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To: [Bolin, John](#)
Subject: NRC Staff Clarification Questions for Public Meeting Regarding General Atomics Fast Modular Reactor Principal Design Criteria Topical Report
Date: Thursday, September 15, 2022 12:40:00 PM

Hi John,

Below are the staff clarification questions for our upcoming September 21, 2022, public meeting. Contact me if you have any questions.

**NRC Staff Clarification Questions for Public Meeting
Regarding General Atomics Fast Modular Reactor
Principal Design Criteria Topical Report**

Clarification Question 1:

Fast modular reactor design criteria (FMR-DC) 12 provides a criterion for the suppression of reactor power oscillations. Relative to general design criterion (GDC) 12, the only substantive change is to remove the word “coolant” from the design criterion. The rationale for this adaptation to the GDC provided in the topical report (TR) is that the helium coolant in the FMR does not affect the core’s susceptibility to power oscillations. The staff agrees with this point and notes that it is consistent with the adaptations for the appropriate modular high temperature gas reactor design criterion (MHTGR-DC) provided in Regulatory Guide (RG) 1.232, “Guidance for Developing Principal Design Criteria for Non-Light Water Reactors,” Revision 0. However, the staff also notes that compared to advanced reactor design criterion (ARDC) 12, FMR-DC 12 does not explicitly include the effects of structures within the core on power oscillations. Given that for fast reactors structural effects are frequently a significant contributor to reactivity feedback, please discuss why structural effects do not need to be explicitly considered in this principal design criteria (PDC) for the FMR, which is a gas-cooled fast reactor design.

Clarification Question 2:

FMR-DC 34 provides a criterion for the design of the passive residual heat removal (PRHR) system. Overall, this criterion is very similar to MHTGR-DC 34 from RG 1.232, aside from the change to specified acceptable fuel design limits (SAFDLs) from specified acceptable system radionuclide release design limits (SARRDLs), which is consistent with other FMR-DC. However, compared to the design-specific PDCs provided in RG 1.232, the words “For normal operations and anticipated operational occurrences” are missing from the FMR-DC. No rationale was provided for this. Please provide additional detail on General Atomics interpretation of this language and why it was necessary to remove.

Clarification Question 3:

FMR-DC 37 provides a criterion for testing of the PRHR system. Some of the language used in this

PDC is redundant and/or very specific to planned elements of the FMR design. Please clarify the redundancies and discuss the level of detail provided in the PDC.

Clarification Question 4:

FMR-DC 44 provides a criterion for the design of the structural and equipment cooling system. The TR notes that the language used is the same as ARDC 44 from RG 1.232. On review, the staff notes that MHTGR-DC 44 appears to be more applicable than ARDC 44 given the use of a PRHR system as discussed in other FMR-DC. Please discuss.

Clarification Question 5:

RG 1.232 states that for MHTGR Criterion 17, “[i]f electric power is not needed for anticipated operational occurrences or postulated accidents, the design shall demonstrate that power for important to safety functions is provided.” This is deleted from the General Atomics FMR-DC 17. We would like to understand why (i.e., is this not applicable since there will be safety-related onsite power?).

Clarification Question 6:

RG 1.232, ARDC 17 “Electric power systems,” states in part “[t]he electric power systems shall include an onsite power system and an additional power system [...] [a]n additional power system shall have sufficient independence and testability to perform its safety function.” Requirements for an additional power system are not provided in General Atomics FMR DC-17. In addition, the rationale for FMR DC-17 states that “[t]he GDC text related to “...supplies, including batteries, and the onsite distribution system,” was deleted to allow increased flexibility in the design of offsite power systems for advanced reactor designs.” Does this mean there will be no offsite or other power systems required, and only onsite power systems will be required? Please discuss how defense-in-depth is addressed, if only using onsite power sources or redundant onsite power sources. Also, discuss how the design of the offsite power systems, if any, is related to the power supplies of the onsite systems.

Clarification Question 7:

RG 1.232, ARDC 56, *Containment Isolation*, includes the following statement:

Isolation valves outside containment shall be located as close to the containment as practical and upon loss of actuating power, automatic isolation valves shall be designed to take the position that provides greater safety.

Although the TR Table 1, “FMR Principal Design Criteria,” indicates that FMR-DC 56, *Containment Isolation*, is the same as ARDC 56 in RG 1.232, the above statement was omitted from the column “FMR-DC Title and Content” for FMR-DC 56. Please clarify whether the omission was intentional and, if so, discuss the basis for the removal of the statement from FMR-DC 56.

Clarification Question 8:

Proposed FMR-DC 54, *Piping Systems Penetrating Containment*, includes a first sentence modified from ARDC 54 to permit demonstration that certain piping systems penetrating containment may not require isolation valves because the piping system performs the containment function by alternate means. However, the second sentence remains identical to the second sentence of ARDC 54 regarding capability to verify, by testing, the performance of isolation valves, including confirming leakage is within acceptable limits. Please clarify how the alternate means of performing the containment function in piping systems penetrating containment would be verified by testing or some other defined basis.

Regards,

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