August 31, 2026

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U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001

Re: Docket ID No. NRC-2025-1140; RIN 3150-AL47; Reforming and Modernizing the NRC's Radiation Protection Framework, 91 Fed. Reg. 43,456 (July 15, 2026)

Submitted via Regulations.gov (Docket NRC-2025-1140)

I. Introduction and Statement of Interest.

The Natural Resources Defense Council (NRDC) respectfully submits these comments on the U.S. Nuclear Regulatory Commission's proposed rule, *Reforming and Modernizing the NRC's Radiation Protection Framework* (the Proposed Rule).[1] The Proposed Rule would carry out the most substantial revision of the NRC's radiation protection standards in 10 CFR part 20 since 1991.

NRDC is a national nonprofit environmental organization that has engaged with nuclear energy policy and NRC licensing and rulemaking proceedings for decades, including on matters of reactor safety, radiation protection, decommissioning, spent fuel management and the role of nuclear energy in addressing climate change. NRDC believes that nuclear energy can provide valuable carbon-free power as we work to address the threat of global warming, and NRDC has a direct interest in the safe, environmentally responsible operation and decommissioning of nuclear facilities and in the integrity of the NRC's regulatory processes.

NRDC's overall assessment is that the existing radiation protection framework remains sound and consistent with current science, and that the case for weakening any of its protective elements has not been made on this record. The framework's core scientific and protective foundations — the linear no-threshold (LNT) model, the "as low as is reasonably achievable" (ALARA) principle, and the rejection of radiation hormesis as a basis for regulation — are settled and should remain unchanged. The Commission itself reaffirms LNT and again declines to adopt hormesis. NRDC agrees on both points and disagrees where the rule moves to eliminate ALARA, the third of these foundations.

[1]Reforming and Modernizing the NRC's Radiation Protection Framework, 91 FR 43456 (proposed July 15, 2026) (to be codified at 10 CFR pts. 19, 20, 34, 35, 40, 50, 53, 61, 71, 72) (Docket ID NRC-2025-1140; RIN 3150-AL47) ("Proposed Rule").

A single theme runs through the comments below. The Proposed Rule repeatedly reassures the public that the fundamental dose limits are unchanged — 5 rem/year occupational exposure and 100 mrem/year public exposure.[2] That is literally true of the numerical limits. But a dose limit is a ceiling; it is only one component of radiation protection. The regulatory mechanisms that have historically held actual doses far below those ceilings — ALARA, the optimization duty, the effluent constraint, the annual (rather than multi-year-averaged) occupational limit, and the numerical bounds on variances — are being loosened or removed at the same time. *An unchanged limit is not an unchanged level of protection.* NRDC's central request is that the Commission evaluate the cumulative outcome of these changes on worker and public exposure and decline to weaken protection wherever it has not demonstrated that doing so is safe, coherent, lawful, and workable.

II. Do not eliminate ALARA.

A. The rule concedes that ALARA is what has kept doses low.

The Commission's own text supplies the core of NRDC's objection. In explaining the removal of ALARA references, the Proposed Rule states that "the implementation of the ALARA principle based on the NRC's current regulatory language has generally led to low overall radiation doses."[3] ALARA is the only requirement in the framework that operates continuously below the numerical dose limits. The limits are ceilings that impose no duty at exposures beneath them; ALARA is the mechanism that has driven doses far below those ceilings and kept them there. The NRC should not eliminate the requirement it acknowledges has helped keep doses low.

The Proposed Rule asserts that its changes "will not require any changes to licensees' current practices" and that existing programs remain compliant[4] while projecting approximately $9.53 million per year in quantified industry savings.[5] The draft regulatory analysis attributes those quantified savings primarily to reduced reporting, recordkeeping, and other administrative labor costs.[6] Many of those savings may be safety-neutral. But the analysis separately anticipates additional, unquantified savings from decisions not to undertake some radiation-protection

[2] Id. at 43469–43470 (public dose limit of 100 mrem/year) and 43494–43495 (§ 20.1201(a); occupational limit of 5 rem/year TEDE retained).

[3] Id. at 43468.

[4] Id. at 43465 (existing programs compliant with current requirements would be compliant with the proposed requirements).

[5] Id. at 43457 (Costs and Benefits; cost savings to industry of approximately $9.53 million/year at a 7 percent discount rate).

[6] U.S. Nuclear Regulatory Commission, *Draft Regulatory Analysis for the Proposed Rule: Reforming and Modernizing the NRC's Radiation Protection Framework* 16, 21–28 & app. A (Mar. 2026), ADAMS Accession No. ML26180A025 ("Draft Regulatory Analysis").

measures, from completing work with fewer workers under the proposed occupational-dose flexibility, and from constructing equipment with less shielding when alternative dosimetry methods produce lower calculated doses. At the same time, the analysis acknowledges that the rule would allow increased occupational and public exposure and increased effluent releases, but does not quantify the resulting dose changes or health effects because the NRC lacks the necessary data. The Commission therefore has not demonstrated that the rule's additional operational savings would come only from eliminating measures that lack a health and safety benefit. NRDC requests that the final regulatory analysis distinguish administrative savings from savings associated with reduced protective measures and assess the resulting changes in occupational and public dose.

B. Eliminating optimization raises doses for the workers least protected by fixed limits.

The fixed 5 rem/year occupational limit does little for a worker whose realistic exposures sit well below it; only the optimization duty pushes those exposures downward. This is especially consequential for workforces outside the nuclear fuel cycle — for example, workers exposed to naturally occurring radioactive material (NORM) in the oil-and-gas sector, and comparable groups — who are not closely managed against the occupational limit and for whom optimization is, in practical terms, the principal protective mechanism. Removing optimization foreseeably increases doses for exactly the populations the fixed limit protects least. The graded approach's determinate thresholds trigger administrative measures, such as training and monitoring, but do not require a licensee to reduce an exposure that remains below the applicable dose limit. Under current ALARA requirements that exposure carries a duty to justify not reducing it further; under the Proposed Rule it carries none.

C. The graded approach is operationally undefined at the moment of adoption.

The Commission states that the guidance defining acceptable graded-approach measures — including the cost-benefit method and the actions expected between the determinate thresholds — "would be issued subsequent to this rulemaking" as part of a "two-phased approach."[7] The agency thus proposes to eliminate an operative, enforceable standard (ALARA) and replace it with a framework whose substantive content does not yet exist and will not exist when the rule is finalized. A rule that withdraws optimization and defers its replacement to later guidance leaves both licensees and inspectors, for an indeterminate period, with determinate ceilings and nothing between them.

[7] Id. at 43469 (cost-basis of an averted person-rem) and 43470 (guidance "issued subsequent to this rulemaking as part of the NRC's planned two-phased approach"); see also id. at 43478 (§ VI, Availability of Guidance).

III. Inconsistency in Low-Dose Radiobiology (Adaptive Cellular Response).

The Proposed Rule relies on the same body of low-dose radiobiology — adaptive cellular response — in two mutually inconsistent ways. NRDC does not contest the Commission's rejection of hormesis as a regulatory model; the Commission correctly retains the linear no-threshold (LNT) model as "the most appropriate available consensus model."[8] NRDC's objection is that the rule does not hold to its own evidentiary standard.

A. The rule downgrades adaptive cellular response where it would support LNT.

In its LNT reconsideration, the Commission acknowledges that advances in radiobiology have identified mechanisms including "DNA damage response and repair, dose-rate effects, and adaptive cellular responses that complicate simple linear extrapolation," but finds that "no consensus-supported, regulation-ready alternative model to the LNT model exists at this time."[9] Adaptive cellular response is thus placed, by the rule's own classification, on the not-yet-consensus-ready side of the line — a mechanism that merely "complicates" the model without sufficing to modify it.

B. The rule upgrades the same mechanism where it justifies reducing effluent protection.

In the justification for raising the effluent constraint from 10 to 25 mrem/year, the rule invokes the identical mechanism as affirmative evidence for reduced protection: "there is evidence for adaptive cellular response, which would mitigate the health effects of exposures at low doses, especially those resulting from effluents."[10] The same mechanism that elsewhere is too preliminary to adjust the dose-response model is here treated as evidence robust enough to help justify a 150-percent increase in a numerical constraint derived from that model. The rule does not reconcile the two treatments, and the phrase "especially those resulting from effluents" is offered without citation or mechanistic basis.

C. The inconsistency resolves, each time, toward less protection.

The Proposed Rule does not reconcile these two treatments of the same evidence: where crediting the mechanism would preserve a protective model (LNT), the rule discounts it; where crediting it would relax a protective standard (the effluent constraint), the rule credits it. A "weight of scientific evidence" approach cannot mean weighing the same evidence differently depending on which outcome reduces regulatory constraint.

[8]Id. at 43461 (denial of the 2015 petitions for rulemaking, 86 FR 45923 (Aug. 17, 2021); hormesis not supported by "the national and international authoritative scientific advisory bodies") and 43464 ("the linear dose response model is the most appropriate available consensus model").
[9]Id. at 43462.
[10]Id. at 43471.

IV. The Public Dose Limit Is Not "Unchanged": Preserve the Structure Around the 100 mrem/yr Limit.

A. Removal of the numerical ceiling on public-dose variance requests.

The Proposed Rule sets out changes which would enable applicants and licensees to apply for higher dose limits for members of the public who enter the controlled area of a facility and also for the general public. The rule imposes a ceiling on the effluent/controlled-area pathway, this being a proposed restriction that must remain below the public dose limit. Yet, in the case of variances under the revised § 20.1301(d), it takes away the current upper limit of 500 mrem per year for the public dose that a licensee may ask for and replaces it with no numerical ceiling above the 100 mrem per year limit. As a result, the numerical cap which has governed such requests since 1991 is not carried forward. Any licensee or applicant could then, on a case-by-case basis, request a higher public dose limit above 100 mrem per year. A case-by-case variance that is decided as part of a license application is a less protective measure than a bounded, optimized limit and it might also avoid the public notice and hearing opportunities that are applicable to other licensing actions. NRDC asks that the Commission keep in place an explicit numerical ceiling on requests for public-dose variances and also specify the public-participation process in any such request.

B. Removal of the 0.002 rem (2 mrem) in any one hour public dose-rate limit.

The current framework protects members of the public not only through an annual dose limit but through a separate limit on dose rate (the current short-term limit that the dose in any unrestricted area from an external source may not exceed 0.002 rem (2 mrem) in any one hour). The Proposed Rule deletes this dose-rate limit outright, reasoning that a member of the public "could receive the full 100 mrem annual public dose instantaneously and this fact in and of itself would have minimal safety impact."[11] That reasoning treats the annual limit as the only value worth protecting, but the dose-rate cap is a distinct safeguard against brief, intense exposures that an annual figure does not capture. Removing it withdraws protection against short-duration high-dose-rate exposures while the rule discloses only that the annual "limit is unchanged." NRDC requests that the Commission retain the 0.002 rem (2 mrem) in any one hour dose-rate limit, or provide an explicit technical basis that the annual limit alone is adequately protective against transient exposures.

[11] Id. at 43474 (proposing to delete the short-term dose-rate limit of 0.002 rem in any hour in § 20.1301(a)(2) and the reference to 2 mrem in an hour in § 20.1302(b)(2)(ii); reasoning that a member of the public "could receive the full 100 mrem annual public dose instantaneously and this fact in and of itself would have minimal safety impact").

C. The below-analysis threshold and pediatric radiosensitivity.

Under the approach NRC proposes to endorse in guidance, a licensee could satisfy the graded-approach requirement without analyzing projected public doses below 25 percent of the public limit, or 25 mrem/year, and would perform a cost-benefit analysis only for projected doses at or above that threshold.[12] The Commission justifies the 100 mrem/year limit using a population-averaged figure: a lifetime at the full limit adds roughly 0.35 percent to the average lifetime cancer risk.[13] That justification is framed in terms of a "large population"[14] and does not address the greater radiosensitivity of children relative to the working-age adults on whom occupational figures are based. The public dose limit is a cradle-to-grave limit that must protect the most vulnerable members of the exposed population, including children and the embryo/fetus — protections the Commission has previously declined to weaken.[15] NRDC requests that any below-analysis threshold be supported by an explicit demonstration that it is protective for those subpopulations, or lowered accordingly.

D. The cumulative effect belies the "limits are unchanged" framing.

The numerical cap on higher public-dose authorizations is removed, the dose-rate limit is removed, the low-dose optimization duty is removed with ALARA, and no analysis is required below 25 mrem/year. The numerical limit is unchanged, but the regulatory mechanisms that kept realistic public doses at small fractions of it are being withdrawn simultaneously. NRDC requests that the Commission present, in the final rule, the cumulative effect of these changes on realistic public exposure — as the Cumulative Effects of Regulation analysis contemplates[16] — rather than evaluating each change separately based only on the fact that the numerical dose limit remains unchanged.

V. The Planned Occupational Dose Limit Extension Is Both a Substantive Weakening and an Unworkable One.

A. The extension reintroduces multi-year averaging the NRC rejected in 1991.

The Proposed Rule would allow licensees to "manage occupational doses using a multi-year average dose within acceptable limits" in lieu of managing the annual 5 rem limit alone, permitting a worker to receive up to twice the applicable annual limit — 10 rem TEDE — in a

[12] Id. at 43470 (no analysis required for projected public doses below 25 mrem/year; cost-benefit analysis at or above 25 percent of the public dose limit).

[13] Id. at 43469–43470 (a lifetime at the 100 mrem/year limit "would conservatively result in an addition of only 0.35 percent" to the 20 percent average lifetime cancer-mortality risk; BEIR VII Table 12-4).

[14] Id. at 43470 (public dose limit "based on the risk of cancer mortality to a large population that is assumed to be exposed at the full limit for a lifetime").

[15] Id. at 43461 (the 2015 petitions had sought "the ending of the use of lower dose limits for pregnant women, an embryo/fetus, and children under 18 years of age"; the NRC denied the petitions).

[16] Id. at 43479 (§ XI, Cumulative Effects of Regulation).

single year, drawing on "retrospective dose" unused over the preceding five-year (25 rem TEDE) window.[17] This is a substantive change, for two reasons. First, stochastic risk is cumulative: the 5 rem annual limit was set in 1991 so that a worker's radiation-related cancer-mortality risk was "roughly equivalent to the mortality risk experienced by workers in industries not involving radiation exposures,"[18] and concentrating dose in a single year is not rendered risk-neutral by a later low-dose year. Second, the Commission already considered and rejected occupational averaging: the rule recounts that ICRP Publication 60 recommended a five-year-averaged occupational limit and that "the NRC decided not to follow this recommendation in the 1991 rule for exposure of workers, based on the NRC's regulatory experience."[19] The Proposed Rule reintroduces averaging — with a single-year ceiling twice as high as the ICRP's — without explaining why the experience that counseled against averaging in 1991 now supports it.

B. A single-year doubling is in tension with the retained LNT model once optimization is removed.

The Commission retains the LNT model — no threshold, risk proportional to dose[20] — while authorizing a single-year exposure of twice the annual limit (10 rem TEDE). Under LNT it is coherent to set a limit and then optimize beneath it; but the same rulemaking eliminates optimization (ALARA) as an obligation.[21] A framework that both permits a doubled single-year dose under LNT and removes the optimization duty that makes such a limit defensible has not reconciled its own premises. The Commission should explain how a doubled single-year dose is consistent with a no-threshold, proportional-risk model once the optimization counterweight is gone.

C. The extension depends on a multi-year average that cannot reliably be verified.

Even apart from the substantive objection, the extension's central safeguard — the multi-year retrospective average — is only as reliable as the underlying dose record, and for the mobile workforce the extension most affects, that record is not reliably available. The Commission

[17] Id. at 43463 ("manage occupational doses using a multi-year average dose within acceptable limits without having to implement burdensome provisions associated with planned special exposures"); see also proposed § 20.1205, id. at 43494–43495 (dose available equals the unused portion of 5 years × 5 rem TEDE = 25 rem TEDE, minus the actual TEDE received in the current and preceding four years, applied "up to a total dose of twice the applicable annual dose limit in the current year").

[18] Id. at 43459 (the 1991 revisions set the occupational stochastic limit so that "the risk of a worker dying from cancer that resulted from occupational exposure to radiation was roughly equivalent to the mortality risk experienced by workers in industries not involving radiation exposures").

[19] Id. at 43460 (ICRP Publication 60 recommended reducing the occupational limit to 2 rem/year averaged over 5 years, not to exceed 5 rem in any single year; "The NRC decided not to follow this recommendation in the 1991 rule for exposure of workers, based on the NRC's regulatory experience") (emphasis added).

[20] Id. at 43462 (linear dose response model retained; no threshold established, so "as the dose decreases to zero, the corresponding risk follows proportionally to zero").

[21] Id. at 43457, 43468 (removal of ALARA references; replacement with a graded approach to dose management).

recognizes that radiation workers may work in different jurisdictions within the same calendar year, but it does not identify a centralized or interoperable mechanism through which a licensee can verify the worker's doses across employers and jurisdictions.[22]The rule itself requires that, before authorizing an extension, the licensee "ascertains prior occupational doses … during the current year and the preceding four years for each individual involved."[23] That is the same lifetime-history determination the rule elsewhere identifies as a principal reason the analogous planned special exposure process has gone entirely unused since 1991. The United States maintains no centralized, cross-jurisdictional occupational dose registry; dose records are held by individual licensees and institutions, and a worker's history can become difficult or impossible to reconstruct across multiple employers, or when a licensee ceases operations. Specialists who practice across multiple unaffiliated institutions — precisely the workers whose high doses might invoke the extension — are the population whose multi-employer dose history is hardest to consolidate. A dose-management mechanism whose operation turns on a five-year retrospective total that the existing recordkeeping infrastructure cannot reliably supply is, as a practical matter, unworkable as written; at best it will be applied on incomplete records that understate cumulative dose. NRDC requests that the Commission not impose it until a verifiable dose-tracking mechanism exists.

VI. The Effluent Constraint Increase from 10 to 25 mrem/yr Lacks a Demonstrated Basis and a Renewed EPA Ample-Margin Determination.

The rule's own arithmetic shows only that both values are small fractions of the baseline cancer rate, not that 25 mrem/year is adequately protective by contrast to 10. Using NCRP Report 180's coefficient, 70 years at 10 mrem/year yields an excess fatal-cancer risk of 3.5×10^{-4}, and at 25 mrem/year, 8.7×10^{-4} — a 2.5-fold increase in individual excess risk, which the rule characterizes as a "small fraction" of the 0.2 baseline.[24] That framing does not answer why an EPA-supported constraint should be relaxed at all, and it obscures the collective-dose consequence of raising the per-capita ceiling 2.5-fold across affected populations. The rule then reaches beyond its own numbers, invoking low-dose uncertainty and adaptive cellular response — the last of which the

[22]Proposed Rule, 91 FR at 43471 (planned special exposures "have not been used by licensees" since their addition in the 1991 revisions, attributed in part to "the administrative burden associated with PSEs (e.g., determination of lifetime exposure histories …)"); id. at 43483 (proposing to assign proposed § 20.1205 compatibility Category A, which Agreement States must adopt as essentially identical, "in order to protect radiation workers' ability to work in different jurisdictions … [so that] all jurisdictions [have] the same flexibility").

[23]Proposed § 20.1205(c), 91 FR at 43494 (before an extension the licensee "ascertains prior occupational doses as required by § 20.2104(b) during the current year and the preceding four years for each individual involved"); see also proposed § 20.2104(b), id. at 43497.

[24]Id. at 43470–43471 (cancer-risk coefficient of 5×10^{-4} per rem, citing NCRP Report 180, Section 4.1; a 70-year excess fatal-cancer risk of 3.5×10^{-4} at 10 mrem/year and 8.7×10^{-4} at 25 mrem/year; baseline lifetime fatal-cancer risk of approximately 0.2, BEIR VII Table 12-4).

rule elsewhere disclaims as too preliminary to modify its model (see Section III).[25] An effluent constraint increase that rests on evidence the rule elsewhere disclaims has no practical effect and is not a demonstrated safety basis.

B. The proposed change lacks the revised EPA "ample margin of safety" determination on which rescission of the radionuclide NESHAP depends.

The current 10 mrem/year constraint exists because the NRC set it at a level the EPA Administrator could find provided an "ample margin of safety" under Section 112(d)(9).[26] On that basis, EPA rescinded its radionuclide NESHAP for NRC-licensed and Agreement State facilities — formerly 40 CFR part 61, subpart I — in 1996, relieving those licensees from redundant regulation under the Clean Air Act.[27] That rescission was expressly premised on the adequacy of the NRC's regulatory framework, including the 10 mrem/year effluent constraint. EPA supported that determination with studies of 412 facilities, none exceeding 10 mrem/year.[28] The NRC now proposes to raise the constraint to 25 mrem/yr without any renewed EPA determination that 25 mrem/year still provides an ample margin of safety.

The NRC proposal violates the Administrative Procedure Act ("APA") and Clean Air Act. The NRC proposal and the absence of any accompanying EPA proposal fail to address, much less establish, the "ample margin of safety" standard in Clean Air Act section 112(d)(9) prior to the proposed rescission. The NRC proposal lacks the requisite facts, analysis, technical, scientific and legal showings to reflect reasoned decision making under both the APA and the Clean Air Act, and to meet the congressional "ample margin of safety" standard in the Clean Air Act. Moreover, the NRC proposal denies the public the opportunity to see, evaluate, dispute and comment on these requisite factors under the APA and Clean Air Act. The NRC may not cure these basic defects by providing any or all of the requisite information, analysis and showings in any final agency action, because doing so would deny the public legal rights to see, evaluate, dispute and comment on the requisite factors under the APA and Clean Air Act. The only way the NRC may cure these deficiencies (or attempt to do so) is through a new supplemental proposal subject to a minimum public comment opportunity and opportunity for public hearing under the APA and Clean Air Act. The EPA has addressed the Clean Air Act's section 112(d)(9) "ample margin of safety" standard at great length in prior rulemakings and those efforts all have been subject to opportunities for

[25] Id. at 43471; cf. id. at 43462 (adaptive cellular response and DDREF as characterized in the LNT reconsideration).
[26] Id. at 43470 (the NRC set the § 20.1101(d) constraint at a value supporting EPA's Clean Air Act § 112(d)(9) "ample margin of safety" determination); see also NESHAP promulgation at 54 FR 9612 and 54 FR 51654.
[27] EPA rescinded 40 CFR part 61, subpart I ("National Emission Standards for Radionuclide Emissions from … NRC Licensees") as applied to NRC-licensed and Agreement State facilities in 1996, on the basis that the NRC's regulatory program provided an ample margin of safety. See 61 FR 65120 (Dec. 10, 1996) and 61 FR 68981 (Dec. 30, 1996).
[28] Id. at 43470 (EPA studies of air emissions from 412 facilities; most below 1 mrem/year, "with a small percentage of facilities approaching, but none exceeding, 10 mrem/year").

public comment and public hearing. The NRC proposal's failure to do so, and the absence of any accompanying EPA proposal to do so, renders the NRC's proposal arbitrary and capricious beyond the legal failures identified above, by departing without any explanation from the interpretations, analysis, relevant factors, and history of EPA's own treatment of the "ample margin of safety" standard in Clean Air Act section 112(d)(9).

NRDC requests that the Commission complete and document EPA consultation and secure EPA's renewed ample-margin concurrence *before* finalizing any change to the effluent constraint.

VII. Conclusion.

NRDC supports the Commission's effort to modernize the radiation protection framework on an evidence basis and acknowledges that the objectivity of the framework can be improved. The recommendations above are directed to make sure that modernization does not become a net reduction in protection: that optimization is bounded rather than eliminated, that low-dose radiobiology is credited consistently, that the structure around the public dose limit is preserved, that the occupational dose-limit extension is not imposed without the infrastructure it requires, and that the effluent constraint is not relaxed without a demonstrated basis and the EPA concurrence the Clean Air Act requires. NRDC welcomes the opportunity for further technical discussion as the Commission proceeds toward a final rule.

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