

ArevaEPRDCPEm Resource

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Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 272, FSAR Ch. 10, Supplement 4
Attachments: RAI 272 Supplement 5 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a draft response for RAI 272 Supplement 5. Earlier today, AREVA submitted supplement 4 that provided a date for the final response as July 8, 2010. These questions have been previously discussed with the staff. Let us know if you have any further questions or we can submit as final.

Thanks,

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Mail Envelope Properties (BC417D9255991046A37DD56CF597DB71067ECAA9)

Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 272,
FSAR Ch. 10, Supplement 4
Sent Date: 6/11/2010 2:19:59 PM
Received Date: 6/11/2010 2:20:03 PM
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Files	Size	Date & Time
MESSAGE	532	6/11/2010 2:20:03 PM
RAI 272 Supplement 5 Response US EPR DC - DRAFT.pdf		443426

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Response to
Request for Additional Information No. 272, Supplement 5

8/21/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 10.03.06 - Steam and Feedwater System Materials
Application Section: 10.3.6

QUESTIONS for Component Integrity, Performance, and Testing Branch 1
(AP1000/EPR Projects) (CIB1)

DRAFT

Question 10.03.06-11:

POTENTIAL OPEN ITEM

In RAI 10.03.06-7, the staff requested that the applicant modify Table 10.3-11 to include weld filler material specifications and classifications used in ASME Code Class 2 and 3 steam and feedwater systems. The applicant's response to RAI 10.03.06-7, dated February 27, 2009, lists weld filler material specifications but does not list classifications. The staff requests that the applicant modify the FSAR to include weld filler material classifications as requested by the staff.

Response to Question 10.03.06-11:

U.S. EPR FSAR Tier 2, Table 10.3-11—Main Steam Supply System and Main Feedwater System will be revised to include weld filler material classifications.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 10.3-11 will be revised as described in the response and indicated on the enclosed markup.

Question 10.03.06-12:**POTENTIAL OPEN ITEM**

In the applicant's February 27, 2009 response to RAI 10.03.06-10, the applicant stated that it would modify the FSAR to state that the minimum design wall thickness will be determined in the design phase in order to allow for a minimum lifetime of the affected piping system of at least 40-years. The 40-year design life of the MSSS and main feedwater system appears to be inconsistent with the design life of the plant which is 60-years. Therefore, FSAR Section 10.3.6 should specify a 60-year design life for the MSSS and main feedwater system piping or clearly state that their design life is only 40 years with an explanation as to why the design life of these systems is not the same as the design life of the plant. The staff requests that the applicant modify the FSAR accordingly.

Response to Question 10.03.06-12:

As stated in U.S. EPR FSAR Tier 2, Section 1.2.1, "the plant design objective is 60 years." The design objective allows a design life of 40 years for components for which a 60 year design life is impractical, provided provisions are made in the plant design to allow replacement of the system or component.

As stated in U.S. EPR FSAR Tier 2, Section 3.9.1.1, "the number of design transients is based on a plant life of 60 years." For the main steam supply system, main feedwater system, and other systems described in U.S. EPR FSAR Tier 2, Section 10.3.6, that are subject to a flow accelerated corrosion (FAC) evaluation, design aspects such as the number of transients and number of stress cycles are based on a plant design life of 60 years. However, for these systems, the current experience with FAC for nuclear power plants supports a design life of 40 years. As stated in the Response to RAI 165, Question 10.03.06-10, the minimum design wall thicknesses will be determined in a design phase evaluation to confirm that the affected piping systems have a minimum lifetime of at least 40 years. Actual service life will be verified by the results of a plant FAC inservice inspection.

Normal wear parts and other consumables that are replaced periodically during preventive maintenance are excluded from the plant design life objective. The excluded parts include, but are not limited to, machinery and access cover studs and bolts, bearings, gaskets, o-rings, packing, seals, wear bushing, filters, paint and coatings, and motor windings.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

U.S. EPR Final Safety Analysis Report Markups

DRAFT

Table 10.3-11—Main Steam Supply System and Main Feedwater System Material Data

Segment	Material Specification		
Main Steam Line	Pipe⁽²⁾	Fittings^{(2) (5)}	Valves⁽³⁾
Steam generator outlet to fixed restraint downstream of MSIV	ASME SA-106 Grade-C	ASME SA-234 Grade-WPG	ASME SA-216 Grade-WGC or SA-105
Fixed restraint to high pressure turbine ^{(1) (3)}	ASTM A-106 Grade-B	ASTM A-234 Grade-WPB	ASTM A-216 Grade-WCB or A-105
Main Feedwater Line			
Feedwater pump outlet to fixed restraint ⁽⁴⁾	ASTM A-106 Grade-B	ASTM A-234 Grade-WPB	ASTM A-216 Grade-WCB or A-105
Fixed restraint to steam generator	ASME SA-106 Grade-B	ASME SA-234 Grade-WPB	ASME SA-216 Grade-WCB or SA-105

10.3.6-11



Table 10.3-11—Main Steam Supply System and Main Feedwater System
Material Data
Sheet 1 of 3

<u>Component</u>	<u>Material</u>
<u>Main Steam Lines – Steam Generator Outlet to Fixed Restraint Downstream of MSIV</u>	(see Note 2)
<u>Piping</u>	<u>SA-106 Grade C</u>
<u>Fittings</u>	<u>SA-234 Grade WPC (see Note 4)</u>
<u>Valves</u>	<u>SA-216 Grade WCC</u>
	<u>SA-105</u>
<u>Weld filler material / specification (see Note 10)</u>	<u>SFA-5.1 E7018</u>
	<u>SFA-5.17 FS7PX-EM12K (see Note 6)</u>
	<u>SFA-5.18 ER70S-6</u>
	<u>SFA-5.20 E71T-1/M</u>
<u>Weld filler material/specification for CS pipe with Cr ≥ 0.10% (see Note 10)</u>	<u>SFA-5.5 E8018-B (see Note 5)</u>
	<u>SFA-5.23 FS7PX-EB1 (see Note 7)</u>
	<u>SFA-5.28 ER80S-B2 (see Note 8)</u>
	<u>SFA-5.29 E81T1-B1/M (see Note 9)</u>
	<u>SFA-5.1 E7018 (see Note 5)</u>
	<u>SFA-5.1 E7018-G (see Note 5)</u>
<u>Main Steam Lines – Fixed Restraint to High Pressure Turbine</u>	(see Notes 1 and 2)
<u>Piping</u>	<u>A-106 Grade B</u>
<u>Fittings</u>	<u>A-234 Grade WPB (see Note 4)</u>
<u>Valves</u>	<u>A-216 Grade WCB (see Note 3)</u>
	<u>A-105</u>
<u>Weld filler material/specification (see Note 10)</u>	<u>SFA-5.1 E7018</u>
	<u>SFA-5.17 FS7PX-EM12K (see Note 6)</u>
	<u>SFA-5.18 ER70S-6</u>
	<u>SFA-5.20 E71T-1/M</u>
<u>Weld filler material/specification for CS pipe with Cr ≥ 0.10% (see Note 10)</u>	<u>SFA-5.5 E8018-B (see Note 5)</u>
	<u>SFA-5.23 FS7PX-EB1 (see Note 7)</u>
	<u>SFA-5.28 ER80S-B2 (see Note 8)</u>
	<u>SFA-5.29 E81T1-B1/M (see Note 9)</u>
	<u>SFA-5.1 E7018 (see Note 5)</u>

Next File

Table 10.3-11—Main Steam Supply System and Main Feedwater System
Material Data
Sheet 2 of 3

	<u>SFA-5.1 E7018-G (see Note 5)</u>
<u>Main Feedwater Lines – Feedwater Pump Outlet to Fixed Restraint</u>	<u>(see Notes 1 and 2)</u>
<u>Piping</u>	<u>A-106 Grade B</u>
<u>Fittings</u>	<u>A-234 Grade WPB (see Note 4)</u>
<u>Valves</u>	<u>A-216 Grade WCB</u>
	<u>A-105</u>
<u>Weld filler material/specification (see Note 10)</u>	<u>SFA-5.1 E7018</u>
	<u>SFA-5.17 FS7PX-EM12K (see Note 6)</u>
	<u>SFA-5.18 ER70S-6</u>
	<u>SFA-5.20 E71T-1/M</u>
<u>Weld filler material/specification for CS pipe with Cr ≥ 0.10% (see Note 10)</u>	<u>SFA-5.5 E8018-B (see Note 5)</u>
	<u>SFA-5.23 FS7PX-EB1 (see Note 7)</u>
	<u>SFA-5.28 ER80S-B2 (see Note 8)</u>
	<u>SFA-5.29 E81T1-B1/M (see Note 9)</u>
	<u>SFA-5.1 E7018 (see Note 5)</u>
	<u>SFA-5.1 E7018-G (see Note 5)</u>
<u>Main Feedwater Lines – Fixed Restraint to Steam Generator</u>	<u>(see Note 2)</u>
<u>Piping</u>	<u>SA-106 Grade B</u>
<u>Fittings</u>	<u>SA-234 Grade WPB (see Note 4)</u>
<u>Valves</u>	<u>SA-216 Grade WCB</u>
	<u>SA-105</u>
<u>Weld filler material/specification (see Note 10)</u>	<u>SFA-5.1 E7018</u>
	<u>SFA-5.17 FS7PX-EM12K (see Note 6)</u>
	<u>SFA-5.18 ER70S-6</u>
	<u>SFA-5.20 E71T-1/M</u>
<u>Weld filler material/specification for CS pipe with Cr ≥ 0.10% (see Note 10)</u>	<u>SFA-5.5 E8018-B (see Note 5)</u>
	<u>SFA-5.23 FS7PX-EB1 (see Note 7)</u>
	<u>SFA-5.28 ER80S-B2 (see Note 8)</u>
	<u>SFA-5.29 E81T1-B1/M (see Note 9)</u>
	<u>SFA-5.1 E7018 (see Note 5)</u>

Table 10.3-11—Main Steam Supply System and Main Feedwater System
Material Data
Sheet 3 of 3

SFA-5.1 E7018-G (see Note 5)

Notes:

1. Outside of the ASME Section III boundary.
2. The minimum chromium (Cr) content of carbon steel (CS) piping, fittings, valves, and weld filler metals in the main steam supply system and main feedwater system shall be 0.10% for resistance to flow accelerated corrosion, unless exempted by the system design engineer. Portions of the main steam supply system and the main feedwater system that are not susceptible to flow accelerated corrosion degradation may be exempted.
3. Does not include the turbine stop and control valves or the turbine bypass valves.

4. ~~The weld filler metal classifications used in the ASME Code Class 2 and 3 portions of the main steam supply system and main feedwater system are given in detailed specifications provided to the Certificate of Authorization Holder performing the welding on behalf of the owner. The Certificate of Authorization Holder is responsible for meeting the requirements of the detailed specifications, and the ASME code for weld filler metals. This includes requirements for strength, toughness, and other mechanical properties, service compatibility with the materials being joined, and other design criteria. The Certificate of Authorization Holder is an organization holding an ASME N certificate, NA certificate, or an NPT certificate to design and/or construct nuclear class 1, 2 or 3 components, install said components, or produce sub-assembly components.~~

~~For carbon steel piping in the ASME Code Class 2 and 3 portions of the main steam supply and main feedwater systems, which is evaluated and found not susceptible to flow accelerated corrosion (FAC), the applicable welding material specifications include: ASME Section II, Part C, SFA 5.17, SFA 5.18 and SFA 5.20. If the welding processes used during fabrication or construction are required to vary from the aforementioned, then the welding materials will be consistent to that of the connecting piping and similar to the aforementioned welding materials.~~

~~For carbon steel piping in the ASME Code Class 2 and 3 portions of the main steam supply and main feedwater systems, which is evaluated and determined to require resistance to FAC, the applicable welding material specifications include: ASME Section II, Part C, SFA 5.18 and SFA 5.20 with a minimum chromium content of 0.10 percent. If the welding processes used during fabrication or construction are required to vary from the aforementioned, then the welding materials will be consistent to that of the connecting piping and similar to the aforementioned welding materials with a minimum chromium content of 0.10 percent.~~

10.3.6-11

- ~~5. Fittings include the pipe fittings furnished in accordance with ASME B16.9, such as tees, reducers, and laterals.~~
4. Fittings include the pipe fittings furnished in accordance with ASME B16.9, such as tees, reducers, and laterals.
5. Permitted classifications are E7018, E7018-G, and E8018-B1. For E7018, purchaser must specify minimum 0.1% Cr min. If E7018-G is used, then purchaser must specify 0.1% Cr min, chemical, and mechanical property requirements for E7018 from ASME Specification SFA 5.1. If E8018-B1 is used, then purchaser must specify mechanical property requirements for E7018 from ASME specification SFA 5.1 in addition to requirements for this classification in SFA 5.5.
6. FS7PX-EM12K may also be procured under Filler Metal Specification SFA-5.23.
7. FS7PX-EG may be specified. If this classification is used, purchaser must specify minimum 0.1%Cr, and weld deposit chemistry and mechanical properties for FS7PX-EM12K from ASME Specification SFA 5.17.
8. ER70S-G may be specified. If this classification is used, purchaser must specify minimum 0.1%Cr and weld deposit chemistry and mechanical properties for ER70S-6 from ASME Specification SFA 5.18.
9. E71T1-G may be specified. If this classification is used, purchaser must specify minimum 0.1%Cr and weld deposit chemistry and mechanical properties for E71T1 in ASME Specification SFA 5.20.
10. Autogeneous welding process such as Friction Welding, Flash-Butt welding, Electron Beam welding, may be used to join all materials listed in this table to themselves and to other materials, provided the welding process is qualified in accordance with the applicable Code.