



Technology Inclusive Content of Application Project Public Meeting

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

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>

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- The purpose of this meeting is to discuss with the nuclear industry issues related to the draft guidance document for safety analysis report (SAR) content for an advanced reactor application based on the licensing modernization project (LMP) described in NEI 18-04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 Classification
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

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

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

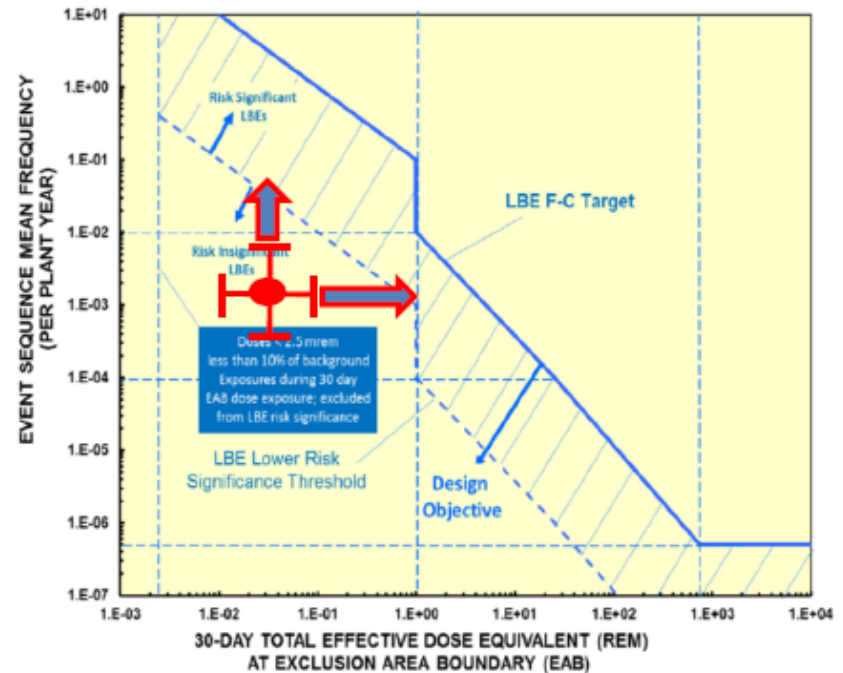


Figure 3-4. Use of the F-C Target to Define Risk-Significant LBEs

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.

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

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 $\mu\text{Ci/g}$ 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 $\mu\text{Ci/g}$ 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

Notes:

- Use of accident-initiated iodine spike is consistent with the guidance in the Standard Review Plan.
- At density of 62.4 lb/ft³.

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

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Generic data table

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.

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.

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