U.S.NRC
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Technology Inclusive Content of Application Project Public Meeting

October 5, 2021
Microsoft Teams Meeting
Bridgeline: 301-576-2978
Conference ID: 968 028 925#

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Agenda

Time	Topic	Speaker
2:00 - 2:10 pm	Opening Remarks	NRC/Industry
2:10 - 2:40 pm	Overview of Staff Comments on NEI 21-07, Revision 0*	NRC
2:40 - 3:30 pm	Discussion of Comments	NRC/Industry
3:30 - 3:45 pm	Stakeholder Questions	All
3:45 - 4:00 pm	Break (if needed)	All
4:00 - 4:15 pm	Continuation of Discussion of NRC Comments	NRC/Industry
4:15 - 4:20 pm	Stakeholder Questions	All
4:20 - 4:30 pm	Next Steps and Closing Remarks	NRC/Industry

***Note that Industry's TICAP guidance document is available at:**
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21250A378

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TICAP Public Meeting

- The purpose of this meeting is to discuss with the nuclear industry issues related to the draft guidance document for safety analysis report (SAR) content for an advanced reactor application based on the licensing modernization project (LMP) described in NEI 18-04
- Key documents associated with this meeting are referenced in the meeting notice and include:
  - NEI 21-07, Rev 0, "Technology Inclusive Guidance for Non-Light Water Reactors Safety Analysis Report Content for Applicants Using the NEI 18-04 Methodology" (ADAMS Accession No. ML21250A378)
  - NRC draft exceptions, clarifications, and additions (ADAMS Accession No. ML21274A032)
  - NRC comments on NEI 21-07 (ADAMS Accession No. ML21274A031)
  - Additional background available on the NRC ARCAP/TICAP public webpage (see: https://www.nrc.gov/reactors/new-reactors/advanced/details.html#advRxContentAppProj)

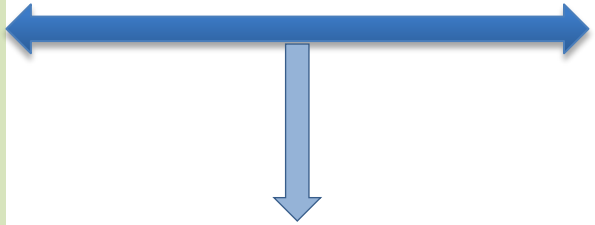
ARCAP and Technology Inclusive Content of Application Project (TICAP) - Nexus

Outline Safety Analysis Report (SAR) – Based on TICAP Guidance

1. General Plant Information, Site Description, and Overview of the Safety Case
2. Methodologies and Analyses
3. Licensing Basis Event (LBE) Analysis
4. Integrated Evaluations
5. Safety Functions, Design Criteria, and SSC Safety Clasification
6. Safety Related SSC Criteria and Capabilities
7. Non-safety related with special treatment SSC Criteria and Capabilities
8. Plant Programs

Additional SAR Content –Outside the Scope of TICAP

9. Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste
10. Control of Occupational Doses
11. Organization
12. Initial Startup Programs



Audit/inspection of Applicant Records

- Calculations
- Analyses
- P&IDs
- System Descriptions
- Design Drawings
- Design Specs
- Procurement Specs
- Probabilistic Risk Assessment

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Physical Security Plan
- SNM physical protection program
- SNM material control and accounting plan
- Cyber Security Plan
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report
- Site Redress Plan
- Exemptions, Departures, and Variances
- Facility Safety Program (under consideration for Part 53 applications)

- Safety Analysis Report (SAR) structure based on clean sheet approach

*Additional contents of application outside of SAR are still under discussion. The above list is draft and for illustration purposes only.

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Overview of NRC Comments on NEI 21-07, Rev 0

Table identifying exceptions, clarifications, and additions, keyed to the NEI 21-07 section numbers as follows:

- Exception - used to indicate statements, or portions thereof, in NEI 21-07 that are factually incorrect or guidance that would result in the need for an NRC Request for Additional Information (RAI) if followed by an applicant in developing a safety analysis report (SAR)

- Clarification - used to indicate statements or guidance in NEI 21-07 that are ambiguous and would require clarification by the NRC to limit the possible interpretations by an applicant or other stakeholder consulting NEI 21-07.

- Addition - used to indicate staff regulatory guidance that should be followed by an applicant in addition to the guidance in NEI 21-07 in order to develop a SAR that addresses the safety case.

Overview of NRC Comments on NEI 21-07, Rev 0

41 items

- 3 exceptions
- Interpretation of principal design criteria (PDC) has not been categorized
  - Staff position under development
- 17 clarifications
- 11 clarifications/additions
- 9 additions

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Overview of NRC Comments on NEI 21-07, Rev 0

Exceptions

- Three exceptions associated with the level of detail in the safety analysis report (SAR) for anticipated operational occurrences (AOOs), design basis events (DBEs) and beyond-design-basis events (BDBEs) that have radiological releases

- The SAR should include a description of the models, site characteristics, and supporting data associated with the calculation of the mechanistic source terms and radiological consequences (to the extent such information is not provided in Section 2.2) for AOOs, DBEs and BDBEs

- The following is the basis for the exception:
  - The models, site characteristics, and supporting data associated with the calculation of the mechanistic source terms and radiological consequences for AOOs, DBEs and BDBEs are essential elements used in the safety case establishing the design bases or in the safety analyses.
  - The SAR should capture the safety case for the reactor; the safety case is tied to appropriately identifying licensing basis events, including AOOs, DBEs, DBAs, and BDBEs.
  - Omission of this information from the SAR would run counter to the Commission's regulations on the control of changes. (See, e.g., 10 CFR 50.59.)

Overview of NRC Comments on NEI 21-07, Rev 0

Evaluation of Changes to the Plant

- Several criteria in 10 CFR 50.59 could apply to licensing basis event information developed from the LMP process including:
  - (c)(2)(ii) more than minimal increase in the likelihood of a malfunction of an SSC important to safety
  - (c)(2)(iv) more than minimal increase in the consequences of a malfunction of an SSC important to safety
  - (c)(2)(viii) results in a departure from a method described in the FSAR in establishing the design bases or in the safety analysis

- Criteria for evaluation of changes to the plant proposed for 10 CFR Part 53 rulemaking that assume licensing basis event information is captured in the FSAR

NEI 18-04

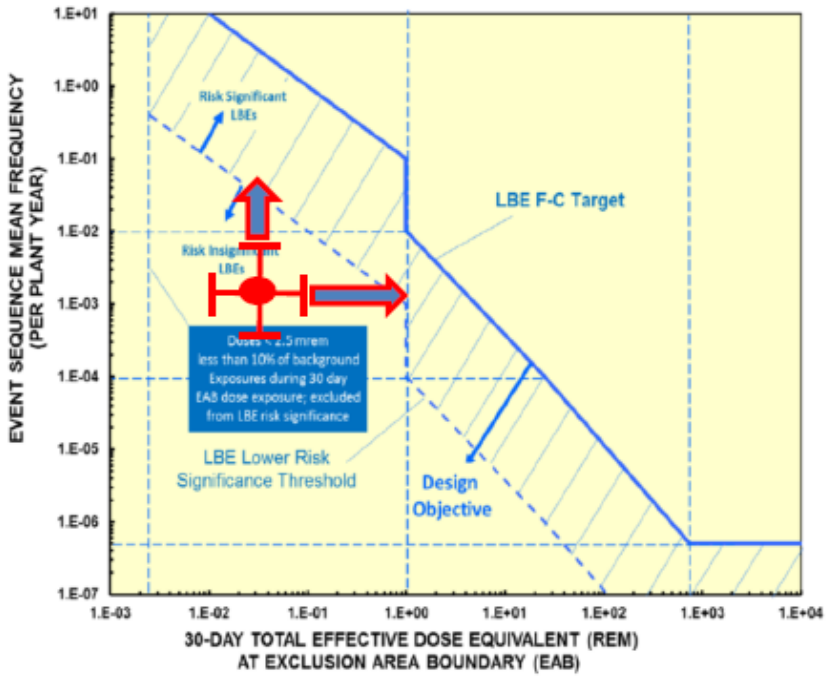

Figure 3-4. Use of the F-C Target to Define Risk-Significant LBEs

Overview of NRC Comments on NEI 21-07, Rev 0

Examples of Level of Information for AOOs, DBE, BDBEs in the safety analysis report based on level of information found in Vogtle 3 and 4 final safety analysis report from Section 15.6.2, “Failure of Small Lines Carrying Primary Coolant Outside Containment” (see: ADAMS Accession No. ML21179A102)

15.6.2.1 Source Term

The only significant radionuclide releases are the iodines and the noble gases. The analysis assumes that the reactor coolant iodine is at the maximum Technical Specification level for continuous operation. In addition, it is assumed that an iodine spike occurs at the time of the accident. The reactor coolant noble gas concentrations are assumed to be those associated with equilibrium operating limits for primary coolant noble gas activity.

15.6.2.2 Release Pathway

The reactor coolant that is spilled from the break is assumed to be at high temperature and pressure. A large portion of the flow flashes to steam, and the iodine in the flashed liquid is assumed to become airborne.

The iodine and noble gases are assumed to be released directly to the environment with no credit for depletion, although a large fraction of the airborne iodine is expected to deposit on building surfaces. No credit is assumed for radioactive decay after release.

15.6.2.3 Dose Calculation Models

The models used to calculate doses are provided in Appendix 15A.

Chapter 2 of the SAR should include something like this Appendix. The title of Appendix 15A is "Evaluation Models and Parameters for Analysis of Radiological Consequences of Accidents"

15.6.2.4 Analytical Assumptions and Parameters

The assumptions and parameters used in the analysis are listed in Table 15.6.2-1.

This table is the type of information that should be included in the application.

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Overview of NRC Comments on NEI 21-07, Rev 0

Examples of Level of Information for AOOs, DBE, BDBEs in the safety analysis report (continued)

15.6.2.6 Doses

Using the assumptions from Table 15.6.2-1, the calculated total effective dose equivalent (TEDE) doses are determined to be 1.3 rem at the exclusion area boundary and 0.6 rem at the low population zone outer boundary. These doses are a small fraction of the dose guideline of 25 rem TEDE identified in 10 CFR Part 50.34. The phrase "a small fraction" is taken as being ten percent or less.

VEGP 3&4 – UFSAR

This table contains the type of information that should be included in the SAR.

Table 15.6.2-1
Parameters Used in Evaluating the Radiological Consequences of a Small Line Break Outside Containment

Reactor coolant iodine activity	Initial activity equal to the design basis reactor coolant activity of 1.0 μCi/g dose equivalent I-131 with an assumed iodine spike that increases the rate of iodine release from fuel into the coolant by a factor of 500 (see Table 15A-2 in Appendix 15A)[a]
Reactor coolant noble gas activity	280 μCi/g dose equivalent Xe-133
Break flow rate (gpm)	130[b]
Fraction of reactor coolant flashing	0.47
Duration of accident (hr)	0.5
Atmospheric dispersion (χ/Q) factors	See Table 15A-5
Nuclide data	See Table 15A-4

This table contains the type of information that should be included in the SAR.

Generic data table

Notes:
a. Use of accident-initiated iodine spike is consistent with the guidance in the Standard Review Plan.
b. At density of 62.4 lb/ft^3.

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Overview of NRC Comments on NEI 21-07, Rev 0

Example clarifications

- Item A.2 – In addition to making a safety case, an applicant should also make a licensing case that focuses on compliance with applicable regulations and includes any exemptions necessary.

- Item A.3b, and B2 – the safety case should include normal operations as well as licensing basis events.

- Item B.3 – Explanation and use of text that is in italics. Further explanation is needed clarifying the use of regular text and text in italics. Staff identified 15 areas where regular text vice italicized text should be used.

- Item 5.6b and 5.6c – Complementary Design Criteria discussion in the SAR should include the relevance of CDC in establishing the engineering criteria for the design

Overview of NRC Comments on NEI 21-07, Rev 0

Example clarifications/additions

- Item A.3a – the staff will continue to reference in TICAP RG the guidance that is relevant to the first 8 chapters of the SAR (e.g., siting, fuel qualification, instrumentation and control design review guide).

- Item 2.1.1b – Discussion of PRA information to be included in the SAR.

- Item 5.6a – Complementary design criteria should be provided in the SAR as part of the safety case. The staff notes that the discussion of the CDC in the SAR could be influenced by the outcome of the discussion of principal design criteria.

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Overview of NRC Comments on NEI 21-07, Rev 0

Example additions

- Human Factors consideration in the SAR – relates to items 4.2.2, 4.2.2.3, 6.4.1a, 6.4.1b, 7.3.1a, and 7.3.1b.
  - Staff is considering additions to either the TICAP RG or ARCAP Chapter 11 (or both) to capture guidance regarding human factors engineering.

NEI 21-07 Rev. 0 Technical Report "Technology Inclusive Guidance for Non-Light Water Reactors"

Initial Clarification Questions on Nuclear Regulatory Commission (NRC) Feedback

Steve Nesbit, LMNT Consulting

NEI – Nuclear Regulatory Commission (NRC) Meeting
October 5, 2021

Southern Company

Overview

- NEI submitted NEI 21-07 Rev 0 “Technology Inclusive Guidance for Non-Light Water Reactors” to the NRC on August 30, 2021
- NRC provided draft exceptions, clarifications and additions to NEI on September 30, 2021
  - Technology Inclusive Content of Application Project (TICAP) Team appreciates the NRC feedback
  - Team has not had time to address all draft exceptions, clarifications and additions in detail
- This presentation summarizes initial clarification questions for the NRC

B.2 Affirmative Safety Case

- NRC wishes to clarify that an affirmative safety case should include normal operation as well as LBEs (licensing basis events)
- The TICAP affirmative safety case definition does not include normal operations (see Section A.3, p. 3), consistent with the Licensing Modernization Project (LMP) focus
- NRC has not previously commented on the affirmative safety case definition
  - Does NRC want to change the definition?
  - Why is this comment tied to the SAR Outline (Section B.2)?

B.3 Explanation and Use of Italics

- NRC says further discussion is needed in either NEI 21-07, Revision 1, or the TICAP draft RG white paper clarifying the meaning of the use of the regular text and text in italics throughout the SAR content guidance in Section C of NEI 21-07 (examples provided)
- TICAP modified the italics criteria in Section B.3 (top of p. 9) to make them clear and straightforward prior to submitting NEI 21-07
- Does NRC believe the criteria need further explanation, or does NRC disagree with the application of the criteria as noted by the examples?

B.5 Two-Step Licensing

- In the first paragraph NRC raises points about
  - inclusion of normal operation in the affirmative safety case
  - compliance with or exemptions from the regulations
- Are these possibly general points rather than items to be addressed under two-step licensing?
- Why is the ITAAC point applicable to two-step licensing?
- In the second paragraph NRC discusses the shift from prescriptive regulations to a focus on the identification and performance of fundamental safety functions
  - Is this a point for two-step licensing, or more general?
  - The point may be addressed already generically, in other parts of the introductory material

» See Section A.3, paragraph following the definition of affirmative safety case (p. 4)

B.6 Design Certification

- NRC desires more discussion "… to clarify that the SAR content developed through use of LMP is similar in scope only to the Tier 2 information required for a DC application."
- Is the NRC implying that the LMP scope information is only Tier 2 information for a design certification?
  - If so, what is the basis for that perspective?

1b Licensing Basis Information

- Regarding the first part of the sentence (Chapter 1 material), the NRC wants clarification on what is part of the licensing basis
- During the development of the guidance, the TICAP team removed statements in earlier drafts of the guidance that the material is not part of the licensing basis and added, in the guidance, the statement that “It is understood that as part of the SAR, Chapter 1 will be maintained and updated as changes to Chapters 2 through 8 occur.” (p. 15)
  - What additional clarification is sought?
- Regarding the second part of the sentence (what parts of the regulation the material seeks to fulfill), is the intent that the guidance instruct the inclusion of a compliance matrix?

1.3.3 Defense in Depth (DID) in Chapter 1

- The NRC states “Further discussion is needed in either NEI 21-07, Revision 1, or the TICAP draft RG white paper to clarify that DID adequacy is based on 3-elements; plant capability DID, programmatic DID, and RIPB DID. Applicants should address risk-informed, performance-based DID also and cite key examples for this DID element.”
- What is the basis for providing such a description in the Chapter 1 introductory material?

2.1.1a Trial Use Regulatory Guide 1.247

- The NRC says “NRC staff positions in RG 1.247, once issued, should be addressed along with the Std.”
- Does this clarification have any relevance for the current version of NEI 21-07?
  - It was the TICAP teams intention not to address the regulatory guide until it has been formally issued

2.1.2 Summary of Key PRA Results

- The NRC desires to see further discussion of human actions
- Is the comment about human actions pertinent to this PRA section or is it intended as a broader comment on NEI 21-07 as a whole?

3.3 Anticipated Operational Occurrences (AOOs)

- The NRC states “Further discussion is needed in either NEI 21-07, Revision 1, or the TICAP draft RG white paper to clarify that non-DBA LBE as analyzed in the PRA should be summarized in the SAR.”
- NEI 21-07 requires documentation of AOOs, design basis events, beyond design basis events, and design basis accidents
  - What is the basis for the stated need for further discussion, given that it appears to be covered already in the guidance?

3.3.1 – Key Information on AOOs (also 3.4.1 and 3.5.1)

- The NRC states in this clarification and exception comment that additional information should be required by the guidance (models, site characteristics, etc., associated with radiological consequences)
- The stated basis is that "… the safety case … is tied to licensing basis events" and the information needs to be in the SAR for purposes of change control
- The TICAP team seeks clarification of the nexus between the desired information and the stated basis
- This also applies to the clarification and exception for 3.4.1 (design basis events) and 3.5.1 (beyond design basis events)

4.1 Overall Plant Risk Information

- The NRC desires further discussion of the analytical methodologies used (site parameters, location of members of the public, source of dose, analysis method, etc.)
- What is the basis for the need for this information?

4.2.1.4 Prevention-Mitigation Balance

- The NRC is requesting the inclusion of ADAMS ML numbers or hyperlinks for ease of reference
- Please clarify that this is a generally applicable comment and not specific to Section 4.2.1.4 of NEI 21-07

4.2.3c Change Process for Defense-in-Depth

- The NRC wishes to add guidance that the applicant describe the change control process in the SAR
- What is the basis for putting descriptive information on the change control process in the SAR?
  - The TICAP team agrees that guidance is needed, but that does not necessarily justify a requirement for such information in the SAR

5.3 Principal Design Criteria (PDC)

- The NRC comment is not categorized, and it covers a lot of matters related to PDC
- What are the “fourth paragraph proposed edits?”
  - The NRC markup provides no proposed edits to the fourth paragraph
- The comment refers to “stated NRC positions”
  - Please clarify what those positions are and where they can be found
- Please clarify the end of the comment
  - It ends with a sentence fragment that is not clear

5.5.1 Non-Safety-Related Structures, Systems and Components (SSCs)

- The NRC comment indicates a desire for similar information to Tables 5-1 and 5-2 for some Non-Safety-Related with Special Treatment (NSRST) SSCs
- Note that Tables 5-1 and 5-2 are supporting material in the guidance and the tables are not intended for inclusion in the SAR for safety-related SSCs per NEI 21-07
  - Please clarify this stated need for information on NSRST SSCs

5.6a, 5.6b, and 5.6c Complementary Design Criteria (CDC)

- The NRC clarification and addition comments address aspects of CDC relating to the affirmative safety case and PDC
- The TICAP team would like clarification on the comments themselves and the basis for the cited needs for additional discussion in the SAR
- Do these comments relate to the forthcoming NRC position on PDC?

6.1.1b Design Basis Hazard Levels (DBHLs)

- The NRC clarification comment cites a need for further discussion on the calculation methodology for DBHL loads
- The TICAP team attempted to address this point in NEI 21-07 through the last italicized paragraph on p. 52 which states that it is covered by ARCAP instead of TICAP
- Please explain the need for additional clarification

6.1.1c DBHL Discussion

- The NRC clarification and addition comment is to summarize the basis for the DBHLs in the SAR
- The TICAP team attempted to address this point in NEI 21-07 through the paragraph above Table 6-1
- Please explain the need for additional clarification

Appendix B Example LBE Descriptions

- The NRC says “The staff does not plan to endorse Appendix B ‘Example Descriptions’ of NEI 21-07 because the agency does not endorse examples provided in guidance documents due to the need for technical review and approval.”
- The TICAP team never intended that the NRC perform a technical review of the material
  - The intent of the examples is only to show how to document LBE descriptions
  - TICAP considers the validity of the underlying analyses to be irrelevant to the value of the example
- Please clarify why any technical review and approval by the staff is considered necessary

Next Steps – Future Milestones

TICAP Near-Term Milestones	Target Date
Update of NRC Draft Guidance Documents	October 2021
ACRS Future Plants Designs Subcommittee Meeting on ARCAP/TICAP Guidance Documents	December 15, 2021
Continuation of Discussion of NRC draft Exceptions, Clarifications, and Additions (possibility of future draft industry or staff documents)	TBD
NEI 21-07, Revision 1	February 2022