



South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

January 25, 2010  
U7-C-STP-NRC-100014

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville MD 20852-2738

South Texas Project  
Units 3 and 4  
Docket Nos. 52-012 and 52-013  
Supplemental Response to Request for Additional Information

Reference: Letter from Scott Head to the Document Control Desk, “Response to Request for Additional Information”, dated December 30, 2009 (U7-C-STP-NRC-090231)

Attached is the supplemental response to the NRC staff question included in Request for Additional Information (RAI) letter number 234 related to Combined License Application (COLA) Part 2, Tier 2, Section 5.02. The original response was submitted by the letter referenced above.

The supplemental response to RAI question 05.02.03-2, attached to this letter, provides a markup of COLA Part 7, Section 3.0, STD DEP 4.5-1, as agreed to in the referenced letter.

The COLA change documented in the attachment will be incorporated in the next routine revision of the COLA following NRC acceptance of the RAI supplemental response.

There are no commitments in this letter.

If you have any questions, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

DO91  
NRC  
STI 32598966

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 11/25/10



Scott Head  
Manager, Regulatory Affairs  
South Texas Project Units 3 & 4

rhs

Attachment:

Question 05.02.03-2, Supplement

cc: w/o attachment except\*  
(paper copy)

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**RAI 05.02.03-2****QUESTION**

In the applicant's response to RAI 05.02.03-1, the applicant; (1) provided a proposed revision of its departure report and, (2) provided a proposed revision to Table 5.2-4. However, the applicant's proposed revision of its departure report (FSAR COLA Part 7, Section 3.0 ) does not appropriately address all of the changes made to ABWR DCD Section 4.5.1 and Table 5.2-4, as part of STD DEP 4.5-1.

Most of the modifications to Table 5.2-4 provide clarity related to product form, material type and component definition and do not involve changes in the material types that will be used. These modifications are described appropriately in the applicant's proposed revision (in response to RAI 05.02.03-1), to the description of STD DEP 4.5-1. However, the applicant's departure report summary does not appropriately address these changes. In addition, the proposed modifications to Table 5.2-4 that are discussed in the departure report references equivalent materials. It is the staff's understanding that equivalent materials applies only to non ASME Code components. Therefore, the applicant's reference to equivalent materials for RCPB applications is inappropriate. Further, the applicant has added austenitic stainless steel for RPV drain nozzles, but this modification is not referenced in the applicant's departure report. The applicant's proposed modification to Table 5.2-4, in response to RAI 05.02.03-1, changes the seal housing nut material to XM-19 material which is not addressed in the applicant's departure report.

STD DEP 4.5-1 list departures from Section 4.5.1 "Control Rod Drive Structural Materials," Section 4.5.2 "Reactor Materials," and Section 5.2.3 "Reactor Coolant Pressure Boundary Materials," and Table 5.2-4 "Reactor Coolant Pressure Boundary Materials." The applicant's departure report is incomplete and does not meet the requirements of 10 CFR 52, Appendix A, Section X.B.1 which states that an applicant who references 10 CFR 52, Appendix A shall submit a report to the NRC containing a brief description of any plant-specific departures from the DCD, including a summary of the evaluation of each. Therefore, the staff requests that the applicant modify its departures report, related to STD DEP 4.5-1, to address all departures from ABWR DCD Sections 4.5.1, 4.5.2, 5.2.3 and Table 5.2-4. The revised departures report should be separated into separate sections for each of the sections referenced above to provide clarity.

**SUPPLEMENTAL RESPONSE**

In the initial response to the RAI question stated above (U7-C-STP-NRC-090231, dated December 30, 2009), STPNOC agreed to revise COLA Part 7, Chapter 3.0, STD DEP 4.5-1 to provide additional detail. A markup of STD DEP 4.5-1, which will be incorporated in the next routine revision of the COLA following NRC acceptance of the RAI response, is provided below. Changes are shown in gray shading. Note that these markups supersede the markups provided in the response to RAI 05.02.03-1.

**STD DEP 4.5-1, Reactor Materials****Description:**

The description of the materials for the control rod drive (CRD) mechanisms in Section 4.5.1 and the reactor internals in Section 4.5.2 and the reactor coolant pressure boundary materials in Table 5.2-4 of the DCD has been revised (1) to reflect the materials successfully used in operating ABWR designs over the last 10 years, (2) to clarify some data and provide equivalent materials, as appropriate; and (3) to clarify some fabrication and material issues for reactor internals materials. In addition, changes have been made to Table 5.2-4 to clarify product form and material type, and to clarify a component definition and to Sections 4.5.1 and 4.5.2 to remove classes F304L and F316L for ASME Grade SA336/336M, because these classes were not listed for use in Section III, Appendix I, Table I-1.2 of the ASME code.

The description of Code Case applied to RPV, Reactor Internals and reactor coolant pressure boundary materials has been revised in Section 5.2 and Table 5.2-4 to reflect the issuance by ASME of "N-580-2".

In addition, some non-technical editorial corrections will be incorporated into Table 5.2-4, and Subsections 4.5.1, 4.5.2.1, 4.5.2.2, 4.5.2.4, and 4.5.2.5, consistent with STD DEP 4.5-1. These corrections include corrections to typographical errors, changes in terminology for correctness, insertion of omissions, and to clarify material categorization.

A summary of the changes to the DCD is as follows:

- (1) All components made from austenitic stainless steels in the original DCD material listings for the CRD mechanisms and the reactor internals are still fabricated from austenitic stainless steels in the revised listings. For example, 316 stainless steel is added to the original DCD material listings.
- (2) Where equivalent materials are now listed for components, the equivalent material has demonstrated successful application and operation with no impact on the design and safety function of the CRD mechanisms and reactor internals.
- (3) In some cases, wrought material is specified instead of cast, or the product form specification has been changed.
- (4) The description of the experience base for the materials has been updated to no longer exclude Type XM-19 stainless steel and now covers 25 years.
- (5) For components that are reactor pressure boundary components, the materials meet ASME Code, Section III, Class 1 or Class CS requirements (Subsection NB or NC).

- (6) The paragraph discussing nondestructive examination (NDE) of wrought seamless tubular products was revised to delete reference to the peripheral fuel supports, which are not tubular products, and to address the fact that the CRD housings are reactor coolant pressure boundary components (ASME Code, Section III, Class 1) as well as core support structures (Class CS).
- (7) The paragraph discussing controls on welding was clarified to make it clear industry welding standards are applicable to internals other than core support structures and that qualification per Section IX of the ASME Code applies to the core support structures.
- (8) The paragraph discussing the fabrication and processing of austenitic stainless steel was revised to clarify the limitations on delta ferrite content in weld materials and castings. This paragraph was also revised to more clearly state how the ABWR will comply with the intent of Regulatory Guide 1.44.
- (9) Mechanical properties of Alloy X-750 and heat treatment method are changed. Alloy X-750 with changed mechanical properties is used for latch and bayonet coupling materials. The material has demonstrated successful application and operation with no impact on the design and safety function of the CRD mechanisms by the Toshiba reliability verification testing. Furthermore, the DCD is changed to reflect the fact that this material has been used in nuclear power plants for more than 25 years.

## Changes to COLA Part 2, Tier 2, Table 5.2-4

<b>Table 5.2-4 Reactor Coolant Pressure Boundary Materials</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
MSIV: Valve Stem	Change material term from "17-4 ph" to "Precipitation Hardened Stainless Steel"	Editorial change to generic terminology. The referenced material specification, type, and condition are unchanged.
MSIV: Body Bolt	Change material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification. The referenced material specification, grade, and class are unchanged.
MSIV: Hex Nuts	Change material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification. The referenced material specification and grade are unchanged.
MSS/R Valve: Body to Bonnet Stud	Change product form term from "Bar/Rod" to "Bolting"	Editorial change for clarification of form. The referenced material specification and grade are unchanged.

<b>Table 5.2-4 Reactor Coolant Pressure Boundary Materials</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
MSS/R Valve: Body to Bonnet Nut	Change product form term from "Bar/Rod" to "Bolting Nuts" and material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification of form and material categorization. The referenced material specification and grade are unchanged.
MSS/R Valve: Disk	Change specification designation from "SA 637 Gr 718" to "SB-637 Gr 718." Change the material term from "Alloy steel NiCrFe" to "NiCrFe Alloy Stainless Steel"	Editorial change to specification designation to correct typographical error in the original DCD (SA-637 Gr 718 does not exist). Change material terminology for editorial correctness, i.e., "Alloy steel NiCrFe" is incorrect as a combined term. The change is made so that "NiCrFe Alloy" corresponds to nonferrous specification "SB 637" and "Stainless Steel" corresponds to ferrous specification "SA 351"). No technical changes have been made.
MSS/R Valve: Adjusting Screw	Change to add the term "Bolting" in the blank space in the product form column of the table.	Editorial change to correct omission of a term from the table in order to clarify the form.
MSS/R Valve: Spindle (stem)	Change material term from "Precipitation-hardened steel" to "Precipitation-hardened stainless steel"	Editorial change for clarification of material categorization. The referenced material specification, type, and condition are unchanged.
MS Piping: 200A 10.36 MPaG large groove flange	The component description is changed from "200A 10.36 MpaG" to "250 A".....	This change is a correction of a typographical error.
Recirculation Pump Motor - Cover: Bottom flange (cover)	Change material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification of material categorization. The referenced material specification, grade, and class are unchanged.
Recirculation Pump Motor Cover: Stud	Change material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification of material categorization. The referenced material specification, grade, and class are unchanged.

<b>Table 5.2-4 Reactor Coolant Pressure Boundary Materials</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
Recirculation Pump Motor Cover: Nut	Change product form term from "Bolting" to "Bolting Nuts" and material term from "Alloy Steel" to "Low-Alloy Steel"	Editorial change for clarification of form and material categorization. The referenced material specification and grade are unchanged.
CRD: Middle flange	Change adds Grades F304 and F316 for Specification SA-182, and adds Specification SA-336/336M, Classes F304 and F316.	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the L grades already referenced in the DCD. Further, the added grades are still limited to 0.020% carbon by the note. The editorial change to the specification designation is made to correctly identify the title of the specification.
CRD: Spool piece	Change adds Grades F304 and F316 for Specification SA-182, and adds Specification SA-336, Classes F304 and F316.	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the L grades already referenced in the DCD. Further, the added grades are still limited to 0.020% carbon by the note. The editorial change to the specification designation is made to correctly identify the title of the specification.
CRD: Mounting Bolts	Change product form term from "Bar" to "Bolting" and material term from "Alloy steel" to "Low-Alloy steel." Changes material specification from "SA 194" to "SA193"	The product form and material terms are editorial changes for clarification. The specification designation is corrected from the specification for nuts (SA-194) to the specification for bolts (SA-193).
CRD: Seal Housing	Change adds Grades F304 and F316 for Specification SA-182, and adds Specification SA-336, Classes F304 and F316.	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the L grades already referenced in the DCD. Further, the added grades are still limited to 0.020% carbon by the note. The editorial change to the specification designation is made to correctly identify the title of the specification.

<b>Table 5.2-4 Reactor Coolant Pressure Boundary Materials</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
CRD: Seal Housing Nut	Change the specification designation from "SA 564 17-4PH" to "SA-564 630 (H1100)"	The change reflects the materials successfully used in operating ABWR designs over the last 10 years.
RPV: Shell and Heads: Plate	Change "Mn ½ Mo ½ Ni" to "Low-alloy steel." Change "Mn ½ Mo ½ Ni" to "Low-alloy steel." Delete the notes "Carbon content is maximum 0.020% and nitrogen from 0.060 to 0.120" and "Added niobium content is 1 to 4%"	Editorial change to generic terminology. The referenced material specification, type, and class are unchanged.
RPV: Forging	Change "¾ Ni ½ Mo Cr V" to "Low alloy steel"	Editorial change to generic terminology. The referenced material specification and class are unchanged.
RPV: Flanged Nozzles Forging	Change "C Si" to "Low alloy steel"	Correct typographical error. SA-508 applies to low alloy steel.
RPV: Drain Nozzles Forging	Change "C Si" to "Low alloy steel" and add stainless steel to material list.	Correct typographical error. SA-508 applies to low alloy steel. Stainless steel added to expand material selection opportunity.
RPV Appurtenances/ Instrumentation Nozzles: Bar, Smls. Pipe	Change specification from "SB 166 or SB 167." to "Code Case N-580-2" Delete the note "Added niobium content is 1 to 4%."	Code Case N-580-2 allows the use of UNS N06600 (Alloy 600) material stabilized with niobium. Referencing this Code Case eliminates the need for the note. The notes were used because this revision of this Code Case had not been approved when the DCD was issued.
RPV Stub Tubes: Forging	Change specification from "SB 564" to "Code Case N-580-2." Delete the note "Added niobium content is 1 to 4%."	
RPV Stub Tubes: Bar, Smls. Pipe	Change specification from "SB 166 or SB 167" to "Code Case N-580-2." Delete the note "Added niobium content is 1 to 4%."	

Changes to Part 2, Tier 2, Section 4.5.1

**Section 4.5.1**

Component	Description of Change	Evaluation
CRD Spool Piece Assembly: Spool Piece Housing	Change from "ASME 182 Grade F304L" to ASME SA-182/182M Grade F304L, F304*, F316L, F316* or ASME SA-336/336M Grade F304L, F304*, F316L, F316*."	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the F304L grade already referenced in the DCD. The carbon content of the F304 and F316 is controlled to a maximum 0.020% by the note (*). Change also adds F316L for SA-182, which has the same mechanical properties as the currently referenced F304L. The editorial change to the specification designation (to SA-182/182M) is made to correctly identify the title of the specification.
CRD Spool Piece Assembly: Seal Housing	Change from "ASME 182 Grade F304L" to ASME SA-182/182M Grade F304L, F304*, F316L, F316* or ASME SA-336/336M Grade F304L, F304*, F316L, F316*."	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the F304L grade already referenced in the DCD. The carbon content of the F304 and F316 is controlled to a maximum 0.020% by the note (*). Change also adds F316L for SA-182, which has the same mechanical properties as the currently referenced F304L. The editorial change to the specification designation (to SA-182/182M) is made to correctly identify the title of the specification.

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
CRD Spool Piece Assembly: Drive Shaft	Change material from "SA-479 Grade XM-19" to "SA-479/479M Type 316*, 316L, or ASTM A479/479M Type 316***, 316L**". Change "Hard surfaced with Colmonoy No. 6" to add "or equivalent Nickel base alloy".	Change to Type 316*/316L from XM-19 justified based on the fact that drive shaft is partly hard surfaced with Colmonoy No. 6 or equivalent Nickel base alloy. Further justified by plant operating experience.  Technical change to allow substitution of another nickel based alloy for hard surfacing, but requires that the alloy must be equivalent Colmonoy No. 6 currently referenced in the DCD.  An Editorial change to the specification designation (to SA-479/479M) is made to correctly identify the specification.
CRD Spool Piece Assembly: Ball Bearings	Change component description to "Ball Bearings (in water)." Change material specification designation from "A756 Type 440C" to "ASTM A756 Type 440C** or A276 Type 440C**."	Non-technical change for materials adds an additional ASTM specification (A276) from which Type 440C material can be ordered. There is no actual technical change to the specified material (440C), regardless of which specification is used. Editorial correction to the referenced specification title adds "ASTM." Technical change to the component description clarifies that the specified material applies to the Ball Bearing used for services in water.
CRD Spool Piece Assembly: Ball Bearings	Add a component description for "Ball Bearings (in air)" and a corresponding material "AISI 52100***"	This technical change allows the use of a standard low alloy bearing steel in place of 440C stainless for use in air-only applications where the corrosion resistance of stainless steel is not needed.
CRD Spool Piece Assembly: Gland Packing Spring	Change from "Inconel X-750" to AMS 5699 Alloy N07750** (Alloy X-750)"	Non-technical change to reference a specification for the material rather than call out only the trade name. There is no actual technical change to the specified material (UNS N07750).
CRD Spool Piece Assembly: Separation Spring	Add a component "Separation Spring" and specify material AMS 5699 Alloy N07750 (Alloy X-750)	Technical change to identify an additional component (Separation Spring) and its corresponding material (UNS N07750).

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
CRD Spool Piece Assembly: Separation Magnet	Add a component "Separation Magnet" and specify a material "Alnico No. 5 and ASME SA-479/479M Type 316*, 316L or ASTM A479/479M Type 316***, 316L***"	Technical change to identify an additional component (Separation Magnet) and its corresponding materials (Alnico No. 5 and either Type 316 or 316L material). The specified materials are a standard permanent magnet material and a non-ferromagnetic stainless steel material for the surrounding structure. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*).
Ball Spindle: Ball Screw Shaft	Change material specification designation from ASTM A564 TP630 (17-4PH) Condition H-1100 to "ASME SA-564/564M Type 630 Condition H-1100 or ASTM A564/564M Type 630 (17-4PH)** Condition H-1100"	Non-technical change to materials to reference the ASME version of the currently referenced ASTM specification (SA-564/564M). Editorial correction to the title of the currently referenced ASTM specification.
Ball Spindle: Ball Nut	Change material specification designation from ASTM A564 TP630 (17-4PH) Condition H-1100 to "ASME SA-564/564M Type 630 Condition H-1100 or ASTM A564/564M Type 630 (17-4PH)** Condition H-1100"	Non-technical change to materials to reference the ASME version of the currently referenced ASTM specification (SA-564/564M). Editorial correction to the title of the currently referenced ASTM specification.
Ball Spindle: Balls	Change material specification designation from "A756 Type 440C" to "ASTM A756 Type 440C** or A580/580M Type 440C** or A276 Type 440C***"	Non-technical change for materials adds an additional ASTM specification (A580/580M or A276) from which Type 440C material can be ordered. There is no actual technical change to the specified material (440C), regardless of which specification is used. Editorial correction to the referenced specification title adds "ASTM."
Ball Spindle: Guide Roller	Change material specification from "Stellite No. 3" to add "or nickel base alloy."	The nickel base alloy is a cobalt replacement alloy (CRA).

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
Ball Spindle: Guide Roller Pin	Change from "Haynes Alloy No. 25" to "ASME SA-479/479M Type XM-19 (Nitrided), or ASTM A479/479M Type XM-19** (Nitrided) or equivalent ferrous base alloy"	Technical change from a cobalt-based alloy to a ferrous alloy, nitrided for wear resistance. Change of material for ALARA concerns associated with cobalt.
Ball Spindle: Spindle Head Bolt	Change to add "***" after Stellite No. 6B	Change provided to allow use of equivalent materials based on the restrictions in the footnote.
Ball Spindle: Spindle head Bushing	Change to add "***" after Stellite No. 12	Change provided to allow use of equivalent materials based on the restrictions in the footnote.
Ball Spindle: Separation Spring	Delete part	Change corrects section to list part with the CRD Spool Piece Assembly rather than the Ball Spindle.
Ball Spindle: Separation Magnet	Delete part	Change corrects section to list part with the CRD Spool Piece Assembly rather than the Ball Spindle.
Buffer Mechanism: Buffer Disk Spring	ASME SB-637 Alloy N07750 or ASTM B-637 Alloy N07750** or AMS 5542 Alloy N07750** (Alloy X-750)	Non-technical change to provide complete references to the material specifications rather than call out only the trade name. There is no actual technical change to the specified material (UNS N07750)
Buffer Mechanism: Buffer Sleeve	Change "316L (Hardsurfaced with Colmonoy No. 6)" to "ASME SA-479/479M Type 316*, 316L (Hardsurfaced with Colmonoy No. 6), or ASTM 479/479M Type 316***, 316L***"	Technical change adds Type 316 material. The mechanical properties of 316 are superior to the L grade already referenced and the carbon content of the 316 is controlled to a maximum of 0.020% by the note (*). Non-technical changes provide the complete reference to the material specifications rather than call out only the Type designation (316/316L).
Buffer Mechanism: Guide Roller	Change material specification from "Stellite No. 3" to add "or nickel base alloy."	The nickel base alloy is Cobalt Replacement Alloy (CRA).

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
Buffer Mechanism: Guide Roller Pin	Change from "Haynes Alloy No. 25" to "ASME SA-479/479M Type XM-19 (Nitrided) or ASTM A479/479M Type XM-19** (Nitrided) or equivalent ferrous base alloy"	Technical change from a cobalt-based alloy to a ferrous alloy, nitrided for wear resistance. Change of material for ALARA concerns associated with cobalt.
Buffer Mechanism: Stop Piston	Change "316L (Hardsurfaced with Stellite No. 6)" to "ASME SA-479/479M Type 316*, 316L (Hardsurfaced with Stellite No. 6), or ASTM 479/479M Type 316***, 316L** (Hard surfaced with Stellite No. 6)"	Technical change adds Type 316 material. The mechanical properties of 316 are superior to the L grade already referenced and the carbon content of the 316 is controlled to a maximum of 0.020% by the note (*). Non-technical change to provide complete references to the material specifications rather than call out only the Type designation (316/316L).
Hollow Piston: Piston Tube	Change from "XM-19" to "ASME SA-312/312M Grade TPXM-19 or ASTM A 312/312M Grade TPXM19"	Non-technical change to provide complete references to the material specifications rather than call out only the Grade (XM-19) designation.
Hollow Piston: Piston Head	Change component description from "Piston Head" to "Drive Piston" and change "316L (Hardsurfaced with Stellite No. 3)" to "ASME SA-479/479M Type 316*, 316L (Hardsurfaced with Stellite No. 6), or ASTM 479/479M Type 316***, 316L** (Hard surfaced with Stellite No. 6)"	Non-technical change to correct the component description. Technical change adds Type 316 material. The mechanical properties of 316 are superior to the L grade already referenced and the carbon content of the 316 is controlled to a maximum of 0.020% by the note (*). Non-technical change to provide complete references to the material specifications rather than call out only the Type designation (316/316L). Technical change from Stellite No. 3 to Stellite No. 6, consistent with the Buffer Mechanism Stop Piston.
Hollow Piston: Latch	Change from "Inconel X 750" to ASME SB-637 Alloy N07750 or ASTM B-637 Alloy N07750** (Alloy X-750)"	Non-technical change to reference a specification for the material rather than call out only the trade name. There is no actual technical change to the specified material (UNS N07750)

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
Hollow Piston: Latch Spring	Specify material AMS 5699 Alloy N07750** (Alloy X-750)	Non-technical change to reference a specification for the material rather than call out only the trade name. There is no actual technical change to the specified material (UNS N07750)
Hollow Piston: Bayonet Coupling	Change from "Inconel X 750" to ASME SB-637 Alloy N07750 or ASTM B-637 Alloy N07750** (Alloy X-750)"	Non-technical change to reference a specification for the material rather than call out only the trade name. There is no actual technical change to the specified material (UNS N07750)
Guide Tube: Guide Tube	Change from "316L" to "ASME SA-312/312M Grade TP316*, TP316L or ASTM A 312/312M Grade TP316**, TP316L**"	Technical change adds Type 316 material. The mechanical properties of 316 are superior to the L grade already referenced and the carbon content of the 316 is controlled to a maximum of 0.020% by the note (*). Non-technical change to provide complete references to the material specifications rather than call out only the Type designation (316L).
Outer Tube Assembly: Outer Tube	Change from "XM-19" to ASME SA-312/312M Grade TPXM-19 or ASTM A312/312M, Grade TPXM-19**"	Non-technical change to provide complete references to the material specifications rather than call out only the Grade (XM-19) designation.
Outer Tube Assembly: Middle Flange	Change from "ASME SA-182 Grade F304LC" to ASME SA-182/182M Grade F304L, F304*, F316L, F316* or ASME SA-336/336M Grade F304L, F304*, F316L, F316*."	Technical change adds F304 and F316 for both SA-182 and SA-336. F304 and F316 have the same mechanical properties for both specifications and the mechanical properties are superior to the F304L grade already referenced in the DCD. The carbon content of the F304 and F316 is controlled to a maximum 0.020% by the note (*). Change also adds F316L for SA-182, which has the same mechanical properties as the currently referenced F304L. The editorial change to the specification designation (to SA-182/182M) is made to correctly identify the title of the specification.

<b>Section 4.5.1</b>		
<b>Component</b>	<b>Description of Change</b>	<b>Evaluation</b>
Miscellaneous Parts: Ball for Check Valve	Change "Haynes Stellite No. 3" to "Stellite No. 3, or equivalent cobalt base alloy."	Non-technical change to delete a specific manufacturer's name (Haynes). Technical change to allow equivalent cobalt based alloys. Requiring that the other alloys be equivalent ensures that the alloy selected has sufficient wear resistance.
Miscellaneous Parts: O-Ring Seal (Between CRD Housing and CRD)	Change "321 SS" to "Type 321 Stainless steel coated with a qualified material"	Editorial change to delete acronym (SS) and replace it with a more complete identification.
Miscellaneous Parts: CRD Installation Bolts	Change "ASME SA193 Grade B7" to "ASME SA-193/193M Grade B7"	The editorial change to the specification designation (to SA-193/193M) is made to correctly identify the title of the specification.
Notes	Change from "The base material shall be qualified to assure that it is free from sensitization." to " <b>**</b> The material shall be qualified to ensure that it is free from sensitization. Carbon content specified to be 0.020% maximum."	Technical change explains the basis for qualification to ensure resistance to sensitization.
Notes	Note added as follows: " <b>***</b> Equivalent materials have been provided. Materials with similar chemical composition, mechanical properties, and operating experience are considered equivalent."	Note intended to provide for additional choices for allowable materials.

Changes to Part 2, Tier 2, Section 4.5.2

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Core Support Structure: Shroud Support Plate	Change from "Nickel-Chrome-Iron-Alloy, ASME SB166 or SB168" to "Niobium modified Nickel-Chromium-Iron Alloy 600 per ASME Code Case N-580-2"	Code Case N-580-2 allows the use of UNS N06600 (Alloy 600) material stabilized with niobium. Referencing this Code Case eliminates the need for the note. The notes were used because even the first revision of this Code Case was developed to support the ABWR and was not approved when the DCD was issued.
Core Support Structure: Shroud, Core Plate, and Grid	Change from "ASME SA240, SA182, SA479, SA312, SA249, or SA213 (all Type 304L or 316L)" to "ASME SA-240/240M Type 316L or Type 316* and SA-479/479M Type XM-19, SA-479/479M Type 316L, ASME SA-182/182M Grade F316L"	Technical change deletes Type 304L and references to SA-312, SA-249, and SA-213 and adds Type 316 for SA-240/240M and SA-479/479M XM-19. Both 316 and XM-19 have mechanical properties superior to the 316L grade already referenced and retained in the DCD. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*). The editorial change to the specification designations (to SA-240/240M and SA-182/182M) is made to correctly identify the title of the specification and the editorial change also includes the correct designation for 316L: Grade F316L for SA-182/182M and SA-479/479M and Type 316 for SA-240/240M.
Core Support Structure: Peripheral Fuel Supports	Change from "ASME SA312 Grade Type-304L or 316L" to "SA-479/479M 316* or Type 316L"	Technical change deletes Type 304L and references to SA-312 and adds Type 316 and 316L for SA-479/479M. The mechanical properties of Type 316L are the same for SA-312 and SA-479 and the mechanical properties of Type 316 are superior to the 316L grade. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*). An editorial change to the specification designation (to SA-479/479M) is made to correctly identify the specification.

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Core Support Structure: Core Plate and Top Guide Studs, Nuts, and Sleeves	Change material from "ASME SA-479 (Type 304, 316, or XM-19) (all parts); or SA-193 Grade B8 Type 304 (studs); or SA-194 Grade 8 (Type 304) (nuts); or SA-479 (Type 304L or 316L), SA-182 (Grade F304L or F316L), SA-213 (Type 304L, 316 or 316L), SA-249 (Type 304L, 316, or 316L) (sleeves)" to "SA-479/479M Type 316* or Type 316L and XM-19"	Technical change deletes Type 304L and references to SA-312, SA-193, SA-194, SA-182, SA-213, and SA-249. Technical change adds Type 316 and XM-19 for SA-479/479M. Both 316 and XM-19 have mechanical properties superior to the 316L grade already referenced and retained in the DCD. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*). An editorial change to the specification designation (to SA-479/479M) is made to correctly identify the specification.
Core Support Structure: Control Rod Drive Housing	Change material designation from "ASME SA-312 Grade TP304L or 316L SA-182 Grade F304L or F316L, and ASME SA-351 Type CF3 (Type 304L) or Type CF3M (Type 316L)" to ASME SA-336/336M Grade F316* or SAME SA312/312M TP316"	Technical change deletes Type 304L, Type 316L, CF3, and CF3M and adds Grade F316 (for SA-336/336M) and TP316 (for SA-312/312M). References to SA-351 (cast material) are deleted. The technical change replaces the low carbon grades with standard 316 which has superior mechanical properties. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*).
Core Support Structure: Guide Tube	Change "ASME SA-351 Type CF3 or CF3M, or SA-358, SA-312, or SA-249 (Type 304L or 316L)" to "SA-312/312M Grade TP316* or Type 316L (Body), SA-479/479M Type XM-19 (Base), SA-312/312M Grade TPXM-19 (Sleeve)"	Technical change deletes SA-351 Type CF3 and CF3M, and Type 304L and 316L of SA-312, SA-249, and SA-358. The replacement materials 316 and XM-19 have mechanical properties superior to the low carbon grades previously specified. The carbon content of the 316 is controlled to a maximum 0.020% by the note (*).

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Core Support Structure: Orificed Fuel Support	Change from "ASME SA-351 Type CF3 (Type 304L) or CF3M (Type 316L)" to "ASME SA-351/351M Grade CF3"	Technical change deletes the CF3M material. Use of the CF3M in the original DCD was optional and the CF3 material which is retained has the same mechanical properties as CF3M. Non-technical change to correct the title of the referenced material specification, eliminate the parenthetical references to wrought equivalents and add the word "grade."
Shroud Head and Separator Assembly and Steam Dryer Assembly	Introductory paragraph is changed from "All materials are 304L or 316L stainless steel" to "All materials are 316L stainless steel except castings, Steam Dryer Vanes, and Steam Dryer Seismic Blocks"	Technical change to eliminate the statement that 304 is optional for all material. The mechanical properties of the 316L material retained in the DCD are equivalent to the 304L. Non-technical change clarifies that castings, Steam Dryer Vanes, and Steam Dryer Seismic Blocks may not be 316L.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Plate, Sheet	Editorial change to move "and strip" from the material description to the component description and change the material designation from "ASTM A240 Type 304L or 316L and Strip" to "ASTM A240/240M 316L"	Technical change to delete the optional use of 304L material. The mechanical properties of the 316L material retained in the DCD are equivalent to the 304L. Editorial change to correct the title of the referenced specification.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Forgings	Change material specification designation from "ASTM A182 Grade F or A336 Grade F316L or ASME SA-182/182M Grade F316L or SA-336/336M Grade F316L"	Non-technical change to materials to reference the ASME version of the currently referenced ASTM specification (SA-564/564M). Editorial correction to the title of the currently referenced ASTM specification.

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Shroud Head and Separator Assembly and Steam Dryer Assembly: Bars	Change material specification designation from "ASTM A276 Type 316L or 304L" to "ASTM A479 Type 316L or ASME SA-479/479M Type 316L"	Technical change to delete the optional use of 304L material. The mechanical properties of the 316L material retained in the DCD are equivalent to the 304L. The materials specification reference is changed to A-479 and the ASME equivalent but the mechanical properties of the referenced 316L are unchanged.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Pipe	Change material specification designation from "ASTM A312 Grade TP-304L or 316L" to "ASTM A312 Grade TP 316L or ASME SA-312/312M Grade TP 316L"	Technical change to delete the optional use of 304L material. The mechanical properties of the 316L material retained in the DCD are equivalent to the 304L. Non-technical change adds the ASME equivalent materials specification.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Tube	Change material specification designation from "ASTM A269 Grade TP-304L or 316L" to add "ASTM A269 Grade TP-316L or ASME SA-312/312M Grade TP 316L or ASME SA-403/403M Grade TP 316L"	Technical change to delete the optional use of 304L material. The mechanical properties of the 316L material retained in the DCD are equivalent to the 304L. Additional ASME material specifications are added but the mechanical properties of the referenced 316L material are the same in all the referenced specifications.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Castings	Change material specification designation from "ASTM A351 Grade CF8, CF8M" to "ASTM A351 Grade CF3 or ASME SA-351/351M Grade CF3."	Technical change from the standard grade CF8 to the low carbon grade CF3. The CF3 mechanical properties are consistent with the mechanical properties of the wrought grades used for all the dryer materials except the seismic blocks. Non-technical change references the equivalent ASME materials specification.
Shroud Head and Separator Assembly and Steam Dryer Assembly: Steam Dryer Seismic Blocks	Add Steam Dryer Seismic Blocks and material specification designation "ASTM A240 Type XM-19 or ASME SA-240/240M Type XM-19"	Change identifies a part (Steam Dryer Seismic Blocks) that was previously not listed in this section of the DCD. The mechanical properties of the specified material, XM-19, exceed the mechanical properties in material specifications listed for other dryer components.

<b>Section 4.5.2.1</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Shroud Head and Separator Assembly and Steam Dryer Assembly: Steam Dryer Vanes	Add Steam Dryer Vanes and material specification designation: "ASTM A240 Type 304L or 316L or ASME SA-240/240M Type 304L or 316L"	Change identifies a part (Steam Dryer Vanes) that was previously not listed in this section of the DCD. The mechanical properties of the specified materials, 304L and 316L, are equivalent to the mechanical properties in material specifications listed for other dryer components.

<b>Section 4.5.2.2</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Fabrication of vessel internal components other than the core support structure.	Clarification added that industry standards, e.g., ASME and AWS, as applicable, will be used in fabrication of vessel internal components other than the core support structure.	This change represents clarification describing the practices applied during past ABWR construction projects.
Welding of core support structures.	Adds clarification that ASME Section IX welding qualification requirements are applied to the core support structures and that welding heat input control is applied.	This change represents clarification describing the practices applied during past ABWR construction projects

<b>Section 4.5.2.3</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
NDE of control rod drive housings	Revised to state that NDE of the Control Rod Drive Housings (CRDHs) satisfies the requirements for ASME Section III Class I (Subsection NB) as well as the current DCD requirement of Class CS (Subsection NG), since the CRDHs also serve as pressure boundary outside the reactor vessel	Adds clarification only

<b>Section 4.5.2.4</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Weld material	Change in delta ferrite content for weld material from "5.0 Ferrite Number (FN)" to "a minimum average Ferrite Number (FN) of 8 FN, with no individual reading less than 5 FN"	The change to the delta ferrite requirements for weld metal is consistent with industry practice and exceeds the RG 1.31 requirement by imposing the additional requirement that the average delta ferrite reading be a minimum of 8 FN.
Delta ferrite in castings	Change delta ferrite limit in austenitic stainless steel castings from "8FN (ferrite number) minimum and a maximum value of 20FN" to "8% minimum and a maximum value of 20%".	Limitations are added for the delta ferrite content in castings to address thermal aging concerns for components designed for 60 years of service.
Regulatory Guide 1.44 compliance discussion.	Revised discussion on sensitization of stainless steel.	The change to the discussion of sensitization clarifies that the primary means of addressing the intent of RG 1.44 is to require the use of low carbon (<0.020%) for all 300 series stainless exposed to the high temperature reactor water environment, where industry experience has identified that sensitization may render the material subject to intergranular stress corrosion cracking. Also, the change specifies that solution annealing of 300 series stainless steel is verified by specific controls, i.e., requiring a standard practice (ASTM A262) for verifying that the material has been properly solution annealed. For welded stainless steel, the section is changed to identify specific controls by requiring the use of ASME Section IX for welding qualifications and that filler materials be in accordance with ASME Section II Part C.

<b>Section 4.5.2.5</b>		
<b>Item</b>	<b>Description of Change</b>	<b>Evaluation</b>
Item (1)	Deleted SA-479	The reference to specification SA-479 for XM-19 stainless steel material is deleted because other specifications are now referenced for this material by the departures.
Item (2)	Changed material specification from "SB166, 167, and 168, Nickel Chrome Iron (Alloy 600)" to "Niobium modified Alloy 600 per ASME Code Case No. N-580-2"	Code Case N-580-2 is referenced for niobium-stabilized Alloy 600. This Code Case was not available when the original DCD was issued so the requirements for the stabilized grade were handled in footnotes. This Code Case is now used for ordering the stabilized material and reference to the Code Case eliminates the need for additional footnotes.
Item (3)	Changed material specification from "SA637 Grade 688 Alloy X-750" to "ASTM B 637 or ASME SB-637, AMS 5542, AMS 5699 UNS N07750 (Alloy X-750) or equivalent"	The references for Alloy X-750 are corrected (from SA-637 to SB-637) and updated (to reference the UNS number N07750).
Solution annealing of Alloy 600.	Revises description of solution annealing of Alloy 600.	The section is changed to add clarification that NB-modified Alloy 600 is used in the solution annealed condition.
Annealing condition for Alloy X-750.	The section is changed to identify that X-750 will be used in the 1093°C annealed and single aged condition for maximum stress corrosion cracking resistance.	The section is changed to identify that X-750 will be used in the 1093°C annealed and single aged condition for maximum stress corrosion cracking resistance. The option for using the material in the equalized and aged condition, where industry experience has shown the material to be more susceptible to stress corrosion cracking under significant stress in the reactor water environment is deleted.
Plating of austenitic stainless steel.	Removes reference to Stellite 6 (or its equivalent) for HPCF couplings and replaces with a hard chromium plating surface.	It is advantageous from an ALARA standpoint to use alternatives to Stellite when practical.

Section 4.5.2.5		
Item	Description of Change	Evaluation
Use of XM-19	Revised to include SA479 Grade XM-19 as being successfully used in BWR applications. The experience base is also updated.	The section is modified to identify XM-19 as a suitable material for use in the ABWR reactor environment based on laboratory testing.

Changes to Part 2, Tier 2, Section 5.2.3

Section 5.2.3		
Item	Description of Change	Evaluation
Section 5.2.3.2.3 Items (1) and (2)	Material list updated.	These items are updated to reflect the types of solution-annealed austenitic stainless steels as well as the Alloy 600 description as reflected in STD DEP 4.5-1.

**Evaluation Summary**

This departure has been evaluated pursuant to the requirements in 10 CFR 52, Appendix A, Section VIII.B.5. There is no impact on any DCD Tier 1 or Tier 2\* DCD, Technical Specifications, Basis for Technical Specifications or operational requirements as a result of these changes.

The changes associated with this departure are primarily equivalent material substitutions, changes in material form, editorial clarifications and format changes. Since the proposed material or editorial changes are equivalent to the original DCD design, there is no effect on any accident previously evaluated in the plant specific DCD. Furthermore, it doesn't change any plant physical features, SSCs important to safety, or fission product barriers. Any previously evaluated accident is not affected, and the possibility for an accident of a different type is not created. Also, it does not affect any method used for evaluation in establishing the design bases or in the safety analyses. This departure does not have an adverse impact on any feature for mitigation of an ex-vessel severe accident. For the same reason, and because there is no effect on any event, operation operational requirement or SSC function, the change does not create a different ex-vessel accident scenario.

Therefore, the change has no adverse impact and does not require prior NRC approval.