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Subject:	NRC Staff Response to the Clarification Question regarding Piping Design and Analysis for the SMR-160 Design
Date:	Friday, September 9, 2022 7:13:00 AM

Hi Justin –

The NRC staff response to the subject clarification question is found below.

Please let us know if you have additional questions or need more information.

Thank you,
Carolyn Lauron
US NRC

Question:

With regards to piping and components and in the context of the Preliminary Safety Analysis Report (PSAR) effort, different sections of NUREG 0800 call for a listing of systems. For the pipe rupture evaluation in the NRC Standard Review Plan (SRP) Section 3.6 (for example) a listing of the various high and moderate energy systems should be provided. **The question is if such tables must be fully populated for the PSAR effort or can only a subsection, pertinent to the systems analyzed at the time, be provided. In other words, does the PSAR require all safety related systems to be fully analyzed prior to submittal, or can a subset of systems be analyzed, demonstrating overall methodology and acceptance with the understanding that all other systems to follow will adhere to the same or similar analysis approach.**

NRC Staff Response:

The applicable regulations for the content in the PSAR are in 10 CFR 50.34(a) and, specifically, 10 CFR 50.34(a)(4) requires the preliminary analysis and evaluation of the design and performance of structures, systems, and components (SSCs). These regulations provide flexibility in the level of detail of the PSAR in that a preliminary analysis is submitted with the construction permit (CP) application that would be finalized in the operating license application and accompanying Final Safety Analysis Report (FSAR). The staff's review of the overall methodology could be reviewed through a topical report prior to submission of the CP application.

The question references tables included in the SRP Section 3.6.1 (Tables 3.6.1-1 and 3.6.1-2, listing of the various high and moderate energy systems). Recently, for applications submitted under 10 CFR Part 52, the staff reviewed reactor designs that did not initially have complete or final piping designs (e.g., AP1000, ESBWR, and NuScale), but still included a table identifying the systems expected to include high or moderate energy piping systems. It is understood that this table is subject to change and therefore not final or complete. In these cases, the staff reviewed the initial information and methodology and when the piping design was finalized, the staff reviewed the final pipe break hazards analysis to confirm that all equipment requiring protection are appropriately protected.

An applicant for a CP under 10 CFR Part 50 should identify the relevant systems in its preliminary design and provide a preliminary analysis of those systems and those piping that interacts with, runs adjacent to, or could potentially impact safety-related (or risk significant) components. The systems evaluated are not only those which are safety-related, but also those whose failure could impact safety-related (or important to safety) functions. The PSAR should include the overall methodology credited to ensure adequate protection against pipe failure. The staff understands that piping layout is one of the last design aspects to be finalized and that a CP applicant may have limited details available. The staff expects that based on design changes, final piping layout, or revised calculations, systems may be added or removed from the tables listing high or moderate energy piping systems.

The staff notes that in the context of pipe rupture evaluation, the applicant not only is required to evaluate the impact of jet impingement from the ruptured pipe to the adjacent pipes but also the structural integrity of all relevant pipes (i.e., the impacted pipe and ruptured pipe). The pipe rupture evaluation should discuss whether the piping systems are still in compliance with (1) the provisions of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section III, as incorporated by reference in 10 CFR 50.55a; (2) relevant NRC regulations such as General Design Criteria 2 and 4 in Appendix A to 10 CFR Part 50, and (3) NRC guidance specified in SRP 3.6.1 such as Branch Technical Position (BTP) 3-3.

The NRC regulations in 10 CFR 50.34(a) allow flexibility in the information to be provided in the PSAR in support of a CP application under 10 CFR Part 50. On pages iv and v, NRC Regulatory Guide 1.70, “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition),” describes differences in the detail of the information to be provided in the PSAR and FSAR. For example, if certain information identified in the Standard Format is not yet available at the time of submission of a PSAR because the design has not progressed sufficiently at the time of writing, the PSAR should provide the criteria and bases being used to develop the required information, the concepts and alternatives under consideration, and the schedule for completion of the design and submission of the missing information. In general, the PSAR should describe the preliminary design of the plant in sufficient detail to enable a definitive evaluation by the staff as to whether the plant can be constructed and operated without undue risk to the health and safety of the public. Changes from the criteria, design, and bases set forth in the PSAR, as well as any new criteria, designs, and bases, should be identified in the FSAR. The reasons for and safety significance of each change should be discussed. The FSAR should describe in detail the final design of the plant as constructed.

A public meeting may be requested to discuss the level of detail of the PSAR at a convenient time in the process.