

# PUBLIC SUBMISSION

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**Docket:** NRC-2022-0085

Request for Comment on Level 3 PRA Project Documentation (Volume 3x)

**Comment On:** NRC-2022-0085-0001

Level 3 Probabilistic Risk Assessment Project Documentation (Volume 3x)

**Document:** NRC-2022-0085-DRAFT-0003

Comment on FR Doc # 2022-08617

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## Submitter Information

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## General Comment

Industry Comments on Draft Level 3 Probabilistic Risk Assessment (PRA) Project Report, "Volume 3x: Overview of Reactor, At-Power, Level 1, 2, and 3 PRAs for Internal Events and Internal Floods," Docket ID NRC-2022-0085

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## Attachments

06-21-22\_Industry Comments on Draft Level 3 Probabilistic Risk Assessment (PRA) Project Report  
Docket ID NRC-2022-0085

**VICTORIA K. ANDERSON**

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June 21, 2022

Michele Kaplan  
Director, Division of Resource Management and Administration  
Office of Administration  
U.S. Nuclear Regulatory Commission  
Mail Stop: TWFN-7-A60M  
Washington, DC 20555-0001

*Submitted via Regulations.gov*

**Subject:** Industry Comments on Draft Level 3 Probabilistic Risk Assessment (PRA) Project Report, "Volume 3x: Overview of Reactor, At-Power, Level 1, 2, and 3 PRAs for Internal Events and Internal Floods," Docket ID NRC-2022-0085

**Project Number: 689**

Dear Ms. Kaplan:

The Nuclear Energy Institute (NEI)<sup>1</sup>, on behalf of its members, submits the following comments on the Draft Level 3 Probabilistic Risk Assessment (PRA) Project Report, "Volume 3x: Overview of Reactor, At-Power, Level 1, 2, and 3 PRAs for Internal Events and Internal Floods." We appreciate the opportunity to comment on this draft report and look forward to continuing to engage with the NRC staff on the Level 3 PRA project.

Several of the high-level conclusions from this portion of the study align with NEI's observations relative to safety benefits of risk-informed regulation and operations. In particular, in Volume 3x, the Key Messages section states that, "Overall, the results show that the combination of this plant design and site location has substantial margin to the QHOs when considering internal events and floods." This supports several of the conclusions from NEI 20-04, "The Nexus Between Safety and Operational Performance in the U.S. Nuclear Industry," and a shared understanding of this conclusion can help the industry and NRC work together to best support the use of risk information in all aspects of operation.

The study also accurately characterizes that the inclusion of Diverse and Flexible Coping Strategies (FLEX) in the PRA model results in substantial reduction in total plant risk. This comports with industry experience in

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<sup>1</sup> The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.

this area, much of which is conceptualized in NEI 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making." Collectively, the industry and the NRC can use this knowledge to enhance risk-informed decision making throughout the fleet, minimizing unnecessary regulatory burden.

While these insights, which were generally gleaned from the Level 1 evaluation portion of the study, are useful, the study includes numerous simplifying assumptions that highlight that, for operating reactors, the methodologies for completing comprehensive Level 2 and Level 3 PRAs are not sufficiently mature for widespread use. Examples of identified simplifying assumptions that impacted the results of the study include:

- Lack of explicit modeling of long-term onsite or offsite resources in terminating accidents after core damage;
- Exclusion of credit for operator actions following core damage during station blackout in the Level 2 Human reliability analysis (HRA);
- Exclusion of some containment systems, such as containment ventilation and purge systems, from the bridge event tree;
- Exclusion of AC power recovery modeling from the Level 2 analysis;
- Limitations of the SAPHIRE platform's ability to provide accurate results with failure probabilities used in Level 2 PRAs;
- Selection of pessimistic radiological source terms for a given plant damage state, resulting in conservative bias;
- Use of an inappropriately broad definition of Large Release Frequency (LRF) as "the summation of the frequency of all release categories that include containment bypass or containment failure, excluding those where fission product scrubbing (or other mechanisms) result in a source term comparable to, or smaller than, the remainder of the (intact containment) source terms";
- Exclusion of containment fragility analysis; and
- Lack of analysis of impact of chemical or physical transformations of radionuclides after their release.

Given the numerous simplifying assumptions made as part of this study, it is unclear that the results of the Level 2 and Level 3 portions of the analysis are a realistic reflection of plant risk. NEI recommends that any reference to this study clearly state the assumptions, conservatisms, and limitations therein.

As this study enters its tenth year, the NRC has made some clear progress towards the originally stated objectives of the project. However, it is not evident that all the original objectives of the project would be met with the continuation of this work as currently being conducted. The below table provides NEI's assessment of the status of the original project objectives for the NRC's consideration moving forward.

<b>Original Project Objective</b>	<b>NEI Assessment of Status</b>
1. Develop a Level 3 PRA, generally based on current state-of-practice methods, tools, and data	<ul style="list-style-type: none"><li>• The numerous simplifications within the documents demonstrate that there are either challenges with the methods, tools, and data, or that the cost of achieving realism is unreasonably expensive for benefit.</li></ul>

	<ul style="list-style-type: none"><li>• The analyzed plant is from 2012 and is not fully representative the current plant design.</li><li>• This PRA would not meet the ASME/ANS PRA Standard.</li></ul>
2. Extract new insights to enhance regulatory decision making and to help focus limited NRC resources on issues most directly related to the agency’s mission to protect public health and safety	<ul style="list-style-type: none"><li>• This study has supported some important insights that can enhance regulatory decision making, and this objective has been met. Specific notable insights include:<ul style="list-style-type: none"><li>○ FLEX has a substantial impact on risk and significantly improves public health and safety, and the benefits of FLEX must be considered in regulatory decisions, where applicable.</li><li>○ Significant margin exists to the QHOs for the analyzed hazards at this plant.</li><li>○ Current methods show that LERF is a very conservative surrogate for the acute fatality QHO.</li></ul></li></ul>
3. Enhance PRA staff capability and expertise and improve documentation practices to make PRA information more accessible, retrievable, and understandable.	<ul style="list-style-type: none"><li>• The documentation should be more readily accessible to the public.</li></ul>
4. Demonstrate technical feasibility and evaluate the realistic cost of developing new Level 3 PRAs	<ul style="list-style-type: none"><li>• Because the study does not comply with best practices outlined in consensus standards, this study does not fully meet this objective.</li><li>• The assumptions and simplifications used imply that the resources required for developing a realistic Level 3 PRA are very high.</li></ul>

As noted in this letter, the study has supported several valuable insights that can improve regulatory decision making; however, it does not appear that additional work on this study would contribute towards further fulfillment of the original objectives of the project because the maturity of the methodologies available to complete the work is not sufficient and the resources required would be extensive. As a result, NEI requests that NRC reconsider the value of continued work on this project. If the NRC does elect to continue work on this project, NEI requests that NRC hold a public meeting to discuss the intended regulatory applications of the potential outputs.

We encourage NRC to consider and address all stakeholder comments on this draft report. Please contact me at [vka@nei.org](mailto:vka@nei.org) or (202) 739-8101 with any questions about the content of this letter.

Sincerely,



Victoria K. Anderson

c: Mr. John Nakoski, RES  
Mr. Alan Kuritzky, RES