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## PWR Owners Group Insights on the PRA standard-based peer review process for the Level 3 PRA study

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### Insights from Internal Events Peer Review of NRC L3 PRA

- Scope
- What Went Well
- Challenges Before/During Review
- Overall Impressions

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### Review Scope

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**Internal Events Peer Review of NRC  
L3 PRA – Scope**

- Elements Included:
  - Initiating Events (IE)
  - Accident Sequences (AS)
  - Success Criteria (SC)
  - Systems Analysis (SY)
  - Human Reliability Analysis (HR)
  - Data Analysis (DA)
  - Internal Flooding (IF)
  - Quantification (QU)
- Level 2 (Separate Review)
- Maintenance and Update (MU) excluded

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**What Went Well**

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**Internal Events Peer Review of NRC  
L3 PRA – What Went Well**

- NRC provided single-point of contact for logistical issues
- NRC Transmitted model information by DVD approximately 1 month prior to review
- Peer Review Team training performed approximately 4 weeks prior to review
- NRC Presentation on model performed approximately 3 weeks prior to review – provided information to support off-site review
- Initial questions from review team provided to NRC 1 week before review

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**Internal Events Peer Review of NRC L3 PRA – What Went Well**

- Well-qualified utility reviewers
- NRC had performed self-assessments and tracked identified issues prior to peer review – tended to be self-critical
- Good interaction with NRC staff during review
- Allowed NRC junior staff not involved in the work to observe review, including consensus sessions
- Expanded NRC appreciation for peer review process – both review participants and management

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**Challenges Before/During Review**

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**Internal Events Peer Review of NRC L3 PRA – Challenges Before/During**

- Limited response to requests for utility volunteers
- Had to replace one NRC peer review team member three weeks prior to review
- NRC reliance on utility modeling created boundary issues for reviewers
  - How to treat issues not identified in previous peer review
  - How to treat disagreement with previous review team on SR grading
  - How to assess resolution of previous peer review F&Os

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**Internal Events Peer Review of NRC L3 PRA – Challenges Before/During**

- NRC identified problems with initiating event analysis prior to review that caused a number of SRs under HLR IE-C to be “not reviewed”
- NRC had not completed uncertainty assessment prior to review – affected multiple SRs
- INL personnel were not present in Washington for review – limited interactions with key personnel
- NRC relies heavily on RADS for documentation – requires registration for access

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**Internal Events Peer Review of NRC L3 PRA – Challenges Before/During**

- Some needed review materials from lower tier documentation were not provided in the review materials transmitted to the team and were not always referenced to allow the team to request them prior to the review week
- Non-disclosure agreements were required – for both NRC information and SAPHIRE code
- Computer security settings is becoming an issue with respect to using the industry peer review database

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**Level 2**

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**Internal Events Peer Review of NRC  
L3 PRA – Level 2 Review**

- Peer review conducted using the trial use version of ASME/ANS RA-S-1.2-2014, "Severe Accident Progression and Radiological Release (Level 2) PRA Standard for Nuclear Power Plant Applications for Light Water Reactors (LWRs)."
- New work performed by NRC with little reliance on previous licensee modeling
- Rules defined in SAPHIRE to evaluate equipment status from Level 1 events trees seemed to create issues with transfer of support system dependencies.
- Identification of sources of parametric uncertainty and sensitivity analyses were incomplete.

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**Internal Events Peer Review of NRC  
L3 PRA – Level 2 Review**

- Documentation:
  - Mapping of CET sequences to release categories and the rationale was not sufficient to support peer review.
  - No discussion of the relative contributions to significant release categories using criteria such as:
    - initiating events,
    - Level 1 PRA accident sequences,
    - equipment failures,
    - CCFs, operator errors,
    - PDSs,
    - accident progression sequences,
    - phenomena,
    - containment challenges,
    - containment failure modes,
    - source term categories.

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**Internal Events Peer Review of NRC  
L3 PRA – Level 2 Strengths**

- Performance of new structural analysis for containment using finite element tools was viewed as a strength.
- Performance of new MELCOR analysis for severe accident progression and source term analyses was viewed as a strength. However, representative sequences chosen for detailed analysis were not shown to fully meet the expectations of the trial use Level 2 PRA Standard.

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## Overall Impressions

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## Internal Events Peer Review of NRC L3 PRA – Overall Impressions

- NRC Staff has taken ownership of the model – consider it their model not the site's model
- Documentation still relies on the site's documentation in many areas – differences not always documented to industry expectations
- Conservative assumptions in many areas
- Some issues raised questions about depth of internal NRC review
- Software upgrades (both NRC and Industry) may be required to support quantification of integrated models

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## Questions?

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