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Table Contents

1. Introduction....5
2. Technical Review....6
3. Regulatory Impact....8
4. Revisions to the Design Control Document....8
5. Revisions to the Probabilistic Risk Assessment....8
6. References....8

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List of Tables

Table 1 Design Change Review.....7

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1. INTRODUCTION

This supplemental environmental report to the ABWR DCD Assessment of Severe Accident Mitigation Design Alternatives (SAMDA) submitted December 21, 1994 (Reference 1) is in support of the General Electric Hitachi Nuclear Energy (GEH) ABWR Certification Renewal Application. In accordance with 10 CFR 52.57(a), GE Hitachi Nuclear Energy (GEH) is requesting that the NRC renew the Advanced Boiling Water Reactor (ABWR) design certification (10 CFR Part 52, Appendix A). The ABWR design certification rule, effective June 11, 1997, would otherwise expire at the end of a period of fifteen years, or June 11, 2012.

This supplemental environmental report to the SAMDA assessment addresses the requirements of 10 CFR 50.150, the Commission's new aircraft impact rule. This new rule, which was published in the Federal Register on June 12, 2009 (Reference 2), requires applicants for new nuclear power reactors to perform a design-specific assessment of the effects of the impact of a large, commercial aircraft. The applicant is required to use realistic analyses to identify and incorporate design features and functional capabilities to show, with reduced use of operator actions, that either the reactor core remains cooled or the containment remains intact, and either spent fuel cooling or spent fuel pool integrity is maintained. Revision 5 to the ABWR DCD describes the results of such an assessment of the certified ABWR design and identifies and incorporates design features and functional capabilities to show, with reduced use of operator actions, that the reactor core remains cooled and spent fuel pool integrity is maintained. The identified design features include changes to the ABWR design as documented in DCD Revision 4.

This supplemental environmental report is being provided to satisfy the requirements of 10 CFR 51.55(b), and evaluates the impact of the design changes identified by GEH on the assessment of Severe Accident Mitigation Design Alternatives (SAMDAs). Section 51.55(b) states:

> Each applicant for an amendment to a design certification shall submit with its application a separate document entitled, "Applicant's Supplemental Environmental Report-Amendment to Standard Design Certification." The environmental report must address whether the design change which is the subject of the proposed amendment either renders a severe accident mitigation design alternative previously rejected in an environmental assessment to become cost beneficial, or results in the identification of new severe accident mitigation design alternatives that may be reasonably incorporated into the design certification.

This supplemental environmental report provides the results of a review to determine whether any of the SAMDAs previously rejected in the NRC's environmental assessment (Reference 3) are rendered cost-beneficial by the design changes, or results in the identification of a new SAMDA that reasonably may be incorporated into the ABWR design certification. As discussed below, the design changes do not cause a previously rejected

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SAMDA to become cost beneficial or result in the identification of new SAMDAs that may be reasonably incorporated into the ABWR design.

2. TECHNICAL REVIEW

The design changes that are identified in the ABWR DCD, Revision 5 were reviewed for their impact on the NRC's assessment of SAMDAs for the ABWR design. A two-step evaluation process was used to determine the impact of each design change on the SAMDA assessment.

1. The design change is evaluated to determine if there is a change to an ABWR Probabilistic Risk Assessment (PRA) modeled Structure, System, or Component (SSC). (The term "PRA-modeled SSC" is defined as an SSC that is currently modeled in the ABWR PRA, or an SSC that, after evaluation, should be modeled in the ABWR PRA).
   a. A response of "No" eliminates the design change from further consideration.
   b. A response of "Yes" identifies the design change for further evaluation
2. A design change identified for further evaluation in 1.b (above) is qualitatively evaluated for severe accident mitigation impact. Expert judgment is used to determine whether the change has an impact on severe accident mitigation, such as prevention or mitigation of vessel failure, containment failure, or offsite release.
   a. A design change with no severe accident impact is not considered for further evaluation. The conclusion is that the current SAMDA basis remains bounding.
   b. A design change that affects the design or performance of severe accident mitigation features is a candidate for cost-benefit analysis.

Table 1 summarizes the results of the review of the evaluated design changes that have a severe accident mitigation impact.

The conclusion from the table is that none of the design changes have an impact on ABWR severe accident risk. Because the ABWR PRA will not be modified as a result of this review, and consequently the ABWR PRA results will not change, the ABWR SAMDA assessment documented in Reference 1 remains valid and applicable to ABWR DCD Revision 5. Furthermore, the bases for the previously analyzed SAMDAs are not changed, including costs and benefits.

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Table 1 Design Change Review

Change Description	Severe Accident Impact	Comments
Moved some existing fire doors and added New Fire Doors/conversion of non-Rated Doors to 3-hour Fire Doors (1)	None	Fire barriers were added in the reactor building. None of the existing fire barriers are eliminated or reduced. There is a potential net benefit for risk reduction purposes in the additional fire barriers. However, the additional barriers have no impact on severe accident mitigation strategies.
Blocked large exterior openings, strengthened specific interior and exterior walls, strengthened several duct spaces, created strengthened vestibules to exterior doors (2)	None	The ABWR Civil/Structural design enhancements as a result of the AIA strengthened the reactor building structure added interior walls to mitigate the spread of the jet fuel fire. There is no impact on severe accident mitigation strategies.

(1) Details of the ABWR design changes to the fire barriers and fire zones are included in ABWR DCD, Revision 5, Appendix 9A

(2) Details of the ABWR Civil/Structural design changes are contained in ABWR DCD, Revision 5, Appendix 3H, Section 3H.6

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3. REGULATORY IMPACT

The ABWR DCD Revision 5 design changes were reviewed to determine whether any impacted the ABWR PRA and the assessment of SAMDAs. The results indicate that there are no design changes that will result in a change to the ABWR PRA or DCD Chapter 19. No new severe accidents are created as a result of these design changes. The results of the ABWR PRA provide input to the ABWR SAMDA assessment. Because the ABWR PRA will not be modified as a result of this review, and consequently the ABWR PRA results will not change, the ABWR SAMDA assessment documented in Reference 3 remains valid and applicable to ABWR DCD Revision 5.

Additionally, the results of this evaluation indicate that, because the ABWR severe accident impact is unchanged, new SAMDAs do not need to be considered, and SAMDAs that were previously rejected in the environmental assessment for the ABWR (Reference 3), or otherwise considered (Reference 1), did not become cost beneficial due to the design changes.

4. REVISIONS TO THE DESIGN CONTROL DOCUMENT

There are no revisions to the DCD as a result of this evaluation.

5. REVISIONS TO THE PROBABILISTIC RISK ASSESSMENT

There are no revisions to the PRA.

6. REFERENCES

1. Letter from J. F. Quirk (GE) to R.W. Borchardt (NRC) titled "NEPA/SAMDA Submittal for the ABWR" dated December 21, 1994 which transmitted "Technical Support Document for the ABWR", 25A5680, Attachment A.

2. 74 Fed. Reg. 28,112 "Consideration of Aircraft Impacts for New Nuclear Power Reactors" dated June 12, 2009.

3. Letter from R.W. Borchardt (NRR) to J. Quirk (GENE) dated March 16, 1995 transmitting document titled "Environmental Assessment by the Office of Nuclear Reactor Regulation Relating to the Certification of the U.S. Advanced Boiling Water Reactor Design Docket No. 52-001”.