dose (mrad) → effective dose or eliminate
  - Skin and TB Dose Rates (setpoints) → effective dose rate (?)
- Replace concepts/numerical values
  - MEI (4 → 6 age groups)
  - ECLs (adult → average adult, per capita composite individual…)
  - Should D.O. for liquids ~ D.O. gases?
    - Liquid D.O. = 3 mrem, annual
    - Gases reference a value of 5 mrem (not a D.O.)

Opportunities – Implementation

- Concluding Statement RM-50-2
- Schedule for implementation
- Cost-benefit Criteria $1000 per man-rem
  - NUREG-1530, $2000 per man-rem
  - $1000 → $2000 → higher (?) → person-rem
- Change supporting documents
  - Regulatory Guides (~15)
  - NUREGs (~25)
  - Generic Communications
- Change supporting software programs
  - GASPAR
  - LADTAP

Opportunities – Organization

- Arrangement of Appendix I, Section II (as an example)
  - Systems approach (objectives for system designs)
  - Group sections by release type
  - Liquid Releases (Section II.A)
  - Gaseous Releases, Noble Gases (Section II.B)
    - B.1 – Noble Gases (gamma-air, beta-air)
    - B.2(a) – Reduce noble gas design objectives (if TB>5 mrem)
    - B.2(b) – Increase noble gas design objectives (if TB<5, Skin<15)
  - Gaseous Releases, Other Nuclides (Section II.C)
    - Iodines
    - Particulates
    - Other nuclides → H-3, C-14 (?)
- Reg Guide 1.21 organized similar to Appendix, I Section II

Comporting Changes – Authority

- Scope of effort is in the SRM (re "conforming changes")
- Develop bases for revisions of Part 20 and Appendix I
- Other Parts will need to be changed ("ASAP")
- Part 2, 19, 30, 31, 32, 40, 50, 51, 52, 61, 63, 70, 71, 72, 76, 100, 140
  - Definitions/terminology (comporting to Part 20)
- Current plan -- separate regulatory actions
- Consider cumulative effects of regulation when changing other Parts

Question 1:

- **Should Appendix I be Changed (or Not)?**
  - Advantages of change?
  - Disadvantages of change?
  - Costs to change programs (and cost savings)?
  - Same impacts to BWRs and PWRs?
  - Benefits to changing Appendix I now or later?

Question 2:

- **What is the scope of changes that should be made to Appendix I?**
  - Very limited? (only the following)
    - Appendix I
    - RG 1.109
      - Tables B1, Noble Gas Factors
      - Tables E-6 through E14, Dose factors for shoreline, inhalation, ingestion
  - Full change?
    - RG 1.109 through RG 1.113 (complete overhaul)
    - NUREGs, Generic Communications (retire, rewrite, combine)
    - Radwaste source term (ANSI N18.1)
    - New dispersion/diffusion models (liquid and gaseous effluents)
    - Evaluate new radwaste system designs
  - Somewhere in between “limited” and “full?”

Question 3:

- **Do we limit the technical changes to Appendix I to "align with ICRP-103"? What does that mean?**
  - Keep numerical values for Design Objectives?
  - Eliminate organ dose?
  - Eliminate gamma-air, beta-air doses (gases)?
  - Update cost benefit criteria ($1000/person-rem)?
  - Eliminate RM-50-2 (Appendix I, Section V)?
  - Expand scope beyond light water reactors (Appendix I Title)?
  - Eliminate skin and whole body dose (gases)?
    - dose rates for skin and whole body (gases) (NUREG-0133)
  - Report organ doses, thyroid doses, skin doses?
  - Release types in Appendix I match the types reported (RG 1.21)?

Question 4:

- **Should NRC include both SI and traditional units?**
  - Dual units (e.g., Bq and Ci) in:
    - Reports,
    - Appendix I, and/or
    - Part 20 Appendix B
  - Would this introduce too much confusion?
  - Undue burden?
  - Costs for program changes?

Question 5:

- **What effective date should be included for any revision of Appendix I (in Section V) for licensee implementation?**
  - How long to change programs, training, & procedures?
  - What actions could minimize implementation time?
  - What other NRC requirements may compete with implementation of any change to Appendix I?
  - What unintentional consequences may arise from a revision to Appendix I?

Tentative Schedule

- Public Mtgs (Savannah Jun 27, Chicago Aug-28, DC Oct-10)
- Publish ANPR (Target Aug 2014)
- Conferences (RETS-REMP-Jun, HPS-Jul, NEI HP Forum-Aug)
- Revise Reg Guides, NUREGS (2014-2020)
- ORNL publishes Dose Coefficients (2015)
- Complete Basis Document (2015)
- Revise Computer Codes (LADTAP, GASPAR) (2017)*
- Prepare the proposed rule (2018)*
- Publish Final Rule (2020)*

* Provided the Commission approves rulemaking.

Questions -- Comments

Acronyms

ANPR	Advanced Notice of Proposed Rulemaking
ANSI	American National Standards Institute
ASAP	As soon as practical
BWR	Boiling Water Reactor
CFR	code of Federal regulations
D.O.	Design Objective
DOE	Department of Energy
ECL	Effluent Concentration Limit
EPA	Environmental Protection Agency
FSME	Office of Federal & State Materials & Environmental Management Programs
GASPAR	Computer program to calculate doses from gaseous releases
HP	Health Physics
ICRP	International Commission on Radiological Protection
LADTAP	Computer program to calculate doses from liquid releases
MEI	Maximum Exposed Individual
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NRO	Office of New Reactors, NRC
NUREG	NRC information document
ORNL	Oak Ridge National Laboratory
PWR	Pressurized Water Reactor
RETS-REMP	Radioactive Effluent Technical Specifications/Radiological Environmental Monitoring Program
SECY	Technical papers submitted to the Commission
SRM	Staff Requirements Memorandum