

## ArevaEPRDCPEm Resource

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**From:** WELLS Russell (AREVA) [Russell.Wells@areva.com]  
**Sent:** Monday, April 18, 2011 10:18 AM  
**To:** Tesfaye, Getachew  
**Cc:** BALLARD Bob (AREVA); BURSTEIN Nissen (AREVA); WILLIAMSON Rick (AREVA); BUDZIK Dennis (AREVA); NOXON David (AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); HALLINGER Pat (EXTERNAL AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLIFORD Dennis (AREVA)  
**Subject:** Draft Response to U.S. EPR Design Certification Application RAI No. 481(5642,5664,5587,5622), FSAR Ch. 3, Question 3.11-39  
**Attachments:** RAI 481 Question 03.11-39 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a draft response for RAI No. 481, Question 3.11-39 as shown below in advance of the May 11, 2011 final date.

Let me know if the staff has questions or if this can be sent as a final response.

*Sincerely,*

*Russ Wells*  
*U.S. EPR Design Certification Licensing Manager*  
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**From:** Tesfaye, Getachew [<mailto:Getachew.Tesfaye@nrc.gov>]  
**Sent:** Monday, April 11, 2011 5:03 PM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** McNally, Richard; Hsu, Kaihwa; Hsia, Anthony; Dixon-Herrity, Jennifer; Strnisha, James; Terao, David; Miernicki, Michael; Clark, Phyllis; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 481(5642,5664,5587,5622), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 4, 2011, and discussed with your staff on April 11, 2011. No changes were made to the draft RAI as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,  
Getachew Tesfaye  
Sr. Project Manager  
NRO/DNRL/NARP  
(301) 415-3361



**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 2853

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**Subject:** Draft Response to U.S. EPR Design Certification Application RAI No. 481(5642,5664,5587,5622), FSAR Ch. 3, Question 3.11-39  
**Sent Date:** 4/18/2011 10:18:03 AM  
**Received Date:** 4/18/2011 10:18:21 AM  
**From:** WELLS Russell (AREVA)

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| RAI 481 Question 03.11-39 Response US EPR DC - DRAFT.pdf |             |                        | 324730 |

**Options**

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**Return Notification:** No  
**Reply Requested:** No  
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**Response to**

**Request for Additional Information No. 481(5642, 5664, 5587, 5622), Revision 0,  
Question 03.11-39**

**4/11/2011**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 03.02.01 - Seismic Classification**

**SRP Section: 03.02.02 - System Quality Group Classification**

**SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical  
Equipment**

**SRP Section: 03.12 - ASME Code Class 1, 2, and 3 Piping Systems and Piping  
Components and Their Associated Supports**

**Application Section: FSAR Ch 3**

**QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects)  
(EMB2)**

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

**QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)**

**Question 03.11-39:**

Section 3.11.2.2 of the U.S. EPR FSAR states, “For mechanical equipment located in a mild environment, acceptable environmental design is demonstrated by the design and purchase specifications for the equipment. The specifications contain a description of the functional requirements for a specific environmental zone during normal environmental conditions and anticipated operational occurrences. The maintenance and surveillance programs provide assurance that the qualified status of the equipment is maintained, by performing required activities upon which the qualification is based, including those activities necessary to extend the qualified life period to the plant life period, which could involve replacement.”

The following paragraph in Section 3.11.2.2 of the U.S. EPR FSAR states, “The operational program that supports implementation of the Maintenance Rule (10 CFR 50.65) and RG 1.160 monitors the effectiveness of maintenance at the plant, and therefore provides assurance that the material degradation related to environmental considerations established during design are maintained on a continuing basis. Equipment is monitored, and equipment that does not meet performance criteria is evaluated, corrective actions identified, and identified for continued monitoring. As noted in Section 17.6, a COL applicant that references the U.S. EPR design certification is responsible for implementing the Maintenance Rule program.”

NRC staff does not consider the Maintenance Rule (10 CFR 50.65) and RG 1.160 to provide sufficient detail to maintain the EQ status of safety-related mechanical and electrical equipment. In order to maintain the EQ status of safety-related equipment during the operational life of the plant, maintenance and surveillance programs are to contain attributes as described in FSAR Section 3.11.2.2.6, "Maintaining Mechanical Equipment Qualification." The NRC staff requests the applicant to revise sections of the FSAR to describe that maintenance and surveillance programs as described in Section 3.11.2.2.6 provide assurance that the EQ status of safety-related equipment located in both mild and harsh environments is adequately maintained.

NRC staff request the applicant to revise the first paragraph to state, “The maintenance and surveillance programs as described in Section 3.11.2.2.6 provide assurance that the qualified status of the mechanical and electrical equipment is maintained, by performing required activities upon which the qualification is based, including those activities necessary to extend the qualified life period to the plant life period, which could involve replacement.”

NRC staff also requests the applicant to revise the second paragraph to state, “The operational program that supports implementation of the Maintenance Rule (10 CFR 50.65) and RG 1.160 monitors the effectiveness of maintenance at the plant and maintenance and surveillance programs as described in Section 3.11.2.2.6 provide assurance that the material degradation related to environmental considerations established during design are maintained on a continuing basis.”

**Response to Question 03.11-39:**

U.S. EPR FSAR Tier 2, Section 3.11.2.2 will be revised as requested in this question. In addition, U.S. EPR FSAR Tier 2, Section 3.11.2.2 will be revised to clarify that maintenance and surveillance programs described in U.S. EPR FSAR Tier 2, Section 3.11.2.2.6 provide reasonable assurance that the safety-related function of the equipment (rather than material degradation), related to environmental considerations established during design, is maintained on a continuing basis.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Section 3.11.2.2 will be revised as described in the response and indicated on the enclosed markup.

DRAFT

# U.S. EPR Final Safety Analysis Report Markups

DRAFT

- Measures are established for the selection and review of the suitability of application of materials, parts, and equipment that are essential to safety-related functions.
- Design control measures are established for verifying the adequacy of design.
- Equipment qualification records are maintained and include the results of tests and materials analyses.

Mechanical components are qualified to perform their required functions under the appropriate environmental effects of normal, abnormal, accident, and post-accident conditions as required by GDC 4 and discussed in Appendix 3D. For mild environments, the area conditions do not change as a result of an accident. ~~There are no degrading environmental effects that lead to common mode failure of equipment in mild environments.~~ Equipment qualification is verification of equipment design by demonstrating functional capability under significant operational and environmental stresses, including those resulting from design basis accidents (DBAs). ~~For mechanical equipment, important service conditions (temperature, pressure, and chemical exposure) do not significantly change as a result of an accident because mechanical components are routinely exposed to the RCS fluid. However, degradation of mechanical equipment due to thermal and radiation aging is typically more severe than the possible degradation due to other environments.~~ Since most mechanical equipment interfaces with process fluid, the effect of the fluid on the environmental conditions is considered for the design and qualification of mechanical equipment.

~~For mechanical equipment, temperature and pressure during abnormal events and DBA do not significantly increase stressors because mechanical components are routinely exposed to RCS fluid.~~ Normal operation and periodic testing, in conjunction with specified maintenance and surveillance activities, ~~demonstrate~~ provide reasonable assurance that each installed item is functional and can also operate during a DBA.

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For mechanical equipment located in a mild environment, acceptable environmental design is demonstrated by the design and purchase specifications for the equipment.

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The specifications contain a description of the functional requirements for a specific environmental zone during normal environmental conditions and anticipated operational occurrences. The maintenance and surveillance programs ~~as described in~~ Section 3.11.2.2.6 demonstrate provide reasonable assurance that the qualified status of the mechanical and electrical equipment is maintained, by performing required activities upon which the qualification is based, including those activities necessary to extend the qualified life period to the plant life period, which could involve replacement.

03.11-39

03.11-39

The operational program that supports implementation of the Maintenance Rule (10 CFR 50.65) and RG 1.160 monitors the effectiveness of maintenance at the plant. Maintenance and surveillance programs, as described in Section 3.11.2.2.6, provide



03.11-39

reasonable assurance that the safety function of the equipment, related to environmental considerations established during design, is maintained on a continuing basis. ~~and therefore provides assurance that the material degradation related to environmental considerations established during design are maintained on a continuing basis.~~ Equipment is monitored, and equipment that does not meet

performance criteria is evaluated, corrective actions identified, and identified for continued monitoring. As noted in Section 17.6, a COL applicant that references the U.S. EPR design certification is responsible for implementing the Maintenance Rule program.

Mechanical equipment located in harsh environmental zones is designed to perform under the appropriate environmental conditions. Consistent with the guidance of RG 1.206, Section C.I.3.11.6, for mechanical equipment, the primary focus is on materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, and diaphragms), needed for safety-related functions and for verifying that the design of such materials, parts, and equipment is adequate. This process involves:

- Identifying safety-related mechanical equipment located in harsh environment areas.
- Identifying nonmetallic subcomponents of this equipment.
- Identifying the environmental conditions and process parameters for which this equipment must be qualified.
- Identifying nonmetallic material capabilities.
- Evaluating environmental effects on the nonmetallic components of the equipment.

Mechanical components are designed to be compatible with postulated environmental conditions, including those associated with loss-of-coolant accidents (LOCAs). The environmental qualification of equipment located in harsh environment shall be demonstrated by appropriate testing and analyses using applicable service conditions as required by GDC 4 and discussed in Appendix 3D.

The potential impact of adverse environmental conditions is considered in the functional design and qualification of pumps, valves and dynamic restraints (see Section 3.9.6). For example, electric motors might produce less torque under high temperature conditions than under ambient conditions, which could impact their capability to operate their individual pumps or valves.

Qualification of mechanical equipment is also performed in accordance with ASME QME-1-2007, Appendix QR-B, as described in Section 3.10.2.