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# NRC Review of Seismic Risk Assessment in Hope Creek 50.69 LAR

PRA Licensing Branch C  
Division of Risk Assessment  
Office of Nuclear Reactor Regulation  
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# Objective

Discuss APLC RAI-01 for justifying that the plant-specific seismic risk has a small contribution to total plant risk for Hope Creek Generating Station and thereby, supporting the applicability of Tier 1 alternate seismic approach in risk-informed categorization

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# Background

- EPRI 3002012988 recommends three tiers within a graded approach that supports the 50.69 categorization process.
- NRC has not endorsed EPRI 3002012988. Staff approved CCNPP Tier 1 approach as a plant-specific approval.
- HCGS has proposed to use EPRI 3002012988 Tier 1 approach stating that HCGS meets the EPRI Tier 1 criteria for a “Low Seismic Hazard/High Seismic Margin” site.

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# EPRI Tier 1 Criteria

- Section 2.1 of EPRI TR recommends three tiers
  - Tier 1: Plants where the GMRS peak acceleration is at or below approximately 0.2g or where the GMRS is below or approximately equal to the SSE between 1.0 Hz and 10 Hz.
  - At Tier 1 sites, the GMRS is either very low or within the range of the SSE such that unique seismic categorization insights are not expected.

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# Expectation of Low Seismic Risk

- Section 2.2.2 of EPRI 3002012988 states:

“ [...] since the seismic hazards for [tier 1] sites are low, the seismic CDF would also be expected to be low. This is important because the NEI 00-04 [...] includes an integral assessment that weights the importance from each risk contributor [...] by the fraction of the total core damage frequency contributed by that contributor. The risk from an external hazard only drives a component to a required HSS determination if the results of the integral assessment meet the importance measure criteria for HSS.”

- Staff determined the low seismic contribution of seismic events to the overall plant risk for CCNPP plant-specific approval.

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# APLC RAI-01

- Meeting Tier 1 criteria in Section 2.1 of EPRI is not sufficient to support the claim that the plant-specific seismic risk is a small percentage contribution to total plant risk and thereby, the applicability of the proposed alternate seismic approach.
- EPRI 3002012988 does not provide guidance for estimating the plants' seismic risk nor an approach for demonstrating the seismic risk is low compared to the overall plant risk.
- CCNPP used a 'plant' HCLPF and latest hazard to estimate the seismic CDF. Staff concluded that seismic risk contribution for CCNPP would not solely result in an SSC being categorized as HSS.

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## APLC RAI-01 (Cont.)

- APLC RAI-01 requests that the licensee “Justify that the plant-specific seismic risk is low enough relative to the other hazards such that the categorization results will not be significantly impacted to support the applicability of the proposed alternate seismic approach.”
  - Qualitative or quantitative approaches may be used to assess the seismic risk. Staff will review the acceptability of approaches during the LAR review.
  - Staff’s determination of low seismic contribution is not based a specific seismic to overall risk ratio.

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# Acronyms

- APLC: PRA Licensing Branch C
- CCNPP: Calvert Cliffs Nuclear Power Plant
- CDF: core damage frequency
- EPRI: Electric Power Research Institute
- GMRS: ground motion response spectra
- HCGS: Hope Creek Generating Station
- HCPLF: high confidence of low probability of failure
- HSS: high safety significant
- LAR: license amendment request
- RAI: request for additional information
- SSCs: structures, systems, and components
- SSE: safe shutdown earthquake



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# References

- Nuclear Energy Institute, "10 CFR 50.69 SSC Categorization Guideline," NEI 00-04, dated July 2005 (ADAMS Accession No. ML052900163).
- Electric Power Research Institute, "Alternative Approaches for Addressing Seismic Risk in 10 CFR 50.69 Risk-Informed Categorization," Report 3002012988, dated July 2018 (publicly available for free at <https://www.epri.com/#/pages/product/000000003002012988/?lang=enUS>).
- Marshall, M., U.S. Nuclear Regulatory Commission, letter to Hanson, B., Exelon Generation Company, LLC, "Calvert Cliffs Nuclear Power Plant, Units 1 And 2- Issuance of Amendment Nos. 332 And 310 Re: Risk-informed Categorization and Treatment of Structures, Systems, And Components for Nuclear Power Reactors (EPID L-2018-LLA-0482)," dated February 28, 2020 (ADAMS Accession No ML19330D909)
- Fleming, J., PSEG Nuclear LLC, letter to U.S. Nuclear Regulatory Commission, "Application to Adopt 10 CFR 50.69, 'Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors,'" dated November 25, 2019 (ADAMS Accession No. [ML19330C961](#))