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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 2.6.2, "Water Level (Flood) Design Site Parameters," 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.

2.6.2 Water Level (Flood) Design Site Parameters

2.6.2.1 Regulatory Criteria

ABWR DCD Tier 2, Section 2.1, Revision 7, provides site parameters (including groundwater levels), that are requirements for site acceptability that must be met by combined license applicants that reference the ABWR design. DCD Tier 2, Section 2.3.2.34 provides information related to the hydrostatic groundwater pressures acting on plant safety-related facilities.

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. In Item No. 4 the staff suggested consideration of the following: (1) the significance of design basis maximum groundwater level in the hydrology section and its allowable margin if any; (2) identify where this parameter is used; and (3) if feasible, set the design basis maximum groundwater level at site grade.

In a letter dated August 24, 2015 (ADAMS Accession No. ML15236A226) the applicant proposed to add a reference in DCD Tier 2, Chapter 2, as the basis for the standard plant site design parameter of "Maximum Ground Water Level" listed in DCD Tier 2, Table 2.0-1. The applicant did not change the existing groundwater level site parameter from the originally certified design, but rather clarified the basis for the site parameter. Therefore, this change is a "modification," as that term is defined in Chapter 1 of this supplement and will correspondingly be evaluated using the regulations applicable and in effect at the initial ABWR certification. The clarification was evaluated using 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." (GDC) 2, "Design Bases for Protection Against Natural Phenomena," which requires that structures, systems, and components important to safety must be designed to withstand the effects of natural phenomena such as floods and high groundwater, and 10 CFR 52.47(a)(1)(iii), which requires site parameters postulated for the design, and an analysis and evaluation of the design in terms of those site parameters. The acceptance criteria for

site specific limits imposed on maximum groundwater level are given in DCD Tier 2, Table 2.0-1 as 61 centimeters (cm) (2.0 feet (ft)) below grade. The staff reviewed the applicants ABWR DCD, Revision 7, change related to the maximum groundwater level site parameter against the acceptance criteria of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP) Section 3.4.2, "Analysis Procedures", Revision 2, March 2007.

2.6.2.2 Summary of Technical Information

DCD, Tier 2, Section 2.0 and Table 2.0-1 was revised in ABWR DCD Revision 6. The applicant stated that the groundwater level is used in determining the at-rest soil pressure and hydrostatic pressure on buildings and below grade exterior walls. As applicable, the groundwater level is also used in determining the shear wave and compression wave velocity of soil which are used in the performance of the soil-to-structure interaction analysis. GEH added a reference to DCD Tier 2, Section 2.0 and modified a footnote in DCD Tier 2, Table 2.0-1 to reflect that the "Maximum Ground Water Level" and "Maximum Flood (or Tsunami) Level" site parameters are based on technical requirements in the Electric Power Research Institute Utility Requirements Document that have been agreed to by the industry and found acceptable by the NRC (NUREG-1242, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document," issued August 1992). The applicant noted that changing the ABWR DCD groundwater level to site grade would not be possible without impacting analyses in DCD Tier 2, Appendices 3A "Seismic Soil Structure Interaction Analysis" and Appendix 3H "Design Details and Evaluation Results of Seismic Category I Structures".

2.6.2.3 Technical Evaluation

The changes reflected in the ABWR DCD, Revision 7, described above, continue to meet established guidance and does not revise groundwater or flooding analyses previously reviewed and found acceptable by the NRC staff in NUREG 1503 and do not affect any previous staff findings of regulatory compliance or reasonable assurance of adequate protection of public health and safety related to the ABWR design. Therefore, the staff finds that the applicant's changes to DCD Tier 2, Table 2.0-1 and the addition of DCD Tier 2, Section 2.0.2 "References" have no safety significance and that these changes remain within the acceptance criteria of the SRP, Section 3.4.2, Revision 2.

2.6.2.4 Conclusion

The staff reviewed the changes to DCD Tier 2, Section 2.0 and Table 2.0-1 of the ABWR DCD that clarified the basis for the maximum groundwater and flood (or tsunami) level site parameters and determined that the changes conform to all applicable acceptance criteria as referenced in SRP, Section 3.4.2 and to GDC 2, and 10 CFR 52.47(a)(1)(iii).

References

1. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."
2. 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena."
3. 10 CFR Part 52, Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor."
4. 10 CFR 52.47, "Contents of Applications; Technical Information."
5. 10 CFR 52.57, "Application for Renewal."
6. NRC, NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.4.2, "Analysis Procedures," Revision 3, March 2007.
7. NRC, NUREG-1242, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document," August 1992 (ADAMS Accession No. ML100430013).
8. NRC, NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design," July 1994 (ADAMS Accession No. ML080670592).
9. 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).
10. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 5, Tier 1 and Tier 2, December 2010 (ADAMS Accession No. ML110040323).
11. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 6, Tier 1 and Tier 2, February 2016 (ADAMS Accession No. ML16214A015).
12. GEH, ABWR Standard Plant Design Certification Renewal Application Design Control Document, Revision 7, Tier 1 and Tier 2, December 2019 (ADAMS Accession No. ML20007E371).