

Structural Review (Programmatic) Request for Additional Information for the TRISO-X License Application Review – Part 2

RAI-1 Follow-up Flooding Regulatory Basis:

This information is necessary to demonstrate compliance with the regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 70.64(a)(2), which states, in part, that the design must provide for adequate protection against natural phenomena with consideration of the most severe documented historical events for the site, as well as 10 CFR 70.61(b) and 10 CFR 70.61(c) which state, in part, that the risk of credible high- and intermediate-consequence events must be limited. Per 10 CFR 70.61(e) also requires the identification and implementation of items relied on for safety (IROFS).

Guidance:

The guidance in NUREG-1520, Revision 2, Appendix D, “Natural Phenomena Hazards,” states in part, “In addition to the facility's location relative to the 100-year or 500-year flood plains, the effects of local intense precipitation and snow load should be considered. Local intense precipitation, especially in the form of snow, can result in roof collapse and localized site flooding.”

Describe Issue:

In response to the request for additional information (RAI) 3-2 (Agencywide Documents Access and Management System Accession Number ML23230B200), TRISO-X (the applicant) submitted calculation no. XE-C-CE-008, Revision 0, “Local Intense Precipitation (LIP) Analysis,” via the TRISO-X portal for staff review. This analysis concludes that the maximum water level due to local intense precipitation (LIP) at the TRISO-X Fuel Fabrication Facility will be above the 811 ft floor elevation credited for flooding in the license application and integrated safety analysis (ISA) summary. The analysis further states that openings in the building (e.g., door opening) will allow for flood water to enter the building, but found the higher flooding water levels acceptable after considering a new permissible water level threshold of 813 ft. However, the license application and ISA summary do not address the external event described in this analysis and the new permissible water level threshold of 813 ft.

The staff notes that Section 1.4.1, “Flood,” and Section 4.2.5.5, “Design Basis Flood,” of the ISA summary and Section 1.1.1.3, “Hydrology,” and other related sections in the license application only describe the flood hazard for the TRISO-X site in terms of its location relative to flood plains from nearby water bodies (e.g., rivers, streams), see NUREG-1520, Appendix D, “Natural Phenomena Hazards.”

When flooding is considered a credible event, an evaluation of the effectiveness of proposed protection and/or action(s) will need to be provided and should consider the effects of inundation, hydrostatic loading, erosion, and sedimentation. However, the application does not address flooding hazards from other applicable flood related events as part of the safety analysis of the site (e.g., a description of the LIP analysis), its methodology, and how the effects of inundation will be managed or prevented to ensure safe operation of the fuel facility and the safety of its workers). The ISA summary also does not describe how the consequences of this external event are being prevented or mitigated to demonstrate compliance with the performance requirements in the regulation.

Information Needed:

Update the application to include the site's evaluation of other flood-related hazards (e.g., local intense precipitation) and a description of the design basis flood level credited for the facility. The information should include, in part, a general description of the analyses performed, the methodology followed, and an evaluation of the effectiveness of proposed protection and/or action(s) that will be implemented to address the effects of inundation, hydrostatic loading, erosion, and sedimentation. The ISA summary should also be updated to include analyses and/or IROFS relied upon to demonstrate compliance with 10 CFR 70.61.

**RAI-2 Risk Category
Regulatory Basis:**

This information is necessary to demonstrate compliance with the regulations in 10 CFR 70.64(a)(2), which states, "(2) Natural phenomena hazards. The design must provide for adequate protection against natural phenomena with consideration of the most severe documented historical events for the site."

Describe Issue:

As stated in the license application, the design of the structures and facilities complies with the 2018 Edition of the International Building Code and American Society of Civil Engineers (ASCE) 7-16, "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," as appropriate for the geographic location of the site. To apply its provisions, ASCE 7-16 states that buildings and other structures shall be classified based on the risk to human life, health, and welfare associated with their damage or failure. ASCE 7-16 table 1.5-1 provides for this classification in terms of "Risk Category" based on the nature of use or occupancy of the buildings and other structures.

ISA summary section 4.2.5.3 states that a Risk Category III was selected for the TRISO-X fuel fabrication facility (FFF), based on considering that the building could "pose a substantial risk to human life with potential to cause a substantial economic impact and/or disruption to day-to-day civilian life in the event of a failure." However, ASCE 7-16, table 1.5-1, categorizes facilities that manufacture, process, handle and/or store highly toxic substances (e.g., hazardous fuels and/or hazardous chemicals) as "essential facilities" with a Risk Category IV level. Similarly, per U.S. Department of Energy DOE-STD-1020-2016, a Risk Category IV is assigned to facilities that results in lower radiological or chemical consequences to the worker and the public (i.e., a SDC-2 facility) than those specified in 10 CFR 70.61. Therefore, the selected Risk Category III for the determination of the design-basis criteria for the TRISO-X FFF is inconsistent with the criteria specified in ASCE 7-16 due to the nature of the hazardous materials that are manufactured, processed, handled, and stored at the proposed facility.

Information Needed:

Update the information in the license application and ISA summary (including the design-basis values) to be consistent with the corresponding risk category for a hazardous FFF as identified in ASCE 7-16 (i.e., Risk Category IV structure as discuss above) or justify the use of Risk Category III.