



Technology Inclusive Content of Application Project (TICAP) Public Meeting

December 14, 2021
Microsoft Teams Meeting
Bridgeline: 301-576-2978
Conference ID: 290 125 988#

Agenda

Time	Topic	Speaker
10:00 – 10:10 am	Opening Remarks	NRC/Industry
10:10 – 10:40 am	Overview of NRC Position on Licensing Modernization Project-based Principal Design Criteria	NRC
10:40 – 11:40 am	Discussion of Changes to NEI 21-07*	Industry
11:40 – 12:00 pm	Stakeholder Questions	All
12:00 – 1:00 pm	Break	All
1:00 – 2:30 pm	Discussion of Status of Draft TICAP Regulatory Guide White Paper Proposed Exceptions, Clarifications and Additions**	NRC/Industry
2:30 – 2:45 pm	Stakeholder Questions	All
2:45 – 3:00 pm	Break (if needed)	All
3:00 – 3:50 pm	Continuation of Discussion on TICAP Guidance	NRC/Industry
3:50 – 4:00 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>

**** Note that the staff TICAP Regulatory Guide Draft White Paper is available at:**

<https://www.nrc.gov/docs/ML2133/ML21336A697.pdf>

TICAP Public Meeting

- Purpose: to discuss draft guidance for advanced reactor application safety analysis reports (SARs) using Nuclear Energy Institute (NEI) 18-04's Licensing Modernization Project (LMP)
- Key documents:
 - NEI 21-07, Revision 0, "Technology Inclusive Guidance for Non-Light Water Reactors Safety Analysis Report Content for Applicants Using the NEI 18-04 Methodology" ([ML21250A378](#))
 - NRC draft exceptions, clarifications, and additions ([ML21274A032](#))
 - NRC comments on NEI 21-07 ([ML21274A031](#))
 - Additional background available on the NRC Advanced Reactor Content of Application Project (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 Events
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 and Human-System Considerations
12. Post-construction Inspection, Testing and Analysis 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.

NRC Update to TICAP Guidance Principal Design Criteria

Summary of the questions posed during the previous Technology Inclusive Contents of Application Project (TICAP) public workshops:

- 1) Does the regulatory language in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, describing the scope of General Design Criteria (GDC) constitute a “definition” for the scope of Principal Design Criteria (PDC)?
- 2) Would an exemption (from 10 CFR Part 50, Appendix A) be needed for applicants proposing PDC using the guidance in NEI 21-07?

Principal Design Criteria

- PDC are required by 10 CFR 50.34 and 10 CFR 52.47, 52.79, 52.137, and 52.157 as a means to meet the requirements of the Atomic Energy Act (AEA), Section 182 for inclusion in license applications of *‘the specific characteristics of the facility, and such other information as the Commission may, by rule, or regulation, deem necessary in order to enable it to find that the utilization or production of special nuclear material will be in accord with the common defense and security and will provide adequate protection to the health and safety of the public.’*
- GDC are applicable to light-water reactors (LWRs) (“minimum requirements”) and “**provide guidance** to applicants for construction permits in establishing principal design criteria **for other types of nuclear power units.**”

Principal Design Criteria

Response to Question 1:

- The scope of PDC were discussed and established in regulatory history and expressed in the regulations (Introduction to 10 CFR Part 50, Appendix A) and logically leads to a conclusion that PDC are the type of information foreseen by AEA Section 182 in license applications, as follows:

The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety; that is, structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.

- **The NRC position on the requirement for proposed PDC is that it includes the scope of PDC described in the regulations as well as in the regulatory history.**

...design, fabrication, construction, testing and performance requirements for structures, systems, and components important to safety

Principal Design Criteria

- The use of PDC was described in the statements of consideration for the final rule incorporating Appendix A into 10 CFR Part 50 (36 FR 3255, 3256; February 20, 1971).

“Principal design criteria established by an applicant and accepted by the Commission will be incorporated by reference in the construction permit. In considering the issuance of an operating license under 10 CFR Part 50, the Commission will require assurance that these criteria have been satisfied in the detailed design and construction of the facility and that any changes in such criteria are justified”

- PDC are required to be proposed by applicants for the following:
 - ✓ 10 CFR 50.34(a)(3) for construction permits (CPs)
 - ✓ 10 CFR 52.79(a)(4) for combined licenses (COLs)
 - ✓ 10 CFR 52.47(a)(3) for design certifications (DCs)
 - ✓ 10 CFR 52.137(a)(3) for standard design approvals (SDAs)
 - ✓ 10 CFR 52.157(a) for manufacturing licenses (MLs)

Principal Design Criteria

PDC are particularly important for CP applications:

- CP applicants are required to provide less information, comparatively speaking, and the information that is provided is generally preliminary.
- The proposed PDC play a significant role in supporting the NRC's finding that there is reasonable assurance that safety questions will be satisfactorily resolved by the date set in the application for completion of construction and that the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public.
- Consistent with historical and current practice associated with the principal architectural and engineering criteria upon which the NRC has made its findings, the PDC proposed by a CP applicant that have been reviewed and approved by the NRC will be included in the CP as conditions.
- NRC findings and safety evaluation reviews will document compliance with the approved PDC that have been incorporated into the license.
- There are no separate requirements for PDC for an OL application.

Principal Design Criteria

Response to Question 2:

- The GDC in 10 CFR Part 50, Appendix A are not applicable to non-light-water reactors (non-LWRs); therefore, non-LWR applicants would not need to request an exemption from the GDC in 10 CFR Part 50 when proposing PDC for a specific design.
- However, based on the NRC's position that the requirement for proposing PDC include the scope of PDC described in the regulations as well as in the regulatory history, applicants that do not fully address the scope of criteria as part of their proposed PDC would need to request an exemption from the applicable PDC regulation associated with their application type.

...design, fabrication, construction, testing and performance requirements for structures, systems, and components important to safety

Principal Design Criteria

Implementation considerations for applicants using the TICAP guidance in NEI 21-07:

- GDC in 10 CFR Part 50, Appendix A are applicable to LWRs (“minimum requirements”) and **“provide guidance to applicants for construction permits in establishing principal design criteria for other types of nuclear power units.”**
- Advanced Reactor Design Criteria (ARDC) developed by the NRC in Regulatory Guide (RG) 1.232 are intended to provide insight into the staff’s views on how the underlying safety bases for the GDC could be applied to address non-LWR design features. As noted in RG 1.232, the development of the ARDC was an important first step to address the unique characteristics of non-LWR technology but the NRC recognizes the future benefits to risk-informing the non-LWR design criteria and determining the role of such criteria within a new regulatory framework.

Principal Design Criteria

- Non-LWR applicants may use the GDC provided in 10 CFR Part 50 Appendix A and the ARDC provided in RG 1.232 as **guidance** for developing their PDC to meet the applicable requirements and to provide the specific characteristics of the facility necessary for the Commission to conclude that it can be operated without undue risk to the health and safety of the public under AEA Section 182.
- As described in NEI 18-04 and RG 1.233, a non-LWR applicant may use a risk-informed methodology (e.g., licensing modernization project (LMP) methodology) to identify both required safety functions and probabilistic risk assessment (PRA) safety functions from which required functional design criteria (RFDC) and other special treatment requirements are identified for safety-related (SR) and non-safety-related with special treatment (NSRST) SSCs. *The RFDC and special treatment requirements derived from the LMP process can be viewed as playing a similar role in identifying design features and related attributes as is provided by the requirements of the GDC and ARDC.*

Principal Design Criteria

- In meeting the regulations for proposing PDC, the staff envisions this as a two-step process (1) propose PDC for those SSCs that are determined to be important to safety (*i.e.*, *SR and NSRST SSCs identified using the LMP methodology*), and (2) for those PDC determined to be necessary, ensure that the proposed PDC address design, fabrication, construction, testing, quality and performance requirements necessary to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.
- When using the LMP methodology, the RFDC and special treatments for other SSCs that are identified as the PDC (as an alternative to the prescriptive GDC or ARDC) should ensure that the necessary design, fabrication, construction, testing, quality, and performance requirements are addressed.

Principal Design Criteria

- Proposed PDC determined to be necessary for a non-LWR design and submitted in an application under 10 CFR Part 50 or Part 52 should be as comprehensive in scope as the GDC and ARDC (i.e., establish the necessary design, fabrication, construction, testing, quality and performance requirements).
- Non-LWR applicants proposing PDC that are not comprehensive in scope (i.e., do not fully address design, fabrication, construction, testing, and performance requirements) will need to request exemptions from the applicable regulations:
 - 10 CFR 50.34(a)(3) for CPs
 - 10 CFR 52.79(a)(4) for COLs
 - 10 CFR 52.47(a)(3) for DCs
 - 10 CFR 52.137(a)(3) for SDAs
 - 10 CFR 52.157(a) for MLs

Principal Design Criteria

- Non-LWR applicants must provide supporting information that justifies to the NRC how their design meets their proposed PDC and how their proposed PDC demonstrate reasonable assurance of safety.
- The NRC believes that it is feasible for applicants for CPs, COLs, DCs, SDAs and MLs to provide justification for an exemption by ensuring that the elements of the PDC scope not specifically included in their proposed PDC are included in their application.
- Exemptions for CP applicants may be more challenging since there are generally fewer other regulatory requirements for CPs and those only require preliminary design information (i.e., if design approvals are not sought by a CP applicant).
- NRC does not intend to review proposed PDC for compliance with the GDC; however, the staff will review PDC against the scope of GDC and ARDC and use the ARDC as review guidance for those non-LWR applicants that rely on them.

Principal Design Criteria

- NRC recognizes that the LMP process described in NEI 18-04, Rev. 1, provides a risk-informed, performance-based approach to developing certain proposed PDC; however, the NRC staff also recognizes that the LMP methodology has a limited scope and does not address areas such as design criteria related to normal operations.
- As described in the TICAP guidance document NEI 21-07, Rev. 0,
“an affirmative safety case is a collection of technical and programmatic evidence which documents the basis that the performance objectives of the technology-inclusive FSFs are met by a design during design-specific Anticipated Operational Occurrences, Design Basis Events, Beyond Design Basis Events, and Design Basis Accidents.”
- NRC considers the TICAP definition for an affirmative safety case, as discussed above, to be limited and does not address areas such as design criteria related to normal operations. The staff plans to address important topics associated with the safety case and outside the scope of the TICAP guidance in the Advanced Reactor Content of Application Project (ARCAP) guidance.

Principal Design Criteria

- The NRC is considering including other regulatory constructs in the 10 CFR Part 53 rulemaking to ensure that appropriate functional design criteria are developed through which an NRC finding could be made.
- The TICAP guidance document NEI 21-07, Rev. 0, introduces a tiered concept for developing design criteria using the LMP process: PDC and Complementary Design Criteria (CDC).
- The tiered PDC/CDC construct was not fully developed in the NRC-endorsed LMP methodology document (NEI 18-04, Revision 1) and requires additional guidance to fulfill the regulatory requirements currently in 10 CFR Parts 50 and 52 related to addressing PDC for items deemed important to safety.

Principal Design Criteria

- The statement in NEI 18-04 that the **RFDC** are defined to capture design-specific criteria that may be used to supplement or modify the applicable GDC or ARDC in the formulation of PDC **addresses SR SSCs.**
- The current regulatory construct for PDC also addresses items considered important to safety. To minimize exemptions, **the TICAP scope currently addressed via the CDC will need to be captured within a broader set of PDC.** However, the benefits of improved clarity and alignment with safety classifications can be maintained through categories of PDC.

For example, the RFDC could identify Type A PDC while the CDC could be renamed Type B PDC. As stated above, both types of PDC would be needed and their scope should ensure that the application provides information on both SR and NSRST SSCs regarding their design, fabrication, construction, testing, quality and performance requirements.

Principal Design Criteria

Recommendations for revising NEI 21-07, Revision 0:

1. Include discussion on the affirmative safety case that recognizes that use of the LMP process by a non-LWR applicant under 10 CFR Parts 50 and 52 will inform the development of a safety case for the facility but may not address the entirety of the safety case necessary for an application for a license (e.g., normal operations, stable long-term subcriticality and cooling, etc.). Elements of the safety case not informed by the LMP process and addressed in the TICAP guidance will be addressed in the ARCAP guidance.
2. Include a discussion on the development of proposed PDC that recognizes that use of the LMP process by a non-LWR applicant under 10 CFR Parts 50 and 52 will inform the development of proposed PDC for the facility but may not include the entirety of PDC necessary to demonstrate, and for the NRC to find, that the facility will operate so as to provide adequate protection of the health and safety of the public (e.g., normal operations, stable long-term subcriticality and cooling, etc.). Development of proposed PDC not informed by the LMP process and not addressed in the TICAP guidance will be addressed in the ARCAP guidance.

Principal Design Criteria

- 3) Include a discussion on the development of proposed PDC that recognizes that the GDC in 10 CFR Part 50, Appendix A, and the ARDC in RG 1.232 provide guidance on the scope of proposed PDC to be developed by a non-LWR applicant under 10 CFR Parts 50 and 52 and contain the criteria that are sufficient to support an NRC finding that there is reasonable assurance of adequate protection of the health and safety of the public (i.e., design, fabrication, construction, testing, and performance requirements for structures, systems, and components).
- 4) Include a discussion on the development of proposed PDC that informs non-LWR applicants that proposed PDC that do not address the comprehensive scope of criteria that are sufficient to support an NRC finding should request an exemption from the applicable regulations (i.e., 10 CFR 50.34(a)(3), 10 CFR 52.79(a)(4), 10 CFR 52.47(a)(3), 10 CFR 52.137(a)(3), and 10 CFR 52.157(a) and provide appropriate justification for the request.

Principal Design Criteria

- 5) Include a discussion on the development of proposed PDC and CDC by a non-LWR applicant under 10 CFR Parts 50 and 52 that certain CDC may be considered by the NRC to be equivalent to PDC if necessary to support its finding if the CDC contain the criteria that are necessary to demonstrate there is reasonable assurance of adequate protection of the health and safety of the public (i.e., design, fabrication, construction, testing, and performance requirements for structures, systems, and components). In such cases, those CDC should be recategorized as PDC and may be categorized, for example, as PDC-B in a two-group PDC construct where PDC-A address SR SSCs and PDC-B address NSRST SSCs.

Principal Design Criteria

Background Slides

Exemption Requests

Exemptions per 10 CFR 50.12:

(a) The Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of this part, which are--

(1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

(2) The Commission will not consider granting an exemption unless special circumstances are present. Special circumstances are present whenever--

(i) Application of the regulation in the particular circumstances conflicts with other rules or requirements of the Commission; or

(ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule; or

Exemption Requests

(iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated; or

(iv) The exemption would result in benefit to the public health and safety that compensates for any decrease in safety that may result from the grant of the exemption; or

(v) The exemption would provide only temporary relief from the applicable regulation and the licensee or applicant has made good faith efforts to comply with the regulation; or

(vi) There is present any other material circumstance not considered when the regulation was adopted for which it would be in the public interest to grant an exemption. If such condition is relied on exclusively for satisfying paragraph (a)(2) of this section, the exemption may not be granted until the Executive Director for Operations has consulted with the Commission.

Exemption Requests

(b) Any person may request an exemption permitting the conduct of activities prior to the issuance of a construction permit prohibited by § 50.10. The Commission may grant such an exemption upon considering and balancing the following factors:

- (1) Whether conduct of the proposed activities will give rise to a significant adverse impact on the environment and the nature and extent of such impact, if any;
- (2) Whether redress of any adverse environment impact from conduct of the proposed activities can reasonably be effected should such redress be necessary;
- (3) Whether conduct of the proposed activities would foreclose subsequent adoption of alternatives; and
- (4) The effect of delay in conducting such activities on the public interest, including the power needs to be used by the proposed facility, the availability of alternative sources, if any, to meet those needs on a timely basis and delay costs to the applicant and to consumers.

Exemption Requests

Issuance of such an exemption shall not be deemed to constitute a commitment to issue a construction permit. During the period of any exemption granted pursuant to this paragraph (b), any activities conducted shall be carried out in such a manner as will minimize or reduce their environmental impact.

Exemptions per 10 CFR 52.7:

The Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of this part. The Commission's consideration will be governed by § 50.12 of this chapter, unless other criteria are provided for in this part, in which case the Commission's consideration will be governed by the criteria in this part. Only if those criteria are not met will the Commission's consideration be governed by § 50.12 of this chapter. The Commission's consideration of requests for exemptions from requirements of the regulations of other parts in this chapter, which are applicable by virtue of this part, shall be governed by the exemption requirements of those parts.

Industry Slides – Updates to NEI 21-07

NRC Update to TICAP Guidance

- NRC draft exceptions, clarifications, and additions ([ML21274A032](#))
 - Discussed during October 5, 2021, Public Meeting
- Staff provided a July 8, 2021, TICAP Regulatory Guide white paper to support stakeholder interactions ([ML21190A014](#))
- On December 2, 2021, Staff issued updated TICAP Regulatory Guide white paper to support continuing discussion of TICAP guidance ([ML21336A697](#))
 - Exceptions, clarifications, and additions found in Appendix B of the document updated from version discussed during October 5th public meeting.
 - Disposition column reflects changes to the table based on feedback from October 5, and November 9, public meeting.

NRC Update to TICAP Guidance

- Exceptions, clarifications, and additions changes since October 5 and November 9, 2021, meetings:
 - Staff proposing change to exception/clarification associated with the level of detail in the safety analysis report for Anticipated Operational Occurrences (AOOs), Design Basis Events (DBEs) and Beyond Design Basis Events (BDBEs)
 - Proposal to revise the comments and change its categorization from exception to clarification
 - Proposal embedded in attachment to Appendix B of December 2, 2021, TICAP Regulatory Guide white paper.
 - Staff removing proposed clarification in NEI 21-07, Section 4.2.2 guidance for programmatic defense-in-depth that the application should provide the justification for where the design does not incorporate the programmatic capability attributes provided in NEI 18-04 Table 5-6
 - Basis for removal is that the TICAP guidance already specifies that the applicant state affirmatively that the guidelines for programmatic capability attributes provided in NEI 18-04 Table 5-6 have been evaluated and included in the design.

NRC Update to TICAP Guidance

- Exceptions, clarifications, and additions changes since October 5 and November 9, 2021, meetings:
 - Staff considering updating proposed addition in NEI 21-07, Section 5.5.1 related to Non-Safety-Related SSCs performing risk-significant functions discussion in the SAR
 - Basis for update of comment is that the staff determined that the depiction and approach found in NEI 21-07 Table 5-2 for Safety-related structures, systems and components (SSCs) does not apply to the NSRST portion of the SSC classification process
 - Staff is considering whether the depiction and approach found in NEI 21-07 Table 5-1 for SR SSCs, could have applicability to NSRST SSCs based on PDC position provided above
 - Consideration is that Table 5-1 relates to PDC guidance and NSRST SSCs have the potential to be identified as PDC
 - Future updates to Appendix B TICAP RG white paper possible in this area

NRC Update to TICAP Guidance

- Exceptions, clarifications, and additions changes since October 5 and November 9, 2021, meetings:
 - Staff considering changes to discussion regarding NEI 21-07 Appendix B, “Example Licensing Basis Event Descriptions,” beyond stating that it does not endorse it.
 - Considering expanding discussion, with appropriate caveats, that NEI 21-07 Appendix B provides useful examples on how to apply the guidance in specific areas
 - Staff notes that in the absence of an NRC-approved SAR with associated references, a conclusion on completeness is not practical

NRC Update to TICAP Guidance

- Appendix A of December 2, 2021, TICAP Regulatory Guide white paper “Construction Permit Application Guidance,” notes that the Appendix is under review
- Staff is reviewing NEI 21-07 to determine possible changes to this Appendix. Staff notes the following inconsistencies are being reviewed for a possible update:
 - Section 2.d of the Appendix provides a detailed list of the site information to be included in the CP application
 - Site information is generally outside the scope of NEI 21-07. Both NEI 21-07 Chapter 1 and 2 do not provide the expected site information to be include in the application
 - The source term to be used for the siting determination for non-LWRs is still under consideration by the staff
 - Issue concerns the source term to be used to meet the requirements found in 10 CFR 50.34(a)(1)(ii)(D)
 - Traditionally, the source terms used in determining site suitability for LWRs have been representative of the source terms that result from event sequences less frequent and more severe than those corresponding to design basis accidents (DBAs)
 - Issue is how to meet the underlying 10 CFR 50.34(a)(1)(ii)(D) requirement for designs following the LMP approach
 - Staff intends to discuss the issue in future TICAP public meetings

NRC Update to TICAP Guidance

- Staff is reviewing NEI 21-07 to determine possible changes to Appendix A. Staff notes the following inconsistencies are being reviewed for a possible update (continued):
 - The guidance associated with scope of the PRA information at the CP stage in this Appendix A is broader and more detailed than specified in NEI 21-07, Revision 0
 - Chapters 1 and 5 of the Appendix describes principal design criteria (PDC) to be included in the CP
 - This guidance will need to be updated to be consistent with PDC discussion provided in early part of today's presentation
 - Sections 6 and 7 of the Appendix provides guidance that notes "information should be provided for each safety related (SR) and non-safety related with special treatment (NSRST) structure, system, and component (SSC) to support a determination that the SSC will meet its reliability and performance targets as credited in the PRA"
 - It is not clear if NEI 21-07 requires this information in a CP application

Next Steps – Milestones

TICAP Near-Term Milestones	Target Date
Update of NRC Draft Guidance Documents	Early December 2021
ACRS Future Plant Designs Subcommittee Meeting on ARCAP/TICAP Guidance Documents	December 17, 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	TBD
Issuance of TICAP draft RG and ARCAP interim staff guidance for public comment	Early Calendar Year 2022