U.S. Federal Oversight of Nuclear Reactors by NRC, DOE, and DoD

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I. Introduction

Federal oversight of nuclear reactors in the United States sits at the complex intersection of law, national security imperatives, and civilian regulatory independence. Since the passage of the Atomic Energy Act of 1954 (AEA) as amended by the Energy Reorganization Act of 1974, any "Person" must have a federal license issued by the Nuclear Regulatory Commission (NRC) for activities involving a nuclear reactor. The AEA defines a "Person" broadly but excludes the Department of Energy (DOE) and its contractors. Similarly, the Department of Defense (DoD)[1] and its contractors are exempted from licensing when so designated by the President. Therefore, over the past five decades, a framework has developed that distinguishes between commercial reactor projects that are licensed by NRC and reactor projects for government purposes that can be authorized by DOE and DoD (when directed by the President). While the NRC was created to be an independent regulatory agency, DOE and DoD have historically exercised oversight of reactors for defense, research, and experimental purposes.

In May 2025, the Trump Administration issued a series of executive orders (EOs) that collectively aim to accelerate nuclear energy deployment across federal agencies. The EO most consequential to nuclear regulation, "Ordering the Reform of the Nuclear Regulatory Commission," requires the NRC to reform many of its rules and regulations. Of most relevance to this brief, the EO requires NRC to expedite review of reactor designs already tested by DOE or DoD, focusing only on risks "not already addressed" by those agencies.[2] A companion EO, "Deploying Advanced Nuclear Reactor Technologies for National Security," directs DoD to deploy an advanced reactor regulated by the Army to provide installation and operational energy on a military base by 2028, in coordination with DOE.[3] Another EO, "Reforming Nuclear Reactor Testing and the Department of Energy" assigns DOE greater control over test reactor development and approval pathways; it directs the Secretary of Energy develop "expedited procedures" to enable "qualified test reactors" to be safely operational at DOE-owned or -controlled sites within two years of submittal of a substantially qualified application".[4] Furthermore, it directs the Secretary to approve at least three reactors by July 4, 2026.[5] These directives underscore the need for clarity on processes across all three agencies, as well as the interfaces between them.

[1] This brief uses the official designation "Department of Defense" to maintain consistency with statutory references and cited authorities.
[2] The White House | Executive Order 14300 | Ordering the Reform of the Nuclear Regulatory Commission
[3] The White House | Executive Order 14299 | Deploying Advanced Nuclear Reactor Technologies for National Security
[4] The White House | Executive Order 14301 | Reforming Nuclear Reactor Testing and the Department of Energy
[5] Ibid.

This brief examines the legal and historical context, tracing the statutes that assign authority for NRC to license and regulate commercial nuclear reactors; for DOE to design and "authorize" nuclear reactors for research activities (with Idaho National Laboratory as the authorization holder); and for DoD to permit the design and operation of nuclear reactors for military use. It also explores interagency interfaces, agreements, and delegations, which shape the coordination of nuclear reactor oversight.

II. The Rise and Fall of AEC

The Atomic Energy Commission (AEC) was established through the enactment of the Atomic Energy Act of 1946 (AEA46), about a year after the end of World War II.[6] Born in an era of postwar optimism, the AEC was established as a non-military commission with sole control over atomic energy use and development. The creation of the AEC reflected Congress's vision that atomic energy should not only be under civilian control while expanding beyond national defense applications, but also serve to advance public welfare, promote world peace, and foster competition in the private sector.[7] In the beginning, secrecy around nuclear energy activities was paramount. The 1946 Act placed control of atomic energy firmly in the hands of the federal government, justified by security concerns and the immense destructive potential of nuclear weapons. While the Act envisioned eventual private sector participation, its structure maintained tight federal oversight.

The Atomic Energy Act of 1954 (AEA54) marked a turning point, opening the door for private sector involvement in the peaceful use of nuclear energy. Through initiatives such as the Cooperative Power Reactor Demonstration Program,[8] which offered cost-sharing mechanisms for reactor deployment, Congress incentivized utilities and industry to engage in nuclear energy development.[9] The 1957 Price-Anderson Act further encouraged participation by creating an insurance and liability framework, thereby lowering risks for private investors. Furthermore, in 1958, Public Law 85-804 was signed into law, allowing the AEC, as the contracting agency, to enter into, amend, or modify contracts without regard to certain provisions of law when such actions were deemed necessary to facilitate the national defense.[10] Public Law 85-804 not only allows extraordinary relief not specified in a contract but also provides for Government indemnification in a contract in anticipation of third-party claims. Practically, this provided another means of shared contractual risk, enabling the AEC to offer protections and advance payments that reduced barriers for contractors undertaking defense-related — in this case, nuclear — projects. Yet, this rapid

[6] Department of Energy | A History of the Atomic Energy Commission
[7] Ibid.
[8] National Reactor Innovation Center | Lessons from the Cooperative Power Reactor Demonstration Program (CPRDP) to Renew U.S. Nuclear Leadership
[9] Nuclear Regulatory Commission | A Short History of Regulation1946–2009
[10] GovInfo | PUBLIC LAW 85-804-AUG. 28, 1958

expansion of the civilian nuclear sector underscored a fundamental flaw in the AEC's structure: the AEC bore dual and often conflicting responsibilities to promote nuclear power while also regulating its safety.

This tension was starkly illustrated in the case of the Power Reactor Development Company (PRDC), a consortium of utilities that applied in 1956 to construct a fast breeder reactor that would later be known as Fermi 1 in Monroe County, Michigan. The Advisory Committee on Reactor Safeguards (ACRS), an expert body established to advise the AEC, warned in an internal report that there was "insufficient information available at this time to give assurance that the PRDC reactor can be operated at this site without public hazard." [11] Despite these concerns, the AEC withheld the ACRS report from both the congressional Joint Committee on Atomic Energy (JCAE) and the Governor of Michigan. Further controversy arose when AEC Chairman Lewis Strauss attended the groundbreaking ceremony for Fermi 1, a public demonstration of assurance while the license application remained under review. The AEC ultimately issued a "conditional" construction permit, revealing the challenge of balancing the conflicting issues of promotion and regulation.[12]

The JCAE took note of these conflicting interests and asked its staff to propose reforms. Three ideas emerged: requiring public hearings before granting or denying construction permits, making reactor safety reports public upon completion, and separating the AEC's regulatory and promotional duties. The first two reforms were incorporated in the amended AEA of 1957. However, the Committee's staff in the late 1950s, and later the AEC itself in a 1961 follow-up study, concluded that separating the AEC's dual functions was premature, given the early stage of commercial nuclear power development.

That said, by the late 1960s, the workload of the AEC had grown significantly, and criticisms of its dual mandate became more difficult to ignore. The issue resurfaced in the early 1970s, when President Nixon put forward proposals to split the AEC amid a growing consensus in both Congress and the executive branch. Testimony before the JCAE reinforced this point. As AEC Director of Regulation L. Manning Muntzing stated during 1973 hearings on H.R. 9090, "[T]here has been almost uniform agreement among those who have studied the problem that a separate regulatory commission for nuclear matters should be established at an appropriate time. We agree with this consensus and believe that the time for separating the [Atomic Energy] Commission's regulatory and promotional functions is now at hand." [13]

This consensus culminated in the Energy Reorganization Act of 1974. Section 2(c) of the Act declared that "[…] it is in the public interest that the licensing and related regulatory

[11] Ibid., 11-12
[12] Ibid., 12-13.
[13] U.S. Congress, House Committee on Government Operations | Energy Reorganization Act of 1974: Hearings on H.R. 11510

functions of the Atomic Energy Commission be separated from the performance of the other functions of the Commission." This legislation abolished the AEC and transferred its regulatory responsibilities to the newly created Nuclear Regulatory Commission (NRC). Meanwhile, the former AEC's developmental and promotional functions were assigned to the Energy Research and Development Administration (ERDA), which was later incorporated into DOE. Thus, nearly three decades after its creation, the AEC's inherent structural conflict of interest in commercial nuclear regulation was addressed through institutional separation, reflecting lessons learned from the AEC's long and sometimes troubled history, even as the federal government continued not only to regulate but also to promote reactors used for governmental purposes.

III. Nuclear Regulatory Commission Licensing of Commercial Nuclear Reactors

The authority to license civilian nuclear reactors in the United States is granted to the NRC by the Atomic Energy Act of 1954. Furthermore, the NRC's independence is affirmed under Section 201 of the Energy Reorganization Act of 1974, which states: "the Commission shall not be responsible to or subject to the supervision or direction of any other officer, employee, or agency of the Government." [14] This insulation has been central to preserving NRC's credibility as a nuclear safety regulator domestically as well as internationally.

The United States ratified the International Atomic Energy Agency's Convention on Nuclear Safety (1999), following Senate approval and presidential transmittal, which requires an independent nuclear regulatory body for civilian nuclear reactors. Article 8(2) of the Convention states that "[e]ach Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy."

Sections 103 and 104 of the AEA establish the NRC's exclusive authority to issue licenses for commercial nuclear facilities. Section 103 covers commercial "utilization and production facilities," such as nuclear power reactors, allowing licenses for terms up to 40 years.[15] Section 104 covers the licensing of research and test reactors, often operated by universities, laboratories, or hospitals, for experimental and medical purposes.[16] These statutory provisions are implemented through NRC regulations in Title 10 of the Code of Federal Regulations (CFR).[17]

[14] Energy Reorganization Act of 1974, Pub. L. No. 93-438, § 201, 88 Stat. 1233 (1974)
[15] Atomic Energy Act of 1954, § 103.
[16] Atomic Energy Act of 1954, § 104.
[17] For detailed information on NRC licensing processes, see NIA's Nuclear Reactor Licensing 101.

A defining institutional shift from the AEC to the NRC was a movement towards increased transparency in reactor licensing. The NRC licensing process incorporates multiple mechanisms for public participation, including public-facing documents, petitions for rulemaking, and both contested and mandatory hearings, as required by AEA54 and Administrative Procedures Act of 1946. The NRC also publishes Safety Evaluation Reports, Environmental Impact Statements, and Commission decisions, ensuring that licensing outcomes are subject to public scrutiny and informed by stakeholder input. These efforts demonstrate the shift toward transparent, independent regulation.

Since its inception, the NRC has licensed a broad range of civilian nuclear facilities pursuant to its authority under the AEA.[18] As of 2025, the agency regulates 94 commercial nuclear power reactors and 29 research and test reactors. It has issued 96 initial license renewals,[19] which extends the license by up to 20 years, as well as 7 subsequent license renewals. The NRC has issued 14 Combined Licenses, as well as 6 Early Site Permits and 8 Design Certifications; the latter two processes are intended to increase the efficiency of the overall licensing process. These licensing actions demonstrate the NRC's enduring role as an independent and experienced nuclear reactor regulator.

The Executive Orders are accelerating efforts that were already well underway by NRC to modernize its regulatory framework in response to congressional direction. It is developing 10 CFR Part 53, a new, risk-informed licensing framework for advanced reactors as directed by Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019.[20] It is likewise implementing mandates from the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act of 2024, such as milestones for workforce development, mission statement revision, microreactor guidance, brownfield licensing, and other rulemaking actions.[21]

The NRC has also licensed — and is set to license — certain DoD nuclear facilities. For example, the Armed Forces Radiobiology Research Institute TRIGA Reactor operates under an NRC Class 104 license.[22] Furthermore, the Eielson Air Force Base microreactor project (initiated in 2017) is intended to be licensed by NRC.[23]

[18] Nuclear Regulatory Commission | NRC By the Numbers | ML25051A118
[19] This figure includes 11 reactors which have since shut down since their renewal.
[20] NRC | Part 53 – Risk Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors
[21] NRC | ADVANCE Act Status Dashboard. See also, NIA's Regulatory Implementation Summary: NRC Progress Under the ADVANCE Act
[22] Armed Forces Radiobiology Research Institute | TRIGA Reactor
[23] Eielson Air Force Base | Secretary of the Air Force Public Affairs | Microreactor pilot reaches major project milestone | June 11, 2025

IV. Department of Energy Authorization of Research and Test Reactors

The Department of Energy (DOE), established under the Department of Energy Organization Act of 1977, assumed responsibility for nuclear reactor research, development and management functions previously carried out by the AEC and its short-lived successor, the Energy Research and Development Administration.[24] While the NRC was created to independently license civilian (including commercial) nuclear facilities, DOE retained responsibility to authorize and operate government-owned reactors, reflecting the prevailing interpretation of the AEA, under which NRC's licensing jurisdiction excludes reactors operated by DOE, DoD (when designated by the President), and their contractors for research or defense purposes.[25]

Under AEA Section 91(c), DOE also has the authority to produce special nuclear material in its facilities if the President deems it necessary for the common defense and security.[26] Section 123(b), while primarily governing international nuclear cooperation, also affirms DOE's role in managing research and defense-related activities.[27] In effect, DOE maintains full oversight of its research, test, and defense reactors through internal standards and regulations. This includes 10 CFR Part 830, *Nuclear Safety Management*, which sets requirements for safety bases, technical safety specifications, and quality assurance,[28] as well as directives such as DOE Order 420.2C[29] and DOE safety standards (e.g., DOE-STD-1189[30] and DOE-STD-1237[31]) that integrate safety into reactor design and authorization.

Each DOE nuclear reactor project is authorized on an individual basis; however, test reactor projects tend to be smaller than the reactors licensed through NRC. Examples include the High Flux Isotope Reactor at Oak Ridge National Laboratory[32] and the Advanced Test Reactor at Idaho National Laboratory, two research reactors that have never undergone NRC licensing.[33] In August 2025, DOE announced it would work to authorize 11 reactor projects from 10 new nuclear reactor companies through its Reactor Pilot Program[34] by July 4, 2026, pursuant to recent executive orders — a pace and scale unprecedented in DOE's reactor authorization history.

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[24] Department of Energy Organization Act of 1977
[25] Atomic Energy Act of 1954, Pub. L. 83-703, 68 Stat. 919, as amended.
[26] Atomic Energy Act of 1954, §91(c).
[27] Atomic Energy Act of 1954, §123(b).
[28] 10 CFR Part 830 | Nuclear Safety Management
[29] Department of Energy | Order 420.2C | Safety of Accelerator Facilities
[30] Department of Energy | STD-1189 | Integration of Safety into the Design Process
[31] Department of Energy | STD-1237 | Documented Safety Analysis for DOE Reactor Facilities
[32] Oak Ridge National Laboratory | High Flux Isotope Reactor
[33] Idaho National Laboratory | Advanced Test Reactor
[34] Department of Energy | Unleash American Energy Innovation | Department of Energy Announces Initial Selections for New Reactor Pilot Program

V. Department of Defense and National Security Facilities

The Department of Defense (DoD) was formally established in 1947 under the National Security Act, which consolidated the War Department and the Department of Navy into a single entity. As with DOE, Sections 91(b), 91(c), and 101 of the AEA similarly allow the President of the United States to authorize DoD to manufacture, produce, or acquire any nuclear power utilization facility for military purposes. This authority is codified in NRC's regulation 10 C.F.R. § 50.11, which expressly exempts such facilities from NRC licensing requirements when manufactured or operated by the DoD pursuant to presidential authorization.

While DoD has authority to manufacture or operate nuclear power utilization facilities independent of NRC, it has historically partnered with NRC's predecessor, the AEC, in its nuclear power projects. Accordingly, in 1954, the U.S. Army Corps of Engineers and AEC jointly established the Army Nuclear Power Program (ANPP) in order to supply power to remote military installations.[35] The ANPP proceeded to construct and operate eight nuclear reactors between 1957 and 1976.[36] For each of these military-owned nuclear reactor projects, the operator (the Army, the Navy, or a contractor) submitted a Hazard Summary Report to the AEC which was reviewed internally and granted administrative approval, i.e., authorization to operate without public transparency due to national security considerations. In effect, the reactors were not formally regulated, per se, but were permitted to operate based on their Hazard Summary Reports.

Today, military-owned reactors can be subject to varying authorities. The Fast Burst Reactor[37] at White Sands Missile Range operates under an Army permit, while Project Pele (initiated in 2018), a mobile nuclear reactor program, is currently being authorized by DOE.[38] New nuclear reactors under the Janus Program, announced in October 2025 (solicitation pending), will operate under Army permits, but with strong collaboration by DOE for its technical expertise; Janus may also interface with the broader electric power grid.

Like Janus, other new DoD nuclear reactor projects are intended to either supply power exclusively to a military base or to power the base as well as interface with the broader electric power grid. The aforementioned Eielson Air Force Base microreactor project is the only initiative to date that is intended to be licensed by NRC.[39] Other efforts, all announced in 2024, include the Army's Advanced Nuclear Power for Installations project (multiple

[35] U.S. Army Corps of Engineers | Army Nuclear Power Program, 1954–1976
[36] U.S. Atomic Energy Commission | Nuclear Reactors Built, Being Built, or Planned in the United States as of June 30, 1970
[37] Program Executive Office Simulation, Training and Instrumentation | Fast Burst Reactor Upgrade
[38] Office of the Under Secretary of War for Research and Engineering | Project Pele
[39] Eielson Air Force Base | Secretary of the Air Force Public Affairs | Microreactor pilot reaches major project milestone | June 11, 2025

sites), the Navy's Request for Information for Contractor Owned and Operated Nuclear Power Sites (multiple sites), and the Joint Base San Antonio solicitation for new nuclear power purchase agreements. While the AEA54 vests authority in the President to direct DoD to operate reactors for military purposes[40] without NRC involvement, the prospect of such military reactors exporting excess power to the commercial grid raises new questions for NRC and DoD. Notably, the number of concurrent projects exceeds the previous eight brought online by the Army between 1957 and 1976.

Agency Interfaces in the Naval Reactor Program

Pursuant to authority under AEA46, the Naval Nuclear Propulsion Program was established as an AEC program to serve the propulsion needs of the Department of the Navy. The authority for naval reactor activities tracked from the AEC, through ERDA to the DOE until, in 1982, Executive Order 12344 recognized the legal and institutional foundation of the AEC Naval Reactors Program under the joint responsibility of the National Nuclear Security Administration (NNSA), which is the semi-autonomous nuclear security agency within DOE, and the U.S. Navy. This was codified in 42 U.S.C. 7158, 50 U.S.C. 2406, and 2511.[41] This action preserved the program's independence from NRC oversight, yet established a collaborative means of oversight between the Navy and NNSA.

VI. Frameworks for Collaboration in Nuclear Reactor Licensing, Authorization, and Permitting

Though not formally binding, a Memorandum of Understanding (MOU) offers a framework for cooperation between two or more entities. Several MOUs have been established between DOE and NRC, such as the 1997 NRC–DOE MOU on agency cooperation,[42] the 1998 MOU on cooperative nuclear safety research,[43] the 2017 MOU on nuclear safety research and advanced technology fuels,[44] and the 2019 NRC–DOE MOU on nuclear energy innovation.[45] Additionally, DOE has been piloting advanced licensing and authorization strategies—such as those outlined in NRC's Licensing Modernization Project

[40] AEA section 91.b.

[41] Ronald Reagan Presidential Library & Museum | Executive Order 12344 | Naval Nuclear Propulsion Program

[42] Nuclear Regulatory Commission | SECY-97-237 | To obtain Commission approval of a Memorandum of Understanding with the Department of Energy | The document references the MOU on establishing "the framework for analyzing the complex legislative and regulatory issues involved in transitioning to the Nuclear Regulatory Commission, oversight of certain DOE nuclear facilities." The text of the MOU is not available for review.

[43] Nuclear Regulatory Commission | NRC-DOE Memorandum of Understanding on Cooperative Nuclear Safety Research | ML003676366

[44] Nuclear Regulatory Commission | NRC–DOE Addendum to Memorandum of Understanding on Nuclear Safety Research and Advanced Technology Fuels | ML17130A815

[45] Nuclear Regulatory Commission | DOE-NRC MOU on Nuclear Energy Innovation | ML19263C976

(Regulatory Guide 1.233,[46] Regulatory Guide 1.232,[47] and NUREG-1537[48]) — to align its practices with evolving NRC methods and lay the groundwork for eventual commercial transition of advanced reactor technologies. In October 2025, the agencies formalized Addendum No. 9 to the 2019 MOU,[49] establishing a framework to implement recent Executive Orders on nuclear innovation and national security. The addendum outlines coordinated roles, data sharing protocols, and technical collaboration mechanisms. It also facilitates NRC observation of and access to DOE safety reviews and related technical information so the NRC may leverage DOE-generated findings to inform and potentially streamline future NRC licensing.

A tripartite MOU was signed on May 10, 2019, by NRC, DOE, and DoD to provide the basis for coordinating technical readiness and sharing expertise on microreactor technologies to support DoD's research and development.[50] As stated by NRC Chairman David Wright in the September 3, 2025, Senate Environment and Public Works NRC Oversight Hearing,[51] the NRC and DoD are currently working on a separate MOU for coordination on new nuclear reactor regulatory pathways. These arrangements, together with the NRC–DOE MOUs, are intended to enable coordinated planning, technical assistance, and joint activities while preserving statutory responsibilities.

These cooperative arrangements take on heightened significance given the scale and tempo of current new nuclear reactor initiatives, which place new demands on interagency coordination. Moreover, President Trump's May 2025 Executive Orders, *Deploying Advanced Nuclear Reactor Technologies for National Security and Ordering the Reform of the Nuclear Regulatory Commission*, signal an explicit federal imperative to coordinate the federal oversight of new nuclear reactors, facilitate their timely deployment, and position them as strategic assets.

VII. Conclusion

The evolving landscape of nuclear reactor oversight across the NRC, DOE, and DoD underscores the need for a more coherent, coordinated and transparent federal approach. Each agency's role arises from distinct statutory and policy foundations — the NRC's independent civilian safety and licensing mandate; DOE's statutory authority to conduct,

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[46] Nuclear Regulatory Commission | Regulatory Guide 1.233 | ML20091l698
[47] Nuclear Regulatory Commission | Regulatory Guide 1.232 | ML17325A611
[48] Nuclear Regulatory Commission | Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors | NUREG-1537
[49] Nuclear Regulatory Commission | Addendum No. 9 to the MOU […] |ML25303A288
[50] Nuclear Regulatory Commission | SECY-20-0093 | Policy and Licensing Considerations for Advanced Nuclear Reactor Designs | ML20129J985 | While the NRC references this MOU in SECY-20-0093, the text of the MOU itself is not publicly available for review.
[51] U.S. Senate Committee on Environment & Public Works | Majority News | Chairman Capito Leads First EPW Oversight Hearing of NRC Since 2023, Urges Further Improvement, Efficiency from the Commission

authorize, and oversee nuclear energy research, development, and production activities in support of both civilian and defense missions; and DoD's mission-specific focus on the development and deployment of nuclear systems for installation power, defense applications, and national security operations.

Recent interagency initiatives, including executive orders, memoranda of understanding, and pilot demonstration projects, signal growing recognition of the need for technical alignment. Achieving a durable and efficient framework will require formalized pathways for interagency consultation, consistent safety and security standards, and mechanisms for knowledge transfer and regulatory learning across institutional lines.

The interface among the three agencies is not a new concept; they have collaborated on numerous projects over the years. Given the scale of current federal programs for nuclear reactor development, the respective roles and interfaces among the three agencies have attracted heightened attention — and, at times, significant confusion. This NIA brief is an attempt to promote a common understanding of the current situation for key stakeholders and policy makers. It also underscores that the scale, pace and ambition of the new DOE and DoD efforts must be matched with robust oversight. This means personnel with sufficient expertise, adequate resources, and a collaborative relationship with NRC to achieve technical integration. The NRC, DOE and DoD have begun to proactively collaborate with each other to promote consistent safety standards, minimize duplication of effort, and create appropriate handoff mechanisms for projects transitioning to (or from) DOE or DoD authorization to NRC commercial licensing. NIA recommends a concerted effort by all three agencies to ensure that technically mature, new nuclear reactor concepts are deployed with appropriate federal oversight and regulatory clarity to inspire public confidence.