NRC Process for Fusion Machine Regulation

NRC Decision on 10 CFR Part 30

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Initiation of NRC Regulation of Fusion Machines

- **Primary regulatory risks: tritium, dust control, low level waste, neutron flux**
  - Traditional areas of regulation by NRC and Agreement States
- **The Nuclear Energy Innovation and Modernization Act (NEIMA)**
  - Directed NRC to develop regulatory framework for “advanced reactors” which it defined to include fusion machines
- **Neither AEA nor NEIMA specified regulatory framework**
  - This provided the NRC broad discretion as to the regulatory path
- **NRC evaluated a variety of options for regulating fusion**
  - Three primary options: Utilization, Hybrid, Part 30/Materials

Regulatory Options Considered by NRC

Utilization Facility	Hybrid	Byproduct Materials
• Regulate under 10 CFR Parts 50-53 like fission reactors • Designed to address fission-specific risks • Would impose significant costs despite non-critical nature of fusion machines • Technically inappropriate for fusion reactors	• A variety of “hybrid” options were proposed • Poorly defined-multiple options considered under this rubric • Unclear technical purpose or legal basis given low risk • Would require extensive new rulemaking	• Regulate under 10 CFR Part 30 like other byproduct material technologies (e.g. accelerators) • Technology neutral and scalable • Better suited to materials-related risks of fusion machines • Allows for Agreement State involvement

NRC Consideration and Public Engagement

- **Three year period of significant engagement with fusion industry stakeholders, state regulatory agencies, academics, national labs, and foreign regulatory bodies**
  - **Oct. 2020** – SRM-SECY-20-0032, Directed staff to "develop[] options for Commission consideration on licensing and regulating fusion energy systems"
  - **Apr. 2021** – Staff White Paper, "Options for Licensing and Regulating Fusion Energy Systems" outlined three options for regulation, initiated engagement with the public
  - **Sept. 2020 – Dec. 2022** – NRC public engagement repeatedly met with broad set of fusion stakeholders such as FIA and its members via public meetings and other fora
- **Industry stakeholders and others aligned with strong support for Byproduct Materials framework as most sensible option**
  - **Actively involved Agreement State agencies also supported the Byproduct Materials framework**
- **Jan. 03, 2023** – SECY-23-001, "Options for Licensing and Regulating Fusion Energy Systems"
  - **NRC staff determined that all three options were legally viable**

NRC Commission Vote

- **April 13, 2023**: **Commission unanimously approved fusion regulation under the Part 30 Byproduct Material framework**

  "[The framework] . . . can accommodate foreseeable fusion technologies in time for likely application submittals . . . [and] also provide[s] jurisdictional certainty for the Agreement States to regulate near-term fusion energy systems." – **Chair Hanson**

- **Commissioners favored Agreement State involvement**

  "It is notable that Agreement States are largely supportive of a byproduct material framework." – **Commissioner Crowell**

  "This approach [i.e. Byproduct Framework] approach would also include the licensing and regulation of these systems by Agreement States where appropriate as has been the recent history." – Commissioner Caputo

- **Commissioners directed new Guidance to ensure Agreement States are supported**

  "[T]he staff should take into account the existence of fusion systems that already have been licensed and are being regulated by the Agreement States, as well as those that may be licensed prior to the completion of the rulemaking."

  "The staff should develop a new volume of NUREG-1556, 'Consolidated Guidance About Materials Licenses,' dedicated to fusion energy systems, so as to provide consistent guidance across the National Materials Program."

Next Steps

- Fusion Energy Act
  - Bipartisan and Bicameral
  - Amends Atomic Energy Act to solidify fusion regulation under Byproduct Material framework
  - Creates explicit definition for “fusion machine” that will be adopted by the NRC
- NRC Rulemaking
  - Proposed Rule to go to Commission in September, published in March 2025
  - Final Rule anticipated 2026
- NRC developing new guidance – NUREG-1556, Volume 22
  - Supports Agreement State regulation by providing guidance for licensing and regulating fusion machines

Going Forward

- Agreement State Activities
  - Several Agreement States taking a lead role on fusion regulation (Wisconsin, Massachusetts, Washington State and California among others)
  - Collaboration between USNRC and the Agreement States vital to ensure convergence in approaches to regulating fusion – will enable widespread commercialization
  - FIA stands ready to work with the Agreement States, through OAS, to assist in a collaborative effort to provide a safe, effective and streamlined regulatory approach
- International Collaboration
  - USNRC/OAS efforts can serve as a model for international adoption
  - USNRC working with UK Atomic Energy Agency and Canadian Nuclear Safety Commission on similar approach to regulating fusion machines
    - Japan, Korea and other countries are leaning toward a similar “Byproduct Model” for fusion regulation
  - FIA engaged with IAEA and European Commission to advocate for similar approach
  - Common international approach for regulating fusion using US /UK/Canadian framework could supercharge potential adoption of commercial fusion machines

Practice Areas/Industries

- Energy
- Fusion Energy
- Nuclear Energy
- Strategic Planning
- Advanced Reactors
- Decommissioning
- Nuclear Security
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- Employee Concerns

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