POLICY ISSUE
NOTATION VOTE

RESPONSE SHEET

TO: Brooke P. Clark, Secretary

FROM: Commissioner Crowell

SUBJECT: SECY-23-0001: Options for Licensing and Regulating Fusion Energy Systems

Approved X **Disapproved** X **Abstain** ____ **Not Participating** ____

COMMENTS: **Below** ____ **Attached** X **None** ____

Bradley R. Crowell

Digitally signed by Bradley R. Crowell
Date: 2023.03.31 15:47:28 -04'00'

Signature

Entered in STAR

Yes X

No ____

Commissioner Crowell's Comments on SECY-23-0001
"Options for Licensing and Regulating Fusion Energy Systems"

Notable scientific advancements and significant technological breakthroughs in fusion energy systems in the past few years have resulted in steadily increasing private sector interest in achieving the long sought-after goal of commercializing fusion energy. I appreciate the NRC staff's efforts to stay abreast of these developments–both domestically and internationally–since the Commission's 2009 decision to assert regulatory authority in this area, and in response to direction from Congress pursuant to the 2019 Nuclear Energy Innovation and Modernization Act (NEIMA). In this present paper, the staff provides three options for licensing and regulating fusion energy systems based on current system designs being pursued by various fusion developers. The limited-scope regulatory framework outlined in Option 2 (byproduct material framework) is the most responsible path forward for regulating near-term fusion energy systems, either through changes to Part 30 and associated regulations or the creation of a new, stand-alone part specific to fusion within 10 CFR.

As noted by the staff,[1] the operating characteristics, potential offsite consequences, and the limited contribution of near-term fusion energy systems to the radiological consequences of potential releases, support the conclusion that such systems are unlikely to meet the Atomic Energy Act's definition of a utilization facility and therefore need not be broadly classified as utilization facilities from a public health and safety perspective at this time. Furthermore, the creation of specific decision criteria by rule, as envisioned in Option 3, would likely create a degree of regulatory uncertainty for near-term system designs that could unreasonably inhibit continued technological development, and ultimate commercialization, of fusion energy systems.

In reaching this decision, I appreciate the views of the Advisory Committee on Reactor Safeguards and acknowledge its support of the hybrid approach as proposed under Option 3.[2] However, I am persuaded that a Part 30 framework for near-term fusion energy systems will properly allow for scaling of byproduct material requirements, including as needed in essential areas such as emergency planning, security, financial assurance, waste handling and disposition, transportation, decommissioning, and facility design. The staff notes that a Part 30 framework will "address near-term needs for continued developer research and development activities, enable regulatory clarity and reliability for early commercial deployment, and lay the foundation for addressing the longer term needs of a commercial fusion energy industry."[3] That said, I am also cognizant that technologies can change rapidly, and, thus, if at some point in the future, the NRC staff, in consultation with the NRC Agreement States, determines that a reasonably plausible future fusion design presents hazards sufficiently beyond those of near-term fusion technologies, the staff should notify the Commission and make recommendations for taking appropriate action as needed to adequately protect public health and safety and/or may be significant to the common defense and security.

It is notable that Agreement States are largely supportive of a byproduct material framework. But as fusion technology matures and the resources required to regulate fusion energy systems becomes clearer, it will be important that Agreement States have the option to return their authority to regulate these systems, consistent with the Agreement State Program Policy Statement,[4] as described by the staff.[5]

---

[1] SECY-23-0001 at 6-7.
[2] Advisory Committee on Reactor Safeguards, Draft SECY White Paper on Licensing and Regulating Fusion Energy Systems, dated October 21, 2022 (NRC Agencywide Documents Access and Management System (ADAMS) Accession No. ML22290A177).
[3] SECY-23-0001 at 17.
[4] 82 FR 48535 (October 18, 2017)
[5] SECY-23-001 at 12 (footnote 20).

While a byproduct material framework is appropriate at this time, such an undertaking must include appropriate consideration of critical technical and policy issues in need of further resolution. Specifically, important unresolved questions regarding fusion energy systems still exist related to waste characterization and management, as well as broader security-related considerations (e.g., 10 CFR Part 37). With respect to waste characterization, I noted with interest the staff's statement that, "The list of radioisotopes and specific activities that define Class C waste category limits in tables 1 and 2 of 10 CFR Section 61.55 'Waste classification,' will need to be expanded to include the radioisotopes of importance for fusion energy systems."[6] These questions and others related to waste and security safeguards have also been raised directly by fusion energy system developers themselves, as well as by our NRC Agreement State and international regulatory partners.[7]

I am particularly mindful of legitimate questions regarding whether a fusion energy system could be capable of producing special nuclear material, either through covert misuse or other means. Indeed, the question of whether and how fusion energy systems could be misappropriated for production of special nuclear material is not new.[8] Fusion industry representatives highlighted in at least two letters to the NRC, and referenced by staff in this paper, questions concerning whether fusion energy systems could be significant to the common defense and security in this regard.[9,10] One such letter addressed this question directly, concluding "that the current dual-use export control regime is an appropriate path to look to for fusion," which may include a "controls-by-design usage-based controls regime for fusion."[11]

Indeed, the NRC staff paper explicitly acknowledges that the three regulatory options analyzed and proposed for regulating fusion energy systems do not include consideration of these safeguards issues for production facilities and the corresponding NRC regulatory frameworks covering these areas. Specifically, the staff is making clear in this caveat that this paper does not attempt to analyze whether a fusion energy system is, or could be utilized as, a production facility as defined in AEA Section 11v., nor whether proposed fusion devices can be adapted to produce special nuclear material such that they would present significant proliferation risk.[12]

Therefore, I believe a fulsome treatment of this topic should be considered in rulemaking. In doing so, staff should specifically include within the rulemaking the key considerations of whether controls-by-design approaches, export controls, or other controls within NRC's authority, are necessary to ensure that near-term fusion energy systems do not contribute to nuclear proliferation concerns.

---

[6] SECY-23-0001 at 5 (footnote 11).
[7] UKAEA-RE(21)01, "Technology Report—Safety and Waste Aspects for Fusion Power Plants," issued September 2021 (https://scientific-publications.ukaea.uk/wp-content/uploads/UKAEA-RE2101-Fusion-Technology-Report-Issue-1.pdf).
[8] Glaser, A., and R.J. Goldston, "Proliferation risks of magnetic fusion energy: clandestine production, covert production and breakout," Nucl. Fusion 52 (2012).
[9] Commonwealth Fusion Systems, "Developing a Regulatory Framework for Fusion Energy Systems," ADAMS Accession No. ML22230D055 at 12.
[10] Helion, "Classification of Fusion Devices as Particle Accelerators; and Supplementing Common Defense & Security Discussions," ADAMS Accession No. ML22243A083 at 2.
[11] Id. at 12.
[12] SECY-23-0001 at 8 and 13