

Why Modernization of the Nuclear Regulatory Commission's Radiation Protection Framework Requires Coordination Across Federal Law

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EXECUTIVE SUMMARY

Under the direction of Executive Order 14300, the Nuclear Regulatory Commission (NRC) is reconsidering one of the foundational principles of the federal radiation protection system: that radiation exposures and releases be maintained “as low as is reasonably achievable,” commonly known as ALARA.¹ The Commission has proposed replacing ALARA with a “graded approach to dose management” and revising several numerical standards governing radioactive effluents. The NRC’s reconsideration of ALARA presents a legitimate opportunity to modernize federal radiation protection.

The changes are primarily being considered under the Atomic Energy Act (AEA),² which assigns the NRC responsibility for protecting public health and safety in its regulation of civilian nuclear materials and facilities. But the legal significance of ALARA extends beyond the AEA. ALARA and related NRC emissions requirements also became part of an interagency arrangement under the Clean Air Act (CAA) that allowed the Environmental Protection Agency (EPA) to withdraw separate radionuclide emissions standards for NRC-regulated facilities.

Section 112(d)(9) of the 1990 Clean Air Act Amendments authorizes the EPA to forgo promulgating radionuclide emission standards for NRC-licensed facilities only if the EPA determines that the NRC’s regulatory program provides “an ample margin of safety to protect the public health.”³ The EPA previously determined that the NRC’s regulations resulted in that standard, in part due to ALARA. The proposed changes must either enable the EPA to continue to rely on its prior

¹ Executive Order 14300, “Ordering the Reform of the Nuclear Regulatory Commission, May 29, 2025, *Section 5(b)*: “shall reconsider reliance on the linear no-threshold (LNT) model for radiation exposure and the “as low as reasonably achievable” standard...”

² Atomic Energy Act of 1954, Pub. L. No. 83-703 (codified at 42 U.S.C. §§ 2011 et seq.).

³ Clean Air Act Amendments of 1990, Pub. L. No. 101-549, § 112(d)(9), 104 Stat. 2399, 2544 (codified at 42 U.S.C. § 7412(d)(9)).

determinations, enable the EPA to make a new determination that is not based on ALARA, or be made obsolete due to statutory changes.

INTRODUCTION

The NRC and the EPA regulate radiation under different statutes and legal standards. The NRC's principal public-health mandate arises under the AEA. The Commission must ensure that licensed activities provide "adequate protection of public health and safety" and "are not inimical to the common defense and security." Under the CAA, the EPA regulates radionuclides as hazardous air pollutants and must determine whether applicable controls provide an "ample margin of safety to protect the public health."⁴

The AEA does not define adequate protection through a single numerical dose or risk threshold. The NRC has historically implemented its mandate through a combination of dose limits, design requirements, operating requirements, defense-in-depth, monitoring, and principles such as ALARA. The CAA approaches the issue differently. For most hazardous air pollutants, the EPA establishes emissions requirements through the statutory framework governing technology-based controls and residual health risk.

Congress addressed the overlap between those authorities in Section 112(d)(9) of the CAA. That provision allows EPA to decline to impose separate radionuclide emissions standards on NRC-regulated facilities.⁵ The provision does not transfer EPA's authority to the NRC. It allows EPA to rely on the NRC's program when EPA independently concludes that the program satisfies the CAA standard.⁶

Section 112(d)(9) specifically states that:

No standard for radionuclide emissions from any category or subcategory of facilities licensed by the Nuclear Regulatory Commission (or an Agreement State) is required to be promulgated under this section if the [EPA] Administrator determines, by rule, and after consultation with the Nuclear Regulatory Commission, that the regulatory program

⁴ For more information see Kyle Danish, Adam Stein, and Paul Libus, "Will Risk Aversion at the NRC Avert the Energy Transition?" 54 ELR 10241, March 2024.

⁵ Clean Air Act Amendments of 1990, Pub. L. No. 101-549, § 112(d)(9), 104 Stat. 2399, 2544 (codified at 42 U.S.C. § 7412(d)(9)).

⁶ *Natural Resources Defense Council, Inc. v. EPA*, 824 F.2d 1146 (D.C. Cir. 1987); *National Emission Standards for Hazardous Air Pollutants; Radionuclides*, 54 Fed. Reg. 51654 (Dec. 15, 1989) (promulgating 40 C.F.R. pt. 61, subpart I).

*established by the Nuclear Regulatory Commission, pursuant to the Atomic Energy Act [42 U.S.C. 2011 et seq.] for such category or subcategory provides an ample margin of safety to protect the public health.*⁷

In 1992 the EPA and the NRC entered into two Memoranda of Understanding addressing radionuclide air emissions. After years of negotiation, the NRC committed to establish a 10 mrem-per-year dose constraint for air emissions and to maintain ALARA requirements.⁸ The EPA then rescinded its oversight for commercial power reactors in September 1995 and for the remaining non-reactor licensees in December 1996.⁹

The EPA considered ALARA alongside numerical effluent requirements, facility performance, monitoring, and the broader NRC regulatory program in its decision. The records differed between power reactors and other licensees, which is why EPA completed the two rescissions separately. In both cases, however, EPA's decision rested on the continued operation of an NRC framework that included ALARA. For reactors this rested upon Appendix I of 10 CFR Part 50.¹⁰ For non-reactors this rested upon how the NRC "proposed to EPA a "constraint" rule construing ALARA as requiring each licensee to limit air emissions to a level resulting in a dose no greater than 10 mrem/yr."¹¹

WHY STANDARDS ARE NOT DIRECTLY COMPARABLE

Dose values between the NRC and EPA are not directly comparable because they arise from different regulatory frameworks and perform different regulatory functions. The EPA's 10 mrem-per-year standard under Subpart I applies to airborne radionuclide emissions from a single covered facility. Compliance is evaluated using a modeled maximally exposed individual, including assumptions about the individual's location and duration of exposure. EPA selected 10

⁷ Clean Air Act Amendments of 1990, Pub. L. No. 101-549, § 112(d)(9), 104 Stat. 2399, 2544 (codified at 42 U.S.C. § 7412(d)(9)).

⁸ Memorandum of Understanding Between the Environmental Protection Agency and Nuclear Regulatory Commission Concerning Clean Air Act Standards for Radionuclide Releases from Facilities Other Than Nuclear Power Reactors Licensed by NRC or its Agreement States, 57 Fed. Reg. 60778 (Dec. 22, 1992).

⁹ National Emission Standards for Radionuclide Emissions From Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H, 60 Fed. Reg. 46206 (Sept. 5, 1995) (nuclear power reactors); Withdrawal of Subpart I of 40 CFR Part 61, 61 Fed. Reg. 68972 (Dec. 30, 1996) (non-reactor facilities).

¹⁰ 10 C.F.R. Part 50, Appendix I, *Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents*; 60 Fed. Reg. 46208-211.

¹¹ 61 Fed. Reg. 68975

mrem per year after considering several possible risk-based standards, as well as the existing regulatory baseline, the small number of people expected to receive the modeled maximum exposure, and the estimated population-level cancer incidence. These are promulgated under CAA 112 authority, and the values were established on a health-only basis after the *Vinyl Chloride* decision.¹² The EPA also has a separate 25 mrem limit under 40 CFR Part 190 that addresses cumulative exposure from the uranium fuel cycle across multiple pathways, rather than air emissions from a single facility alone.

The NRC has a public dose limit of 100 mrem for the public and 5000 mrem for workers, derived from historic limits based on presumed health effects and feasibility. These are promulgated under AEA authority. In addressing EO 14300, the NRC is now replacing ALARA with “optimization.” Another aspect of the NRC’s proposed radiation protection rule bounds “optimization” practices with a graded approach to dose management. This includes setting a limit of 25 mrem where compliance can be achieved “by not analyzing projected public doses below 25 mrem/year and by performing a cost-benefit analysis for projected public doses greater than or equal to 25 mrem/year.”¹³ This NRC provision uses 25 mrem as a threshold for determining when additional cost analysis is required, it is not equivalent to either an expected individual dose or the Part 190 dose cap. The NRC is also proposing to adjust the effluent limit to 25 mrem, keeping the numeric limits in Appendix I as they are but offering a new 25 mrem optional pathway for reactor licensees, and an equivalent 25 mrem effluent limit for independent spent fuel storage installations (ISFSIs).

Accordingly, a numerical comparison of 10 mrem and 25 mrem, standing alone, is misleading. The comparison must account for which sources are covered, which exposure pathways are included, how the exposed individual is defined, what modeling assumptions are used, and whether the value operates as a public dose limit, a design objective, or a decision threshold.

LEGAL CONSEQUENCES OF REMOVING ALARA IN 10 CFR PART 20 AND GUIDANCE

The NRC’s proposed rule materially changes the regulatory features on which the EPA’s 1995 and 1996 determinations were based. The problem at hand is that the EPA did not simply conclude

¹² *Natural Res. Def. Council, Inc. v. EPA*, 824 F.2d 1146 (D.C. Cir. 1987) (en banc) (Vinyl Chloride decision).

¹³ *Reforming and Modernizing the NRC’s Radiation Protection Framework*, 91 Fed. Reg. 43456 (proposed July 15, 2026) (Docket No. NRC-2025-1140, RIN 3150-AL47), <https://www.regulations.gov/docket/NRC-2025-1140>

that NRC jurisdiction, by itself, was sufficient. It examined whether the NRC program would keep emissions consistently and predictably at or below the level EPA considered protective and whether NRC could require corrective action when that level was exceeded.

EPA Authority Remains Intact

Radionuclides remain listed as hazardous air pollutants under Section 112 of the CAA. To re-establish compliance with the CAA, the EPA might have to reinstate Subpart I through notice-and-comment rulemaking, imposing its 10 mrem/year standard with separate reporting requirements. Unlike “adequate protection”, “ample margin” has a derived basis of a 1-in-1-million chance of a latent cancer fatality to the greatest number of people during normal operations.¹⁴ The EPA has legal basis to reconsider “ample margin” with reasoned justification.

Potential Vulnerability

The rescission of EPA regulation over NRC-licensed facilities is not impacted by the NRC’s current rulemaking unless the EPA revises it or a court requires further action.¹⁵ But a material change to the NRC program could undermine the factual basis for EPA’s continuing reliance on that determination.

CAA Section 304(a)(2) authorizes litigation against the EPA for failure to perform nondiscretionary duties.¹⁶ And the EPA’s 1996 rescission specifically states that “In the event that the NRC regulatory program does not assure that licensee emissions result in doses at or below 10 mrem/year, any interested person may petition EPA to initiate a rulemaking to reinstate Subpart I. Furthermore, EPA can act on its own initiative to reconsider the rescission if new information indicates that the public health is not protected with an ample margin of safety.”¹⁷

¹⁴ Stein et al, *Clarifying the Limits of Regulatory Authority under the Clean Air Act*, Breakthrough Institute, June 10, 2025, <https://thebreakthrough.org/issues/energy/clarifying-the-limits-of-regulatory-authority-under-the-clean-air-act>.

¹⁵ *NRDC v. Reilly* said the EPA exceeded its authority in staying Subpart I while they conducted the dose analysis for non-reactor licensees. It would follow that Subpart I would thus immediately need to be reinstated if cause was found. *NRDC v. Reilly*, 976 F.2d 36 (D.C. Cir. 1992)

¹⁶ 42 U.S.C. § 7604(a)(2).

¹⁷ 61 Fed. Reg. 68978

So, intervening groups could petition the EPA to reconsider its determination, on the basis of reduction in public health protection and that Subpart I should once again be expanded to NRC licensees. Since this is tied to 112 (d)(9), the EPA would have statutory reasons to respond.¹⁸

MECHANISMS OF ACTION

With the NRC revising its radiation standards, the NRC and EPA must reconcile statutory requirements. There are multiple ways to do so.

1. Coordinated Agency Action:

The NRC made the case that its proposed rule meets the EPA's definition of "ample margin of safety". Now, the EPA must complete a reasoned EPA determination, on the current record, that the revised program still provides an ample margin of safety under Section 112(d)(9).

The same process that produced the original ample-margin finding could produce a renewed one, whether by reaffirming the existing methodology against the revised program or by adopting a different one EPA finds equally protective.¹⁹

The EPA could pursue one of the following:

1. **Accept optimization.** In changing ALARA to optimization, the NRC is attempting to change the philosophy around radiation protection, but they use the same toolkit of procedures for protecting workers and the public. The determination could recognize that the features of this regulatory program are functionally similar in practice to meet the 10 mrem limit.
2. **Reconsider the 10 mrem limit.** The fuel-cycle limit in 40 CFR Part 190 is 25 mrem, and is also deemed sufficiently protective. While it is based on all-source contribution from the fuel-cycle, the rationale could be made that the source summation is unlikely in most populations, and that, while effluent releases should be considered, the NRC's 25 mrem cost-evaluation threshold is sufficiently protective in a manner like the fuel cycle rule,

¹⁸ 5 U.S.C. § 553(e) and § 555(e); *Massachusetts v. EPA*, 549 U.S. 497, 527-28 (2007).

¹⁹ *National Emissions Standards for Radionuclide Emissions From Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H*, 60 Fed. Reg. 50165 (September 28, 1995).

although that rule is issued under AEA §161(b) authority rather than the CAA. The 1989 basis for the CAA limits shows flexibility in possible approach to risk and dose limits.

3. **Harmonize with AEA limits.** A broader rulemaking could be initiated to direct EPA staff to harmonize with AEA limits through Presidential Federal Guidance.²⁰ Such considerations could be within the EPA's role as having the ability to adjust risk methodology and appropriately broaden the range of risk discussions.

2. Congressional Action:

A coordinated determination under Section 112(d)(9) is necessary, but it is not wholly durable. The same interagency process that can produce a renewed finding under this administration can produce a different one under the next. Post-*Loper Bright*, a reviewing court owes neither finding any special deference: a well-reasoned determination may hold, and a differently reasoned one may just as easily replace it.²¹ A durable fix requires legislation, since only Congress can settle, across statutes, which agency's methodology governs.²²

Absent a legislative fix, the questions above will be settled by litigation and executive action rather than by Congress. Within statute, there are multiple legislative avenues:

1. **Consolidate radiation-protection into a single federal authority.** Consolidating radiation-protection standard-setting into a single federal authority is the most complete fix and would eliminate overlap by design. While the largest legislative lift, the authorities already exist, and just need administrative consolidation, not more federal spending.²³
2. **Center radiation protection through the AEA.** Congress could remove CCA 112(d)(9) and make the NRC's AEA program the exclusive federal framework for radionuclide emissions

²⁰ While Vinyl Chloride established the current two-test methodology, there were proposals in the 2000s to update federal guidance that could have adjusted EPA consideration to be an all-source consideration to the public limit of 100 mrem or remove the public limit consideration altogether and have single-source compliance. PJ Seel, *Decay Fragments: A Health Physics History*, The Breakthrough Institute, March 10, 2026, <https://thebreakthrough.org/issues/nuclear-energy-innovation/decay-fragments-a-health-physics-history>

²¹ *Loper Bright Enterprises v. Raimondo*, 603 U.S. 369 (2024).

²² Adam Stein, Kyle Danish & Paul Libus, *Will Risk Aversion at the NRC Avert the Energy Transition?*, Environmental Law Reporter, 54 ELR. 10241, 2024, <https://thebreakthrough.imgix.net/pdfs/NRCRiskAversion.pdf>.

²³ Adam Stein and Kyle Danish, "Implications for NRC Comprehensive Risk Standards in Part 53 Post *Loper Bright* Decision" The Breakthrough Institute, February 20, 2025, <https://thebreakthrough.org/issues/energy/implications-for-nrc-comprehensive-risk-standards-in-part-53-post-loper-bright-decision>.

from licensed facilities. This would clarify that the NRC sets standards for radionuclide emissions, enforcing them for their licensees, with the EPA still enforcing off-site emissions. Additionally, explicitly giving the NRC the ability to establish a *de minimis* dose would solve the primary issue of ALARA: not having an enforcement floor.

3. **Align definitions, risk-assessment methodologies, and quantitative thresholds.** A freestanding definitions statute would not resolve the jurisdictional overlap, but it would supply the scientific anchor current law lacks. Pairing it with a statutory Interagency Steering Committee on Radiation Standards, authorized to issue binding guidance when agencies miss their conforming deadlines, would manage implementation without amending the CAA. This approach would require additional federal spending.

CONCLUSION

The NRC's reconsideration of ALARA presents a legitimate opportunity to modernize federal radiation protection. A system designed to protect public health should distinguish meaningful risk reduction from requirements that consume resources without producing a commensurate safety benefit. But, together with numerical emissions constraints and other regulatory controls, ALARA became part of the legal and administrative basis for EPA withdrawal of duplicative CAA standards.

The NRC's proposed graded approach and revised effluent constraints may be capable of supporting a renewed EPA finding that the program provides an ample margin of safety. Establishing that conclusion requires an analysis tied to the CAA, made or adopted by the EPA, and supported by a record that accounts for the substantive changes to the NRC program.

Unilateral removal of ALARA without corresponding EPA action creates legal risk from multiple directions: federal EPA reinstatement of Subpart I, Agreement State compatibility issues, and citizen suit litigation. The 1992 MOUs represent a negotiated status quo; rescinding their basis without a replacement framework exposes the NRC and its licensees to regulatory uncertainty.