ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Wednesday, September 16, 2009 11:09 AM
To: Tesfaye, Getachew
Cc: WELLS Russell D (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No.96, FSAR Ch. 3, Supplement 2
Attachments: RAI 96 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to all 4 questions of RAI No. 96 on November 14, 2008. Supplement 1 to RAI 96 was submitted to NRC on May 6, 2009 to modify the response to RAI 96, Question 03.11-1.

Based on discussions between AREVA NP and NRC, the attached file, "RAI 96 Supplement 2 Response US EPR DC.pdf" supersedes AREVA NP's previous response to Question 03.11-4 regarding the environmental qualification of mechanical equipment.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 96, Question 03.11-4.

The following table indicates the respective page in the response document, "RAI 96 Supplement 2 Response US EPR DC.pdf" that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 96 — 03.11-4	2	2

This concludes the formal AREVA NP response to RAI 96, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Wednesday, May 06, 2009 5:01 PM
To: 'Getachew Tesfaye'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WELLS Russell D (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No.96, FSAR Ch. 3, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to all 4 questions of RAI No. 96 on November 14, 2008. In an e-mail dated November 14, 2008, NRC requested that AREVA NP modify the response to RAI 96, Question 03.11-1 and the U.S. EPR FSAR "to reflect the change from IEEE Std 323-2003 to IEEE Std 323-1974." Based on a conference call between AREVA NP and the NRC on February 6, 2009, AREVA NP is providing a revised response to Question 03.11-1 to change IEEE Std 323-2003 to IEEE Std 323-1974 with the exception where IEEE Std 323-2003 is referenced for safety-related computer-based instrumentation and controls (I&C) systems located in a mild environment as addressed in RG 1.209. This revised response is provided in the attached file, "RAI 96 Supplement 1 Response US EPR DC.pdf."

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 96 Question 03.11-1.

The following table indicates the respective page in the response document, "RAI 96 Supplement 1 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 96 — 03.11-1	2	2

This concludes the formal AREVA NP response to RAI 96, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, November 14, 2008 5:59 PM
To: Pederson Ronda M (AREVA NP INC)
Cc: John Rycyna; Michael Miernicki; Joseph Colaccino
Subject: FW: Response to U.S. EPR Design Certification Application RAI No.96(991,1025,,1209), FSAR Ch. 3

Ronda,
Staff feedback on your RAI response. If you need to setup a phone call to discuss this further, John will help you next week.
Getachew

From: Paul Shemanski
Sent: Friday, November 14, 2008 5:55 PM
To: Getachew Tesfaye

Cc: Ronaldo Jenkins; Robert Buhowski; Amar Pal; Peter Kang
Subject: RE: Response to U.S. EPR Design Certification Application RAI No. 96(991,1025,,1209), FSAR Ch. 3

Getachew,

I reviewed the response from AREVA on RAI-SRP 3.11-EEB-01 and find it unacceptable. I explained to AREVA during our telecon that NRC has not endorsed IEEE Std 323-2003 and IEEE Std 323-1974 is the record of standard to be used for compliance with 10 CFR 50.49 based on my discussions with OGC. As such, this will be treated as an open item until the U.S. EPR FSAR is modified to reflect the change from IEEE Std 323-2003 to IEEE Std 323-1974. Unless AREVA modifies the FSAR to use IEEE 323-1974, EEB cannot make the finding that their EQ program is is compliance with 10 CFR 50.49.

Paul,

From: Getachew Tesfaye
Sent: Friday, November 14, 2008 5:05 PM
To: Paul Shemanski; Ronaldo Jenkins; Sara Bernal; Jean-Claude Dehmel; James Strnisha; David Terao; Michael Miernicki; Joseph Colaccino; John Rycyna; Tarun Roy
Subject: FW: Response to U.S. EPR Design Certification Application RAI No. 96(991,1025,,1209), FSAR Ch. 3

From: Pederson Ronda M (AREVA NP INC) [mailto:Ronda.Pederson@areva.com]
Sent: Friday, November 14, 2008 5:04 PM
To: Getachew Tesfaye
Cc: WELLS Russell D (AREVA NP INC); OWEN Dennis E (EXT); SLIVA Dana (EXT); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 96(991,1025,,1209), FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 96 Response US EPR DC.pdf" provides technically correct and complete responses to all 4 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 96 Question 03.11-2.

The following table indicates the respective pages in the response document, "RAI 96 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 96 — 03.11-1	2	3
RAI 96 — 03.11-2	4	5
RAI 96 — 03.11-3	6	7
RAI 96 — 03.11-4	8	10

This concludes the formal AREVA NP response to RAI 96, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification

New Plants Deployment
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, October 17, 2008 11:10 AM
To: ZZ-DL-A-USEPR-DL
Cc: Paul Shemanski; Ronaldo Jenkins; Sara Bernal; Jean-Claude Dehmel; James Strnisha; David Terao; Michael Miernicki; Joseph Colaccino; John Rycyna; Tarun Roy
Subject: U.S. EPR Design Certification Application RAI No. 96(991,1025,,1209), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 6, 2008, and discussed with your staff on October 15, 2008. Draft RAI Question 03.11-2(i) was modified and Draft RAI Question 03.11-3(ii) was deleted 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: 814

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D31013BFFBC)

Subject: Response to U.S. EPR Design Certification Application RAI No.96, FSAR Ch. 3, Supplement 2
Sent Date: 9/16/2009 11:09:03 AM
Received Date: 9/16/2009 11:09:08 AM
From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:
"WELLS Russell D (AREVA NP INC)" <Russell.Wells@areva.com>
Tracking Status: None
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	8071	9/16/2009 11:09:08 AM
RAI 96 Supplement 2 Response US EPR DC.pdf	138612	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 96 (991, 1025, 1209,), Supplement 2, Revision 0

10/17/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment

Application Section: FSAR Ch. 3

QUESTIONS for EEB, CHPB, and CIB1 Branches

Question 03.11-4:

In Tier 2, Section 3.11.2.2 of the U.S. EPR FSAR titled, "Environmental Qualification of Mechanical Equipment," the applicant states that the U.S. EPR's approach to environmental qualification (EQ) of mechanical equipment is based on methods developed and accepted for the South Texas Project 1 and 2 (STP) in References 24, 25, 26, and 27 of the EPR Tier 2 FSAR Section 3.11. The program the applicant is proposing for EPR might not be appropriate for use as an initial mechanical EQ program under a design certification. The STP approach was based on a 50.59 evaluation ensuring that existing mechanical EQ methods were maintained using operational programs such as maintenance, surveillance, and procurement programs that were redundant with the mechanical EQ program. Provide an explanation of how it can be determined at this time that the maintenance, surveillance, and procurement programs for future plants referencing the EPR standard design provide an equivalency to a mechanical EQ program when those operational programs are outside the scope of design certification and are not yet developed.

Response to Question 03.11-4:

U.S. EPR FSAR Tier 2, Section 3.11.2.2 will be revised to delete the references to the South Texas Project 1 and 2 methodology listed in U.S EPR FSAR Tier 2, Section 3.11.7, References 24, 25, 26, and 27. U.S. EPR FSAR Tier 2, Section 3.11.2.2 will be revised to describe the environmental qualification (EQ) of mechanical equipment in accordance with GDC 4 and the guidance of RG 1.206 as part of the procurement process. Based on discussions with the NRC on July 30, 2009, U.S. EPR FSAR Tier 2, Section 3.11.2.2 and Appendix 3D will be revised to delete the term "form, fit, and function" and replace it with a reference to the material evaluations described in U.S. EPR FSAR Tier 2, Section 3.11.2.2.5.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.11.2.2 and Appendix 3D will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

"For plants using Revision 4 of Regulatory Guide 1.97, accident monitoring equipment identified as Type A, B, or C in accordance with that guide should be environmentally qualified as required by 10 CFR 50.49. Type D variables should be environmentally qualified for the particular accident's postulated environment at the installed location in accordance with the plant's licensing basis. Licensees converting to Revision 4 or performing modifications based on Revision 4 may reference previously accepted alternatives as their basis for deviations from the environmental qualification criteria in Revision 4."

Table 3.11-1 and Table 3.10-1 provide a more extensive list of PAM equipment than the minimum PAM list provided in Section 7.5. This is as a result of the EQ and Seismic qualification systems screening process that identified additional components, as potentially supporting PAM instrumentation. These lists will be reconciled when the complete PAM list is developed, as explained in Section 7.5, and subsequently incorporated into the COL applicant's or holder's FSAR.

The acceptability of safety-related and important to safety electrical equipment located in a mild environment and not subject to 10 CFR 50.49 or EMC is demonstrated and maintained by use of the following types of programs:

- A periodic maintenance, inspection or replacement program based on sound engineering practice and recommendation of the equipment manufacturer, which is updated as required by the results of an equipment surveillance program.
- A periodic testing program used to verify operability of safety-related equipment within its performance specification requirements. System level testing of the type typically required by the plant technical specifications may be used.
- An equipment surveillance program that includes periodic inspections, analysis of equipment and component failures, and a review of the results of the preventive maintenance and periodic testing program.

3.11.2.2 Environmental Qualification of Mechanical Equipment

This section demonstrates that the U.S. EPR approach to qualification of mechanical equipment is in accordance with the Standard Review Plan (SRP) 3.11 and GDC 4.

03.11-4

As noted in NUREG-1793, Section 3.11.3.2.2, although no detailed requirements exist for mechanical equipment, GDC 1 and 4 and Appendix B to 10 CFR Part 50 (Criteria III, "Design Control," and XVII, "Quality Assurance Records") contain the following requirements related to equipment qualification:

- Components are designed to be compatible with the postulated environmental conditions, including those associated with LOCAs.

- 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.

03.11-4

Mechanical components are qualified by design 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. Accordingly, radiation is the principal degrading environmental effects that potentially relates to common mode failure and that requires special consideration for maintaining qualification.

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. Therefore, normal operation and periodic testing demonstrate that each installed item is functional during normal operation then those items can also operation during a DBA.

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 program demonstrates that equipment meets the design specifications and the equipment is qualified for the designed life.

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.

03.11-4

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.

Similar to equipment located in mild environments, components are also exposed to RCS fluid. This is an important consideration because it means that the temperature and pressure stressors effect on equipment is essentially the same during normal operation as it is during accident conditions. Therefore, in lieu of accelerating aging analysis, the aging evaluation for temperature and pressure stressors consists of the specified frequency and test conditions of the surveillance program and the equipment failure analysis/trending program requirements. This simplifies the evaluation of materials that are sensitive to environmental effects because temperature and pressure do not produce a failure mode during accident conditions more than those that occur during normal operation.

The mechanical equipment service condition information critical to qualification is consistent with the information noted in Section 3.9.6, including data such as fluid pressure and temperature used to verify the functional requirements of equipment qualification.

3.11.2.2.1 Identifying Safety-Related Mechanical Equipment Located In Harsh Environment Areas

For mechanical equipment, the environmental design and qualification process focuses on the materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, diaphragms). A listing of the safety-related mechanical equipment expected to contain non-metallic or consumable parts located in harsh environment areas that require EQ is provided in Table 3.10-1. This table is comprehensive, in that it includes all Seismic Category I and II components in the

03.11-4

systems screened for seismic qualification. Section 3.10 provides additional information on the seismic and dynamic qualification of mechanical and electrical equipment.

3.11.2.2.2 Identifying Nonmetallic Subcomponents of this Equipment

Table 3.10-1 identifies those components that may contain mechanical non-metallic or consumable parts that require EQ (i.e., classification C/NM). However, the chemical composition of the non-metallic or consumable parts are not specified in the U.S. EPR FSAR. Non-metallic or consumable parts are not expected to be standardized since different component vendors could be used for different projects. Additionally, vendors are anticipated to change the formulation of non-metallics over time in response to operating experience. That may prompt material upgrades. Therefore, the identification of the chemical composition of the nonmetallic subcomponents and the environmental effects occurs as part of the procurement process as specified in Sections 3.11.2.2.4 and 3.11.2.2.5.

Engineering design specifications are used in the procurement of equipment, components, and parts that are to be qualified. Under the procurement program, the mechanical non-metallic or consumable parts (e.g., gaskets, seals) materials may be identified either in the procurement specification or by the vendor. Additionally, the procurement specifications identify the environmental conditions (see Section 3.11.2.2.3) for which the components must be qualified. Compliance with GDC 4 through the evaluation of nonmetallic parts in mechanical components will be based on material evaluations described in Section 3.11.2.2.5.

3.11.2.2.3 Identifying the Environmental Conditions and Process Parameters for which this Equipment Must Be Qualified

Mechanical equipment experiences the same environmental conditions as those defined in 10 CFR 50.49 for electrical equipment, and such conditions are used in qualifying mechanical equipment. Section 3.11.1.2 describes the environmental conditions for which the equipment is qualified. The environmental parameters (e.g., radiation, temperature, chemical spray, humidity from steam, pressure, flooding) applicable to the various environmental conditions in specific plant building and room locations are specified in Section 3D.5 of Appendix 3D and in the tables and figures provided in Appendix 3D.

3.11.2.2.4 Identifying Nonmetallic Material Capabilities

Mechanical equipment is inherently more rugged than electrical equipment and is less vulnerable to environmental conditions. Mechanical equipment is designed to operate under hostile process conditions. GDC 4 states, in part, that components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with postulated accidents, including loss-of-

03.11-4

coolant accidents. Mechanical equipment is designed to comply with GDC 4 by verifying the ability of the components to perform their required safety functions when exposed to internal and external, normal and abnormal operating conditions, and when exposed to external postulated accident environments. The engineering design process and program evaluates both metallic and non-metallic components to meet environmental conditions (e.g., radiation, temperature, pressure) for safety related and important to safety mechanical equipment. The combination of operating temperatures and pressures are compared to the design parameters of each component to confirm and demonstrate that design limits are not exceeded. The effects of radiation are considered in the evaluations. These evaluations constitute a normal and accident environmental analysis in accordance with GDC 4. The procurement process provides confirmation that the material capabilities of the components provided by the vendor satisfy the environmental conditions described in Section 3.11.2.2.3.

3.11.2.2.5 Evaluating Environmental Effects on the Nonmetallic Components of the Equipment.

For mechanical equipment, the environmental design and qualification process focuses on the materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, diaphragms). Equipment records are maintained, and these records include the results of tests and material analyses used as part of the environmental design and qualification process for each mechanical component. Engineering design specifications are generated and used in the procurement of equipment, components, and parts that are to be qualified. Under the procurement program, compliance with GDC 4 through the evaluation of nonmetallic parts in mechanical components will be based on material evaluations. Metallic components that form a pressure boundary are considered to be qualified by the nature of their pressure retention capability as demonstrated by the application of an ASME Boiler and Pressure Vessel stamp. Nonmetallic components, such as greases, gaskets, and lubricants, are shown to be capable of performing their intended functions under accident environments.

Accordingly, during the procurement process, environmental effects of non-metallic components of safety-related mechanical equipment located in harsh environment areas are evaluated using one of the following methods:

- Experience data with identical or similar equipment of non-metallics under similar conditions with a supporting analysis to show that the equipment is acceptable.
- Analysis in combination with type test data that supports the analytical assumptions and conclusions.
- Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment is acceptable.

03.11-4

- Testing a similar item of equipment with a supporting analysis to show that the equipment is acceptable.

In the evaluation of environmental effects on non-metallic components, consideration is given to the fact that temperature and pressure values (stressors) are not significantly different during accident conditions than during plant operation because the components are routinely exposed to RCS fluid during plant operation. Therefore, for those stressors, the material evaluations performed to determine the adequacy for normal operation provide the confidence in performance during abnormal and accident environments as well.

3.11.2.2.6 Establishing and Maintaining Mechanical Equipment Qualification

Compliance with GDC 4 is maintained through the engineering design, procurement, maintenance, and surveillance programs. These plant programs include inspections, testing, analyses, repairs, and replacements.

For mechanical equipment, qualification is maintained through implementation of the preventive maintenance program, surveillance program, and periodic testing of mechanical equipment.

Under the maintenance program, routine monitoring of mechanical equipment is performed to identify and prevent age-related degradation of non-metallic parts. The program also verifies that the safety function of the mechanical equipment is maintained in normal, abnormal, and accident environments. Similarly, the procurement, maintenance, and surveillance programs maintain the equipment in sufficient operating condition and generate necessary corrective actions. This is based on documentation that includes vendor certification, design and purchase specifications for replacement parts, and material evaluations for replacement parts.

To verify the effectiveness of these programs to maintain compliance with GDC 4, the program data and records are reviewed periodically in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI and other inspection, in situ test and monitoring programs. This process demonstrates that the equipment has not suffered degradation, which may include the effects of thermal, radiation, and/or cyclic aging.

As noted in Section 3.11.3, if the equipment qualification testing is incomplete at the time of the COL application, a COL applicant that references the U.S. EPR design certification will submit an implementation program, including milestones and completion dates, for NRC review and approval prior to installation of the applicable equipment.

~~and is based on methods developed and accepted by the NRC for the current fleet of operating reactors as described in South Texas Project, Units 1 and 2, Docket Nos. STN~~

50-498, STN 50-499, 10 CFR 50.59 Summary Report (Reference 24), Request for Additional Information on Elimination of EQ of Mechanical Components, South Texas Project, Units 1 and 2 (STP) (TAC Nos. M98912 and M98913) (Reference 25), Response to Request for Additional Information on Elimination of EQ of Mechanical Components (Reference 26), and Licensee's 10 CFR 50.59 Evaluation of Elimination of EQ of Mechanical Components, South Texas Project, Units 1 and 2 (STP) (TAC Nos. M98912 and M98913) (Reference 27).

03.11-4

Mechanical equipment is inherently more rugged than electrical equipment and is less vulnerable to environmental conditions. Mechanical equipment is designed to operate under hostile process conditions. GDC 4 states, in part, that components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with postulated accidents, including loss-of-coolant accidents. Mechanical equipment is designed to comply with GDC 4 by verifying the ability of the components to perform their required safety functions when exposed to internal and external, normal and abnormal operating conditions, and when exposed to external postulated accident environments. The engineering design process and program evaluates both metallic and non-metallic components to meet environmental conditions (e.g., radiation, temperature, pressure) for safety-related and important to safety mechanical equipment. The combination of operating temperatures and pressures are compared to the design parameters of each component to confirm and demonstrate that design limits are not exceeded. The effects of radiation are considered in the evaluations. These evaluations constitute a normal and accident environmental analysis in accordance with GDC 4.

For mechanical equipment, the environmental design and qualification process focuses on the materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, diaphragms). Equipment records are maintained, and these records include the results of tests and material analyses used as part of the environmental design and qualification process for each mechanical component. Engineering design specifications are generated and used in the procurement of equipment, components, and parts that are to be qualified. Under the procurement program, compliance with GDC 4 through the evaluation of non-metallic parts in mechanical components will be based on material evaluations and the form, fit, and function methodology used in an item equivalency evaluation. A listing of the mechanical non-metallic or consumable parts that require EQ are provided in Table 3.10-1.

The need to maintain a separate mechanical equipment qualification (MEQ) program for the U.S. EPR was determined to be redundant, considering current engineering design programs. This determination was based on the regulatory precedent from current operating reactors that originally maintained an MEQ program. The NRC has determined that engineering design, procurement, maintenance, and surveillance programs are acceptable to comply with the guidance in the SRP 3.11 (References 24,

03.11-4

~~25, 26, and 27) for MEQ. Accordingly, evaluations documented in a separate MEQ program are not necessary to justify compliance for safety-related mechanical components. Compliance with GDC 4 is initiated and maintained through the engineering design, procurement, maintenance, and surveillance programs. These plant programs include inspections, testing, analyses, repairs, and replacements.~~

~~The mechanical equipment qualification operational program identifies the plant programs that demonstrate mechanical equipment accommodates the effects of DBEs. The maintenance program includes maintenance, surveillance, and periodic testing of mechanical equipment. Under the maintenance program, routine monitoring of mechanical equipment is performed to identify and prevent age-related degradation of non-metallic parts. The program also verifies that the safety function of the mechanical equipment is maintained in normal, abnormal, and accident environments. Similarly, the procurement, maintenance, and surveillance programs maintain the equipment in sufficient operating condition and generate necessary corrective actions. This is based on documentation that includes vendor certification, design and purchase specifications for replacement parts, and material evaluations for replacement parts.~~

~~To verify the effectiveness of these programs to maintain compliance with GDC 4, the program data and records are required to be reviewed periodically in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI and other inspection, in situ test and monitoring programs. This process demonstrates that the equipment has not suffered any degradation, which may include the effects of thermal, radiation, and/or cyclic aging.~~

3.11.2.3 Justification for Using Latest IEEE Standards Not Endorsed by a RG

This section provides the description and justification for using the latest IEEE standards not endorsed by current RGs for the qualification of equipment. This justification does not preclude the use of versions of IEEE standards that are currently endorsed by RGs.

The IEEE has periodically updated the standards to incorporate evolutionary thinking and approaches of the nuclear industry with regard to equipment qualification. Table 3.11-4 provides a summary comparison of the current IEEE standards to be used for equipment qualification and the associated RGs and revision that endorse them. As shown in Table 3.11-4, a number of the later IEEE standards recommended for use on the U.S. EPR are not currently endorsed by the NRC. The following is a discussion of these non-endorsed IEEE standards and the justification for their use.

For an IEEE standard, the "R" just prior to the year means that the previously cited version of the standard was "Reaffirmed" in the later year shown. Reaffirmation is an approval process whereby the document is not changed, just agreed to be re-issued, as

effect on the safety function performance of the remainder of the similar group. However, if significant differences in performance between aged and unaged modules are found, similarity may not be used.

In summary, the analysis to extrapolate QL for similar equipment includes the following:

- Group modules by similarity and justify the grouping.
- Type test modules, excluding aging.
- Type test one duplicate module from each similar group with aging.
- Determine if differences in results are acceptable for extending aging results to similar units.

3D.6.2.2 Substitution

03.11-4

Substitution of parts or materials is acceptable if a comparison or analysis of their ~~fit, form, and function~~material evaluations as described in Section 3.11.2.2.5 supports the conclusion that the equipment performance is equal to or better than the originally qualified equipment.

3D.6.2.3 Analysis of Safety-Related Mechanical Equipment

Section 3.11.2.2 describes the qualification of mechanical equipment. Engineering design specifications are generated and used to procure equipment, components, and parts. Under the procurement program, compliance with GDC 4 through the evaluation of non-metallic parts in mechanical components is based on material evaluations ~~and the form, fit, and function methodology~~as described in Section 3.11.2.2.5 used in an item equivalency evaluation. Table 3D-10—Mechanical Equipment Components Requiring Environmental Qualification provides a summary of the types of non-metallic or consumable parts in mechanical components that will be screened for EQ. The list of specific non-metallic components by tag number screened in the EQ program is provided in Section 3.10, Table 3.10-1—List of Seismically and Dynamically Qualified Mechanical and Electrical Equipment.

03.11-4

3D.7 Equipment Qualification Maintenance Requirements

The equipment qualification maintenance requirements serve a dual function. They identify the specific maintenance requirements for EQ, and the condition monitoring and preventive maintenance activities required based on vendor requirements and engineering judgment.

These maintenance requirements documents typically consist of the following sections: