**[7590-01-P]**

**NUCLEAR REGULATORY COMMISSION**

**[NRC-2022-0052]**

# Acceptability of Probabilistic Risk Assessment Results for Non-Light Water Reactor Risk-Informed Activities

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Regulatory guide for trial use; response to comments.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is addressing comments received after issuing for public comment on the trial use of the new regulatory guide (RG) 1.247, "Acceptability of Probabilistic Risk Assessment Results for Non-Light Water Reactor Risk-Informed Activities." The NRC will not make any changes to the RG as a result of these comments.

**DATES:** The public comment period for RG 1.247 ended on May 23, 2022.

**ADDRESSES:** Please refer to Docket ID **NRC-2022-0052** when contacting the NRC about the availability of information regarding this document. You may obtain publicly available information related to this document using any of the following methods:

- **Federal Rulemaking Website:** Go to https://www.regulations.gov and search for Docket ID **NRC-2022-0052**. Address questions about Docket IDs in Regulations.gov to Stacy Schumann; telephone: 301-415-0624; email: Stacy.Schumann@nrc.gov. For technical questions, contact the individuals listed in the "For Further Information Contact" section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to PDR.Resource@nrc.gov. The ADAMS accession number

for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in this document.

- **NRC's PDR:** You may examine and purchase copies of public documents, by appointment, at the NRC's PDR, Room P1 B35, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. Eastern Time (ET), Monday through Friday, except Federal holidays.

RG 1.247 for trial use and the regulatory analysis may be found in ADAMS under Accession Nos. ML21235A008 and ML21235A010, respectively.

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**FOR FURTHER INFORMATION CONTACT:** Michelle Gonzalez, telephone: 301-415-5661, email: Michelle.Gonzalez@nrc.gov, Anders Gilbertson, telephone: 301-415-1541, email: Anders.Gilbertson@nrc.gov, or Harriet Karagiannis, telephone: 301-415-2493, email: Harriet.Karagiannis@nrc.gov. These individuals are staff in the Office of Nuclear Regulatory Research at the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

**SUPPLEMENTARY INFORMATION:**

## I. Background

The NRC has issued for trial use this new RG titled, "Acceptability of Probabilistic Risk Assessment Results for Non-Light Water Reactor Risk-Informed Activities," and it is designated as trial use RG 1.247. It describes one acceptable approach for determining whether a design-specific or plant-specific probabilistic risk assessment (PRA) used to support an application is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decision-making for non-light water reactors (NLWRs) for implementing the requirements in part 50 and 52 of title 10 of the *Code of Federal Regulations* (10 CFR). In addition, this trial use RG is intended to be consistent with the

NRC's PRA Policy Statement and reflects and endorses, with staff exceptions, national consensus PRA standards provided by standards development organizations and guidance provided by nuclear industry organizations. As a trial use RG, this issuance allows early use prior to general implementation, and the guidance may be revised based on experience obtained by the NRC from the implementation of the trial use RG.

The staff is planning to conduct a public meeting by the end of calendar year 2022 to obtain stakeholder feedback on the development of a draft guide, which will be issued at the conclusion of the trial use period, and subsequent final publication of RG 1.247. The NRC will also provide an additional opportunity for formal public comment on the planned draft RG, with feedback considered prior to final RG publication.

## II. Public Comments

This trial use RG was not published for public comment as a draft RG. Trial use RG 1.247 was issued for a 60-day, post-promulgation public comment in the *Federal Register* on March 24, 2022 (87 FR 16770). Pursuant to 10 CFR 2.804(e), the NRC must publish in the *Federal Register* an evaluation of any significant comments and describe any revisions made as a result of the comments and their evaluation.

The public comment period ended on May 23, 2022, and comments were received from two organizations (Nuclear Energy Institute (NEI) and X-energy). NEI and X-energy submitted separate comments on the staff endorsement of items HLR-HR-E and HR-E4 from the American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS) NLWR PRA standard. The staff considers these comments significant to the extent they warrant a response to clarify the record. While the staff is not responding in this notice to the other comments submitted in response to the opportunity to comment the NRC published at 87 FR 16770, the staff will consider those comments in preparing a draft of RG 1.247 for comment or in considering the experience obtained through trial use of RG 1.247.

For items HLR-HR-E and HR-E4, the staff takes exceptions to the ASME and

ANS NLWR PRA standard regarding the treatment of errors of commission (EOCs) in a PRA. The exceptions provide for consideration of EOCs that result in adverse safety impacts for Compatibility Category I, (CC-I). CC-I defines the minimum capability needed for a PRA element. In contrast, Compatibility Category II (CC-II) defines the minimum capability needed to meet current good practice standards for each PRA element. The comments indicate that these exceptions are not consistent with the current PRA state of practice, which does not call for broad consideration of EOCs for PRAs for LWRs as per the NRC endorsement of HR-E4 in the trial use RG. Thus, the comment contends that broadly considering EOCs goes above and beyond the requirement for the current operating fleet. Although no changes were made to the trial use RG based on these comments, the staff provides a brief discussion on these significant comments.

Specifically, the comment recommends that this exception to HR-E4 and the HLR-HR-E be removed from the trial use RG or only be applicable for CC-II of HR-E4, the latter of which would represent good practice as opposed to a minimum capability. Another comment notes that the trial use RG 1.247 includes additional language on the scope of such considerations; however, the comment states that this added language does not maintain consistency with the LWR PRA standard. The comment supports retaining consistency with the LWR PRA standard in the trial use RG 1.247, which would call for removal of this added exception regarding consideration of EOCs in the NLWR PRA standard.

The staff is keeping the exceptions related to EOCs in this trial use RG, which is based on the following consideration. The development efforts for the ASME/ANS NLWR PRA standard relied substantially on the development efforts for the next edition of the ASME/ANS Level 1/large early release frequency (LERF) LWR PRA standard and, in many cases, the NLWR PRA standard adopted the same or similar requirements as the next edition of the Level 1/LERF LWR PRA standard. However, the Level 1/LERF LWR PRA standard state of practice relies on significant LWR operating

experience that facilitates a consensus to generally exclude EOCs from LWR PRAs, but no similar body of operating experience underlies the NLWR PRA standard.

Because there is limited operating experience regarding EOCs for NLWRs and the scope of the ASME/ANS NLWR PRA standard is broader than the scope of the ASME/ANS Level 1/LERF LWR PRA standard, EOCs may play a more important role in NLWR PRA than for LWR PRA and, therefore, NLWR PRA developers will need to demonstrate that EOCs are not an issue before eliminating them from consideration. However, the staff also notes that such identification of EOCs is generally expected to apply to a PRA developed for the operational phase of a plant's lifecycle. This is based on the premise that there is expected to be a general lack of available, relevant information that would allow meaningful identification of EOCs in pre-operational stages of a plant's lifecycle. Related staff guidance on the treatment of such EOCs during pre-operational phases of a plant's lifecycle is currently under development.

A comment states that EOCs are already captured in FHR-A1 at CC-II for fires where operating experience supports consideration of spurious signals. Therefore, the comment notes that the RG 1.247 position on HR-E4 requiring EOCs at CC-I is not internally consistent with the trial use RG position on FHR-A1 requiring EOCs only at CC-II. The comment also states that, for non-fire hazards, spurious signals should occur with low frequency and would require significant operator error due to the redundancy of information available to the operator.

The staff notes that, while the consideration of spurious signals as a potential cause of an EOC is important and spurious signals may occur due to fire damage, such spurious signals are not the only reason an EOC may occur. NUREG-1880, "ATHEANA User's Guide," (ADAMS Accession No. ML072130359) recommends searching for potential EOCs and the contexts that could cause them. However, while the staff maintains that other sources of EOCs should be considered for identification in CC-I of FHR-A1, the staff did not intend for new, undesired operator actions that could result from spurious indications from fire-induced failure of a single instrument to be identified

to meet CC-I of FHR-A1. The staff would therefore not call for such identification as part of meeting the trial use RG. The staff notes that while the comment characterizes the staff positions as “requirements,” no regulatory guide establishes requirements. Rather, the exceptions and clarifications in a regulatory guide are guidance to an applicant stating elements of an acceptable method for complying with NRC regulations.

Dated: October 12, 2022.

For the Nuclear Regulatory Commission.

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