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August 28, 2026

Chairman Nieh
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Rulemakings and Adjudications Staff

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

Comments Supporting Replacement of ALARA and Further Review of Radiation Dose Limits and the Linear No-Threshold Model

Dear Chairman Nieh,

The America First Policy Institute (AFPI) respectfully submits these comments on the U.S. Nuclear Regulatory Commission's (NRC or Commission) proposed rule, "Reforming and Modernizing the NRC's Radiation Protection Framework." AFPI is a nonprofit, nonpartisan research institute dedicated to advancing policies that promote American prosperity, security, and energy abundance. Because a reliable, rapidly expanding nuclear sector is central to meeting projected load growth and keeping energy affordable, AFPI has a strong interest in a radiation-protection framework that protects workers and the public while removing open-ended obligations that raise costs and slow deployment without measurable safety benefit. AFPI has previously called for reconsideration of the "as low as is reasonably achievable" (ALARA) principle as part of broader reforms to facilitate nuclear deployment.[1]

Executive Summary

AFPI supports the proposed rule and offers three recommendations:

First, the NRC should finalize its proposal to replace the ALARA principle with an objective, graded dose-management framework while retaining the existing baseline public and occupational dose limits. As the Commission itself has found, ALARA's implementation has "at times resulted in significant economic costs and operational and licensing inefficiencies without commensurate public health and safety gains."2

Second, the NRC should separately initiate a review of whether the principal public and occupational dose limits relevant to reactors, fuel-cycle facilities, waste management, and decommissioning remain scientifically and operationally appropriate. AFPI supports retaining the current limits in this rulemaking,

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[1] See Oliver McPherson-Smith, *Five Steps Toward an American Nuclear Renaissance*, Am. First Pol'y Inst. (Sept. 13, 2023) (recommending that the NRC study the continuing debate over the appropriateness of ALARA and reconsider the standard in light of current scientific evidence); Am. First Pol'y Inst., *Nuclear Moratoria: Barriers to Affordable, Reliable Power* (Nov. 24, 2025) (arguing that rising electricity demand increases the need for firm nuclear generation and that barriers to new nuclear development can raise costs and strain reliability); Ted Ellis & David Vasquez, *Small Modular Reactors & Microreactors*, Am. First Pol'y Inst. (Mar. 12, 2026) (recommending that the NRC revisit the ALARA standard in light of the latest research and propose an alternative standard or standards if ALARA is no longer appropriate).

[2] Reforming and Modernizing the NRC's Radiation Protection Framework, 91 Fed. Reg. 43,456, 43,462 (proposed July 15, 2026) (Docket No. NRC-2025-1140; RIN 3150-AL47) [hereinafter Proposed Rule].

but the Commission's extensive operating experience, including decades of occupational-exposure data, warrants a distinct, time-bound reassessment.

Third, the NRC should commission a structured, time-bound scientific reassessment of whether the linear no-threshold (LNT) model remains the best-supported dose-response model at low doses, or whether the evidence better supports a threshold, hormetic, or other dose-response model. This review should include a formal challenge process in which qualified critics and defenders of LNT present their strongest cases to an independent body.

Together, these recommendations would modernize the NRC's radiation-protection framework in two stages. Finalizing the proposed ALARA reform would correct an immediate regulatory defect; separate reviews of the dose limits and LNT would address the scientific premises that should govern radiation regulation over the longer term.

I. AFPI's Interest in the Radiation-Protection Framework

A. Modern radiation protection is essential to the energy buildout.

The United States faces significant electricity load growth driven by data centers, manufacturing, and electrification, at the same time that policymakers are prioritizing affordability and, increasingly, reliability.[3] Nuclear energy is among the few sources that can meet this demand with a small land footprint and a high capacity factor; it also has among the lowest lifecycle carbon emissions of any generation source.[4] Federal policy now expressly seeks a major expansion of U.S. nuclear capacity and faster deployment of advanced reactors, reflected in a package of Executive Orders issued May 23, 2025, including Executive Order 14300, "Ordering the Reform of the Nuclear Regulatory Commission."[5]

AFPI's comments focus on the energy applications of the radiation-protection framework: reactors and advanced reactors, fuel-cycle facilities, radioactive-waste management, and decommissioning. Radiation-protection rules reach every stage of the nuclear enterprise: design, construction, maintenance, outage work, operations, cleanup, and waste handling. Therefore, they directly affect both the cost and the pace of deployment. The NRC's broader reform agenda, including risk-informed, technology-inclusive reactor licensing under Part 53, depends on a radiation-protection framework that is itself risk-informed and performance-based.[6] AFPI has likewise urged that advanced-reactor regulation be calibrated to actual risk

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[3] N. Am. Elec. Reliability Corp., *2025 Long-Term Reliability Assessment* 9, 16, 24–28 (Jan. 2026) (reporting that electricity peak-demand and energy-growth forecasts are rising faster than at any point in the past two decades; that new data centers account for most projected North American electricity-demand growth over the next decade; and identifying electrification, industrialization, and manufacturing loads as additional demand drivers).

[4] U.S. Dep't of Energy, Office of Nuclear Energy, *5 Fast Facts About Nuclear Energy* (May 7, 2025) (reporting that U.S. nuclear power plants operated at full capacity more than 92% of the time in 2023); U.S. Dep't of Energy, Office of Nuclear Energy, *3 Reasons Why Nuclear Is Clean and Sustainable* (Mar. 31, 2021, updated June 2022) (noting that nuclear energy produces more electricity on less land than any other clean-air source and that a typical 1,000-megawatt U.S. nuclear facility requires slightly more than one square mile); Int'l Atomic Energy Agency, Climate Change and Nuclear Power 2016 2 (2016) (noting that nuclear power, together with hydropower and wind, is among the lowest greenhouse-gas-emitting electricity sources on a lifecycle basis).

[5] Exec. Order No. 14,300, *Ordering the Reform of the Nuclear Regulatory Commission*, 90 Fed. Reg. 22,587, 22,588 (May 29, 2025) (directing the NRC to "facilitate the expansion of American nuclear energy capacity from approximately 100 GW in 2024 to 400 GW by 2050" and to facilitate deployment of new reactor technologies). Companion orders issued the same day address advanced-reactor deployment and the nuclear fuel cycle.

[6] See 10 C.F.R. pt. 53 (risk-informed, technology-inclusive regulatory framework for commercial nuclear reactors, including advanced reactors).

and that radiation standards, including LNT and ALARA, reflect current science.[7] That approach is consistent with AFPI's broader regulatory-reform work, which has called for regulatory requirements to be proportionate to real-world risk while preserving substantive protections.[8]

II. The NRC Should Finalize the Replacement of ALARA With an Objective, Graded Framework

A. ALARA has become an open-ended below-limit obligation.

Under current regulations, ALARA operates as a separate expectation below the established dose limits: even after a licensee satisfies every applicable regulatory limit, it must continue to ask whether doses could be reduced still further. The Commission has diagnosed the problem precisely. In the proposed rule, the NRC explains that the reasonableness test "that is supposed to be inherent to ALARA-related decision-making has gradually become an expectation that if a means of dose reduction is available, regardless of its reasonableness in relation to the total dose and the amount of reduction, it should be applied without further consideration."[9] The Commission found that this dynamic has "at times resulted in significant economic costs and operational and licensing inefficiencies without commensurate public health and safety gains."[10]

The NRC further observed that ALARA's implementation lacks "a reasonable stopping point," producing outcomes that are "overly conservative" and that "can significantly undervalue the benefits of activities when compared to their risks, sometimes at great economic costs or stifling of innovation."[11] The agency concluded that its implementation of ALARA "has led to regulatory burden that is not commensurate with the resulting public health and safety benefit and that is not consistent with the original intent of the ALARA principle."[12] These findings supply ample basis to finalize the reform. Measures aimed at driving one already-small risk still lower can create offsetting risks or divert resources from other safety improvements. As the risk-tradeoff literature has observed, overestimating low-dose risk "upsets the careful balancing of risks required of risk managers."[13] An obligation to pursue reductions "without a reasonable stopping point" invites precisely that distortion.

B. The graded approach is the better regulatory model.

The proposed framework would replace the open-ended ALARA obligation with a graded approach to dose management: Licensees would manage doses to levels below the retained regulatory limits in a manner scaled to risk and operational circumstances. This is a better fit for a risk-informed, performance-

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[7] See Am. First Pol'y Inst., *AFPI Urges Congress to Advance Nuclear Energy* (Apr. 2, 2026) (urging risk-informed, performance-based advanced-reactor regulation and recommending that radiation-safety standards, including LNT and ALARA, reflect current science).
[8] See Ted Ellis, Joshua Antonini & David Vasquez, *Building Energy Dominance: A Near-Term Permitting Agenda*, Am. First Pol'y Inst. (June 9, 2026) (arguing that regulatory review should be proportionate to real-world risk and that unnecessary process burdens can delay energy and industrial infrastructure without producing corresponding public benefits).
[9] Proposed Rule, *supra* note 2, at 43,462.
[10] Proposed Rule, *supra* note 2, at 43,462.
[11] Proposed Rule, *supra* note 2, at 43,462.
[12] Proposed Rule, *supra* note 2, at 43,463.
[13] Dima Yazji Shamoun, Edward Calabrese, Richard A. Williams & James Broughel, *Regulation Under Uncertainty: Use of the Linear No-Threshold Model in Chemical and Radiation Exposure*, abstract (Mercatus Ctr. Working Paper, Sept. 2016).

based regulatory philosophy. The compliance obligation should be tied to defined precautions and enforceable limits, not to an indefinite and inherently subjective duty to pursue ever-lower exposure.

Importantly, the proposed rule retains the existing baseline dose limits. The reform does not abandon those baseline limits; rather, it removes a below-limit expectation that the Commission has found to be subjective, susceptible to inconsistent enforcement, and prone to imposing costs disproportionate to safety benefit. The NRC's draft regulatory analysis estimates that the proposed rule as a whole would save industry approximately $9.53 million annually at a 7% discount rate; it also identifies benefits and savings that could not be quantified, so the quantified figure does not capture the full economic effect of the reform.[14]

C. Related flexibilities appropriately distinguish regulatory limits from risk thresholds.

The proposed planned occupational dose-limit extension applies the same principle in a concrete setting. Annual occupational dose limits necessarily translate longer-term radiation risks into administrable yearly limits; they do not establish a biological boundary at which a modest additional increment of exposure suddenly becomes unsafe. Where a worker has received substantially less than the permitted dose over preceding years, rigid adherence to the annual allocation can require additional staffing, temporary shielding, or other changes to planned maintenance even though cumulative exposure remains controlled. The proposed extension would permit limited use of that unused multiyear dose capacity, while retaining a five-year cumulative limit, restricting exposure in any single year, requiring advance authorization and risk disclosure, and excluding minors and declared pregnant workers.[15] AFPI supports this flexibility because it allows operational decisions to reflect cumulative exposure and actual risk rather than treating the annual limit as an artificial cliff.

AFPI likewise supports the proposal to permit licensees to use a 25-mrem annual constraint for radionuclide effluents in place of the existing 10-mrem constraint.[16] A regulatory constraint set well below an already protective dose limit should have an identifiable function. If the constraint can be raised from 10 to 25 mrem while preserving a substantial margin below the public dose limit and continuing to trigger additional oversight well before that limit is approached, retaining the lower threshold merely because it is more conservative is difficult to justify.

D. Relevance across the nuclear energy sector.

Radiation-protection requirements translate directly into the engineering, labor, and schedule of nuclear projects. Site-specific decommissioning cost estimates submitted to the Commission demonstrate this: For example, the decommissioning analysis for Oyster Creek implements ALARA through work-duration adjustments for radiological-protection instruction, mock-up training, respiratory protection, protective clothing, and related controls. These measures can make radiological work take longer, increasing labor costs and potentially extending project schedules.[17]

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[14] Proposed Rule, *supra* note 2, at 43,457.
[15] Proposed Rule, *supra* note 2, at 43,471–73.
[16] Proposed Rule, *supra* note 2, at 43,470–71.
[17] See TLG Services, Inc., *Decommissioning Cost Analysis for the Oyster Creek Nuclear Generating Station*, E16-1726-001, Rev. 0, at 3-15–3-16 (Mar. 2016) (explaining that the study implements ALARA through work-duration adjustment factors for

These costs are not necessarily unwarranted. Radiation-protection measures can provide important health and safety benefits, which naturally incur a cost. The relevant question is what standard determines when another increment of dose reduction justifies additional engineering, worker hours, training, work controls, or project time. Where exposure is already controlled below applicable dose limits, an open-ended obligation or even perceived expectation to pursue still-lower doses can make that stopping point difficult to identify.

That distinction has meaningful consequences for reactor operations, decommissioning, fuel-cycle activities, and radioactive-waste management. A graded framework can preserve appropriate radiation protections while more clearly tying additional regulatory effort to the significance of the underlying risk. Technical or economic feasibility of a further dose reduction should not, standing alone, be sufficient reason to require the additional expenditure.

III. The NRC Should Separately Review the Principal Dose Limits

A. Retain the current limits in this rulemaking, but review them separately.

The proposed rule appropriately retains the current dose limits while changing the below-limit dose-management framework. AFPI supports retaining the limits for purposes of this rulemaking. At the same time, we ask the Commission to initiate a separate review of whether the principal public and occupational limits remain scientifically and operationally appropriate in light of modern evidence and dose-assessment methods. Retaining the limits now and reviewing them later are complementary, not contradictory: The reform can proceed without delay while the deeper question receives the deliberate, evidence-based treatment it deserves. The proposed rule itself reflects the same premise. The Commission recognizes that the generic public dose limit may be overly conservative in particular circumstances and proposes allowing higher limits on a case-by-case basis where an applicant demonstrates reasonable assurance of adequate protection of public health and safety.[18] AFPI supports that flexibility, which further illustrates the value of separately reviewing whether the generic limit remains appropriately calibrated.

B. The NRC's operating experience should inform the review.

The Commission possesses an unusually rich body of real-world exposure data. Its occupational-exposure reporting spans reactors, fuel-cycle facilities, independent spent-fuel storage installations, and other categories. The most recent reporting shows that the adjusted average measurable total effective dose equivalent was approximately 1.6 millisieverts (0.16 rem) in 2024—far below the general annual occupational limit of 50 millisieverts (5 rem).[19] Underlying reactor data provide additional context: average annual collective dose was approximately 53 person-rem per light-water reactor in 2024. This does not by itself prove that any particular limit is set incorrectly, but it does demonstrate that the NRC

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radiological-protection instruction, mock-up training, respiratory protection, and protective clothing, which increase task duration and cost; ALARA planning is also reflected in engineering, planning, activity specifications, and detailed procedures).

[18] Proposed Rule, *supra* note 2, at 43,473–74 (demonstrating reasonable assurance of adequate protection of public health and safety).

[19] U.S. Nuclear Regulatory Comm'n, *NUREG-0713, Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities 2024: Fifty-Seventh Annual Report*, vol. 46, at iv, tbl. 4-3 (Mar. 2026); 10 C.F.R. § 20.1201(a)(1)(i).

has extensive, directly relevant operating data with which to assess whether the current limits remain appropriate.

C. Natural-background and high-background exposure are relevant context.

Natural-background radiation varies widely by geography, and high-background regions such as Kerala (India), Ramsar (Iran), Guarapari (Brazil), and Yangjiang (China) have long been identified as areas of high natural background radiation, where absorbed dose rates may reach hundreds to thousands of nanograys per hour.[20] More broadly, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimates that the average annual effective dose to the public from natural radiation sources ranges from approximately 1 to 14 millisieverts.[21] By comparison, NRC reporting indicates that the median dose to members of the public from radioactive effluents from U.S. nuclear power plants is typically less than 1 millirem (0.01 millisievert) per year.[22]

The extensively studied Karunagappally cohort in Kerala now includes 149,585 residents followed for an average of 19.1 years; the 2021 update found no significant association between cumulative natural-background radiation dose and cancer excluding leukemia or any site-specific cancer.[23] Low-dose epidemiology more generally continues to face the design limitations that the National Academies has emphasized in calling for renewed research.[24] AFPI offers this as illustrative context supporting renewed review; we do not suggest that high-background epidemiology, standing alone, proves the existence of a threshold. A 2025 Idaho National Laboratory (INL) technical review provides an additional reason for a focused reassessment. The review concluded that the balance of available scientific evidence indicates that annual dose rates of 5,000 mrem or less have not been shown to produce detectable increases in adverse health outcomes and identified "substantial" evidence suggesting that even 10,000 mrem per year may retain a reasonable safety margin.[25] INL recommended retaining the 5-rem annual occupational limit while eliminating ALARA below it and recommended increasing the general public limit from 100 to 500 mrem per year. The NRC discusses the same report in this proposed rule.[26] AFPI does not ask the Commission to adopt those numerical recommendations on the present record but does suggest that the existence of a technically developed alternative assessment reinforces the case for direct evaluation of whether the principal limits remain appropriately calibrated.

D. Requested action.

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[20] U.N. Sci. Comm. on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation: UNSCEAR 2000 Report to the General Assembly, with Scientific Annexes*, vol. I, Annex B, at 121 tbl. 11 (2000) (identifying Guarapari, Yangjiang, Kerala, and Ramsar as areas of high natural radiation background and reporting absorbed dose rates reaching hundreds to thousands of nanograys per hour).
[21] U.N. Sci. Comm. on the Effects of Atomic Radiation, *Sources, Effects and Risks of Ionizing Radiation: UNSCEAR 2024 Report*, vol. II, Scientific Annex B, *Evaluation of Public Exposure to Ionizing Radiation*, at 179–81 & fig. XXIX (2025).
[22] U.S. Nuclear Regulatory Comm'n, NUREG/CR-2907, *Radioactive Effluents from Nuclear Power Plants: Annual Report 2018* 2-4 (Nov. 2020), ADAMS Accession No. ML20325A229 (noting that the median public dose from radioactive effluents is typically less than 1 mrem per year).
[23] Jayalekshmi Padmavathy Amma et al., *Background Radiation and Cancer Excluding Leukemia in Kerala, India—Karunagappally Cohort Study*, 10 Radiation Environment and Medicine 74, 74, 78 (2021).
[24] Nat'l Acads. of Scis., Eng'g & Med., *Leveraging Advances in Modern Science to Revitalize Low-Dose Radiation Research in the United States* (2022) [hereinafter National Academies].
[25] John C. Wagner et al., *Reevaluation of Radiation Protection Standards for Workers and the Public Based on Current Scientific Evidence*, INL/RPT-25-85463, Revision 0, at 35 (Idaho Nat'l Lab., July 2025).
[26] Proposed Rule, *supra* note 2, at 43,473.

The NRC should initiate a time-bound review of the principal dose limits relevant to nuclear-energy activities, drawing on current epidemiology, its own operating experience, natural-background and high-background evidence, and modern dose-assessment methods.

IV. The NRC Should Continue Testing the Scientific Basis for LNT

A. The NRC's present conclusion on LNT warrants continued independent scientific testing.

The Commission has reconsidered LNT in this rulemaking and concluded that the available evidence is insufficient to refute its use for stochastic health effects. The Commission also reaffirmed the linear dose-response model as the most appropriate available consensus model for formulating radiation-protection standards. Specifically, the Commission acknowledges that "no consensus-supported, regulation-ready alternative model to the LNT model exists at this time"—a statement about the present state of regulatory readiness, not a finding that the underlying science is settled.[27] Indeed, the Commission recognizes that advances in radiobiology have identified mechanisms such as DNA damage response and repair, dose-rate effects, and adaptive cellular responses that "complicate simple linear extrapolation."[28] Those findings support a focused, independent reassessment designed not to presume that LNT is wrong, but to test whether the Commission's present conclusion remains the best-supported interpretation of the evidence. A focused reassessment would also continue the science-based reconsideration directed by Executive Order 14300, section 5(b), while applying the weight-of-scientific-evidence approach the NRC states it used in this rulemaking.[29]

B. The National Academies supports renewed low-dose research.

The National Academy of Sciences, Engineering, and Medicine has called for a revitalized U.S. research program on low-dose and low-dose-rate radiation effects, focusing on exposures below about 100 milligray or at dose rates below roughly 5 milligray per hour.[30] Significantly, this is the very range in which health effects and biological mechanisms remain incompletely understood. A renewed NRC review should be coordinated with, and informed by, that research effort.

C. Recent epidemiology and mechanistic evidence should be evaluated directly.

A credible review must engage the strongest evidence on all sides. Recent occupational epidemiology—including the International Nuclear Workers Study (INWORKS) cohort of workers in France, the United Kingdom, and the United States—reports a positive dose-response association between cumulative low-dose exposure and solid-cancer mortality. It should be evaluated directly, including the dose-estimation uncertainties, potential confounding, and sensitivity analyses addressed by the authors, as well as methodological critiques that have been raised against it.[31] A distinct body of occupational evidence

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[27] Proposed Rule, *supra* note 2, at 43,462–64.
[28] Proposed Rule, *supra* note 2, at 43,462.
[29] Exec. Order No. 14,300, *supra* note 5, § 5(b), 90 Fed. Reg. at 22,589 (directing reconsideration of LNT and ALARA and consideration of determinate radiation limits); Proposed Rule, *supra* note 2, at 43,456 (describing the NRC's approach as a "weight of scientific evidence decision-making approach" under Executive Order 14303).
[30] National Academies, *supra* note 22, at 1–2, 4–6 (defining a "low dose" as below 100 mGy and a "low dose rate" as below 5 mGy per hour, concluding that health effects and biological mechanisms at low doses and dose rates remain incompletely understood, and calling for a revitalized U.S. low-dose radiation research program).
[31] David B. Richardson et al., Cancer Mortality After Low Dose Exposure to Ionising Radiation in Workers in France, the United Kingdom, and the United States (INWORKS): Cohort Study, 382 BMJ e074520 (2023) (estimating a 0.52 excess relative rate per

comes from the U.S. Naval Nuclear Propulsion Program. Large studies of submariners and nuclear shipyard personnel provide an additional body of low-dose evidence. The Program's 2025 overview summarizes studies involving more than 85,000 submariners and more than 370,000 shipyard workers that did not identify cancer risks linked to radiation exposure. The original Nuclear Shipyard Worker Study and subsequent Johns Hopkins analyses have expanded that shipyard evidence base to 437,937 workers, including recent studies of lymphohematopoietic cancer and solid-tumor mortality at low occupational doses. This evidence should be evaluated alongside INWORKS in assessing the evidence at low doses and low dose rates.[32] At the same time, evidence about how cells and tissues respond biologically to low-dose radiation, including DNA repair, adaptive response, inflammation, genomic instability, and effects in nearby non-irradiated cells, is relevant to determining the shape of the dose-response relationship in the low-dose region. The UNSCEAR 2020/2021 review documents these mechanisms while also emphasizing that many of their implications for cancer-risk inference remain uncertain or difficult to quantify. [33] That residual uncertainty reinforces the case for continuing to test whether a strictly linear, no-threshold relationship remains the best-supported description of risk in the low-dose region. The historical scholarship examining how LNT became the default model, including competing and recent accounts of the scientific judgments and institutional dynamics in that adoption, is also properly part of the record for review.[34]

D. The review should compare LNT with alternatives.

The review should compare LNT against threshold, hormetic, adaptive-response, linear-quadratic, dose-rate-dependent, and other plausible models, and should ask not merely whether LNT is defensible as a cautious default but whether it is the best-supported description of risk in defined dose ranges.[35] If LNT

Gy for solid-cancer mortality, 90% CI 0.27–0.77); Richard Wakeford, Twenty-first Annual Warren K. Sinclair Keynote Address: Challenges Faced by Studies of Nuclear Industry Workers, 45 J. Radiol. Prot. 041001 (2025) (discussing interpretive issues in INWORKS involving potential bias and confounding, period-of-hire differences, internal-emitter exposures, dose-response shape, and dosimetric uncertainty).

[32] U.S. Naval Nuclear Propulsion Program, *2025 United States Naval Nuclear Propulsion Program* 31 (2025) (summarizing studies of approximately 76,000 submariners, a subsequent cohort of more than 85,000 submariners, and studies of more than 70,000 and later more than 370,000 nuclear-shipyard workers, and reporting that the studies did not show cancer risks linked to radiation exposure); Genevieve M. Matanoski et al., *Health Effects of Low-Level Radiation in Shipyard Workers*, Final Report, DOE/EV/10095-T2 (Johns Hopkins Univ. June 1991); T.J. Mueller, G.A. Caskey & D.R. Tyson, U.S. Naval Nuclear Propulsion Program, Report NT-26-3, *Occupational Radiation Exposure from Naval Reactors' Department of Energy Facilities 2025* 48–50 (May 2026) (discussing the 2022 Johns Hopkins update involving 372,047 shipyard workers and the 2024 analyses expanding the study population to 437,937 workers); Xuguang (Grant) Tao, Frank C. Curriero & Mahadevappa Mahesh, *Low-Dose Radiation Risks of Lymphohematopoietic Cancer Mortality in U.S. Shipyard Workers*, 201 Radiation Research 586, 586–603 (2024); Xuguang (Grant) Tao, Frank C. Curriero & Mahadevappa Mahesh, *Low Dose Radiation and Solid Tumors Mortality Risk*, 66 Journal of Occupational & Environmental Medicine e230, e230–e237 (2024).

[33] U.N. Sci. Comm. on the Effects of Atomic Radiation, Sources, Effects and Risks of Ionizing Radiation: UNSCEAR 2020/2021 Report, vol. III, Scientific Annex C, Biological Mechanisms Relevant for the Inference of Cancer Risks from Low-Dose and Low-Dose-Rate Radiation, at 158–62 (2021).

[34] See, e.g., Edward J. Calabrese, Muller's Nobel Prize Lecture: When Ideology Prevailed Over Science, 126 Toxicological Scis. 1 (2012); Paul B. Selby & Edward J. Calabrese, How Self-Interest and Deception Led to the Adoption of the Linear Non-Threshold Dose Response (LNT) Model for Cancer Risk Assessment, 898 Sci. Total Env't 165402 (2023). See also John J. Cardarelli II, Barbara Hamrick, Daniel Sowers & Brett Burk, The History of the Linear No-Threshold Model and Recommendations for a Path Forward, 124 Health Physics 131 (2023); for a contrary assessment, see Jan Beyea, False and Misleading Claims of Scientific Misconduct in Early Research into Radiation Dose-response: Part 1. Overlooking Key Historical Text, 128 Health Physics 507 (2025).

[35] For representative critiques of LNT at low doses, see, e.g., John J. Cardarelli II & Brant A. Ulsh, *It Is Time to Move Beyond the Linear No-Threshold Theory for Low-Dose Radiation Protection*, 16 Dose-Response 1559325818779651 (2018); Brant A. Ulsh, *A Critical Evaluation of the NCRP Commentary 27 Endorsement of the Linear No-Threshold Model of Radiation Effects*, 167 Env't Rsch. 472 (2018); Antone L. Brooks et al., *How the Science of Radiation Biology Can Help Reduce the Crippling Fear of*

materially overstates or mischaracterizes risk within a defined range, the NRC should not continue to rely on it to impose regulatory burdens in that range. Any additional margin of protection the Commission wishes to retain should be identified openly as a policy judgment—consistent with the longstanding distinction between risk assessment and risk management—rather than embedded within a dose-response model that the evidence no longer supports. Identification of a biological threshold, if supported, would not itself determine the appropriate regulatory dose limit. The scientific review should determine the best-supported dose-response relationship; the NRC should then evaluate regulatory limits separately in light of the magnitude of risk above any threshold, operating experience, and the Commission's adequate-protection standard. As commentators across this debate have emphasized, blurring the line between scientific estimation and policy choice ultimately undermines both.[36]

E. The review should include a structured challenge process.

Executive Order 14303 calls for federal scientific work to communicate error and uncertainty, remain skeptical of findings and assumptions, apply a weight-of-scientific-evidence approach, and provide for consideration of different or dissenting viewpoints.[37] Consistent with those principles, AFPI recommends a formal challenge phase in which qualified experts representing materially different interpretations of the low-dose evidence present their strongest cases; those competing analyses are subjected to direct response; and an independent body synthesizes the evidence and identifies the regulatory implications. Structuring the review this way would test assumptions without making the process outcome-driven and would produce a defensible record whatever the conclusion.

F. Requested action.

If, at the conclusion of the review, a threshold, hormetic, or other dose-response model is better supported by the evidence in a defined range, the NRC should initiate appropriate regulatory changes. If the review concludes that LNT remains the best-supported model for regulatory purposes, the review will have strengthened the scientific foundation of the existing framework.

V. Conclusion

AFPI urges the Commission to finalize the replacement of ALARA with an objective, graded dose-management framework now; to separately initiate a time-bound review of the principal dose limits relevant to nuclear-energy regulation; and to commission a structured reassessment of LNT and plausible alternatives, including a formal challenge process. Each step advances the same goal. The NRC can modernize radiation regulation while maintaining reasonable assurance of adequate protection by replacing an open-ended and subjective duty of precaution with clearer, enforceable rules, and by

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Low-Level Radiation, 124 Health Physics 407 (2023). For assessments supporting continued use of LNT for radiation protection, see Nat'l Rsch. Council, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (2006); Nat'l Council on Radiation Prot. & Measurements, *Implications of Recent Epidemiologic Studies for the Linear-Nonthreshold Model and Radiation Protection*, Commentary No. 27 (2018).

[36] James Broughel, *Myths and Facts in Radiation Risks: A Simple Solution to Remove Obstacles to Nuclear Power* 14 (Competitive Enter. Inst. 2024) ("This blurring of lines between risk assessment and risk management, between science and science policy, acts to the detriment of science ...."); Kenneth L. Mossman, *The LNT Debate in Radiation Protection: Science vs. Policy*, 10 Dose-Response 190 (2012); see Nat'l Rsch. Council, *Risk Assessment in the Federal Government: Managing the Process* (Nat'l Acads. Press 1983) (distinguishing scientific risk assessment from risk-management decision-making).

[37] Exec. Order No. 14,303, Restoring Gold Standard Science, §§ 3(a)(iii), (v), 4(f), 5(b)(ii), 90 Fed. Reg. 22,601, 22,602–04 (May 29, 2025).

ensuring that the next generation of radiation-protection standards rests on the best available evidence. Doing so will protect workers and the public while removing needless costs and delay from the nuclear buildout the Nation now urgently needs.

AFPI appreciates the opportunity to comment and welcomes the chance to provide further information.

Respectfully submitted,

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