TOSHIBA
Leading Innovation >>>

TOSHIBA CORPORATION

1-1,SHIBAURA 1-CHOME, MINATO-KU TOKYO 105-8001,JAPAN
PHONE:(03)3457-3734
FACSIMILE:(03)5444-9195

TOS-CR-DCA-2010-0001
October 27, 2010

10 CFR 52.57(a)
10 CFR 52.59(c)
10 CFR 52.47(b)(2)
10 CFR 51.55(b)
10 CFR 52.63

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Project Number T-ABWR:0775

Subject: Submittal of Toshiba Corporation Application for Renewal and Amendment of the Design Certification Rule for the U.S. Advanced Boiling Water Reactor

References:

1. Letter to U.S. Nuclear Regulatory Commission (NRC) Document Control Desk from Kiyoshi Okamura, Vice President, Nuclear Energy Systems & Services Division, Toshiba Corporation Power Systems Company dated March 3, 2010 (ML100710026)
2. Letter to U.S. NRC Document Control Desk from Mark McBurnett, STPNOC, South Texas Project Units 3 and 4, Docket Nos. 52-012 and 52-013, Submittal of Combined License Application Revision 3, STPNOC Submittal Letter U7-C-STP-NRC-090130 dated September 16, 2009 (ML092930393)

Toshiba Corporation ("Toshiba") is pleased to submit Toshiba's Application for Renewal and Amendment of the Title 10 Code of Federal Regulations (CFR), Part 52, Appendix A, Design Certification Rule for the U.S. Advanced Boiling Water Reactor. This application is submitted to the NRC in accordance with the requirements of 10 CFR 52.57(a), "Application for renewal," which provides that not less than 12 nor more than 36 months before the expiration of the initial 15-year period of a design certification, any person may apply for renewal of the certification. The current 10 CFR 52 Appendix A U.S. Advanced Boiling Water Reactor ("ABWR") design certification rule expires on June 12, 2012. Toshiba hereby applies for renewal of the U.S. ABWR design certification as the applicant and requests that the U.S. ABWR design certification be amended as described in this application and renewed for a period of 15 years.

Both a non-public and a public version of Toshiba's Design Control Document (DCD) for renewal and amendment are provided to the NRC in Enclosures No. 1 and 2 respectively. No proprietary information is included in either version of Toshiba's DCD. The non-public

D105
NRO

version of the DCD contains security-related sensitive information that should be withheld from public disclosure under 10 CFR 2.390. No security-related information is provided in this transmittal letter itself.

Toshiba previously informed the NRC of its intent to submit this application by letter dated March 3, 2010 (Reference 1). In addition, on August 24, 2010, Toshiba representatives met with members of the NRC staff in a pre-application meeting and presented Toshiba's plans for requesting renewal and amendment of the design certification.

In addition to the renewal, Toshiba requests that the U.S. ABWR design certification be amended pursuant to 10 CFR 52.59(c) to address the following:

- Incorporation of features to address the requirements of 10 CFR 50.150, "Aircraft impact assessment,"
- Incorporation of specified design departures in order to make the ABWR design certification rule similar to the South Texas Project Units 3 and 4 Combined License Application Revision 3 (Reference 2), and
- Incorporation of a revised fuel design.

The proposed amendments to the U.S. ABWR design certification satisfy the criteria contained in 10 CFR 52.63 pertaining to the finality of designs. Specifically, the proposed amendments will make the ABWR design similar to the South Texas Project Units 3 and 4 COLA Revision 3, and include the AIA amendment proposed by STPNOC. Accordingly, the amendments meet the criteria set forth in 10 CFR 52.63(a)(1)(vii) because they contribute to increased standardization of the certification information.

A Change List is provided as Attachment No. 1 to this application. Pages of the proposed renewal and amended DCD are marked with revision bars to identify changes. Pages are also marked with Toshiba document number "RS-5146900 Rev. 0."

A Commitment List is provided as Attachment No. 2 to this application. This Commitment List provides Toshiba commitment dates for making available DCD-referenced documents that are not currently available to the NRC.

In addition, 10 CFR 52.47(b)(2) and 10 CFR 51.55(b) require each applicant for an amendment to a design certification to submit with its application a separate document entitled "Applicant's Supplemental Environmental Report – Amendment to Standard Design Certification." The required report is provided as Attachment No. 3 to this application.

Toshiba is prepared to work closely with the NRC staff to assist the NRC's review of this application. Should the NRC require additional information for processing this application either during or after the acceptance review, Toshiba will supply the requested supplemental information.

Please contact Mr. Robert W. Schrauder, Vice President – Licensing, US ABWR Projects & Technologies, Toshiba America Nuclear Energy Corporation ("TANE") at (704) 548-7640 if you have any questions regarding this application. TANE is a wholly owned U.S. subsidiary of

Toshiba. For convenience, Toshiba has authorized TANE to communicate with the NRC with respect to this application.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on October 27, 2010.

Keisuke Kitsukawa

Keisuke Kitsukawa
Technology Executive
Light Water Reactor Systems
Toshiba Corporation Power Systems Company

Attachments:

1. Change List
2. Commitment List
3. Applicant's Supplemental Environmental Report – Amendment to Standard Design Certification

Enclosures:

1. One DVD containing the Non-Public Version of DCD RS-5146900 Rev. 0 for Toshiba's Application for Renewal and Amendment of 10 CFR 52, Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor." This DVD contains security-related information to be withheld from public disclosure under 10 CFR 2.390. This DVD includes a packing slip that lists the DVD contents.
2. One DVD containing the Public Version of DCD RS-5146900 Rev. 0 for Toshiba's Application for Renewal and Amendment of 10 CFR 52, Appendix A, "Design Certification Rule for the U.S. Advanced Boiling Water Reactor." This DVD has redacted the security-related information. This DVD includes a packing slip that lists the DVD contents.

Contact Information:
Mr. Robert W. Schrauder
Vice President – Licensing
US ABWR Projects & Technologies
Toshiba America Nuclear Energy Corporation
3545 Whitehall Park Drive, Suite 500
Charlotte, NC 28273

RSchrauder@tane.toshiba.com
(704) 548-7640
Facsimile: (704) 548-7701

cc: (electronic copies w/o enclosures or attachments)

Michael R. Johnson
David B. Matthews
David Misenhimer
Mark Tonacci
U. S. Nuclear Regulatory Commission

Kenji Arai
Ryuji Iwasaki
Toshiba Corporation

Richard DiSalvo
Robert W. Schrauder
Dale R. Wuokko
Toshiba America Nuclear Energy

Daniel F. Stenger
Hogan Lovells US LLP

Robert Coward
Caroline Schlaseman
Randolph Trench
MPR Associates

M.A. McBurnett
STP Nuclear Operating Company

Robert D. Quinn
Raymond J. Sero
Westinghouse Electric Company

Attachment No. 1

Change List

ABWR DCD RS-5146900 Rev. 0 Change List

Change List

Toshiba Corporation's (Toshiba) U.S. Advanced Boiling Water Reactor (ABWR) Design Control Document (DCD) is part of Toshiba's application to renew and amend the design certification for the U.S. ABWR standard design. The purpose of the DCD is to provide, in a single document, design related information to be incorporated by reference in the renewed and amended design certification rule for the U.S. ABWR standard design. The original design certification rule for the U.S. ABWR was approved by the Nuclear Regulatory Commission (NRC) in 1997, and is published in 10 CFR Part 52, Appendix A. The currently applicable DCD for the U.S. ABWR design certification rule is Revision 4 ("DCDR4").

Toshiba has built ABWR plants in Japan and is supplying the two U.S. ABWRs for South Texas Project (STP) Units 3&4 under the original design certification. The NRC is currently reviewing STP Nuclear Operating Company's (STPNOC) combined license application (STP 3&4 COLA) for the two new units.

The ABWR design certification will expire in 2012. Toshiba's DCD, referred to herein as "DCD RS-5146900 Rev. 0," is based on its implementation of the ABWR design. For the reasons summarized below, Toshiba incorporated changes into its DCD RS-5146900 Rev. 0 relative to DCDR4. These changes are noted by revision bars in the right hand margins of Toshiba's DCD RS-5146900 Rev. 0 document. The purpose of this attachment is to provide a list of changes made to each section of DCD RS-5146900 Rev. 0 and the source for the change.

Most of the changes incorporated into Toshiba's DCD RS-5146900 Rev. 0 fall into one or more of the following categories:

1. **Changes associated with the STP 3&4 COLA Revision 3**: A number of changes identified in departures and supplements in the STP 3&4 COLA Revision 3 have been selected as applicable to the standard ABWR plant based on Toshiba experience or STP 3&4 requirements and have, therefore, been included in Toshiba's amended ABWR design. These changes include:
   - Technical and design departures – these affect the plant structures, systems, and components, how the plant is operated, or the analytical basis for the plant.
   - Vendor departures – these identify Toshiba Corporation as the ABWR vendor.
   - Administrative departures – these correct non-technical errors in DCDR4, such as incorrect cross references or typographical errors.
   - Supplemental information, where such information is applicable to the standard plant design.

   Revision 3 of the STP 3&4 COLA was used as the basis for the departures and supplemental information changes incorporated into DCD RS-5146900 Rev. 0. Applicable responses to selected Requests for Additional Information not already incorporated into Revision 3 of the STP 3&4 COLA are also incorporated where the responses impact the standard plant DCD RS-5146900 Rev. 0.

2. **Changes associated with incorporation of STPNOC's Aircraft Impact Assessment Amendment**: DCD RS-5146900 Rev. 0 incorporates by reference the STPNOC response to the aircraft impact assessment (AIA) rule previously submitted to the NRC for approval. The STPNOC AIA amendment satisfies the aircraft impact rule based on maintaining core cooling and maintaining spent fuel pool integrity against the effects associated with postulated impact of an aircraft as required by 10 CFR 50.150(a)(1). Aircraft impact is considered a beyond design basis event. The additional information and changes to the information included in DCDR4 as provided in STPNOC's application to amend the design certification rule for the U.S. ABWR to address the AIA rule are incorporated by reference in the Certified Design Material (Tier 1) for the ABWR and in the Tier 2 material applicable for the ABWR standard design.

3. **Changes associated with use of Optima2 fuel**: Toshiba is changing the fuel used in the certified ABWR design to Optima2 fuel provided by Westinghouse. As a result, the amended DCD RS-5146900 Rev. 0 replaces certain information in DCDR4 related to the previous fuel design with new information applicable to the Optima2 fuel.

4. **Changes associated with replacement of proprietary information**: Certain information in DCDR4 for the certified design was proprietary to the original applicant. Changes have been made in DCD RS-5146900 Rev. 0 to replace or eliminate this proprietary information.

5. **Changes associated with an updated probabilistic risk assessment**: Toshiba's amended DCD RS-5146900 Rev. 0 includes a limited update of the certified design's probabilistic risk assessment (PRA). The intent of the limited update was to verify that the PRA-based conclusions of DCDR4 remain valid with a more modern treatment; to address the effect of the amended ABWR standard design on the PRA results; and to replace non-Toshiba proprietary information. The changes from performing this PRA primarily affect Chapter 19 as a result of:
   - Updated Component and Initiating Event Data;
   - Updated Select Human Actions;
   - Modeled Common Cause Failures;
   - Updated fault tree models to include Ultimate Heat Sink design changes;
   - Consideration of Low Power and Shutdown (LPSD) events; and
   - Updated Level 1 and Level 2 results for internal events.

6. **Administrative changes**: DCD RS-5146900 Rev. 0 incorporates administrative changes such as the following:
   - Correction of grammatical mistakes such as misspellings and punctuation errors;
   - Correction of incorrect citations for sections, references, and figures; and
   - Correction of minor discrepancies in the document text.

The definition of abbreviations and acronyms used in this Change List can be found in Tier 1 Appendix B.

In some portions of Toshiba's DCD, information designated by NRC in DCD Revision 4 as Tier 2* has been removed and replaced by Toshiba or Westinghouse information. While a

determination if this replacement information is to be designated as Tier 2* has yet to be made by the NRC, such replacement information in the Toshiba DCD has nonetheless been marked in the Toshiba DCD as Tier 2* pending NRC's future determination.

Title: Introduction

Summary of Changes:

- Administrative changes to update citations to the current Code of Federal Regulations (CFR)
- Administrative changes to delete references to the ABWR Standard Safety Analysis Report (SSAR)
- Changed to incorporate by reference STPNOC's proposed aircraft impact assessment amendment

Tier 1

Tier 1 Section 1.0

Title: Introduction

Summary of Changes:

- Changed to incorporate by reference STPNOC's proposed aircraft impact assessment amendment

Tier 1 Section 1.1

Title: Definitions

Summary of Changes:

- Expanded the "As-built" definition

Tier 1 Section 1.2

Title: General Provisions

No changes

Tier 1 Section 2.0

Title: Certified Design for ABWR Systems

No changes

Tier 1 Section 2.1

Title: Nuclear Steam Supply Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added cladding to the RIP motor casing
- Clarified the term "ATWS Permissive" with respect to ADS Automatic Inhibition
- Changed to reflect use of Westinghouse Optima2 fuel

Tier 1 Section 2.2

Title: Control and Instrument Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated Safety-Related I&C Architecture
  - Provided dual-redundant controller channels
  - Eliminated hydrogen recombiner flammability control system
- Administrative changes

Tier 1 Section 2.3

Title: Radiation Servicing Equipment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system

Tier 1 Section 2.4

Title: Core Cooling Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Added condensate pump trip by Class 1E breakers
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control system
- Updated RHR heat exchanger heat removal capacity
- Updated ECCS systems' pump NPSH ITAACs to reflect change from "50% blocked strainer" acceptance criterion to current RG 1.82 Rev. 3 acceptance criteria
- Administrative changes

Tier 1 Section 2.5

Title: Reactor Servicing Equipment

No changes

Tier 1 Section 2.6

Title: Reactor Auxiliary Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System

Tier 1 Section 2.7

Title: Control Panels

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system
  - Updated safety-related I&C architecture

Tier 1 Section 2.8

Title: Nuclear Fuel

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel

Tier 1 Section 2.9

Title: Radioactive Waste System

No changes

Tier 1 Section 2.10

Title: Power Cycle Systems

Summary of Changes:

- Administrative changes

Tier 1 Section 2.11

Title: Station Auxiliary Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
- Administrative changes

Tier 1 Section 2.12

Title: Station Electrical Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Modified electrical breaker/fuse coordination and low voltage testing in conformance with industry standards and codes
  - Changed Class 1E I&C power distribution system from three to four safety related divisions
- Replaced references to specific vendors
- Administrative changes

Tier 1 Section 2.13

Title: Power Transmission

No changes

Tier 1 Section 2.14

Title: Containment and Environmental Control Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
- Administrative changes

Tier 1 Section 2.15

Title: Structures and Servicing Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Re-classified Radwaste Building Substructure from Seismic Category I to Non-Seismic
  - Increased Diesel Generator (DG) engine room maximum temperature limit during DG operation from 50°C to 60°C
  - Eliminated hydrogen recombiner flammability control system
  - Added condensate pump trip by Class 1E breakers
- Administrative changes

Tier 1 Section 2.16

Title: Power Yard Structures and Equipment

No changes

Tier 1 Section 2.17

Title: Emergency Planning

No changes

Tier 1 Section 3.0

Title: Additional Certified Design Material

No changes

Tier 1 Section 3.1

Title: Human Factors Engineering

No changes

Tier 1 Section 3.2

Title: Radiation Protection

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Updated plant computer function description on two figures

Tier 1 Section 3.3

Title: Piping Design

No changes

Tier 1 Section 3.4

Title: Instrumentation and Control

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated safety-related I&C Architecture

Tier 1 Section 3.5

Title: Initial Test Program

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR

Tier 1 Section 3.6

Title: Design Reliability Assurance Program

No changes

Tier 1 Section 4.0

Title: Interface Requirements

No changes

Tier 1 Section 4.1

Title: Ultimate Heat Sink

No changes

Tier 1 Section 4.2

Title: Offsite Power System

No changes

Tier 1 Section 4.3

Title: Makeup Water Preparation System

No changes

Tier 1 Section 4.4

Title: Potable and Sanitary Water System

No changes

Tier 1 Section 4.5

Title: Reactor Service Water System

No changes

Tier 1 Section 4.6

Title: Turbine Service Water System

No changes

Tier 1 Section 4.7

Title: Communication System

No changes

Tier 1 Section 4.8

Title: Site Security

No changes

Tier 1 Section 4.9

Title: Circulating Water System

No changes

Tier 1 Section 4.10

Title: Heating, Ventilating and Air Conditioning System

No changes

Tier 1 Section 5.0

Title: Site Parameters

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Increased maximum precipitation rate for rainfall and increased humidity by adjusting ambient design wet bulb temperatures
  - Added design temperatures for non-safety-related HVAC
- Administrative changes

Tier 1 Appendix A

Title: Legend for Figures

No changes

Tier 1 Appendix B

Title: Abbreviations and Acronyms Used in the ABWR Certified Design Material

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system

Tier 1 Appendix C

Title: Conversion to ASME Standard Units

Summary of Changes:

- Administrative changes

Tier 2

Tier 2 Chapter 1 Section 1.1

Title: Introduction and General Description of Plant

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed rated heat balance due to new Toshiba turbine design and changes in the steam cycle design and RIP and CRD purge flows
- Changed to incorporate by reference the aircraft impact assessment amendment
- Replaced references to specific vendors
- Administrative changes

Tier 2 Chapter 1 Section 1.2

Title: General Plant Description

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Relocated RIP MG sets and associated support components to a new, Non-Seismic Category I Control Building Annex adjacent to the Control Building
  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Resized the Radwaste Building due to process and other changes
  - Changed medium-voltage electrical distribution system
  - Updated fuel storage and handling equipment

  - Changed the Service Building HVAC System
  - Revised the Turbine Island HVAC system flow rate and cooling/heating
  - Changed design of turbines, reheaters, and valves, and made related changes to turbine protection system and preservice/inservice inspection requirements
  - Replaced multi-pressure main condenser design with single pressure condenser; included four circulating water pumps; deleted warm water recirculation line
  - Changed load rejection capability
  - Modified radioactive waste processing and handling systems
- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 1 Section 1.3

Title: Comparison Tables

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 1 Section 1.4

Title: Identification of Agents and Contractors

Summary of Changes:

- Changed NSSS vendor
- Incorporated Toshiba design and construction experience

Tier 2 Chapter 1 Section 1.5

Title: Requirements for Further Technical Information

No changes

Tier 2 Chapter 1 Section 1.6

Title: Topical Reports and Other Documents

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Addition of supporting reference materials associated with COLA changes
- Changed to reflect use of Westinghouse Optima2 fuel
- Changed to reflect update to probabilistic risk assessment
- Replaced non-Toshiba proprietary information in Table 1.6-1 Referenced Reports
- Administrative changes

Tier 2 Chapter 1 Section 1.7

Title: Drawings

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Updated P&ID pipe schedule
- Administrative changes

Tier 2 Chapter 1 Section 1.8

Title: Conformance with Standard Review Plan and Applicability Of Codes and Standards

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated codes and standards associated with changes made to Standard Plant scope
- Updated information for Standard Review Plan conformance
- Updated Operating Experience information
- Administrative changes

Tier 2 Chapter 1 Section 1.9

Title: COL License Information

Summary of Changes:

- Administrative changes

Tier 2 Chapter 1 Appendix 1A

Title: Response to TMI Related Matters

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control system

Tier 2 Chapter 1.Appendix 1AA

Title: Plant Shielding to Provide Access to Vital Areas and Protective Safety Equipment for Post-Accident Operation

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Reevaluated integrated doses for environmental qualification based on more detailed design
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Eliminated hydrogen recombiner flammability control
- Administrative changes

Tier 2 Chapter 1 Appendix 1B

Title: *Not Used*

Tier 2 Chapter 1 Appendix 1C

Title: ABWR Station Blackout Considerations

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated specific codes, standards and mil specs
  - Changed medium-voltage electrical distribution system
- Administrative changes

Tier 2 Chapter 2 Section 2.0

Title: Site Characteristics

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Increased maximum precipitation rate for rainfall and increased humidity by adjusting ambient design wet bulb temperatures
  - Added design temperatures for non-safety-related HVAC

Tier 2 Chapter 2 Section 2.1

Title: Limits Imposed on SRP Section II Acceptance Criteria by ABWR Standard Plant

No changes

Tier 2 Chapter 2 Section 2.2

Title: Requirements for Determination of ABWR Site Acceptability

Summary of Changes:

- Updated computer code descriptions

Tier 2 Chapter 2 Section 2.3

Title: COL License Information

Summary of Changes:

- Updated computer code description

Tier 2 Chapter 2 Appendix 2A

Title: Input to CRAC 2 Computer Code for Determination of ABWR Site Acceptability

No changes

Tier 2 Chapter 3 Section 3.1

Title: Conformance with NRC General Design Criteria

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Re-classified Radwaste Building substructure from seismic Category I to Non-Seismic
  - Changed safety-related I&C Architecture
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 3 Section 3.2

Title: Classification of Structures, Components, and Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control system
  - Corrected inconsistencies in Service Air System (SAS) text; changed design of Breathing Air System (SAS)
  - Re-classified Radwaste Building substructure from seismic Category I to Non-Seismic
  - Changed safety-related I&C architecture
  - Changed medium-voltage electrical distribution system
- Replaced non-Toshiba proprietary information

Tier 2 Chapter 3 Section 3.3

Title: Wind and Tornado Loadings

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added wind speed clarification per the International Building Code
  - Re-classified Radwaste Building substructure from seismic Category I to Non-Seismic

Tier 2 Chapter 3 Section 3.4

Title: Water Level (Flood) Design

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Re-classified Radwaste Building substructure from seismic Category I to Non-Seismic
  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Resized the Radwaste Building due to process and other changes

Tier 2 Chapter 3 Section 3.5

Title: Missile Protection

Summary of Changes:

- Eliminated non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 3 Section 3.6

Title: Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Allowed reduced thickness of main steam tunnel concrete in specific locations based on shielding and structural requirements
  - Deleted "Leak Before Break"
- Administrative changes

Tier 2 Chapter 3 Section 3.7

Title: Seismic Design

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
  - Updated specific codes, standards and mil specs
- Administrative changes

Tier 2 Chapter 3 Section 3.8

Title: Seismic Category I Structures

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
  - Updated specific codes, standards and mil specs
  - Corrected discussion concerning blowout panels and relief and release pathways associated with the steam tunnel
- Administrative changes

Tier 2 Chapter 3 Section 3.9

Title: Mechanical Systems and Components

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Changed material for in-core guide tube lower stabilizer
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Updated RSW system design to reflect increased system flow and discharge pressure
  - Corrected inconsistencies in Service Air System (SAS) text; changed design of Breathing Air System (SAS)
- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 3 Section 3.10

Title: Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

Summary of Changes:

- Administrative change to delete a reference to a specific vendor

Tier 2 Chapter 3 Section 3.11

Title: Environmental Qualification of Safety-Related Mechanical and Electrical Equipment

No changes

Tier 2 Chapter 3 Section 3.12

Title: Tunnels

No changes

Tier 2 Chapter 3 Section 3.13

Title: Secondary Containment and Divisional Separation Zones – Barrier Considerations

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 3 Appendix 3A

Title: Seismic Soil Structure Interaction Analysis

Summary of Changes:

- Administrative changes

Tier 2 Chapter 3 Appendix 3B

Title: Containment Hydrodynamic Loads

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Corrected factor used in containment impact load analysis
  - Revised pool swell analysis using an alternate method
  - Changed RCIC turbine driven pump design
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 3 Appendix 3C

Title: Computer Programs Used in the Design and Analysis of Seismic Category I Structures

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added reference to the ANSYS Code

Tier 2 Chapter 3 Appendix 3D

Title: Computer Programs Used in the Design of Components, Equipment and Structures

Summary of Changes:

- Administrative change to delete a reference to a specific vendor

Tier 2 Chapter 3 Appendix 3E

Title: *Not Used*

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Leak Before Break methodology is not being used. This Appendix is deleted in its entirety and marked Not Used

Tier 2 Chapter 3 Appendix 3F

Title: *Not Used*

Tier 2 Chapter 3 Appendix 3G

Title: Response of Structures to Containment Loads

No changes

Tier 2 Chapter 3 Appendix 3H

Title: Design Details and Evaluation Results of Seismic Category I Structures

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Re-classified Radwaste Building substructure from seismic Category I to Non-Seismic
  - Increased maximum precipitation rate for rainfall
  - Updated specific codes, standards and mil specs
  - Changed the containment liner anchor material to SA-36
- Administrative changes

Tier 2 Chapter 3 Appendix 3I

Title: Equipment Qualification Environmental Design Criteria

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Revised the integrated gamma radiation dose for the main steam tunnel
  - Eliminated hydrogen recombiner flammability control system
  - Increased Diesel Generator (DG) engine room maximum temperature limit during DG operation from 50°C to 60°C
  - Changed safety-related I&C architecture
- Administrative changes

Tier 2 Chapter 3 Appendix 3J

Title: *Not Used*

Tier 2 Chapter 3 Appendix 3K

Title: Designated NEDE-24326-1-P Material Which May Not Change Without Prior NRC Staff Approval

No changes

Tier 2 Chapter 3 Appendix 3L

Title: Evaluation of Postulated Ruptures in High Energy Pipes

No changes

Tier 2 Chapter 3 Appendix 3M

Title: Resolution of Intersystem Loss of Coolant Accident for ABWR

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed design of liquid radioactive waste system
  - Changed RCIC turbine driven pump design
- Administrative changes

Tier 2 Chapter 3 Appendix 3MA

Title: System Evaluation for ISLOCA

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Upgraded piping systems
- Administrative changes

Tier 2 Chapter 4 Sections 4.1

Title: Reactor

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 4 Sections 4.2

Title: Fuel System Design

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 4 Sections 4.3

Title: Nuclear Design

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 4 Sections 4.4

Title: Thermal-Hydraulic Design

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 4 Section 4.5

Title: Reactor Materials

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Revised materials for the control rod drive and reactor internals
- Replaced references to specific vendors

Tier 2 Chapter 4 Section 4.6

Title: Functional Design of Reactivity Control System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Provided water for FMCRD test equipment from the CRD pump
  - Clarified condensable gas build-up in RPV reference leg water level instrument lines having condensing chambers is continually flushed using CRD water

Tier 2 Chapter 4 Appendix 4A

Title: Typical Control Rod Patterns and Associated Power Distribution for ABWR

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information

Tier 2 Chapter 4 Appendix 4B

Title: Fuel Licensing Acceptance Criteria

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information

Tier 2 Chapter 4 Appendix 4C

Title: Control Rod Licensing Acceptance Criteria

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel

Tier 2 Chapter 4 Appendix 4D

Title: Reference Fuel Design Compliance with Acceptance Criteria

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel

Tier 2 Chapter 5 Section 5.1

Title: Reactor Coolant System and Connection Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Increased flow capacity of the two pumps and two filter demineralizers in RWCU
  - Added a vent line from the RWCU RPV head-spray line to the Reactor Head Vent Line
  - Provided limit switches for SRV valve position indication, giving a direct indication of valve position
  - Changed packing for large remote power operated valves located in the drywell and made associated design changes in leakoff lines and instrumentation
  - Changed rated heat balance due to new Toshiba turbine design and changes in the steam cycle design and RIP and CRD purge flows
- Administrative changes

Tier 2 Chapter 5 Section 5.2

Title: Integrity of Reactor Coolant Pressure Boundary

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Added condensate pump trip by Class 1E breakers
  - Eliminated hydrogen recombiner flammability control
  - Updated specific codes, standards and mil specs
  - Revised materials for the control rod drive and reactor internals
  - Changed PSI and ISI requirements for welds in RCS piping to meet requirements
  - Changed packing for large remote power operated valves located in the drywell and made associated design changes in leakoff lines and instrumentation
  - Changed tech spec LCO actions based on revised drywell leakage rate limits

- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 5 Section 5.3

Title: Reactor Vessel

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added cladding to RIP motor casing
  - Clarified number of test specimens listed and added a reference for the RPV Material Surveillance Program
- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 5 Section 5.4

Title: Component and Subsystem Design

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Increased the heat removal capacity of the RHR heat exchangers
  - Increased flow capacity of the two pumps and two filter demineralizers in RWCU
  - Revised the RIP cross section illustration to show reduced size of cable box and plug-in type power connector
  - Clarified wetwell spray operation in conjunction with the LPFL mode, minimum flow valves open logic, and relief valve setpoints
  - Permitted fabrication of RMHX shell, tube, sheet and water box using carbon steel or stainless steel
  - Added a vent line from the RWCU RPV head-spray line to the Reactor Head Vent Line:
  - Changed containment debris protection of ECCS strainers design per Reg. Guide 1.82, Revision 3
  - Changed packing for large remote power operated valves located in the drywell and made associated design changes in leakoff lines and instrumentation
  - Changed rated heat balance due to new Toshiba turbine design and changes in the steam cycle design and RIP and CRD purge flows
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 5 Appendix 5A

Title: *Not Used*

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed PSI and ISI requirements for welds in RCS piping to meet modern requirements. This Appendix contained inspection requirements that are no longer applicable; therefore, Appendix 5A has been deleted and marked Not Used

Tier 2 Chapter 5 Appendix 5B

Title: RHR Injection Flow and Heat Capacity Analysis Outlines

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Increased the heat removal capacity of the RHR heat exchangers
- Administrative changes

Tier 2 Chapter 6 Section 6.0

Title: General

Summary of Changes:

No changes

Tier 2 Chapter 6 Section 6.1

Title: Engineered Safety Features Materials

Summary of Changes:

No changes

Tier 2 Chapter 6 Section 6.2

Title: Containment Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated the containment analysis
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Added condensate pump trip by Class 1E breakers
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Corrected descriptions of primary containment penetrations and provided additional design detail
  - Changed Containment Debris Protection of ECCS Strainers design per Reg. Guide 1.82, Revision 3
  - Changed the HVAC HNCW System design

  - Corrected inconsistencies in Service Air System (SAS) text; changed design of Breathing Air System (SAS)
  - Added Suppression Pool Cleanliness Program
- Changed to reflect use of Westinghouse Optima2 fuel
- Changed to reflect update to probabilistic risk assessment
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 6 Section 6.3

Title: Emergency Core Cooling Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed RCIC turbine driven pump design
  - Changed packing for large remote power operated valves located in the drywell and made associated design changes in leakoff lines and instrumentation
  - Changed Containment Debris Protection of ECCS Strainers design per Reg. Guide 1.82, Revision 3
  - Updated LOCA analysis
- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 6 Section 6.4

Title: Habitability Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed design of the Control Building HVAC system
- Administrative changes

Tier 2 Chapter 6 Section 6.5

Title: Fission Products Removal and Control Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
- Changed to reflect update to probabilistic risk assessment

Tier 2 Chapter 6 Section 6.6

Title: Preservice and Inservice Inspection, and Testing of Class 2 and 3 Components and Piping

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control system
  - Clarified restrictions for accessibility for PSI/ISI and provided requirements for program plans
- Administrative changes

Tier 2 Chapter 6 Section 6.7

Title: High Pressure Nitrogen Gas Supply System

No changes

Tier 2 Chapter 6 Section 6A

Title: Regulatory Guide 1.52, Section C Compliance Assessment

No changes

Tier 2 Chapter 6 Appendix 6B

Title: SRP 6.5.1, Table 6.5.1-1 Compliance Assessment

Summary of Changes:

- Administrative changes

Tier 2 Chapter 6 Appendix 6C

Title: Containment Debris Protection for ECCS Strainers

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed containment debris protection of ECCS strainers design per Reg. Guide 1.82, Revision 3
  - Provided additional discussion and references on strainer performance and testing
- Administrative change to delete a reference to a specific vendor

Tier 2 Chapter 6 Appendix 6D

Title: HPCF Analysis Outlines

Summary of Changes:

- Administrative changes

Tier 2 Chapter 6 Appendix 6E

Title: Additional Bypass Leakage Considerations

No changes

Tier 2 Chapter 7 Section 7.1

Title: Instrumentation & Control Systems/Introduction

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified references to Setpoints and Allowable Values
  - Connected FMCRD motors to a power supply from the emergency diesel generators
  - Provided ATWS permissive signals from SNRM and APRM to the ESF Logic and Control System
  - Clarified description of Alternate Rod Insertion functions
- Administrative changes

Tier 2 Chapter 7 Section 7.2

Title: Reactor Protection (Trip) System (RPS)—Instrumentation and Controls

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified references to Setpoints and Allowable Values
  - Corrected statement regarding manual scram switches
  - Provided new specification ranges for RPS instrumentation setpoints
  - Changed medium-voltage electrical distribution system
- Administrative changes

Tier 2 Chapter 7 Section 7.3

Title: Engineered Safety Feature Systems, Instrumentation and Control

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Added condensate pump trip by Class 1E breakers
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified references to Setpoints and Allowable Values

  - Corrected inconsistency in input variables used in LOCA analysis
  - Clarified actuation is pneumatic for function of the automatic SRV
  - Modified nomenclature for vessel water level monitoring
  - Provided limit switches for SRV valve position indication, giving a direct indication of valve position
  - Changed the ADS inhibit switches from keylock type to a normal manual switch
  - Changed description of RHR Shutdown Cooling Mode valve alignment during LPFL actuation
  - Changed description of ESF Logic and Control System Mode and changed ELCS mode automation logic
  - Changed packing for large remote power operated valves located in the drywell and made associated design changes in leakoff lines and instrumentation
  - Changed tech spec LCO actions based on revised drywell leakage rate limits
  - Clarified logic, method, and interlocks associated with the Containment Spray System
  - Updated discussion of RHR Suppression Pool Cooling logic and sequencing
  - Changed RCW design so that Division I, II, and III flow signals are provided to the MCR
  - Improved testing of SRV solenoid valves
  - Clarified ADS electrical interface control logic
  - Changed recording discharge temperatures of all SRV to an historian function

- Replaced non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 7 Section 7.4

Title: Systems Required for Safe Shutdown

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified description of Alternate Rod Insertion functions
  - Clarified descriptions of RHR alarms
  - Changed medium-voltage electrical distribution system
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 7 Section 7.5

Title: Information Systems Important to Safety

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system
  - Updated specific codes, standards and mil specs
  - Modified the Drywell Pressure Post-Accident Monitoring system
  - Changed Process and Effluent Radiation Monitoring and Sampling System detailed design and specific equipment
- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 7 Section 7.6

Title: All Other Instrumentation Systems Required for Safety

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Provided dual-redundant controller channels
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified references to Setpoints and Allowable Values
  - Connected FMCRD motors to a power supply from the emergency diesel generators
  - Provided ATWS permissive signals from SNRM and APRM to the ESF Logic and Control System
  - Clarified description and modified design of OPRM logic
  - Clarified the description for the SPTM System
  - Clarified that the power range for PNRM operability begins at ~5% power
  - Changed Process and Effluent Radiation Monitoring and Sampling System detailed design and specific equipment
- Provided new APRM setpoints based on new stability analysis
- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 7 Section 7.7

Title: Control Systems Not Required for Safety

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Increased flow capacity of the two pumps and two filter demineralizers in RWCU
  - Clarified condensable gas build-up in RPV reference leg water level instrument lines having condensing chambers is continually flushed using CRD water
  - Changed recording discharge temperatures of all SRV to an historian function
  - Deleted feedwater turbidity monitoring and signal transmission to the MCR
  - Clarified Automatic Power Regulator/RCIS Interface
  - Provided more information about available display information at the RCIS dedicated operator interface on the main control panel
  - Clarified RCIS commands
  - Provided additional information and more complete design description of RCIS
  - Clarified and added additional information regarding SCRRI function
  - Updated CRD control system interface
  - Clarified Rod Withdrawal Sequence restrictions
  - Clarified the detailed design description of the reference rod pull sequence
  - Deleted specific technology for optical isolation of rod block signals
  - Changed description and design of the RCIS bypass capabilities
  - Revised RCIS operator information description and design
  - Clarified and revised the Recirculation Flow Control Logic
  - Expanded the description of the ATLM setpoint and rod block action
  - Modified description and design of ATIP

  - Clarified description of I&C interface for Steam Bypass and Pressure Control System
  - Changed medium-voltage electrical distribution system
  - Changed description of the non-safety RIP Motor-Generator sets and adjustable speed drives
  - Modified Condensate and Feedwater System
  - Updated specific codes, standards and mil specs
- Provided new APRM setpoints based on new stability analysis
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 7 Section 7.8

Title: COL License Information

Summary of Changes:

- Identified commitment regarding Q420.92 in Section 7.8.3

Tier 2 Chapter 7 Section 7.9

Title: Data Communications Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added new Section 7.9 based on COLA Section 7.9S to address safety and non-safety-related data communications

Tier 2 Chapter 7 Appendix 7A

Title: Design Response to Appendix B, ABWR LRB Instrumentation and Controls

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
  - Clarified references to Setpoints and Allowable Values
- Administrative changes

Tier 2 Chapter 7 Appendix 7B

Title: Implementation Requirements for Hardware/Software Development

No Changes

Tier 2 Chapter 7 Appendix 7C

Title: Defense against Common-Mode Failure in Safety-related, Software-Based I&C Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 8 Section 8.1

Title: Electric Power

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed Class 1E I&C power distribution system from three to four safety related divisions
  - Added condensate pump trip by Class 1E breakers
  - Updated specific codes, standards and mil specs
  - Changed medium-voltage electrical distribution system
  - Updated reference for DG Jacket Cooling Water System

Tier 2 Chapter 8 Section 8.2

Title: Offsite Power Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed location of non-Class 1E electrical power distribution equipment and revised bus numbers and equipment locations in the turbine building
  - Changed medium-voltage electrical distribution system
- Administrative changes

Tier 2 Chapter 8 Section 8.3

Title: Onsite Power Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed Class 1E I&C power distribution system from three to four safety related divisions
  - Changed medium-voltage electrical distribution system
  - Added condensate pump trip by Class 1E breakers
  - Eliminated hydrogen recombiner flammability control system
  - Updated the containment analysis
  - Updated reference for DG Jacket Cooling Water System
  - Changed design of turbines, reheaters, and valves, and made related changes to turbine protection system and preservice/inservice inspection requirements
- Replaced non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 8 Appendix 8A

Title: Miscellaneous Electrical System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated lightning protection system requirements
- Administrative changes

Tier 2 Chapter 9 Section 9.1

Title: Auxiliary Systems: Fuel Storage and Handling

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated fuel storage and handling equipment
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
- Changed to reflect use of Westinghouse Optima2 fuel

Tier 2 Chapter 9 Section 9.2

Title: Water Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Replaced Ultimate Heat Sink conceptual information with basin-type UHS conceptual design
  - Increased the heat removal capacity of the RCW heat exchangers
  - Increased the heat removal capacity and flow of Turbine Building Cooling Water System
  - Updated RSW system design to reflect increased system flow and discharge pressure
  - Changed HNCW System design and corrected inconsistent information
  - Revised Turbine Service Water System
  - Revised Turbine Island HVAC system to accommodate the effect of change of the Turbine Building general arrangement, systems located in Turbine Building, and Off Gas System requirements
  - Modified Control Building Annex HVAC System to provide appropriate ventilation, filtering cooling and heating of the MG Set rooms
  - Eliminated hydrogen recombiner flammability control system
  - Updated specific codes, standards and mil specs
- Administrative changes

Tier 2 Chapter 9 Section 9.3

Title: Process Auxiliaries

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Replaced carbon steel piping in the Radwaste Collection System with stainless steel
  - Corrected inconsistencies in Service Air System (SAS) text; changed design of Breathing Air System (BAS)

- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 9 Section 9.4

Title: Air Conditioning, Heating, Cooling and Ventilating Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Revised Turbine Island HVAC system to accommodate the effect of change of the Turbine Building general arrangement, systems located in Turbine Building, and Off Gas System requirements
  - Changed Turbine Building HVAC design parameters and main heating coil
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
  - Increased maximum precipitation rate for rainfall and increased humidity
  - Changed HNCW System design and corrected inconsistent information
  - Changed design of the Control Building HVAC system
  - Changed the Service Building HVAC System
  - Eliminated hydrogen recombiner flammability control system
  - Modified Radwaste Building ventilation
  - Provided two channels per emergency filtration (EF) division for Control Building HVAC System
  - Modified Control Building Annex HVAC System to provide appropriate ventilation, filtering cooling and heating of the MG Set rooms
  - Added tornado dampers and changed design temperature limits for Reactor Building HVAC System

Tier 2 Chapter 9 Section 9.5

Title: Other Auxiliary Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Changed medium-voltage electrical distribution system
  - Changed design of the control building HVAC system
  - Updated reference for DG Jacket Cooling Water System
  - Changed description of lower drywell flooder fusible plugs
  - Changed description of the non-safety RIP Motor-Generator sets and adjustable speed drives
  - Changed high ceiling lamps from mercury vapor to high pressure sodium
  - Relocated diesel fuel oil storage tanks and changed design of connections, associated piping and pumps
  - Replaced fuel oil-heated boiler with electrically-heated boiler
- Administrative changes

Tier 2 Chapter 9 Appendix 9A

Title: Fire Hazards Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
  - Relocated RIP MG sets and associated support components to a new, Non-Seismic Category I Control Building Annex adjacent to the Control Building
  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Resizing Radwaste Building
  - Replaced fuel oil-heated boiler with electrically-heated boiler
  - Changed Process and Effluent Radiation Monitoring and Sampling System detailed design and specific equipment
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 9 Appendix 9B

Title: Summary of Analysis Supporting Fire Protection Design Requirements

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Replaced non-Toshiba proprietary information

Tier 2 Chapter 9 Appendix 9C

Title: Regulatory Guide 1.52, Section C, Compliance Assessment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated specific codes, standards and mil specs

Tier 2 Chapter 9 Appendix 9D

Title: SRP 6.5.1, Table 6.5.1-1 Compliance Assessment

No changes

Tier 2 Chapter 10 Section 10.1

Title: Steam and Power Conversion System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed steam cycle design to improve the overall cycle efficiency, plant reliability and availability
  - Changed rated and VWO heat balance due to new Toshiba turbine design and changes in the steam cycle design and RIP and CRD purge flows
  - Changed design of turbines, reheaters, and valves, and made related changes to turbine protection system and preservice/inservice inspection requirements
  - Replaced multi-pressure main condenser design with single pressure condenser; included four circulating water pumps; deleted warm water recirculation line
  - Modified Condensate and Feedwater System
  - Changed safety-related I&C architecture
  - Increased the heat removal capacity and flow of Turbine Building Cooling Water System
  - Changed inlet pressure at the turbine main steam valves
- Administrative changes

Tier 2 Chapter 10 Section 10.2

Title: Turbine Generator

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Replaced built-up turbine rotor design with monoblock rotor design
  - Changed design of turbines, reheaters, and valves, and made related changes to turbine protection system and preservice/inservice inspection requirements
  - Implemented digital turbine controls
  - Added condensate pump trip by Class 1E breakers
- Administrative changes

Tier 2 Chapter 10 Section 10.3

Title: Main Steam Supply System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed design of turbines, reheaters, and valves, and made related changes to turbine protection system and preservice/inservice inspection requirements
  - Clarified that MSS also serves as the main steam line leakage path
  - Added a non-safety-related Gland Seal Exhaust to Turbine Gland Seal System to supply sealing steam to the main turbine shaft seal glands and various turbine valve stem
  - Revised design of Main Condenser Evacuation System
- Administrative changes

Tier 2 Chapter 10 Section 10.4

Title: Other Features of Steam and Power Conversion

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Increased the heat removal capacity and flow of Turbine Building Cooling Water System
  - Added a non-safety-related Gland Seal Exhaust to Turbine Gland Seal System to supply sealing steam to the main turbine shaft seal glands and various turbine valve stem
  - Revised design of Main Condenser Evacuation System
  - Modified Condensate and Feedwater System
  - Replaced multi-pressure main condenser design with single pressure condenser; included four circulating water pumps; deleted warm water recirculation line
  - Changed load rejection capability
  - Revised Turbine Bypass Hydraulic Control: figure to resolve inconsistencies
  - Deleted feedwater turbidity monitoring and signal transmission to the MCR
  - Changed safety-related I&C architecture
- Administrative changes

Tier 2 Chapter 11 Section 11.1

Title: Radioactive Waste Management

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed rated heat balance due to new Toshiba turbine design and changes in the steam cycle design and RIP and CRD purge flows

Tier 2 Chapter 11 Section 11.2

Title: Liquid Waste Management System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed design of liquid radioactive waste system to incorporate modern mobile processing technology

Tier 2 Chapter 11 Section 11.3

Title: Gaseous Waste Management System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Modified Gaseous Waste Management System
  - Revised design of Main Condenser Evacuation System
  - Modified Condensate and Feedwater System
- Administrative changes

Tier 2 Chapter 11 Section 11.4

Title: Solid Waste Management System

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added Solid Waste Management System information to incorporate modern mobile processing technology

Tier 2 Chapter 11 Section 11.5

Title: Process and Effluent Radiological Monitoring and Sampling Systems

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed Process and Effluent Radiation Monitoring and Sampling System detailed design and specific equipment
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed safety-related I&C architecture
  - Clarified references to Setpoints and Allowable Values

Tier 2 Chapter 11 Section 11.6

Title: Offsite Radiological Monitoring Program

No changes

Tier 2 Chapter 11 Section 11A

Title: *Not Used*

Summary of Changes:

- Incorporated based on STP Unit 3&4 COL Application:
  - This information has been added to Sections 11.2 and 11.4, and this appendix has been marked as Not Used

Tier 2 Chapter 12 Section 12.1

Title: Radiation Protection

No changes

Tier 2 Chapter 12 Section 12.2

Title: Radiation Sources

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed design of liquid radioactive waste system
  - Modified Radioactive Solid Waste Management System
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
  - Increased flow capacity of the two pumps and two filter demineralizers in RWCU
- Administrative changes

Tier 2 Chapter 12 Section 12.3

Title: Radiation Protection Design Features

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Provided graded approach to cobalt concentrations using various grades of low cobalt stainless steel
  - Added additional monitors and alarm capability to certain area radiation monitors
  - Changed Process and Effluent Radiation Monitoring and Sampling System detailed design and specific equipment
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture

  - Changed Turbine Building design to accommodate replacement of the turbine generator and related turbine cycle equipment
  - Updated specific codes, standards and mil specs
  - Resized Radwaste Building
  - Corrected discussion concerning blowout panels and relief and release pathways associated with the steam tunnel
- Administrative changes

Tier 2 Chapter 12 Section 12.4

Title: Dose Assessment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Updated fuel storage and handling equipment
  - Changed design of liquid radioactive waste system
- Replaced non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 12 Section 12.5

Title: Health Physics Program

No changes

Tier 2 Chapter 12 Appendix 12A

Title: Calculation of Airborne Radionuclides

No changes

Tier 2 Chapter 13 Section 13.1

Title: Conduct of Operations

No changes

Tier 2 Chapter 13 Section 13.2

Title: Training

No changes

Tier 2 Chapter 13 Section 13.3

Title: Emergency Planning

No changes

Tier 2 Chapter 13 Section 13.4

Title: Review and Audit

No changes

Tier 2 Chapter 13 Section 13.5

Title: Plant Procedures

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:

– Eliminated hydrogen recombiner flammability control system

Tier 2 Chapter 13 Section 13.6

Title: Physical Security

Summary of Changes:

- Added COL License Information item requiring a physical security and cyber security plan

Tier 2 Chapter 14 Section 14.1

Title: Initial Test Program

No changes

Tier 2 Chapter 14 Section 14.2

Title: Specific Information to be Included in Final Safety Analysis Reports

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed RCIC turbine driven pump design
  - Eliminated hydrogen recombiner flammability control
  - Changed safety-related I&C architecture
  - Provided water for FMCRD test equipment from the CRD pump
  - Changed medium-voltage electrical distribution system
  - Updated fuel storage and handling equipment
  - Updated reference for DG jacket cooling water system
  - Changed design of liquid radioactive waste system
  - Modified radioactive solid waste system
  - Modified UHS preoperational test requirements
  - Deleted requirement for performing control rod drive CRD friction testing at rated pressure
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 14 Section 14.3

Title: Tier 1 Selection Criteria and Processes

No changes

Tier 2 Chapter 15 Section 15.0

Title: Accident and Analysis

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel, including:
  - Evaluation models and computer codes
  - Revised input parameters and initial conditions for system response analysis transients
  - Revised results for system response analysis transient events
  - Added consideration of possible use of partial arc turbine control
- Administrative change to delete a reference to a specific vendor

Tier 2 Chapter 15 Section 15.1

Title: Decrease in Reactor Coolant Temperature

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
  - Evaluation models and computer codes
  - Updated analysis and results
- Administrative changes

Tier 2 Chapter 15 Section 15.2

Title: Increase in Reactor Pressure

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Changed medium-voltage electrical distribution system
  - Changed turbine bypass configuration
- Noted need to reanalyze turbine trip for partial arc turbine control
- Changed to reflect use of Westinghouse Optima2 fuel – Updated analysis and results
- Administrative changes

Tier 2 Chapter 15 Section 15.3

Title: Decrease in Reactor Coolant System Flow Rate

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel – Updated analysis and results
- Administrative changes

Tier 2 Chapter 15 Section 15.4

Title: Reactivity and Power Distribution Anomalies

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel, including
  - Updated analysis and results
  - Approach for misloaded fuel bundles
- Replaced non-Toshiba proprietary references
- Administrative changes

Tier 2 Chapter 15 Section 15.5

Title: Increase in Reactor Coolant Inventory

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel – Updated analysis and results

Tier 2 Chapter 15 Section 15.6

Title: Decrease in Reactor Coolant Inventory

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 15 Section 15.7

Title: Radioactive Release from Subsystems and Components

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Re-classified Radwaste Building Substructure from Seismic Category I to Non-Seismic
  - Modified Gaseous Waste Management System
- Changed to reflect use of Westinghouse Optima2 fuel
- Administrative changes

Tier 2 Chapter 15 Section 15.8

Title: Anticipated Transients Without Scram

Summary of Changes:

- Administrative changes

Tier 2 Chapter 15 Section 15.9

Title: Boiling Water Reactor Stability

Summary of Changes:

- Section added to address coupled neutronic-thermal-hydraulic instabilities in regard to GDCs 10 and 12. Some of this information was previously in Section 4.4

Tier 2 Chapter 15 Section 15A

Title: Plant Nuclear Safety Operational Analysis (NSOA)

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 15 Section 15B

Title: Failure Modes and Effects Analysis (FMEA)

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Clarified that condensable gas build-up in reactor vessel reference leg water level instrument lines having condensing chambers is continually flushed using CRD water
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 15 Section 15C

Title: *Not Used*

Tier 2 Chapter 15 Section 15D

Title: Probability Analysis of Pressure Regulator Downscale Failure

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 15 Section 15E

Title: ATWS Performance Evaluation

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Changed to reflect use of Westinghouse Optima2 fuel, including:
  - Updated analysis and results
  - Evaluation models and computer codes
- Eliminated non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 15 Section 15F

Title: LOCA Inventory Curves

No changes

Tier 2 Chapter 16 Section 16.0

Title: Technical Specifications

Summary of Changes:

- Administrative changes

Tier 2 Chapter 16 Section 16.1

Title: Use and Application

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture

Tier 2 Chapter 16 Section 16.2

Title: Safety Limits (SLs)

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed the wording and the intent of some ABWR DCD Technical Specifications as described in the STP COLA
- Changed to reflect use of Westinghouse Optima2 fuel
- Replaced references to non-Toshiba proprietary information
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 16 Section 16.3

Title: Limiting Condition for Operation (LCO) Applicability

Summary of Changes:

- This Section uses the STP 3&4 COLA R4 as the base document with changes relative to the current certified design marked with revision bars
- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Added condensate pump trip by Class 1E breakers
  - Changed RCIC pump turbine design
  - Changed Class 1E I&C power distribution system from three to four safety related divisions
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
  - Updated the containment analysis
  - Revised drywell leakage rate limits
  - Clarified Automatic Depressurization System (ADS) Electrical Interface control logic
  - Modified the Drywell Pressure Post-Accident Monitoring system
  - Updated CRD control system interface
  - Revised Rod Control and Information System
  - Changed medium-voltage electrical distribution system
  - Modified Condensate and Feedwater System
- Changed wording/intent of some ABWR DCD Technical Specifications as described in the STP COLA and associated responses to Requests for Additional Information, including:
  - Revised surveillance condition
  - Revised surveillance frequency
- Changed to reflect use of Westinghouse Optima2 fuel
- Eliminated references to non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 16 Section 16.4

Title: Surveillance Requirement (SR) Applicability

Summary of Changes:

- Changed to reflect use of Westinghouse Optima2 fuel

Tier 2 Chapter 16 Section 16.5

Title: Design Features

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
- Changed the wording and the intent of the some ABWR DCD Technical Specifications as described in the STP COLA and associated responses to Requests for Additional Information
- Administrative changes

Tier 2 Chapter 17 Section 17.0

Title: Introduction

Summary of Changes:

- Added description of Toshiba Quality Assurance program
- Administrative changes

Tier 2 Chapter 17 Section 17.1

Title: Quality Assurance During Design and Construction

Summary of Changes:

- Added description of Toshiba Quality Assurance during design and construction
- Administrative changes

Tier 2 Chapter 17 Section 17.2

Title: Quality Assurance During the Operations Phase

No changes

Tier 2 Chapter 17 Section 17.3

Title: Reliability Assurance Program During Design Phase

Summary of Changes:

- Administrative change to delete references to a specific vendor
- Administrative changes

Tier 2 Chapter 18 Section 18.1

Title: Introduction

No changes

Tier 2 Chapter 18 Section 18.2

Title: Design Goals and Design Bases

No changes

Tier 2 Chapter 18 Section 18.3

Title: Planning, Development, and Design

No changes

Tier 2 Chapter 18 Section 18.4

Title: Control Room Standard Design Features

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Modified the Drywell Pressure Post-Accident Monitoring system
  - Relocated controls and displays required for the synchronization of the main generator

Tier 2 Chapter 18 Section 18.5

Title: Remote Shutdown System

No changes

Tier 2 Chapter 18 Section 18.6

Title: Systems Integration

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture

Tier 2 Chapter 18 Section 18.7

Title: Detailed Design of the Operator Interface System

No changes

Tier 2 Chapter 18 Section 18.8

Title: COL License Information

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture

Tier 2 Chapter 18 Section 18A

Title: Emergency Procedure Guidelines

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
- Administrative changes

Tier 2 Chapter 18 Section 18B

Title: Differences Between BWROG EPG Revision 4 and ABWR EPG

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system

Tier 2 Chapter 18 Section 18C

Title: Operator Interface Equipment Characterization

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Administrative changes

Tier 2 Chapter 18 Section 18D

Title: Emergency Procedures Guidelines—Input Data and Calculation Results

No changes

Tier 2 Chapter 18 Section 18E

Title: ABWR Human-System Interface Design Implementation Process

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Updated specific codes, standards and mil specs
- Administrative change to delete a reference to a specific vendor
- Administrative changes

Tier 2 Chapter 18 Section 18F

Title: Emergency Operation Information and Controls

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system
- Changed to reflect update to probabilistic risk assessment for important operator actions
- Administrative changes

Tier 2 Chapter 18 Section 18G

Title: Design Development and Validation Testing

No changes

Tier 2 Chapter 18 Section 18H

Title: Supporting Analysis for Emergency Operation Information and Controls

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated MSIV automatic closure trip on high radiation in steam tunnel
  - Eliminated hydrogen recombiner flammability control system
  - Modified Condensate and Feedwater System
- Replaced non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 19 Section 19.1

Title: Purpose and Summary

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Incorporated condensate booster pumps
- Administrative changes

Tier 2 Chapter 19 Section 19.2

Title: Introduction

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment, including:
  - Updated initiating events, including more recent reference of Loss Of Off-site Power and LOCA frequencies
  - Updated human actions, including reference to updated analysis
  - Low Power Shut Down analysis
- Administrative changes

Tier 2 Chapter 19 Section 19.3

Title: Internal Event Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Incorporated condensate booster pumps
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated initiating events, including more recent reference

  - Updated PRA results and eliminated discussion of results that are no longer applicable or are discussed elsewhere
  - Included addition of pumps in decay heat removal common cause failures
- Replaced non-Toshiba proprietary information
- Administrative change to delete a reference to a specific vendor and associated design tools
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19.4

Title: External Event Analysis and Shutdown Risk Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
  - Added RSW pump house to areas considered in flooding analysis
- Changed to reflect update to probabilistic risk assessment, including:
  - Eliminated cross-reference to material that is no longer provided
  - Updated discussion of Low Power Shut Down analysis
- Eliminated references to non-Toshiba proprietary information
- Administrative changes

Tier 2 Chapter 19 Section 19.5

Title: Source Term Sensitivity Studies

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment, including:
  - Deleting Subsection 19.5.2 information to reflect update to probabilistic risk assessment which no longer includes sensitivity for assessing the benefits of the Containment Over-Pressure System (COPS) since the COPS is an established design feature

Tier 2 Chapter 19 Section 19.6

Title: Measurement Against Goals

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment, including:
  - Eliminated cross-reference to material that is no longer provided
- Administrative changes

Tier 2 Chapter 19 Section 19.7

Title: PRA as a Design Tool

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Revised FMCRD test interval
  - Removed RSW vacuum breaker valves
  - Added RSW pump house to areas considered in flooding analysis
  - Changed plant medium voltage electrical system
- Changed to reflect update to probabilistic risk assessment, including:
  - Eliminated cross-reference to material that was not provided in DCDR4

Tier 2 Chapter 19 Section 19.8

Title: Important Features Identified by the ABWR PRA

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Added RSW pump house to areas considered in flooding analysis
  - Eliminated RSW anti-siphon capability, consistent with conceptual use of basin-type UHS
  - Revised Ultimate Heat Sink design
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated discussion of core damage frequency results
  - Updated discussion of Low Power Shut Down analysis
- Administrative changes

Tier 2 Chapter 19 Section 19.9

Title: COL License Information

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
  - Eliminated RSW anti-siphon capability, consistent with conceptual use of basin-type UHS
  - Updated procedure for operation of RCIC from outside the Control Room
  - Incorporated condensate booster pumps
- Changed to reflect update to probabilistic risk assessment, including:
  - Eliminated cross-reference to material that is no longer provided
- Administrative changes

Tier 2 Chapter 19 Section 19.10

Title: Assumptions and Insights Related to Systems Outside of ABWR Design Certification

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminates Sections 19.10.1 and 19.10.2 discussions of RSW system and UHS
- Changed to update power cycle heat sink assumptions by adding two references

Tier 2 Chapter 19 Section 19.11

Title: Human Action Overview

No changes

Tier 2 Chapter 19 Section 19.12

Title: Input to the Reliability Assurance Program

No changes

Tier 2 Chapter 19 Section 19.13

Title: Summary of Insights Gained from the PRA

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed RCIC turbine driven pump design
- Administrative changes

Tier 2 Chapter 19 Section 19A

Title: Response to CP/ML Rule 10CFR50.34(f)

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system

Tier 2 Chapter 19 Section 19B

Title: Resolution of USIs and GSIs

Summary of Changes:

- Incorporated design, procedure, and analysis changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Eliminated Leak Before Break as an option to address water hammer
  - Changed medium-voltage electrical distribution system
  - Response to reactor overfill events
  - Changed safety-related I&C Architecture
- Updated to reflect current status of Unresolved Safety Issues and Generic Safety Issues
- Changed to reflect data used in limited probabilistic risk assessment update
- Eliminated cross-reference to material that is no longer provided
- Administrative changes

Tier 2 Chapter 19 Section 19C

Title: Design Considerations Reducing Sabotage Risk

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR regarding sabotage risk

Tier 2 Chapter 19 Section 19D

Title: Probabilistic Evaluations

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19E

Title: Deterministic Evaluations

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Changed description of lower drywell flooder fusible plugs
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated Level 2 analysis
  - Eliminated discussion of results that is no longer applicable, such as performance without COPS
- Replaced non-Toshiba proprietary information
- Administrative change to delete a reference to a specific vendor
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19EA

Title: Direct Containment Heating

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment (PRA)
- Eliminated non-Toshiba proprietary information
- Administrative change to delete a reference to a specific vendor
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19EB

Title: Fuel Coolant Interactions

No changes

Tier 2 Chapter 19 Section 19EC

Title: Debris Coolability and Core Concrete Interaction

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment
- Eliminated non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19ED

Title: Corium Shield

No changes

Tier 2 Chapter 19 Section 19EE

Title: Suppression Pool Bypass

Summary of Changes:

- Eliminated non-Toshiba proprietary information in Subsection 19EE.4.4
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19F

Title: Containment Ultimate Strength

No changes

Tier 2 Chapter 19 Section 19FA

Title: Containment Ultimate Strength

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19G

Title: *Not Used*

Tier 2 Chapter 19 Section 19H

Title: Seismic Capacity Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Reclassified Radwaste Building substructure from Seismic Category I to non-seismic
- Eliminated reference to non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19I

Title: Seismic Margins Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed the design input assumption used in the seismic margins PRA analysis regarding Atmosphere Control System crosstie lines / valves
- Changed to reflect update to probabilistic risk assessment
- Eliminated non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19J

Title: *Not Used*

Tier 2 Chapter 19 Section 19K

Title: PRA-Based Reliability and Maintenance

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed RCIC turbine driven pump design
  - Change safety-related I&C architecture
  - Added RSW pump house to areas considered in flooding analysis
  - Eliminated RSW anti-siphon capability, consistent with conceptual use of basin-type UHS
  - Added additional components considered in regards to Reliability Assurance Program activities
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated results for most important SSCs

  - Updated discussion of Low Power Shut Down analysis
  - Identified Common Cause Failures of pumps in regards to Reliability Assurance Program activities
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19L

Title: ABWR Shutdown Risk Evaluation

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed Class 1E I&C power distribution system from three to four safety-related divisions
  - Incorporated condensate booster pumps
  - Changed Reactor Water Cleanup system description to include two 100% flow pumps
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated discussion of Low Power Shut Down analysis
- Eliminated non-Toshiba proprietary information
- Eliminated reference to specific vendors
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19M

Title: Fire Protection Probabilistic Risk Assessment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Eliminated hydrogen recombiner flammability control system
  - Discussed review of the ABWR FIVE analysis to assess changes to the ABWR design since the issuance of the original design certification, such as:
    - New RCIC pump design
    - Relocation of RIP motor generator sets
    - Turbine building modifications
- Eliminated non-Toshiba proprietary information
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19N

Title: Analysis of Common-Cause Failure of Multiplex Equipment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed safety-related I&C architecture
- Changed to reflect update to probabilistic risk assessment reliability data
- Resolved inconsistencies addressed by RAI 19-23
- Administrative changes

Tier 2 Chapter 19 Section 19O

Title: *Not Used*

Tier 2 Chapter 19 Section 19P

Title: Evaluation of Potential Modifications to the ABWR Design

Summary of Changes:

- Administrative change to remove reference to a ABWR Technical Support Document

Tier 2 Chapter 19 Section 19Q

Title: ABWR Shutdown Risk Assessment

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed from two to three RHR loops connected to the Fuel Pool Cooling and Cleanup System
  - Changed flooding protective measures
  - Eliminated hydrogen recombiner flammability control system
  - Changed safety-related I&C architecture
  - Changed Reactor Water Cleanup system description to include two 100% flow pumps
  - Incorporated condensate booster pumps and fourth feed pump
  - Eliminated RSW anti-siphon capability, consistent with conceptual use of basin-type UHS
  - Added RSW pump house to areas considered in flooding analysis
- Changed to reflect update to probabilistic risk assessment, including:
  - Updated discussion of Low Power Shut Down analysis
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 19 Section 19QA

Title: [ABWR Shutdown Risk Assessment – Fault Trees]

Summary of Changes:

- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19QB

Title: DHR Reliability Study

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Changed Reactor Water Cleanup system description to include two 100% flow pumps
- Administrative change to remove reference to the ABWR SSAR

Tier 2 Chapter 19 Section 19QC

Title: Review of Significant Shutdown Events: Electrical Power and Decay Heat Removal

Summary of Changes:

- Changed to reflect update to probabilistic risk assessment

Tier 2 Chapter 19 Section 19R

Title: Probabilistic Flooding Analysis

Summary of Changes:

- Incorporated design changes based on STP Unit 3&4 COL Application, including:
  - Added RSW pump house to areas considered in flooding analysis, and added watertight doors to the RSW pump rooms, and the RSW electrical and HVAC rooms
  - Eliminated RSW anti-siphon capability, consistent with conceptual use of basin-type UHS
  - Added fourth circulating water pump and clarified idle pump isolation valve is closed
  - Added motor-operated valves to prevent UHS basin draining
  - Added consideration of RSW line breaks
  - Revised operating parameters (e.g., flow rates for various pumps)
- Eliminated non-Toshiba proprietary information
- Replaced security-related figures with cross-references to other figures
- Administrative change to remove reference to the ABWR SSAR
- Administrative changes

Tier 2 Chapter 20 Section 20.1

Title: Question and Response Guide

Summary of Changes:

- Clarified that content of Chapter 20 is historical and not updated in DCDRA

Tier 2 Chapter 20 Section 20.2

Title: Questions

No changes

Tier 2 Chapter 20 Section 20.3

Title: Questions/Responses

No changes

Tier 2 Chapter 20 Section 20.4

Title: References

No changes

Tier 2 Chapter 20 Section 20A

Title: ODYNA/REDYA

No changes

Tier 2 Chapter 20 Section 20B

Title: Equipment Data Base

No changes

Tier 2 Chapter 21 All Sections

Title: Engineering Drawings

Summary of Changes:

Figures and the list of figures have been changed in accordance with changes identified in the associated individual sections for:

- Incorporated design changes based on STP Unit 3&4 COL Application
- Provided missing figures
- Administrative changes

Attachment No. 2

Commitment List

Reports referenced in the enclosed Toshiba Application for Renewal and Amendment of the Design Certification Rule for U.S. Advanced Boiling Water Reactor that are not currently available to the NRC will be available by the dates provided below.

Report Number	Title	Commitment Date
UTLR-0010-P	Toshiba Task Report for Supporting Analysis for Emergency Operating Information and Controls	December 10, 2010
UTLR-0011	ABWR Probabilistic Evaluations	November 26, 2010
UTLR-0012	ABWR PRA-Based Reliability	November 26, 2010
UTLR-0013	ABWR Shutdown Risk Evaluation	November 26, 2010
UTLR-0014	ABWR Severe Accident Evaluations	November 26, 2010
UTLR-0015	ABWR Risk-Significant Human Actions	November 26, 2010
UTLR-0016	ABWR Severe Accident Analysis	November 26, 2010
UTLR-0017	ABWR Containment Ultimate Strength	November 26, 2010
WCAP-17137-P	Westinghouse Stability Methodology for the ABWR	December 10, 2010

Attachment No. 3

Applicant's Supplemental Environmental Report –
Amendment to Standard Design Certification

Toshiba Report Number RS-5146857, Revision 0

October 2010

Applicant's Supplemental Environmental Report - Amendment to Standard Design Certification

ABWR Design Change Review for Impacts to the Assessment of Severe Accident Mitigation Design Alternatives

TOSHIBA CORPORATION
NUCLEAR ENERGY SYSTEM & SERVICES DIVISION

Copyright © 2010 Toshiba Corporation. All rights reserved.

RS-5146857 Rev.0

Table of Contents

1.0 Introduction 1
2.0 Technical Review 2
3.0 Revisions to the Probabilistic Risk Assessment 5
4.0 Revisions to the Design Control Document 5
5.0 Regulatory Impact 6
6.0 References 6

1.0 INTRODUCTION

This report addresses design changes proposed in Toshiba's application for renewal and amendment of the Design Certification Rule for the U.S. Advanced Boiling Water Reactor (ABWR) Design originally published on May 12, 1997. More specifically, this supplemental environmental report assesses Severe Accident Mitigation Design Alternatives (SAMDA) issues that were addressed by the GE Nuclear Energy "Technical Support Document for the ABWR" dated December 1994 (Reference 1) and approved by the U.S. Nuclear Regulatory Commission in its "Final Environmental Assessment" (Reference 2) during the original design certification.

Most design changes identified in Toshiba's renewal and amendment application do not affect SAMDA issues. This includes design changes required to address the new aircraft impact rule requirements of 10 CFR 50.150 and those that incorporate design departures in order to make the ABWR design certification rule similar to the South Texas Project Units 3 and 4 Combined License Application Revision 3. Design changes associated with the new Ultimate Heat Sink (UHS) might affect the ABWR probabilistic risk assessment (PRA) reported in Reference 1. The Reference 1 PRA was used to evaluate the probability of severe accidents and, thereby, the cumulative exposure risk associated with severe accidents. Toshiba has prepared a new "ABWR Severe Accident Analysis" (Reference 3) to update the Reference 1 probabilities and support this severe accident assessment. Design change and PRA information is provided in Section 2 and Section 3.

This supplemental environmental report is being provided to satisfy the requirements of 10 CFR 52.47(b)(2) and 51.55(b), and evaluates the impact of the design changes identified by Toshiba on the SAMDA assessment contained in the previous application. 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 "Technical Support Document for the ABWR" (Reference 1) or the NRC's "Final Environmental Assessment" (Reference 2) are rendered cost-beneficial by the design changes, or whether the design changes result in the identification of a new SAMDA that reasonably may be incorporated into the U.S. ABWR design certification. As discussed below, the design changes do not cause a previously rejected SAMDA to become cost beneficial or result in the identification of new SAMDAs that may be reasonably incorporated into the ABWR design.

2.0 TECHNICAL REVIEW

The design changes in Toshiba's application for renewal and amendment of the Design Certification Rule for the U.S. ABWR Design were identified in the STP Nuclear Operating Company's (STPNOC's) South Texas Project Units 3 and 4 Combined License Application, Rev. 3 (COLAR3) (Reference 4) as departures and supplements to the U.S. ABWR Design Control Document Rev. 4 (DCDR4) (Reference 5). Additional design changes were identified in STPNOC's application for amendment of the Design Certification Rule for the U.S. ABWR Design, the "ABWR STP Aircraft Impact Assessment (AIA) Amendment Revision 3" (Reference 6). Most of the COLAR3 departures and a small portion of the COLAR3 supplements have been incorporated into Toshiba's Design Control Document for the renewal and amendment (DCDRA) of the U.S. ABWR Design Certification Rule. STPNOC's AIA amendment application has been incorporated by reference into Toshiba's DCDRA. For this Applicant's Supplemental Environmental Report and Toshiba's application for renewal and amendment of the Design Certification Rule for the U.S. ABWR, these design changes were reviewed for their impact on SAMDAs for the U.S. ABWR design. A two-step evaluation process was used to determine the impact of each design change on the SAMDA assessment.

1. The design changes were evaluated to determine if there is a change to a PRA-modeled System, Structure, and Component (SSC). (The term "PRA-modeled SSC" is defined as an SSC that is currently modeled in "Technical Support Document for the ABWR" dated December 1994 (Reference 1) or an SSC that, after evaluation, should be modeled by an updated ABWR PRA.)
    a. A response of "No" eliminated the design change from further consideration.
    b. A response of "Yes" identified the design change for further evaluation.
2. The design changes identified for further evaluation in 1.b (above) were qualitatively evaluated for PRA impact. Expert judgment was used to determine whether the change has a risk-beneficial impact or a potentially risk-negative impact.
    a. Risk-beneficial design changes were not considered for further evaluation. For these design changes, the conclusion was that the previous ABWR PRA model remains bounding.
    b. Potentially risk-negative design changes were incorporated into the updated PRA model to quantify the Core Damage Frequency and Large Release Frequency.

Table 2-1 summarizes the results of the review of the evaluated design changes that have a PRA impact. The conclusion from Table 2-1 is that only the design changes associated with the Ultimate Heat Sink (UHS) could have a negative impact on ABWR plant risk as evaluated by the previous ABWR PRA. The UHS design change from a spray pond to a basin-type cooling tower should be evaluated by an updated PRA.

Table 2-1. Design Change Review

Change Description	PRA Impact	Comments
Over 200 COLAR3 Departures and Supplements	None	Each departure and supplement to DCDR4 was evaluated for PRA impact. All the departures and supplements except for the Ultimate Heat Sink departure and supplement were considered to have no PRA impact or to be risk-beneficial design changes that would result in small changes to the PRA results. These changes are not considered in the updated PRA.
COLAR3 – Ultimate Heat Sink (UHS) Design Changes	Yes	The conceptual design of the UHS has been changed from a spray pond to a basin-type cooling tower. This is a change to a PRA-modeled System, Structure, and Component (SSC). These changes should be evaluated by an updated PRA model to establish if these changes impact core damage probabilities or SAMDA evaluations.
Aircraft Impact – Additional Alternate Feedwater Injection (AFI) System	None	The AFI adds a new and diverse water supply for core cooling which is separate and independent from existing sources. Back leakage through this system is minimized by: (1) two existing safety-grade isolation check valves located in the reactor building, (2) two new normally closed motor-operated valves (MOVs), and (3) a leak off line which directs any leakage past the two check valves and one MOV back to the reactor building. The AFI pump has the same capacity and head as the High Pressure Core Flooder pump currently provided in the ABWR design. The AFI is manually actuated and controlled in the AFI pump house. The addition of a manually actuated backup to the existing high pressure injection systems provides a net benefit in terms of risk reduction over the previous ABWR design. The quantitative effect of the addition of AFI is small however. This design change is not considered in the updated PRA.

Change Description	PRA Impact	Comments
Aircraft Impact - Instrumentation Added for AFI	None	This change does not impact PRA models and assumptions as the credited instrumentation remains unaffected. This instrumentation can provide additional information for operators when existing instrument and control systems are potentially unavailable (e.g., long-term station blackout). This provides a net benefit in terms of risk reduction for the ABWR design. Quantitatively, the effect would be very small. This design change is not considered in the updated PRA.
Aircraft Impact - Addition of New Fire Doors and Conversion of Non-Rated Doors to 3-hour Fire Doors	None	Additional fire barriers are added in the reactor building. None of the existing fire barriers are eliminated or reduced. There is potentially a net benefit for risk reduction purposes in the addition of additional fire barriers. Because of the nature of the fire screening assessment performed for the ABWR design, there is no change to the fire screening results presented in the previous ABWR PRA. These design changes are not considered in the updated PRA.

3.0 REVISIONS TO THE PROBABILISTIC RISK ASSESSMENT

An updated PRA has been prepared to support SAMDA evaluations for Toshiba's proposed renewal and amendment application. The new PRA results are reported in "ABWR Severe Accident Analysis" (Reference 3). The updated PRA model incorporated the following changes:

- Included the cooling tower-based Ultimate Heat Sink design changes into the fault tree models.
- Evaluated recent data to develop new Initiating Event Frequencies.
- Evaluated recent data to develop new Component Reliability Data.
- Modeled Common Cause Failure of pumps for decay heat removal.
- Evaluated the five most important human actions and incorporated updated failure probabilities.
- Developed new plant data, plant operating states, and plant model to evaluate Low Power Shut Down.

While some accident probabilities changed, the total accident probabilities calculated by the updated PRA model were lower than the total accident probabilities from the original PRA model that were reported in the "Technical Support Document for the ABWR" (Reference 1). The updated total cumulative exposure risk based on the updated PRA results was lower than the original total cumulative exposure risk reported in Reference 1. Therefore, the "Technical Support Document for the ABWR" (Reference 1) remains the bounding case for severe accident and SAMDA evaluations.

4.0 REVISIONS TO THE DESIGN CONTROL DOCUMENT

Information from the updated PRA has been incorporated into Toshiba's Design Control Document for the renewal and amendment (DCDRA). This information replaces the previous PRA results with the updated PRA results. Most of these changes are documented in DCDRA Chapter 19 – "Response to Severe Accident Policy Statement" and Appendices.

5.0 REGULATORY IMPACT

The severe accident probability is extremely low for the previously certified U.S. ABWR. The Toshiba ABWR design includes additional design changes that will further reduce overall risk.

Based on the updated PRA results, the updated total cumulative exposure risk for Toshiba's ABWR design certification renewal and amendment application is lower than the original total cumulative exposure risk reported in the "Technical Support Document for the ABWR" (Reference 1). Therefore, Reference 1 remains the bounding case for severe accident and SAMDA evaluations. The SAMDA evaluations provided in Reference 1 and the "Final Environmental Assessment" (Reference 2) remain a valid basis for rejecting the previously rejected SAMDAs and any new SAMDA.

Based on References 1 and 2 and consideration of the extremely low probabilities associated with severe accidents, the proposed design changes in the renewal and amendment application do not render any of the SAMDAs previously rejected to become cost beneficial.

The design changes in the renewal and amendment application have not resulted in the identification of any new SAMDA that reasonably may be incorporated into the U.S. ABWR design certification.

6.0 REFERENCES

1. GE Nuclear Energy, "Technical Support Document for the ABWR, Report No. 25A5680, Rev. 1 dated December 1994" attached to the Joseph F. Quirk, GE Nuclear Energy, Submittal Letter MFN 162-94 for Docket No. 52-001 to the U.S. Nuclear Regulatory Commission dated December 21, 1994, "NEPA/SAMDA Submittal for ABWR", NRC Adams Accession Number ML100210563.

2. U.S. Nuclear Regulatory Commission, "Final Environmental Assessment by the Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Relating to the Certification of the U.S. Advanced Boiling Water Reactor Design Docket No. 52-001", provided as Attachment 2 to SECY-96-077, Certification of Two Evolutionary Designs, dated April 15, 1996, NRC Adams Accession Number ML003708129.

3. Toshiba Corporation, "ABWR Severe Accident Analysis", UTLR-0016 Rev.0.

4. Mark A. McBurnett, STPNOC, "South Texas Project Units 3 and 4 Docket No. 52-012 and 52-013 Submittal of Combined License Application Revision 3 (COLA R3)," STPNOC Submittal Letter U7-C-STP-NRC-090130 to the U.S. Nuclear Regulatory Commission dated September 16, 2009 with DVDs in PDF electronic format.

5. Joseph A. Savage, GE-Hitachi, "Submittal of ABWR Design Certification Document Revision 4 in electronic format (DCDR4)," Submittal Letter MFN 07-487 to the U.S. Nuclear Regulatory Commission dated September 4, 2007 in PDF electronic format. (GE Nuclear Energy originally submitted DCDR4 to the NRC in hard copy format on March 28, 1997.)

6. Mark A. McBurnett, STP Nuclear Operating Company, "ABWR STP Aircraft Impact Assessment (AIA) Amendment Revision 3," Document No. U7-C-STP-NRC-100213, letter, addressed to Document Control Desk, U.S. Nuclear Regulatory Commission, September 23, 2010, NRC Adams Accession Number ML 102770373.