

NRC Meeting on Technology-Inclusive Risk-Informed Change Evaluation

June 9, 2022

Mike Tschiltz, consultant to Southern Company



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Overview of Topics to be Discussed



- Provide an update on status of the project
- Proposed resolution to NRC comments on Draft white paper entitled “*Change Control Scope and Process for a Reactor Licensed in Accordance with the NEI 18-04 Guidance*”
- Tabletop Exercise planning and execution
- Plan for transitioning from white paper to guidance document
- Topics for next meeting with NRC



- Revision of white paper to address NRC comments
- X-energy Tabletop entering into planning and execution phase
 - Coordination with X-energy, TIRICE participants and NRC
- Outline for guidance drafted and peer review underway

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Discussion of NRC Comments on White Paper “Change Control Scope and Process for a Reactor Licensed in Accordance with the NEI 18-04 Guidance” (Rev. A)

June 9, 2022

Steve Nesbit, LMNT Consulting



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- TIRICE provided the Nuclear Regulatory Commission (NRC) with the draft white paper (Rev. A) on May 6, 2022
- Goals of the white paper:
 - Facilitate socialization with industry
 - Obtain feedback from NRC
 - Support tabletop exercises
- NRC provided initial feedback on May 20, 2022
- TIRICE developed a revision to the draft white paper (Rev B.) and provided it to NRC on June 3, 2022



- NRC comments highlight a number of issues for discussion
 - The following slides describe specific issues
 - Some issues have been addressed, at least partially, in Rev. B

Issue 1 – SMRs or Large LWRs



Can light water small modular reactors or large advanced light water reactors that follow NEI 18-04 use this change control guidance?

- Rev B clarifies that the change control guidance is intended to be applicable to any reactor that follows NEI 18-04 and NEI 21-07
 - NEI 18-04 documents the methodology for selection of Licensing Basis Events (LBEs); safety classification of Structures, Systems, and Components (SSCs); and evaluation of Defense-in-Depth (DID) adequacy
 - NEI 21-07 provides guidance on scope and content for portions of a Safety Analysis Report (SAR) for a reactor that uses the NEI 18-04 methodology
- NEI 18-04 and NEI 21-07 were developed for advanced non-light water reactors
- The change control guidance can be applied to advanced light water reactors but licensee-specific adjustments are expected to be required in certain areas

Issue 2 – Design Certifications



Does the paper include a new change control process for 10 CFR Part 52 design certifications?

- Rev B clarifies that the change control guidance is not intended to be applicable to design certifications
- The change control guidance is applicable to
 - Construction permit and operating license under 10 CFR Part 50
 - Combined construction and operating license under 10 CFR Part 52 with no design certification or early site permit

Issue 3 – Expansion of Scope



Is it clear to all stakeholders that applying the proposed TIRICE approach addresses all licensing basis events (LBEs) (including beyond design basis events (BDBEs)), thereby expanding this fundamental scope?

- Yes, but calling this an expansion of scope may be a misnomer
- An LMP-based affirmative safety case is fundamentally different from a traditional deterministic safety case
- The change control process must address the key aspects of the LMP-based affirmative safety case, including all LBEs
- All LBEs are not treated identically in NEI 18-04 and NEI 21-07
- All LBEs should not necessarily be treated identically with respect to change control

Issue 4 – Inspection of PRA Details



It is not clear how, for the duration of the operating license, when NRC inspects a licensee's conformance with its 50.59-type requirements, the inspectors will be able to delve into the PRA details relied upon by the licensee to justify a change not being noticed to NRC in advance.

- If a licensee concludes prior NRC review is not required, the evaluation would be documented consistent with NEI 96-07 Section 5.0, and such evaluations would be available for inspection
- Licensees would periodically provide the NRC with a summary of evaluations for activities implemented without prior NRC review
- Licensees would periodically update the SAR
- Through audit or inspection, the NRC has ample authority to review PRA design records supporting evaluations

Issue 5 – Reductions in Margin to the F-C Curve



The proposed criteria in Part 53 address reductions in margin as well as LBE results that cross the frequency-consequence (F-C) curve.

- Criteria need to be considered holistically, not in isolation.
 - While LMP 50.59 criterion (a) addresses LBE F-C results explicitly, LMP 50.59 criterion (d) addresses cumulative risk
 - LMP 50.59 criterion (f) addresses defense-in-depth (DID), which includes an assessment of LBE risk margins (see NEI 18-04 Section 5.9.3, which is invoked by NEI 21-07 SAR Section 4.2.3)
- Because NEI 18-04 is risk-informed, it affords the opportunity to consider changes in terms of overall risk as well as changes in risk
 - It is important to take advantage of this attribute
 - Changes in margin, even if they appear large percentage-wise, should not by themselves constitute a need for prior NRC approval

Issue 6 – Alternate Emergency Planning Zones (EPZs)



For an alternate exclusion area boundary (EAB), NRC may assess the LBE margin to an offsite consequence of 1 rem. Should pending changes be assessed against how they impact this original “licensing basis margin?”

- This proposal seems speculative (“may assess”) and seems to presume a licensee pursues an alternate EPZ
- This issue seems to fall into the category where changes to the facility or procedures are controlled by more specific regulations (i.e., Emergency Planning)
- Would this be an analysis involving all LBEs or just a subset, such as Design Basis Accidents (DBAs)?
- To what extent is alternate EPZ covered in the Advanced Reactor Content of Application Project (ARCAP)?

Issue 7 – 10 CFR Part 53



NRC may be judging the TIRICE criteria based on the extent they agree with the NRC's draft criteria in 10 CFR Part 53 (e.g., Issue 5).

- TIRICE recognizes that NRC is developing 10 CFR Part 53 in parallel with the industry TIRICE project
- The projects are related but not identical
- TIRICE is informed by 10 CFR Part 53 proposed language – but not bound by it

Issue 8 – “More than Minimal” Language



How is more than minimal adverse effect on DID adequacy defined?

- TIRICE agrees the subjective nature of the phrase is problematic
- Some subjectivity is expected due to the non-quantitative nature of some of the elements of DID
- Section 3.3.2 discusses how licensees may be able to address the concern, at least somewhat, when the DID baseline is established in initial licensing
- A “one size fits all” definition of “more than minimal” may be challenging to apply for all reactor technologies and all elements of DID and this criterion will be tested during Tabletop exercises
- TIRICE is open to suggestions for alternative terminology or approaches to DID change control

Issue 9 – Tech Specs and LBE Categories



NRC has a concern pertaining to an LBE changing type and an SSC going from being in Tech Specs to not being in Tech Specs.

- TIRICE does not understand the concern
- If an SSC is in Tech Specs, it cannot be removed without a license amendment
 - Therefore, the need for prior NRC approval is a moot point

Issue 10 – Non-LMP Safety Analyses



How are safety analyses outside the LMP framework but part of the licensing basis (e.g., aircraft impact) to be addressed?

- Aircraft impact is specifically addressed in 50.150
 - 50.34(a)(13) requires an analysis in the SAR
 - 50.150(b) addresses control of changes related to aircraft impact
 - Per NEI 96-07 Section 4.1.1, 50.59 (and an NEI 18-04 change control process) would not appear to be applicable to the aircraft impact analysis because there are more specific requirements and criteria established by the regulations [i.e., 50.150(b)]
- ARCAP may require other analyses (beyond LBEs) to be documented in the SAR
 - It may be necessary to modify or add criteria to address such analyses
 - This issue would be informed by access to ARCAP

Questions



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Discussion of Tabletop Exercises

June 9, 2022

Justin Wheat, Enercon



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Tabletop Exercises – Objectives & Schedule



Objectives

- Guidance is being developed to evaluate changes to advanced reactor facilities that plan to be licensed using NEI 18-04 methodology
- The objective is to exercise the draft change evaluation guidance with reactor developers to:
 - Demonstrate usability of the process
 - Validate thresholds
 - Incorporate lessons learned to improve the process

X-energy Tabletop

- Execution – 6/13 through 6/16/2022, from Noon to 2 pm (Central) / 1 pm to 3 pm (Eastern)
- Develop lessons learned – 6/20 to 6/24/2022
- Complete deliverables – 6/27 to 7/12/2022

Sodium Tabletop – TBD

Tabletop Exercises – Format



- Remote work with a combination of individual evaluation and team meetings
- Team-created examples that will be evaluated using the change evaluation guidance
- Tabletop participants will be provided the examples, ad hoc procedures, and other source materials
- Technical leads will evaluate examples and then convene with the larger group to ask questions, discuss the proposed answers to the criteria and the bases for those answers, etc.
- Meeting minutes will capture key discussions and key challenges to develop the lessons learned & actions
- Team will evaluate some examples using proposed Part 53 rule language

Tabletop Exercises – Deliverables



- Evaluation, with a documented basis, for each of the criteria selected for each example
- Meeting minutes that include key discussions and considerations
- Summary of lessons learned
- Recommendations for improving the guidance document
- Lessons learned from the X-energy tabletops will be applied to Sodium

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Transition to Development of Guidance

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Plan for development of guidance document



- Utilize final white paper revision that incorporates Tabletop Lessons Learned
- Utilize outline for guidance that has the same general topics covered in the outline as NEI 96-07
 - Will retain the same or slightly altered language wherever possible for aspects of the process that will not change
- Current Status:
 - Draft outline for guidance has been developed and reviewed by TIRICE peer team
- Next Steps:
 - Revise Draft outline for guidance to address comments and provide to NEI ARRTF for review/comment
 - Address ARRTF comments and provide to NRC for review/comment

Topics for next meeting with NRC



- Tabletop Lessons Learned
- Revision to white paper based on Tabletop Lessons Learned and additional feedback from NRC
- Draft Outline for Guidance