

# Incorporation of FLEX Strategies and Equipment into PRA Models

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# Purpose

- Discuss staff's assessment of NEI 16-06 Tier 3 approach
  - Discuss certain elements that appeared to lack sufficient technical justification
  - Identify areas where improved industry guidance will strengthen the technical basis

# Background: NEI 16-06

- Nuclear Energy Institute (NEI) 16-06, “Crediting Mitigating Strategies in Risk-Informed Decision Making,” outlines a three-tiered approach for evaluating the safety benefits of plant mitigating strategies:
  - Tier 1. Qualitative assessment
  - Tier 2. Semi-quantitative assessment
  - Tier 3. Full probabilistic risk assessment, seeks to fully quantify the risk impact of mitigating strategies using a PRA that meets the guidance of RG 1.200.

# Background: NRC Evaluation of NEI 16-06

- NRC staff issued a memorandum on May 30, 2017 (ML17031A269) that provides an evaluation of Tier 3 approach.
- Information could enhance predictability and efficiency of reviewing risk-informed applications that use PRAs to credit mitigating strategies.
- The memo clarifies positions on four major topics:
  - applicability of guidance
  - PRA upgrade
  - human reliability analysis
  - data analysis

# Area 1: Applicability to Offsite Portable Equipment

- Discussions and examples do not provide enough detail regarding some aspects of crediting offsite portable equipment (e.g., existing gaps in HRA).
- Claiming quantitative credits for offsite equipment is not appropriate until evaluations consistent with RG 1.200, improvements in NEI guidance or state-of-art methods address technical gaps.

# Area 2: PRA Upgrade

- NEI 16-06 states that use of additional portable equipment will not generally fall into the PRA upgrade category.
- Depending on strategies incorporated and how the PRA scope is affected, the changes in PRA could include extensive model structure/logic changes.
- Some existing gaps may be addressed through complex changes or new methodologies and merit suitable scrutiny.

## PRA Upgrade (Cont.)

- For any new risk-informed application, the licensee should either perform a focused-scope peer review of the PRA model or demonstrate that none of PRA upgrade criteria is satisfied.
- For self-approvals, NRC will monitor licensee's evaluations of the upgrade criteria through appropriate regulatory processes.

# Area 3: Data Analysis

- NEI 16-06 identified techniques for providing failure rates for portable equipment:
  - Assume a bounding failure rate based on a multiple
  - Address potential increases in the failure rates by crediting spare portable equipment not modeled in the PRA
  - Assume equivalent failure rate as that of permanently installed equipment and perform sensitivity studies
  - PWROG-14003 approach

# Data Analysis (Cont.)

- Use of expert judgment needs to be consistent with the ASME/ANS PRA Standard as endorsed by RG 1.200.
- Failure rates of permanently installed equipment cannot be used for portable equipment even if sensitivity analyses are performed.
- Spare portable equipment not modeled in PRA cannot be credited in lieu of using appropriate failure rates.

## Data Analysis (Cont.)

- Approaches proposed by PWROG-14003 are treated as unreviewed methods.
- The staff recommends that organizations such as INPO, EPRI, and NRC's RES collect and share operating experience data of portable equipment to improve the technical basis for relevant reliability data

## Area 4: HRA

- NEI 16-06 states that in some cases, “engineering judgement will be required to estimate human error probabilities until new guidance on these issues is developed.” Examples includes use of surrogates.
- NEI guidance and examples do not provide enough details on considering plant specific and scenario specific performance shaping factors.

# HRA (Cont.)

- Using surrogates for specific actions or engineering judgement to estimate the failure probability do not adequately address the elements needed for a technically acceptable human reliability analysis.
- Until gaps in the human reliability analysis methodologies are addressed by improved industry guidance, HEPs associated with actions for which the existing approaches are not explicitly applicable should be submitted to NRC for review.