

EPA's Role in U.S. Radiation Protection: Past Successes and Challenges Ahead

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August 22, 2011
At the NSFS – 2011 Conference, Reykjavik

Disclaimer and Scope

- More details about EPA's program history are available in the document, "Radiation Protection at EPA – The First 30 Years" (J.Dziuban, 2000) available at www.epa.gov/radiation.
- Any factual mistakes or expressed opinions are attributable to me and not to the United States Environmental Protection Agency (EPA).
- I am focusing on radiation protection at EPA, and, in the interest of time, have chosen not to include radioactive waste management in this presentation.

The Formation of EPA

- Reorganization Plan No. 3 (Dec. 2, 1970)
 - Reorganization of Executive Branch agencies proposed by President Nixon and approved by Congress
 - Established the Environmental Protection Agency
 - Reflected growing environmental concerns in the U.S. about air and water pollution



Some EPA Functions Consolidated from Other Agencies

- Department of Health, Education and Welfare or “HEW” (now the Department of Health and Human Services)
- Department of Agriculture
- Department of Interior
- Atomic Energy Commission (AEC)
 - Former AEC functions now divided among Nuclear Regulatory Commission (NRC), Department of Energy (DOE), and EPA

Functions Transferred from HEW's Bureau of Radiological Health

- Development of Protective Action Guides for emergency response
- Responsibility for the collection, analysis, and interpretation of data on environmental radiation levels
 - Included 2 laboratories located in Alabama (southeastern US) & Nevada (western US)
- Environmental impact analysis and evaluation
- Certain other monitoring, research, and development authorities

Functions Transferred from the Atomic Energy Commission

- Establish generally applicable environmental standards for the protection of the general environment from radioactive material
 - Defined in the Atomic Energy Act as “limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material” – applies to nuclear fuel cycle facilities “outside the fence”

Functions Transferred from the Federal Radiation Council (FRC)

- FRC abolished by Reorganization Plan No. 3 and all functions transferred to EPA
- Principal FRC function is Federal Guidance; i.e., to “advise the President with respect to radiation matters directly or indirectly affecting health, including guidance for all Federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States”

Early Federal Guidance Reports



U.S. Radiation Protection Laws Implemented by EPA

- Atomic Energy Act (AEA)
 - Fundamental U.S. law on both the civilian and the military uses of nuclear materials
 - Dates from Cold War era
 - Originally implemented by the Atomic Energy Commission
 - Now provides authority for NRC, DOE, and EPA
 - NRC licenses and regulates use of radioactive material
 - EPA sets standards for radioactivity in the environment

U.S. Radiation Protection Laws Implemented by EPA

- Clean Air Act (CAA) – Dec. 31, 1970
 - Radionuclides defined as hazardous air pollutants under the CAA
 - Regulated through National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Safe Drinking Water Act (SDWA) – 1974
 - SDWA requires EPA to set maximum contaminant levels (MCLs) for U.S. drinking water supplies
 - MCLs issued for gross alpha, Ra, U, and all manmade beta/photon emitters

U.S. Radiation Protection Laws Implemented by EPA

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – 1980
 - Known as Superfund; Regulations at 40 CFR 300 (1994)
 - Provides for risk-based cleanup of abandoned or legacy sites
 - Radionuclides are included along with other carcinogens and hazardous chemicals for setting risk-based site-specific cleanup goals

Major RP Regulations from EPA

(Regulations must be authorized by US law)

- Uranium Fuel Cycle – 40 CFR 190 (1977)
 - ICRP Pub. 2-based dose standards
- Drinking Water – 40 CFR Part 141 (1976)
- Uranium and thorium mill tailings – 40 CFR Part 192 (1983)
- National Emissions Standards for Hazardous Air Pollutants, Standards for Radionuclides – 40 CFR Part 61 (1983)

A Few of EPA's Contributions to RP

- Control of Radioactivity in the Environment
 - Regulation of radioactivity in the air and drinking water
 - Radon awareness efforts (stressing both testing and mitigation)
 - Cleanup of sites with radioactive contamination
 - Legacy sites (old radium sites, uranium mill tailings, etc.)
 - Industrial sites
 - Nuclear weapons program sites

Contributions to Radiation Emergency Response

- Issue Protective Action Guides for emergencies
- Operate the RadNet national system of radiation monitors (see Fukushima data at epa.gov/japan2011)
- Lead federal agency for domestic response to foreign nuclear incidents
- Assume long term control of monitoring and assessment for domestic nuclear incidents during the recovery phase (post-emergency)

Contributions to Radiation Science

- Issued June 2011 updated “Blue Book” -- *EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population* (download from epa.gov/radiation)
- Sponsor U.S. National Academy of Sciences reports on the Biological Effects of Ionizing Radiation (most recent is BEIR VII)
- Support radiation epidemiology studies
 - Serve on Joint Coordinating Committee on Radiation Effects Research -- Mayak and Techa River studies
 - Collaborate with scientists at Radiation Effects Research Foundation in Hiroshima, Japan

Federal Guidance Contributions

- EPA has used Federal Guidance to
 - Set New Limits for Uranium Workers
 - Set Revised General Standards for Workers
 - Issue Guidance on the Use of Diagnostic X-rays
- Federal Guidance Technical Reports (FGRs) have standardized methods for dose and risk assessment

Current FG Technical Reports

	FGR 9 (1976)	FGR 11 (1988)	FGR 12 (1993)	FGR 13 (1999)
Subject	Diagnostic X-ray Guidance	Internal DCFS - Ingestion - Inhalation	External DCFs	Cancer Risk Coefficients
International Consensus Basis		ICRP 26/30	ICRP 26/30	ICRP 60/72

FGR 11: Internal Dose Coefficients

- FGR 11 dose conversion factors (DCFs) used to calculate effective dose to reference adult from ingestion and inhalation of 800+ radionuclides (Sv/Bq)
- Provides annual limits on intake (ALIs) and derived air concentrations (DACs)
- FGR 11 dosimetry is out of date (based on ICRP 26 and 30 from 1976); but still needed to comply with some US regulations

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 Laboratory
 - Will incorporate ICRP Pub. 107 decay data
- FGR 13 is being revised to update age- and gender-specific cancer risk coefficients
 - Will reflect BEIR VII and new EPA Blue Book
 - Will update U.S. baseline health data to 2000

Planned New Federal Guidance

- EPA is replacing FGR 9 with FGR 14 this year
 - FGR 14 is titled *Federal Radiation Protection Guidance for Diagnostic and Interventional X-ray Procedures*
 - Updates guidance to include higher dose digital procedures (CT) and interventional fluoroscopy
- EPA to consider revising FGR 11 – radionuclide-specific adult dose conversion factors
 - Would be required if NRC updates dosimetry in 10 CFR Part 20 (RP regs.) or EPA updates 40 CFR 190 (fuel cycle regs.) to ICRP 103

Challenges for the Future

- Adopt SI more uniformly in the U.S. (Fukushima response exposed the pitfalls of translating and communicating two sets of units to the public)
- Incorporate ICRP Publication 103 recommendations into U.S. RP regulations and guidance
- Better integrate radon and TENORM into the system of RP (“If you’re worried about exposure from manmade sources, test for radon first!”)
- Continue to use effective dose for setting annual limits, but consider adopting risk for long term performance standards