

NRC Probabilistic Flood Hazard Assessment Research Program

Objective

This research program is designed to support development of regulatory tools (e.g., regulatory guidance, standard review plans) for permitting new nuclear sites, licensing of new nuclear facilities, and oversight of operating facilities. The probabilistic technical basis developed under this program will provide a risk-informed approach for future regulatory decisions and, as needed, rulemaking.

Scope

In developing this research program, NRC staff identified projects that address specific regulatory issues or requirements. Some of the research needs have been identified during previous work on implementation of probabilistic or risk-informed performance-based approaches. The main focus areas of the PFHA Research Program are:

1. Leverage available frequency information on flooding hazards at operating nuclear facilities and develop guidance on its use
2. Develop and demonstrate PFHA framework for flood hazard curve estimation
3. Assess and evaluate application of improved mechanistic and probabilistic modeling techniques for key flood generating processes and flooding scenarios
4. Assess and evaluate methods for quantifying reliability of flood protection and plant response to flooding events
5. Assess potential impacts of dynamic and nonstationary processes on flood hazard assessments and flood protection at nuclear facilities.

Phased Approach

A comprehensive and detailed quantitative risk assessment framework that integrates flooding hazards with other external and internal hazards will require a phased research approach. The phased approach envisioned is as follows:

Phase 1: Focus mainly on the probabilistic hazard assessment element of risk analysis, but include work on reliability of flood protection features and procedures, flood mitigation strategies, and initial work on quantitative assessment of total plant response to a flooding event.

Phase 2: Develop and perform pilot studies to gain real-world experience in applying the methods developed in Phase 1. This phase will also include work to fill in gaps or deficiencies identified during the pilot studies. This phase will include significant interactions with external stakeholders (e.g. one or more licensees, industry research organizations).

Phase 3: Develop guidance for conducting a complete flooding PRA. The focus will be on integrating flooding hazards (and other associated external and internal hazards) with PRA models of plant internal performance. This phase will also include significant interactions with internal and external stakeholders, as well as and standards-developing entities.

Cooperation, Collaboration and Communication

Implementation of this research program will include both internal and external coordination, cooperation and collaboration. Cooperation and collaboration with external entities (e.g., other federal agencies, domestic and international research organizations, and industry stakeholders) will be pursued in order to leverage their valuable work and experience.

Research progress and results will be shared with various stakeholders and the public through the publication of NUREG series reports, draft and final regulatory guides, presentations at the RIC and other public meetings, as well as through the NRC website and social media channels.