UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 18, 2025

MEMORANDUM TO: Michael F. King, Acting Director
Office of Nuclear Reactor Regulation

FROM: Tania Martinez Navedo, Acting Director
Division of Engineering and External Hazards
Office of Nuclear Reactor Regulation

TANIA MARTINEZ NAVEDO
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Date: 2025.06.18 14:54:18 -04'00'

SUBJECT: PROCESS FOR THE ONGOING ASSESSMENT OF NATURAL HAZARDS INFORMATION PERIODIC REPORT

This memorandum provides an update on the status of the Process for the Ongoing Assessment of Natural Hazards Information (POANHI), as reflected in the enclosed periodic report. The U.S. Nuclear Regulatory Commission (NRC) staff developed the POANHI framework in response to the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, Recommendation 2.2, which called for periodic evaluations of natural hazards at U.S. nuclear power plants (Agencywide Documents Access and Management System (ADAMS) Accession No. ML111861807). In SECY-16-0144, "Proposed Resolution of Remaining Tier 2 and 3 Recommendations Resulting from the Fukushima Dai-ichi Accident," dated December 29, 2016 (ML16286A586), the staff proposed an ongoing system that uses existing NRC processes to enhance its collection and analysis of natural hazards information. In the staff requirements memorandum for SECY-16-0144, dated May 3, 2017 (ML17123A453), the Commission approved the staff's proposal and provided resources for the staff to implement the POANHI. To create the POANHI framework, the staff first developed internal agency guidance, detailed in LIC-208, "Process for the Ongoing Assessment of Natural Hazards Information," dated November 20, 2019 (ML19210C288), and the Natural Hazards Information Digest (now known as the External Hazards Information Digest), an internal tool used by the NRC to document and organize natural hazards information related to U.S. nuclear power plants.

In accordance with LIC-208, the enclosed periodic report documents the activities undertaken by the NRC staff since it released the last report in February 2024 (ML24025A135).

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The enclosed periodic report covers activities related to the three major elements of POANHI: (1) knowledge base activities, (2) active technical engagement, and (3) assessment of hazards information. During the period covered by this report, the staff did not identify the need for potential regulatory actions in response to the new natural hazards information assessed under the POANHI framework.

Enclosure:
As stated

SUBJECT: PROCESS FOR THE ONGOING ASSESSMENT OF NATURAL HAZARDS INFORMATION PERIODIC REPORT
DATED: June 18, 2025

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ADAMS ACCESSION No.: ML25104A139 **NRR-106**

OFFICE	NRR/DEX/EXHB	NRR/DEX/EXHB: BC	QTE
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PROCESS FOR THE ONGOING ASSESSMENT OF NATURAL HAZARDS INFORMATION: 2025 PERIODIC REPORT

Background

The U.S. Nuclear Regulatory Commission (NRC) staff developed the Process for the Ongoing Assessment of Natural Hazards Information (POANHI) framework in response to the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, Recommendation 2.2, which called for periodic evaluations of natural hazards at U.S. nuclear power plants (Agencywide Documents Access and Management System (ADAMS) Accession No. ML111861807). In SECY-16-0144, "Proposed Resolution of Remaining Tier 2 and 3 Recommendations Resulting from the Fukushima Dai-ichi Accident," dated December 29, 2016 (ML16286A586), the staff proposed an ongoing system that uses existing NRC processes to enhance its collection and analysis of natural hazards information. In the staff requirements memorandum for SECY-16-0144, dated May 3, 2017 (ML17123A453), the Commission approved the staff's proposal and provided resources for the staff to implement the POANHI. To create the POANHI framework, the staff first developed internal agency guidance, detailed in NRC Office of Nuclear Reactor Regulation (NRR), Office Instruction LIC-208, "Process for the Ongoing Assessment of Natural Hazards Information," dated November 20, 2019 (ML19210C288), and the Natural Hazards Information Digest, an internal tool used by the NRC to document and organize natural hazards information related to U.S. nuclear power plants. This tool has since been updated and renamed the External Hazards Information Digest (EHID).

In accordance with LIC-208, this report documents the activities undertaken by the NRC staff since it released the last report in February 2024 (ML24025A135). This report covers activities related to the three major elements of POANHI: (1) knowledge base activities, (2) active technical engagement, and (3) assessment of hazards information.

1. Knowledge Base Activities

Knowledge base activities, which provide the foundation for the POANHI framework, are related to the collection and archiving of natural and human-induced hazards information in the EHID. The NRC Office of Nuclear Regulatory Research (RES) designed the EHID to provide a digital infrastructure for compiling and storing natural hazards information related to U.S. nuclear power plant sites. Idaho National Laboratory developed and hosts the EHID, which provides a single digital repository of natural hazards licensing basis information (e.g., licensing basis flood elevations, safe-shutdown earthquakes, wind loads, etc.). The NRC staff updates the EHID with new information as it becomes available. Additional specific knowledge base activities are discussed below.

Site-Specific Seismic Evaluations

The Next Generation Attenuation for Central and Eastern North America (NGA-East) ground motion model (GMM) was a multidisciplinary research project to develop a new ground motion characterization model for central and eastern North America.[1] This GMM includes a set of new

[1] Pacific Earthquake Engineering Research (PEER) Center, "Central and Eastern North America Ground-Motion Characterization: NGA-East Final Report," PEER Report 2018/08, Pacific Earthquake Engineering Research Center Headquarters at the University of California, Berkeley, California, December 2018.

ground motion prediction equations and their associated weights in the logic trees for use in a probabilistic seismic hazard analysis. Consistent with the Central and Eastern United States Seismic Source Characterization model found in NUREG-2115, “Central and Eastern United States Seismic Source Characterization for Nuclear Facilities,” dated January 2012 (ML12048A776), the NGA-East project was conducted using the Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 guidelines in NUREG-2213, “Updated Implementation Guidelines for SSHAC Hazard Studies,” dated October 2018 (ML18282A082). The NRC staff evaluated the NGA-East GMM and documented the results of this evaluation in Research Information Letter (RIL) 2020-11, “NRC Staff Evaluation of the Next Generation Attenuation for Central and Eastern North America Project (NGA-EAST) Ground Motion Model Characterization,” dated September 2020 (ML20255A115).

RIL 2021-15, “Documentation Report for SSHAC level 2: Site Response,” dated November 2021 (ML21323A056), documents work sponsored by the NRC that applied the SSHAC process for systematically identifying and propagating epistemic uncertainties in the site response analyses as has been previously applied to the seismic source characterization and ground motion characterization analyses.

The NRC staff is producing site-specific seismic hazard evaluation reports for an initial set of U.S. nuclear power plant sites in the central and eastern United States (see table 1) that implement both the NGA-East GMM (PEER Report 2018/08) and updates in site response analyses (RIL 2021-15). These reports are being sent directly to the licensees and made publicly available in ADAMS.

Table 1 Issuance of Hazard Evaluation Reports that Implement the NGA-East GMM and RIL 2021-15

Site	Issuance Date	ADAMS Accession No.
Vogtle	May 15, 2023	ML23006A091
Sequoyah	July 31, 2023	ML23192A447
Watts Bar	July 31, 2023	ML23192A447
Browns Ferry	July 31, 2023	ML23192A447
North Anna	September 5, 2023	ML23214A177
Robinson	November 1, 2023	ML23244A231
Peach Bottom	January 17, 2024	ML23346A238
Summer	November 24, 2024	ML24221A062
DC Cook	Second Quarter 2025 (estimated)	
Callaway	Second Quarter 2025 (estimated)	
Oconee	Third Quarter 2025 (estimated)	
Dresden	Third Quarter 2025 (estimated)	
Beaver Valley	Fourth Quarter 2025 (estimated)	

2. Active Technical Engagement

The NRC staff's active technical engagement with external stakeholders and the broader natural hazards community is an essential element of the POANHI framework. This engagement happens in a variety of forums, including public meetings and professional and academic conferences, as well as through participation in other governmental working groups.

Table 2 summarizes the NRC staff's participation in external meetings and conferences on various topics related to natural hazards during the time period covered by this report. Conference attendance enables the staff to maintain awareness of the state of practice in natural hazards assessment. In addition, the staff presented at several of these meetings and conferences. Such presentations provide the public opportunities to view the NRC's thinking on topics relevant to natural hazards and to offer feedback on these topics outside of specific licensing or inspection activities. In addition, these meetings and conferences are an opportunity for the staff, the regulated community, and outside researchers to gather, present research findings, and discuss areas of future research.

Table 2 List of External Meetings and Conferences with NRC Staff Participation under POANHI

Hazard	Meeting	Dates
All	American Geophysical Union Conference	December 2024
Geology	Association of Engineering Geologists Annual Meeting	September 2024
Hydrology	National Dam Safety Review Board	Quarterly
Hydrology	American Society of Civil Engineers	October 2024
Hydrology	IAEA Safety Evaluation of Nuclear Installations for External Events Excluding Earthquakes	Guidance update began September 2024
Meteorology	IAEA Consultancy Meeting on the Effects of Climate Change on Meteorological and Hydrological Hazards for Nuclear Installations	November 2024
Seismology	NRC-EPRI Memorandum of Understanding Periodic Discussion on Seismic Hazards	September 2024
Seismology	IAEA Meeting for the Development of a Safety Report on Seismic Site Response Analysis for Nuclear Installations	Two per calendar year
Seismology	IAEA Workshop on TECDOC Preparation: “Seismic Monitoring of Nuclear Installation Sites”	April 2024
Seismology	IAEA Workshop on Draft Safety Report on Evaluation of Epistemic Uncertainties in Seismic Hazard Assessment	October 2024
Seismology	IAEA Technical Meeting on the Protection of Nuclear Installations Against External Hazards	Annual
Multiple	IAEA Updates to SSG-18, “Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations”	Guidance update began July 2023
Multiple	DOE/NRC Natural Phenomena Hazards Meeting	October 2024
Multiple	National Science Foundation Natural Hazards Research Summit	May 2024
Multiple	Meetings of the Science for Disaster Reduction Interagency Working Group	Monthly
Multiple	Steering Committee for the IAEA External Event Notification System	March and November 2024

Hazard	Meeting	Dates
Multiple	Meetings of the Nuclear Energy Agency Working Group on External Events	February and September 2024
Multiple	IAEA International Workshop on Recent Advances in Seismic and Fault Displacement Hazard Assessment for Nuclear Installations	June 2024

Key: IAEA: International Atomic Energy Agency; DOE: U.S. Department of Energy; EPRI: Electric Power Research Institute; SSG: Specific Safety Guide; TECDOC: IAEA technical document.

NRC staff technical engagements provide significant exposure to advancements in data acquisition and processing that inform the development of appropriate regulatory positions. As such, active technical engagement additionally supports other agency work critical to the NRC's mission, most notably, compliance with the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act of 2024 (ADVANCE Act). Specifically, certain sections of the ADVANCE Act have cross-cutting considerations related to the natural hazards considered under POANHI. These ADVANCE Act sections include the following:

- section 206, pertaining to identifying and addressing regulatory challenges to the efficient, timely, and predictable licensing reviews for, and to support the oversight of, nuclear reactors at brownfield and/or retired fossil fuel sites
- section 207, pertaining to an expedited procedure for issuing combined licenses for new nuclear reactors
- section 208, pertaining to enhancing strategies and guidance to license and regulate microreactors
- section 505, pertaining to establishing guidance to support efficient, timely, and predictable reviews of nuclear reactor license applications

The NRC staff identified a need to develop new guidance on a graded approach to site characterization to address some of these ADVANCE Act sections. This guidance will address considerations for the use of existing site and hazard characterization information, factoring in design-specific features as they relate to the potential impact of external hazards, and determining the hazards information necessary to meet the applicable regulatory requirements when applying a graded approach to site characterization.

Public Website

The NRC staff published the POANHI public website in 2023 and updates that website whenever warranted. The public website is at https://www.nrc.gov/reactors/operating/ops-experience/poanhi.html. The intent of the public website is to provide updates on staff activities related to hydrology, meteorology, geology, and seismology, as well as to answer frequently asked questions about POANHI. The public website also provides an email address to which members of the public and external stakeholders can submit any comments or feedback related to external hazards. Annex I to this report summarizes such messages sent to the staff and the staff's responses.

External Hazards Information Digest

The NRC staff continues to maintain the functionality of the EHID, which is a repository of information that provides an overview of natural and human-made external hazards that could impact nuclear power plants and other NRC-licensed facilities. It serves as a reference for the staff by summarizing key information on various hazards, their regulatory considerations, and how they are evaluated in the licensing and oversight processes. The EHID covers hazards such as earthquakes, floods, hurricanes, tornadoes, tsunamis, volcanic activity, wildfires, and human-induced events (e.g., aircraft impacts, industrial accidents, etc.).

GAO Audit of Nuclear Power Plant Climate Resilience

Beginning in December 2022, the U.S. Government Accountability Office (GAO) conducted an audit on the climate resilience of U.S. nuclear power plants. The audit involved extensive meetings, written inquiries, and site visits. On February 8, 2024, the GAO provided to the NRC a draft of the report on the audit, to which the NRC staff responded with detailed comments in early March. The GAO published the final report on the audit, GAO-24-106326, “Nuclear Power Plants: NRC Should Take Actions to Fully Consider the Potential Effects of Climate Change,” in April 2024. This report concludes that the NRC does not use climate projections data to identify and assess risk as part of the safety reviews it conducts or the probabilistic risk assessments it reviews during the initial licensing process and that the NRC has not fully developed POANHI, which the agency relies on to identify and assess changes in natural hazard risks, including climate change. The report includes three recommendations for executive action: assessing whether the NRC’s licensing and oversight processes adequately address climate change risks, developing a plan to address any gaps in existing processes, and developing guidance on incorporating climate projection data into regulatory processes.

The NRC disagrees with GAO-24-106326. The NRC’s position is that by incorporating conservatism, safety margins, and defense-in-depth policies, its regulations provide reasonable assurance of public health and safety, common defense and security, and environmental protection. These layers of conservatism account for any plausible combination of current and projected future natural hazards over a nuclear power plant’s licensed operational lifetime. However, under its POANHI framework, the NRC staff will continue to take actions that address the report’s three recommendations. For example, the staff will continually reevaluate whether new external hazards information indicates the existence of regulatory gaps and will address any such gaps accordingly. Importantly, the GAO acknowledges in its report that its analysis does not account for site-specific plant elevation or protective measures taken to mitigate risks from natural hazards. As discussed below, the NRC maintains continuous oversight of all U.S. nuclear power plants and, in doing so, accounts for this information and if any such information indicates a significant change in individual licensed reactor conditions, then the NRC has the authority to, and will, mandate any required safety-related modifications.

Over the past year, the offices of NRR and RES have also been engaged with the U.S. Geological Survey (USGS), through an interagency agreement, on a long-term research project devoted to seismic hazards. This research project focused on elements of seismic hazard

characterization related to new and existing seismic sources, induced seismicity, earthquake recurrence rates, and the impact of GMM selection on seismic hazard results. Future NRC staff evaluations of seismic hazard and guidance updates will apply the results of this research.

3. Assessment of Hazards Information

The final major element of the POANHI framework is the assessment of hazards information to determine whether new information should be passed on to other processes within the NRC for regulatory action. The assessment of new information is often straightforward. For example, licensee event reports concerning natural hazards are forwarded to the NRC staff. These event reports are also forwarded to relevant licensing and inspection groups within the NRC for evaluation against licensing bases and regulatory requirements and for inspection, if necessary. The staff also receives custom ShakeMap products from the USGS that provide a map of estimated ground motion based on local reports of earthquake shaking intensity and community-developed GMMs. The ShakeMap product that the NRC receives also provides a point estimate of ground motion at U.S. nuclear power plants in the vicinity of earthquakes. These single events, and the documents that accompany them, do not drive POANHI decision-making; they provide individual datapoints to the staff that can be used to determine future research directions. During the period covered by this report, the staff did not identify the need for potential regulatory actions in response to the new hazards information assessed under the POANHI framework.

In addition to individual reports related to single events, the NRC staff, working under the POANHI framework, is responsible for assessing new natural hazards information (i.e., new data, models, and methods) to determine whether additional regulatory action may be warranted. These assessments include reviewing both domestic and international reports as they are published, reviewing and documenting extreme weather impacts, considering state-of-the-science reports, and determining whether updates to NRC guidance are warranted.

Event Intake and Evaluation

LIC-208 directs the NRC staff to evaluate the significance of new information and to refer potentially significant issues to appropriate NRC regulatory programs. During the period covered by this report, three events were analyzed to determine whether any additional regulatory action was warranted.

NRC reviewers looked at two events—an extreme precipitation event at Perry Nuclear Power Plant and a storm surge event from Hurricane Helene near Crystal River Unit 3 Nuclear Generating Plant, which is a permanently shutdown and defueled reactor that is undergoing decommissioning—and determined that no additional regulatory actions were necessary. The analysis of each event revealed that either the hazards were bounded by the design, or the elevation of the facility exceeded the hazards.

The third event was a minor seismic event located near Abilene, Texas. This event did not pose any threat to nearby nuclear facilities. However, the then-ongoing NRC staff safety review of a construction permit application for a research reactor at Abilene Christian University in Abilene, Texas was updated to include consideration of this event. No further action was required.

Future Activities

During the remainder of 2025, the NRC staff will continue its assessment of the NGA-East GMM and any related potential impacts on seismic hazards that could affect existing NRC licensees and applicants. The staff will also address the recommendations in GAO-24-106326 under existing NRC processes.

ANNEX I

NRC Staff Responses to Public Comments

Since the issuance of the previous Process for the Ongoing Assessment of Natural Hazards Information (POANHI) periodic report in February 2024 (Agencywide Documents Access and Management System Accession No. ML24025A135), the U.S. Nuclear Regulatory Commission staff received one email from external stakeholders. That email, sent at the end of September 2024, requested the status of the POANHI letters for the Summer, D.C. Cook, Oconee, Callaway, Dresden, and Beaver Valley nuclear power plants. The staff responded and provided a link to the POANHI website, which had been updated with the most recent dates and projected timelines.

Members of the public and external stakeholders can submit any comments or feedback to the staff by emailing POANHI.Seismic@nrc.gov.