

Tier 2* Problem Statement

Through the Design Certification application, review, and rulemaking process, certain information in Tier 2 of the Design Certification Document (DCD) was designated Tier 2*, requiring prior NRC approval to depart from such information. Due to a lack of precision in Tier 2* designations and conservative NRC staff interpretations, the scope of Tier 2* has proven larger than expected, including information of low safety significance. The need to request license amendments during construction for an expanded scope of Tier 2* departures has reduced the flexibility intended by Part 52 and unnecessarily increased the burden on both licensees and the NRC.

Background

Tier 2* is defined in each of the 10 CFR 52 Design Certification Rule (DCR) appendices, e.g., Appendix D for AP1000, Section II.F, as "*the portion of the Tier 2 information, designated as such in the generic DCD, which is subject to the change process in Section VIII.B.6 of this appendix. This designation expires for some Tier 2* information under paragraph VIII.B.6.*" To depart from Tier 2* information, licensees must obtain prior NRC approval via license amendment.

Section VIII.B.6 for AP1000 provides additional details and is attached for reference.

As originally intended, the purpose of Tier 2* was to ensure that a licensee could not make changes in certain important design methodologies that pertained to areas where it is not practical to specify a high degree of design detail at the time of design certification or where applicants preferred to specify design information in Tier 2, not Tier 1, to allow the design to accommodate subsequent improvements in technology. According to the NRC, Tier 2* designations compensate for the industry's desire to limit the amount of information in Tier 1.

It was originally envisioned that there might be 3 or 4 such areas associated with fuel design and certain other design methodologies, including human factors. During the design certification review process, the scope of Tier 2* grew significantly (to 24 areas for AP1000), greatly expanding the scope of departures subject to prior NRC approval and limiting the flexibility intended by Part 52 to facilitate plant construction. In addition, Tier 2* was not designated precisely enough, and this has led to a lack of clarity and conservative NRC interpretations concerning the scope of changes that require prior NRC approval via license amendment.

Action Plan

(1) Near-term actions/options for the lead licensees

- conduct proactive design assessments to identify and correct additional T2* ambiguities or errors
 - prepare/submit LARs as needed
 - discuss and document common understandings with NRC staff on scope of Tier 2*

- apply the principles related to secondary references¹ to narrow the scope of Tier 2* references to codes to only those code provisions that were intended, in the context of Tier 2* to be requirements
- request an amendment to reclassify specific Tier 2* provisions as Tier 2, i.e., clarify scope of Tier 2*
- request an exemption from the Tier 2* change process

(2) Near-term action for design certification applicants

- ensure that the provision warrants treatment as Tier 2* (establish criteria)
- make the Tier 2* provisions more specific, e.g., Tier 2* designation of specific portions of a technical report, rather than the entire report
- replace Tier 2* references to Codes with specific provisions

(3) Longer term action to improve the Tier 2* Change Process for future applicants/licensees (e.g., SMRs)

- Improve guidance (establish a set of criteria to be followed in designating material to be designated Tier 2*)
- Consider rule changes to:
 - allow Tier 2* departures at licensee's risk pending NRC approval, without requiring a PAR
 - allow a screening process for Tier 2* departures
- Consider elimination of Tier 2* based on experience that argues Tier 2* is no longer necessary

¹ [A]n applicant for a construction permit or COL, or licensee that references this certified design must conform with all of the requirements from the DCD, including the codes, standards, and other guidance documents that are referenced from the DCD (so-called secondary references). The industry agreed to treat these secondary references as requirements even though they are not incorporated by reference, in the context as described in the DCD, as set forth in a letter from Dennis Crutchfield of the NRC to Joe Colvin of the Nuclear Energy Institute, dated May 3, 1994. [60 Fed. Reg. 17902, 17909]

Excerpt from AP1000 DCD, Section VIII.B.6

"6.a. An applicant who references this appendix may not depart from Tier 2* information, which is designated with italicized text or brackets and an asterisk in the generic DCD, without NRC approval. The departure will not be considered a resolved issue, within the meaning of Section VI of this appendix and 10 CFR 52.63(a)(5).

b. A licensee who references this appendix may not depart from the following Tier 2* matters without prior NRC approval. A request for a departure will be treated as a request for a license amendment under 10 CFR 50.90.

- (1) Maximum fuel rod average burn-up.
- (2) Fuel principal design requirements.
- (3) Fuel criteria evaluation process.
- (4) Fire areas.
- (5) Reactor coolant pump type.
- (6) Small-break loss-of-coolant accident (LOCA) analysis methodology.
- (7) Screen design criteria.
- (8) Heat sink data for containment pressure analysis.

c. A licensee who references this appendix may not, before the plant first achieves full power following the finding required by 10 CFR 52.103(g), depart from the following Tier 2* matters except under paragraph B.6.b of this section. After the plant first achieves full power, the following Tier 2* matters revert to Tier 2 status and are subject to the departure provisions in paragraph B.5 of this section.

- (1) Nuclear Island structural dimensions.
- (2) American Society of Mechanical Engineers Boiler & Pressure Vessel Code (ASME Code) piping design and welding restrictions, and ASME Code Cases.
- (3) Design Summary of Critical Sections.
- (4) American Concrete Institute (ACI) 318, ACI 349, American National Standards Institute/American Institute of Steel Construction (ANSI/AISC)–690, and American Iron and Steel Institute (AISI), "Specification for the Design of Cold Formed Steel Structural Members, Part 1 and 2," 1996 Edition and 2000 Supplement.
- (5) Definition of critical locations and thicknesses.
- (6) Seismic qualification methods and standards.
- (7) Nuclear design of fuel and reactivity control system, except burn-up limit.

- (8) Motor-operated and power-operated valves.
 - (9) Instrumentation and control system design processes, methods, and standards.
 - (10) Passive residual heat removal (PRHR) natural circulation test (first plant only).
 - (11) Automatic depressurization system (ADS) and core make-up tank (CMT) verification tests (first three plants only).
 - (12) Polar crane parked orientation.
 - (13) Piping design acceptance criteria.
 - (14) Containment vessel design parameters, including ASME Code, Section III, Subsection NE.
 - (15) Human factors engineering.
 - (16) Steel composite structural module details.
- d. Departures from Tier 2* information that are made under paragraph B.6 of this section do not require an exemption from this appendix.”