

14 INITIAL TEST PROGRAM

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Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," constitutes the standard design certification (DC) for the U.S. Advanced Boiling Water Reactor (ABWR) design. To document the U.S. Nuclear Regulatory Commission (NRC) staff's review supporting initial certification of the ABWR, the staff issued a final safety evaluation report (FSER) in NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," in July 1994 and NUREG-1503, Supplement 1, in May 1997.

The staff is documenting its review of the GE-Hitachi Nuclear Energy (GEH or the applicant) application for renewal of the ABWR DC in Supplement 2 to NUREG-1503. Chapter 1 of this supplemental FSER describes the staff's review process for the ABWR DC renewal. This supplemental FSER section documents the NRC staff's review specifically related to Chapter 14, "Initial Test Program," Section 14.3.2.3.6, "Structural Task Group Review," and Section 14.3.2.3.8, "Verification of As-Built Components," of the GEH Design Control Document (DCD), Revision 7. Except as modified by this supplement to the FSER, the findings made in NUREG-1503 and its Supplement 1 remain in full effect.

14.3.2.3.6 Structural Task Group Review

14.3.2.3.6.1 Regulatory Criteria

In the ABWR DCD, Revision 7, the applicant added a definition of "ASME Code" to DCD Tier 1, Section 1.1, "Definitions," and a corresponding addition to DCD Tier 1, Section 2.1.1, "Reactor Pressure Vessel System." This definition is consistent with the NRC position on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code at the time of the original DC, specifically the ASME BPV Code may be used contingent on the conditions imposed by the NRC in 10 CFR 50.55a, "Codes and Standards," including any NRC-authorized ASME Code alternatives. The addition to DCD Tier 1, Section 2.1.1 clarifies that the listed ASME materials are in Section II of the ASME Code, which is consistent with the NRC position at the time of the original design certification. As the changes are consistent with the staff position at the time of original design certification, these changes are considered a "modification," as this term is defined in Chapter 1 of this supplemental FSER and will be evaluated using the regulations applicable and in effect at initial certification.

The applicable regulatory requirements for evaluating the ABWR DCD modification are as follows:

- 10 CFR 52.47(a)(1)(vi) (1997) requires that a DC application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) necessary and sufficient to provide reasonable assurance that, if the tests, inspections and analyses are performed and the acceptance criteria met, a plant that references the design is built and will operate in accordance with the DC.

- 10 CFR 50.55a (1997), requires compliance with codes and standards incorporated by reference into the regulations, subject to conditions imposed by the NRC and with allowance for NRC-authorized alternatives to the codes and standards.

14.3.2.3.6.2 *Summary of Technical Information*

In DCD Tier 1, Section 1.1, as supplemented by the responses to requests for additional information (RAI) described below, the applicant provided a definition of “ASME Code” to clarify that “ASME Code” refers to Section III of the ASME BPV Code unless specifically stated otherwise and that a Tier 1 departure and associated exemption is not required where Tier 1 requires compliance with the “ASME Code” and the applicant/licensee has received NRC authorization for an alternative under 10 CFR 50.55a to Section III of the ASME BPV Code. The supplemental RAI responses discussed below add the words “Code Section II” between “ASME” and “materials” to DCD Tier 1, Section 2.1.1 to denote the specific section of the ASME Code being invoked.

14.3.2.3.6.3 *Technical Evaluation*

In the ABWR DCD, Revision 5, the applicant did not include a definition for “ASME Code,” in DCD Tier 1, Section 1.1. Without an explicit definition of “ASME Code,” a concern was raised regarding whether a combined license (COL) holder referencing a DCD might need a Tier 1 departure and associated exemption to use an alternative to the ASME Code under 10 CFR 50.55a. The NRC has previously stated explicitly that an exemption would not be needed for NRC-authorized alternatives to the ASME Code (as noted in the Statements of Consideration for the August 28, 2007 revision to 10 CFR Part 52, in Volume 72 of the *Federal Register*, page 49438). This reflects the NRC’s historical practice of allowing use of the ASME Code contingent on the conditions imposed by the NRC in 10 CFR 50.55a, including any NRC-authorized ASME Code alternatives. In a letter dated March 9, 2015, the staff issued RAI 14.03-1 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15068A227), due to the potential misconception that NRC-authorized alternatives to the ASME Code might be viewed as unacceptable for closure of ITAAC invoking the ASME Code. In the applicant’s RAI response dated April 1, 2015 (ADAMS Accession No. ML15092A175), GEH proposed a definition, which was later supplemented by a March 2, 2017 letter (ADAMS Accession No. ML17061A065) and a March 21, 2017 letter (ADAMS Accession No. ML17080A042) after public teleconferences held on February 23, 2017, and March 16, 2017, respectively. The following is the resulting definition:

ASME Code means Section III of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, unless specifically stated otherwise. Some Tier 1 content in the ABWR DCD specifies that structures, systems, and components be designed and constructed in accordance with ASME Code Section III requirements. When this language is used, it indicates that the Tier 1 requirements will be met by satisfying the edition and addenda of the ASME Boiler and Pressure Vessel Code, Section III as specified in the DCD and as incorporated by reference in 10 CFR 50.55a subject to the conditions listed in 10 CFR 50.55a, or in accordance with alternatives authorized by the NRC pursuant to 10 CFR 50.55a.

In conjunction with this change, GEH added a section identifier to an ASME reference in DCD Tier 1, Section 2.1.1, where the ASME Code Section referenced was Section II instead of Section III. Because these changes do not affect previous NRC safety findings in the

NUREG-1503 and NUREG–1503, Supplement 1, the staff’s original FSER for the ABWR DC, or change the ABWR’s compliance with ASME Code requirements, the staff finds this addition of a definition for ASME Code and a corresponding section identifier in DCD Tier 1, Section 2.1.1 acceptable. The NRC staff confirmed that the changes discussed above were incorporated in the ABWR DCD, Revision 7. Therefore, Confirmatory Item 14.03-1 from the staff advanced safety evaluation with no open items for the ABWR DC renewal is resolved and closed.

14.3.2.3.6.4 Conclusion

The NRC staff reviewed the applicant’s changes to DCD Tier 1, Section 1.1, “Definitions,” and DCD Tier 1, Section 2.1.1, “Reactor Pressure Vessel System.” Based on the staff’s technical evaluation described in this supplemental FSER section, the staff found that:

- The proposed changes do not adversely affect any previous NRC safety findings.
- The changes provided additional clarity to existing documentation.

For the reasons specified above, the staff found that the changes incorporated into the ABWR DCD, Revision 7, are acceptable.

Based on this finding, the staff concludes that the requirements of 10 CFR 52.47(b)(1), and 10 CFR 50.55a continue to be met with the ABWR design change as described in this supplemental FSER section.

14.3.2.3.8 Verification of As-Built Components

In RAI 14.03.01, dated March 9, 2015 (ADAMS Accession No. ML15068A227), the NRC staff asked GEH whether revisions made to the ITAAC for the Economic Simplified Boiling Water Reactor DC to enhance the clarity of ASME Code requirements would be considered appropriate for the content of the ABWR DCD. Specifically, the NRC clarified the requirement for ASME Code component design verification to indicate that the activities performed to satisfy the ITAAC should be performed at the as-built stage, and they should involve a design verification and an as-built reconciliation using ASME Code design reports. In the applicant’s April 1, 2015, response to RAI 14.03.01 (ADAMS Accession No. ML15092A175), GEH provided confirmation to the NRC staff of its understanding that ASME Code component design verification relies on testing performed post-construction, once the as-built component is in its final installed location at the plant site, with the exception of two specific instances. In these two instances, the Reactor Pressure Vessel and Containment Vessel, the ITAAC clearly identify the documents to be reviewed. This response did not result in a change to the ABWR DCD, but the response is noted here to preserve information for future use.

14.3.2.3.8.1 Regulatory Criteria

The applicant does not propose any change to the ABWR DCD, but the RAI 14.03-01 response clarifies the ITAAC meaning, in that the activities performed to satisfy the ITAAC are done at the as-built stage and not during the design phase of construction. The following applicable regulatory requirements were effect at initial certification:

- 10 CFR 52.47(a)(1)(vi) (1997), requires that a DC application contain the proposed ITAAC which are necessary and sufficient to provide reasonable assurance that, if the inspections,

tests and analyses are performed and the acceptance criteria met, a plant that references the design is built and will operate in accordance with the DC.

- 10 CFR 50.55a (1997), requires compliance with codes and standards incorporated by reference into the regulations, subject to conditions imposed by the NRC and with allowance for NRC-authorized alternatives to the codes and standards.

14.3.2.3.8.2 Summary of Technical Information

In the applicant's April 1, 2015, response to RAI 14.03.01, GEH confirmed its understanding that ASME Code component design verification relies on testing performed post-construction, once the as-built component is in its final installed location at the plant site, with the exception of two ITAAC, which clearly identify the documents to be reviewed.

14.3.2.3.8.3 Technical Evaluation

The NRC staff agrees with the applicant's response, indicating that ASME Code component design verification relies on testing performed post-construction, once the as-built component is in its final installed location at the plant site, with the exception of two ITAAC, which clearly identify the documents to be reviewed. The intent of ASME Code component design verification is not to review as-designed components, but rather to ensure that the as-built components are consistent with the design. This is consistent with the definitions in DCD Tier 1, Section 1.1, and with the guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria – Design Certification," Draft Revision 0, issued April 1996, both of which define "as-built" as "the physical properties of the structure, system, or component following the completion of its installation or construction activities at its final location at the plant site," and provide that a test's purpose is to "evaluate the performance or integrity of as-built structures, systems, or components, unless explicitly stated otherwise."

14.3.2.3.8.4 Conclusion

As described in the staff's evaluation above, there are no changes to the ABWR DCD, Revision 7, but the applicant confirmed the NRC staff's understanding of how ASME Code component design verification is accomplished. Therefore, the staff safety findings made in NUREG-1503, the staff's FSER for the original ABWR DC, are valid and unchanged for this supplemental FSER section. The applicant's ITAAC continue to meet the requirements of 10 CFR 52.47(a)(1)(vi), and a COL applicant/licensee will verify that 10 CFR 50.55a will be met for the as-built plant since it must meet the design requirements.

References

1. 10 CFR 50.55a, "Codes and Standards."
2. 10 CFR Part 52, Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor."
3. 10 CFR 52.47, "Contents of Applications; Technical Information."
4. NRC, NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 14.3, "Inspections, Tests, Analyses, And Acceptance Criteria – Design Certification," Draft Revision 0, April 1996 (ADAMS Accession No. ML052070653).
5. NRC, NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," July 1994 (ADAMS Accession No. ML080670592).
6. NRC, NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," Supplement 1, May 1997 (ADAMS Accession No. ML080710134).
7. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 5, Tier 1 and Tier 2, December 2010 (ADAMS Accession No. ML110040323).
8. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 6, Tier 1 and Tier 2, February 2016 (ADAMS Accession No. ML16214A015).
9. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 7, Tier 1 and Tier 2, December 2019 (ADAMS Accession No. ML20007E371).
10. ASME Boiler and Pressure Vessel Code -Section III, "Rules for Construction of Nuclear Power Plant Components."
11. ASME Boiler and Pressure Vessel Code -Section II, "Materials."