

# TERRESTRIAL ENERGY USA

June 08, 2016

Mr. Michael E. Mayfield, Director  
Division of Engineering, Infrastructure, and Advanced Reactors  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Mr. Mayfield:

**Subject:** Terrestrial Energy USA Comments on Draft Advanced Non-Light Water Reactor Design Criteria

Terrestrial Energy USA (“TEUSA”) is pleased to submit these comments on the Nuclear Regulatory Commission’s (“NRC”) draft advanced non-light water reactor design criteria (“ARDC”).

We believe that the NRC’s decision to begin developing a non-light water reactor (“LWR”) Advanced Reactor licensing framework is positive, and we thank the Agency for taking this important step forward.

In our review of the proposed ARDC, as well as the Department of Energy’s (“DOE”) December 2014 report – “Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors – it was not clear to us why the NRC chose not to adopt DOE’s proposed modifications, as there was no commentary in the document to explain the variation in approaches. From our review of the document, it appears that the DOE approach was consistent with the views adopted by the NRC in the 2008 Commission Policy Statement on Advanced Reactors. We believe the DOE proposal would have provided an appropriate foundation for the ARDC. While we understand the Agency may have had differences with the DOE in how best to address these issues, we would suggest that more explicit commentary as to the rationale for these differences would have been helpful.

While the approach in the ARDC includes generic criteria as well as requirements tailored specifically for sodium fast reactors and modular high temperature reactors, we believe that similar tailoring should be conducted for molten salt reactors as a category of Advanced Reactor technologies. While many of the ARDC standard criteria are applicable to molten salt reactor designs, we believe that many of the revisions made to accommodate HTGRs, including the recognition that many of the GDC do not apply to HTGRs, could be similarly made for molten salt reactors. Recognizing that this may require dialog among the NRC, DOE and the designers of molten salt reactors, TE is willing to work with the NRC Advanced Reactor staff to modify the ARDC criteria to be more appropriately tailored to the design characteristics of molten salt reactors.

In ARDC 10 and other elements of the proposal, the NRC recognizes that HTGRs do not have traditional core cooling requirements and the language contained in the ARDC refers to “reactor system and associated heat removal”. We believe similar treatment should be adopted for molten salt reactor designs as the NRC further refines the ARDC. We would have similar comments related to ARDC 33 and 34 among others.

Second, as it relates to the proposed ARDC 13-16 regarding the issue of functional containment, we believe this is a positive step forward and would urge the NRC to consider adopting a similar approach for molten salt reactor technologies.

Third, in regards to ARDC 17, Terrestrial Energy’s Integrated Molten Salt Reactor (“IMSR”) design relies on passive safety and inherent safety design features that do not require offsite power (or for that matter, onsite power) to safely shut down and cool the reactors. The only electrical equipment that will be needed in an emergency situation will be computer monitoring systems that do not justify a requirement for multiple, expensive AC power lines running to the site as is the case with traditional LWRs. As the IMSR design may be utilized for industrial heat purposes and not power, or may be operating in remote locations off the grid, the need to have a mandatory off-site AC connection to the grid is not applicable and should be modified.

Fourth and finally, in the proposed ARDC 50, the NRC recognizes that mHTGRs can rely on “a multi-barrier functional containment configuration to control the release of radionuclides.” As the NRC has recognized that traditional containment buildings may not be appropriate in Advanced Reactor designs, we would like to work with the NRC to tailor these specific elements for molten salt reactor designs including the IMSR. Additionally, as the IMSR design is intended to operate at near atmospheric pressure, the use of traditional “pressure boundary” based criteria in the ARDC are not applicable and should be appropriately tailored.

As this process moves forward, we stand ready to work with the NRC staff to create ARDC more appropriately tailored for molten salt reactors. We also look forward to working with the NRC as it continues to work toward establishing a comprehensive, risk-informed, performance-based licensing process for non-LWR Advanced Reactors.

Thank you for considering our comments,

A handwritten signature in black ink, appearing to be 'S. Irish', written over a circular scribble.

Simon Irish  
CEO, Terrestrial Energy USA Ltd

Cc: Ms. Diane T. Jackson, NRO/DEIA/ARPB, NRC  
Ms. Jan M. Mazza, NRO/DEIA/ARPB, NRC  
Email: [AdvancedRxDCComments.Resource@nrc.gov](mailto:AdvancedRxDCComments.Resource@nrc.gov)