

FUSION INDUSTRY ASSOCIATION

Fusion Industry Association
800 Maine Ave SW
Suite 223
Washington, DC 20024

July 30, 2021

Ms. Margaret M. Doane
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555-0001

Dear Ms. Doane:

As the unified voice of the fusion industry, the Fusion Industry Association (“FIA”) is writing to update the U.S. Nuclear Regulatory Commission (“NRC”) regarding its position on the appropriate regulatory framework for fusion energy.

Recent advancements in fusion scientific research, engineering development, and private investment demonstrate that the timetable for bringing fusion energy to the grid is closer than some have predicted. Indeed, development pathways for FIA member companies indicate an acceleration of the date at which fusion will provide power. However, despite this acceleration, the FIA and its member companies are concerned that rushing to present an options paper to the Commission on a proposed regulatory framework on fusion could result in an overconservative approach. Because of the continuing and accelerating development of fusion technologies, as well as fusion’s important role in addressing climate change, it is vital the NRC staff ensure that its options paper presents the appropriate, risk informed regulatory framework at the outset.

Therefore, we encourage the NRC staff to spend a limited amount of additional time engaging with the U.S. fusion industry to better understand the timing and technologies that are being developed. This will allow the Agency staff to obtain additional fusion expertise and insights over the next 4-6 months, before proceeding to develop the options paper for Commission review. We believe that taking this additional time will enable a better understanding of the

technical approaches that developers will seek to license and will allow the NRC to more accurately craft the appropriate regulatory framework that could be proposed to the Commission.

Fusion Needs a Different Framework than Fission

The FIA advocates for a risk-informed regulatory framework that will foster innovation and development of the fusion industry, while ensuring public health and safety. In 2020, as the FIA began its engagement with the NRC, it published a White Paper outlining its approaches to the regulation of fusion energy.¹ As stated in that paper, the FIA strongly supports a regulatory framework that explicitly and permanently separates fusion energy from the regulatory approaches that the federal government has taken towards fission power plants. Regulating fusion plants as utilization facilities under Part 53 is inappropriate given the low risks of fusion energy and will significantly hamper the development of fusion. Since then, some have argued that fusion necessitates a “graded approach,” but the FIA believes this would add unneeded complexity without a compelling need. Such actions could stifle the global deployment of these technologies and would impose adverse and needless impacts on the role that fusion could play in providing carbon free power generation as well as technological leadership and job creation.

Fusion is not like fission, and any risk-informed evaluation of proposed fusion-energy facilities would indicate that existing federal regulations for fission systems or a new regulatory approach for advanced fission systems (e.g., Part 53) are inappropriate for fusion systems. Fusion facilities present radically lower risk profiles compared with any fission reactor, and it is not appropriate to try to fit fusion into a utilization facility approach that is wholly unreflective of risk.

Fusion energy demands a different regulatory approach than fission because the risks driving the utilization facility framework are not applicable to fusion. Specifically:

- Fusion energy devices do not use any special nuclear material or source material for fuel, and criticality or meltdown accidents are physically impossible. This means there is a much lower risk profile than fission facilities and a much smaller danger of off-site consequences.
- Fusion creates no reasonable risk of proliferation of nuclear weapons from dual-use technologies: there is no enrichment or reprocessing of fissionable materials because no such materials are present.
- Fusion energy does not produce high level radioactive waste or spent nuclear fuel.

The aspects of fusion energy relevant to NRC regulation are limited to two areas: the production of low-level waste and the possession and use of small amounts of tritium.² Some fusion facility components will become activated over the lifetime of the plant and will need to

¹ "Igniting the Fusion Revolution in America" June, 2020. Available at: <https://www.fusionindustryassociation.org/post/fusion-regulatory-white-paper>

² Note that not all proposed technologies will produce LLRW or use tritium.

be disposed of as low-level waste. This waste will be managed at the end of plant life as outlined in a decommissioning plan or during periodic maintenance scenarios and will be disposed of no differently than other low-level radioactive waste produced by materials licensees in the U.S. For fusion facilities that use tritium as a fuel, tritium will exist predominantly within the vacuum vessel, the blanket loop, and in fuel handling systems. Those fusion facilities that do use tritium will have a detailed tritium management plan, as outlined under current regulations. In addition, tritium levels will remain low: even full-scale fusion energy facilities are anticipated to keep small inventories of tritium on site.

A Byproduct Materials Regulatory Framework Is Appropriate for Commercial Fusion

Fortunately, these risks are already addressed in NRC regulations. Existing regulations including 10 C.F.R. Parts 20 and 30 which govern radioactive materials and byproduct materials would apply to commercial and demonstration fusion energy systems and are appropriate given the technology's minimal potential impact on the health and safety of the public. For that reason, the FIA supports a regulatory approach using these existing regulations. The NRC has already determined that some fusion facilities can be regulated under Part 30 via the agreement state program, such as Phoenix, LLC's neutron generator facility in Wisconsin. There is no reason for the NRC to create a new regulatory structure when existing regulations are already up to the task.

It is true that researchers and businesses are developing a broad diversity of approaches towards fusion energy. Within the FIA's 22 members, there are nearly as many different approaches to building a fusion device being contemplated. However, *none* of these proposed technologies presents risks that cannot be appropriately managed with a Part 30 approach. Indeed, NRC staff within the Office of Nuclear Material Safety and Safeguards is well equipped to manage diverse technologies since they deal with licensees with diverse technologies from the academic, medical, or industrial sectors. While some have argued that this diversity of fusion approaches would necessitate a graded approach, the truth is that there is no compelling need for the regulations to include requirements encompassing hypothetical fusion designs that will not be licensed and deployed in the United States.

Proponents of the graded approach may point to the size of devices like ITER or a proposed DEMO plant as justification for tiered regulation. First, it is highly unlikely that a plant of ITER's scale would be designed, funded, or constructed within the U.S., as there is no technological or commercial justification for such a facility. Second, it is questionable whether a facility like ITER, even as large as its physical footprint might be, should be licensed as a utilization facility because it would pose only a fraction of the risk presented by fission plants. As stated earlier, existing regulations are appropriate to govern fusion systems. There is no need for the NRC to devise a graded approach that contemplates an ITER or DEMO sized fusion device for which there will never be a commercial market demand, especially as the graded approach will likely result in increased licensing costs and unnecessarily extended timeframes for the smaller fusion facilities which are being considered.

FIA Recommendations for Next Steps

The FIA believes that the NRC should continue focusing on gaining a thorough understanding of the possible fusion technologies that would come up for licensing prior to locking in a regulatory approach. Any approach built to accommodate the licensing of facilities such as ITER or DEMO would not be based on any commercial approach contemplated by the private fusion industry in the United States.

We believe that NRC staff presenting an options paper to the Commission based on the incorporation of an ITER or DEMO sized facility could result in an approach that does not reflect (1) the commercial approaches under consideration in the United States, and (2) the risk-informed approach the Commission and Congress have asked for based on the technology.

For that reason, the FIA believes that the Agency would benefit from enhanced capacity building in fusion. The FIA and its members welcome all additional engagement needed by the broader NRC staff, including by the Office of Nuclear Material Safety and Safeguards and the Office of State and Tribal Programs. Before preparing an options paper, the NRC staff should spend more time engaging with the U.S. fusion industry and gaining a better understanding of the proposed technologies and associated risks.

The US is on the verge of becoming a world leader in the development and deployment of fusion technologies that could dramatically improve the ability to provide clean, carbon free energy and could provide an enormous opportunity for job creation and exports. This potential should not be quashed by the development of regulatory frameworks that are overly conservative and inapplicable to the technologies that will be deployed in the U.S. We urge the NRC to utilize the existing Part 30 to create an appropriate and risk informed framework for these innovative and safe technologies.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Holland", written in a cursive style.

Andrew Holland
Chief Executive Officer
Fusion Industry Association

cc: Chairman Christopher T. Hanson
Commissioner Jeff Baran
Commissioner David A. Wright