

Radiation Protection Policy in a Nuclear Era

Recommendations from Health Physicists in Response to EO 14300

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Executive Order (EO) 14300, issued May 23, 2025, calls for a comprehensive reform of the Nuclear Regulatory Commission (NRC) to improve transparency, regulatory efficiency, and scientific coherence in nuclear oversight. While the EO focuses on NRC oversight authority, its stated aims include improving interagency coordination, which creates a timely opportunity to modernize and harmonize radiation protection standards across all federal agencies. Currently, federal agencies including the NRC, Department of Energy (DOE), Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), and Department of Defense (DOD) use incongruous regulatory frameworks that differ in their radiation dose limits, units, dosimetric models, and compliance methodologies, resulting in implementation inefficiencies and inconsistencies in both risk communication and regulatory enforcement.

This paper outlines key recommendations to **streamline U.S. radiation protection policy** while maintaining robust public and worker safety, improving scientific transparency, and aligning with international best practices.

Key Recommendations

1. Harmonize Radiation Dose Limits Across Federal Agencies

There should be **a unified set of radiation dose limits** and protection criteria applied across all federal agencies that have jurisdiction over any aspect of radiation protection, including but not limited to, the NRC, DOE, EPA, OSHA, DOT, and DOD. These limits should:

- Use consistent dosimetry models, i.e. the most recent International Commission on Radiological Protection (ICRP) recommendations given in Publication 103 (see also #6).
- Eliminate duplicative or inconsistent agency-specific requirements, particularly EPA's groundwater, air, and site decommissioning limits that are not aligned with NRC's dose-based approach under 10 CFR 20. These legacy risk-based standards create regulatory conflicts, delay cleanups, and undermine public confidence in consistent federal protection criteria.
- Eliminate over-conservative assumptions in derivation of effluent limits.

2. Standardize the Use of SI Units

All federal agencies should adopt and uniformly apply the **International System of Units (SI)** in radiation protection standards and public communications. Despite long-standing recognition of SI units as the international standard, federal regulatory language continues to reference non-SI units such as rem and curie, creating inconsistency and increasing the likelihood of misinterpretation. Transitioning to SI units exclusively would align U.S. practices with ICRP and IAEA recommendations, reduce conversion-related errors, and simplify training and compliance across agencies, licensees, and the public. This transition should include revising existing regulatory language, updating compliance guidance, and phasing out dual-unit reporting.

3. Depoliticize Low-Dose Risk Debates—Focus on *Practical Protection*

Scientific discourse regarding health effects at low doses, along with continued debate over the application of the Linear No-Threshold (LNT) model as a regulatory construct, should not paralyze regulatory policy. Instead, radiation protection policy at all levels – federal, state, and local – should:

- Focus on the principles of **justification** and **optimization**, as described in ICRP Publication 103. Justification ensures that the net benefit is *achievable*; optimization that the net benefit is *maximized*. Both must consider all factors (e.g. safety, economic viability, environmental impacts, etc.), not just radiological ones.
- Apply ALARA only to contexts where it provides **demonstrable** protective value, such as **occupational exposure management, medical exposures, and emergency response scenarios**. In such cases, what is considered “reasonable” may vary; for example, diagnostic imaging requirements may warrant higher exposures.
- Clarify that ALARA is not required or expected for public exposures already below regulatory limits. This is particularly relevant in environmental cleanup or in scenarios where background radiation dominates total exposure.

4. Establish a *De Minimis* Threshold for Regulation

Define a scientifically justified, risk-informed “**below regulatory concern**” or ***de minimis* dose threshold**, under which *no regulatory action* is required. This threshold would prioritize regulatory attention toward exposures with meaningful radiological impact while avoiding unnecessary control of exposures that are well below background variability. A practical benchmark should be recommended by the National Council on Radiation Protection and Measurements (NCRP) as an authority chartered by the U.S. Congress to provide radiation protection expertise, alongside stakeholders and regulators, in a transparent, scientifically defensible process. The authors posit that a practical *de minimis* dose might be on the order of 0.2 mSv/year (20 mrem/year) above background, representing approximately 20–30% of the combined cosmic and terrestrial components of natural background. This value could serve as a candidate threshold for consensus-based scientific evaluation, consistent with international approaches to exclusion and exemption. This approach would further support proportionality in regulation, improve resource allocation, and enhance clarity in public communication.

5. Maintain Current Dose Limits While Enhancing Practicality

Maintain the current federal dose limits in 10 CFR 20.1201 and 20.1301 and 10 CFR 35.75 of:

- **1 mSv/year** (100 mrem/year) for the public
- **50 mSv/year** (5 rem/year) for occupational exposure (and maintain other occupational dose limits in 20.1201 for lens of eye, skin dose, etc.)
- **5 mSv** (0.5 rem) for any individual from exposure to a released patient

These limits are scientifically supported, internationally aligned, and operationally achievable. Rather than pursuing ALARA as minimization to zero dose, an interpretation not grounded in regulatory intent, agencies should emphasize best practices to justify and optimize exposure levels (see also #3). Justification ensures the net benefit of the practice outweighs the radiological detriment, while optimization considers technical feasibility, economic cost, and protection objectives.

Revise NRC and other agency guidance (e.g., NUREG-1530 Rev.1) to reflect these practical approaches and to provide a unified, interagency framework for radiation protection. A *single, harmonized guidance document* would improve consistency, reduce misaligned standards among federal agencies, and support coherent implementation of radiation protection policy.

6. Conduct Periodic Scientific Updates Without Disrupting Policy

Establish a structured mechanism for both reviewing and incorporating updated scientific data, such as dose coefficients, biokinetic and dosimetric models, and epidemiological findings, based on consensus-driven scientific recommendations from bodies such as the ICRP and NCRP, into the regulations on a periodic basis (e.g., every 5 years). These updates should be implemented through interagency coordination with NCRP, ICRP, and relevant technical bodies, while maintaining stability in overarching dose limits. This approach allows regulatory frameworks to reflect evolving science without introducing uncertainty or disruption in compliance obligations.

7. Ensure an Independent Regulatory Authority

To maintain nuclear safety and public confidence, the NRC must retain its operational independence from undue political or commercial influence. While subject to appropriate Congressional oversight, the agency's regulatory decisions should remain grounded in technical expertise and statutory authority. Preserving this independence is especially important in the context of Executive Order 14300, which emphasizes interagency coordination but must not be interpreted as a mandate for political intervention in technical decision-making.

Conclusion

EO 14300 presents a time-sensitive opportunity to unify, modernize, and harmonize the U.S. system of radiation protection. By advancing consistent standards, updating technical foundations, and clarifying regulatory expectations across federal agencies, the recommendations outlined here promote scientifically grounded and operationally practical reform. These actions support the

protection of public and worker health while improving clarity, reducing unnecessary duplication, and enhancing public trust in federal oversight.

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