UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

October 26, 2021

Daniel H. Dorman
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REGULATORY GUIDE 1.247, "ACCEPTABILITY OF PROBABILISTIC RISK ASSESSMENT RESULTS FOR ADVANCED NON-LIGHT WATER REACTOR RISK-INFORMED ACTIVITIES"

Dear Mr. Dorman:

During the 689th meeting of the Advisory Committee on Reactor Safeguards, October 5 - 7, 2021, we reviewed Regulatory Guide (RG) 1.247 endorsing with clarifications and qualifications the Probabilistic Risk Assessment (PRA) Standard for Non-Light Water Reactors (Non-LWRs). The staff is issuing this regulatory guide for trial use and, after experience is gained, intends to issue a final version. Our Future Plant Designs Subcommittee also reviewed this matter, including the standard itself, during meetings on October 2, 2019, November 2, 2020, and September 20, 2021. We had the benefit of discussions with representatives of the NRC staff, the American Society of Mechanical Engineers (ASME) Joint Committee on Nuclear Risk Management (the Standards Committee), and other stakeholders. We also had the benefit of the referenced documents.

CONCLUSIONS AND RECOMMENDATIONS

1. RG 1.247 should be issued for trial use.

2. Before a final version of RG 1.247 is issued the staff should consider the following suggested changes, in addition to including lessons learned during review of trial applications of the standard.

    a. Rephrase the "Resolution" column of Appendix A of RG 1.247, to show the clarifications and qualifications, as "Interpretations" of the standard that are acceptable to the NRC staff, rather than as changes to the text of the standard.

    b. Include guidance that the initial search for initiating events and scenarios should be done without preconceptions or using existing lists.

BACKGROUND

Over the past two decades ASME has published a series of LWR PRA standards, starting with a standard for Level 1 PRA of internal events for plants at power. ASME also issued standards for plants in the low power and shutdown condition, for large early release frequency, for internal fire, and for external events such as seismic and wind. The staff issued RG 1.200 describing an approach for determining the acceptability of a PRA to be used for regulatory decisionmaking; it endorsed a PRA standard (the 2013 version of Reference 6) with exceptions and clarifications. RG 1.200 was revised several times, with the current version being issued in December 2020.

The newest standard is the "Probabilistic Risk Assessment Standard for Advanced Non-Light Water Reactor Nuclear Power Plants" (the Non-LWR PRA standard or the standard). It was first issued for trial use in 2013 and was issued as a final standard in January of 2021. ASME also has committees looking at probabilistic methods in design and probabilistic evaluation models.

DISCUSSION

The staff has followed development of the non-LWR PRA standard and has briefed us on their support for the standard over the past two years. RG 1.247 is being issued for trial use and endorses the standard with no objections or exceptions, but with 147 clarifications and qualifications. We were initially concerned that this large number of specific issues indicated substantial unanticipated differences between the standard and the staff. After reviewing the regulatory guide, we find the clarifications and qualifications helpful. They help eliminate ambiguity for users of the standard. Further, the staff is endorsing the standard with no exceptions or objections. Some representatives from the Standards Committee disagreed with the staff on specific issues and suggested that the staff should rephrase its "Resolution" of the clarifications and qualifications in Appendix A of RG 1.247 as interpretations of the standard that are acceptable to the NRC staff, rather than as changes to the text of the standard. We agree. First, some of the resolutions go beyond acceptable language or positions for an American National Standard. More importantly, the staff should own its clarifications and qualifications and make it clear to users that adopting the clarifications and qualifications is one acceptable way to demonstrate they meet the standard.

RG 1.247 is structured much like RG 1.200. However, the discussion in Part C that describes an acceptable PRA differs quite a bit from the language in RG 1.200. There are several reasons for this. Most significantly, the new standard covers all levels of a PRA, for the complete range of initiating events, in an integrated fashion. Additionally, the language has been updated to be consistent with current practice at NRC. We expect that the language in RG 1.200 will be brought into harmony with RG 1.247 at some point. Eventually, a single PRA standard and a single regulatory guide would be preferred.

We have written to the staff on several occasions about the importance of conducting the search for initiating events and associated scenarios for new designs without preconceptions, using a structured approach to enhance the thoroughness of the search. The current version of the standard does a nice job of stating the requirements for a structured search in the Supporting Requirements for initiating events. The explanatory Nonmandatory Appendix IE provides help on how to conduct the search and includes elements that should enhance the rigor of the search. The standard requires a complete list of initiating events. We are disappointed that the staff offered no guidance on how to improve completeness. The staff had no comments on the importance of starting the search with "a blank sheet of paper," when there

is ample research demonstrating that starting with an existing list creates significant anchoring bias. The inclination is to start with the existing list and remove events that do not apply to the new design. Of course, after a list of initiating events is developed, it makes sense to compare it with lists developed for current LWRs and even other industries.

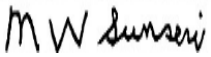
One editorial change we discussed with the staff would be easily accomplished and could help avoid confusion for users and potential critics not intimately familiar with PRA. To speak of "crediting" a human action or taking "credit" for an action implies to some engineers that we should assume that the action occurs and is successful. To the PRA analyst it means "include the action in the model" and evaluate the likelihood of success and failure.

Finally, there were several reservations expressed during our September 2021 Subcommittee meeting about some of the qualifications provided in RG 1.247. The Nuclear Energy Institute indicated that they needed more time to consider some of the specific staff positions. We expect to discuss these with the staff in the future and look forward to lessons learned from trial applications of the standard using the regulatory guide.

SUMMARY

RG 1.247 is acceptable for release on a trial basis. It would be beneficial if the staff could modify it as suggested in our report at this time. However, we would not object to delaying the improvements for the final version, if such changes would lead to substantial delay in its issuance for trial use. Lessons learned from the trial applications will be important and we look forward to continuing interactions with the staff.

Sincerely,


Signed by Sunseri, Matthew
on 10/26/21

Matthew W. Sunseri
Chairman

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