

2 SITE CHARACTERISTICS

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2 SITE CHARACTERISTICS

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 2, "Site Characteristics," Section 2.6.8, "Requirements for Determination of ABWR Site Acceptability," 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.

2.6.8 Requirements for Determination of ABWR Site Acceptability

2.6.8.1 Regulatory Criteria

ABWR DCD Tier 2, Section 2.2, Revision 7, provides site parameters that are requirements for site acceptability that combined operating license (COL) applicants that reference the ABWR design must demonstrate are met. These site parameters cover both the evaluation of the radiological consequences of design-basis accidents (DBAs) for the siting and safety assessment, and the assessment of the radiological dose impacts of severe accidents. DCD Tier 2, Section 2.2.1, provides information related to DBAs, while ABWR DCD Tier 2, Section 2.2.2, gives information needed to perform severe accident consequence assessment. ABWR DCD Tier 2, Section 2.3.3, provides the related COL information items.

The change to the ABWR DCD does not alter the site parameters but modifies the ABWR DCD Tier 2, Section 2.2.2, discussion of how the COL applicant is to demonstrate that the severe accident site parameters are met. Specifically, instead of specifying use of the Calculation of Reactor Accident Consequences, Version 2, (CRAC 2) computer code, the revised text provides flexibility for the COL applicant to use a more modern severe accident consequence computer code. Since the applicant's design change is to provide DCD flexibility for a future COL applicant, it is an "amendment," as this term is defined in Chapter 1 of this supplement and is evaluated using the regulations in effect at renewal. The following regulatory requirements provide the basis for the acceptance criteria for the staff's review:

- 10 CFR 52.47(a)(1), which requires site parameters postulated for the design, and an analysis and evaluation of the design in terms of those site parameters.

2.6.8.2 *Summary of Technical Information*

In a letter dated July 20, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12125A385), the NRC staff identified 28 items for GEH's consideration as part of its application to renew the ABWR DC. GEH proposed design changes to address Item No. 3 of the NRC July 20, 2012, letter, which suggested that the applicant consider removing references in DCD Tier 2, Chapter 2 directing COL applicants to use the CRAC 2 computer code,¹ which is no longer in use, and replace the references to the CRAC 2 computer code with generalized direction to use an appropriate severe accident consequences code such as the MELCOR Accident Consequence Code System (MACCS2).² In a letter dated June 19, 2015 (ADAMS Accession No. ML15170A039), GEH proposed changes to DCD Tier 2, Sections 2.2.2 and 2.3.3, to remove such references to the CRAC 2 severe accident consequences code and replace them with a generalized reference to severe accident consequence codes or more specifically to MACCS2 as an example. As noted in the revised text of paragraph three in DCD Tier 2, Section 2.2.2, when supplying the ABWR design data to be used in severe accident consequence assessment provided in DCD Tier 2, Table 2.2-2, and the tables in DCD Tier 2, Appendix 2A, the applicant retained the information in the CRAC 2 data input format as an example. GEH also made a conforming change to DCD Tier 2, Table 1.9.1, to revise the name of COL Information Item 2.42 to read "Severe Accident Consequence Computer Code Calculations." The applicant incorporated these changes in the ABWR DCD, Revision 6.

2.6.8.3 *Technical Evaluation*

The changes to DCD Tier 2, Table 1.9.1 and DCD Tier 2, Sections 2.2.2 and 2.3.3 remove certain references to a severe accident consequence computer code (CRAC 2) that is not currently in use by NRC staff or reactor licensees and applicants. The CRAC 2 code is an NRC-developed severe accident consequence computer code that has been used for environmental assessment and reactor safety studies. The MACCS code, developed in 1998 for reactor severe accident environmental assessments and reactor safety studies, is the only consequence code that the NRC staff uses for these assessments. MACCS is also used by power reactor licensees and applicants. Because 10 CFR 52.47(a)(1) does not require that the DC specify the method that the COL applicant must use in determining site characteristics, the staff finds that the use in an ABWR COL application of an appropriate severe accident consequence computer code other than CRAC 2 is acceptable. In addition, if a COL applicant uses a code other than the MACCS2 code updated in 2004, as identified in the ABWR renewal DCD, the staff will assess the use of such other code against the review standards in effect at the time of the COL application, as appropriate. The changes to the ABWR DCD described above do not revise any accident analyses previously reviewed and found acceptable by the staff and do not affect any previous staff findings of reasonable assurance of adequate protection of public health and safety related to the ABWR design. The changes to the information regarding severe accident consequence assessment in the ABWR DCD, Revision 7, prevent the need for a COL applicant to justify a departure from the DCD information in order to use a state-of-the-art severe accident consequence code. Therefore, the staff finds acceptable the changes to DCD Tier 2, Table 1.9.1, COL Information Item 2.42, and Sections 2.2.2 and 2.2.3.

¹ See NUREG/CR-2326, "Calculations of Reactor Accident Consequences Version 2, CRAC2: Computer Code, User's Guide," issued February 1983.

² MACCS2 is a fully integrated, engineering-level computer code developed at Sandia National Laboratories for the NRC. MACCS2 simulates the impact of severe accidents at nuclear power plants on the surrounding environment.

2.6.8.4 *Conclusion*

Based on the staff's review discussed above, the staff finds that the changes to ABWR DCD Tier 2 that provide adequate and sufficient information for COL applicants related to the use of severe accident consequence computer codes comply with 10 CFR 52.47(a)(1) and are acceptable.

References

1. 10 CFR Part 52, Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor."
2. NRC, NUREG/CR-2326, "Calculations of Reactor Accident Consequences Version 2, CRAC2: Computer Code, User's Guide," February 1983.
3. NRC, NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," July 1994 (ADAMS Accession No. ML080670592).
4. 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).
5. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 5, Tier 1 and Tier 2, November 2010 (ADAMS Accession No. ML110040323).
6. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 6, Tier 1 and Tier 2, February 2016 (ADAMS Accession No. ML16214A015).
7. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 7, Tier 1 and Tier 2, December 2019 (ADAMS Accession No. ML20007E371).