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June 25, 2010

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

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-10179

Subject: MHI's Supplemental Responses to US-APWR DCD RAI No. 511-3739

References:
1) "Request for Additional Information No. 511-3739 Revision 0, SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment," dated 12/15/2009.
2) "Response to Request for Additional Information No. 511-3739 Revision 0, SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment," (MUAP-HF-10028), dated 2/02/2010.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Supplemental Responses to Request for Additional Information No. 511-3739, Revision 0."

Enclosed are the supplemental responses to clarify the previous responses submitted in Reference 2 to 12 RAIs contained within Reference 1. This transmittal completes the response to this RAI.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Supplemental Responses to Request for Additional Information No. 511-3739, Revision 0

CC: J. A. Ciocco
C. K. Paulson

D081
NRO

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Docket No. 52-021
MHI Ref: UAP-HF-10179

Enclosure 1

UAP-HF-10179
Docket No. 52-021

Supplemental Responses to Request for Additional Information
No. 511-3739, Revision 0

June, 2010

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-17:

This Request for Additional Information (RAI) was written prior to the receipt of MUAP-08015, Revision 1. Rather than delay issuance of the RAI to review Revision 1, the RAI is being issued as written.

Section 6.2.2, "Substitution", of MHI Technical Report MUAP 08015 (R0) states: "Substitution of parts or materials is acceptable if a comparison or analysis of their fit, form and function supports the conclusion that the equipment performance is equal to or better than the originally qualified equipment." This approach as stated contains some of the necessary elements, i.e., form, fit and function. However, those elements alone are not sufficient because they do not take materials or manufacturing process into account, both of which have the most significant effect on equipment performance in a harsh environment, especially prolonged exposure to elevated temperatures, moisture and radiation. Revise Section 6.2.2 of MUAP 08015, to reflect analysis of substitute parts or materials that takes the material properties required in a harsh environment and manufacturing processes that could affect equipment performance in a harsh environment into account, or using partial test data (or applicable operating experience data) to support the analyses as required by 10 CFR 50.49(f) when analysis is used in combination with other methods for qualification.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project.

These project-specific procurement and QA procedures are where any impacts of manufacturing process for important to safety and safety-related components are normally addressed. Typically, manufacturing process is not the limiting factor for design or in producing acceptable components. The substitution EQ process is generally more applicable to operating plants than new construction, that is, where the need for replacement parts may necessitate the need for the use of substitution. Where applicable, project specific designs for important to safety and safety-related components that may be impacted by manufacturing process are addressed in project-specific procurement and QA procedures.

If a plant specific design for important to safety and safety-related components is impacted by manufacturing process, then the specific requirements are delineated in the procurement documents. This situation would be the same for original component design or for substitution of an original component design. Project-specific procurement and QA procedures reflect critical manufacturing process requirements and this will be reviewed when and if substitute items are used.

The US-APWR EQP complies with the referenced codes, standards and applicable industry practices endorsed by the NRC. MUAP-08015, R1 discusses the qualification process in Chapters 6, 7 and 8 and the specific substitution program requirements in section 6.2.2. Additional guidance in the use of substitute components will be provided in the next revision to MUAP-08015.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

Section 6.2.2. of MUAP-08015, R1 will be revised in a future revision to provide additional clarification regarding equipment qualification methodologies for substitute of components during the procurement and construction and phases of a US-APWR Project. The planned change to this section will read as follows:

"**6.2.2 Substitution**

During the construction of a new US-APWR substitution or like-for-like replacement of qualified components may be required only if the original as-designed components are no longer available. In this case, the procurement and design documents would be suitably revised to reflect the use of a substitute component. In order for a substitute component to be used in the construction of a new US-APWR, this alternate component would be evaluated for form, fit and function, as well as other parameters to verify that its use would be acceptable. During the substitute equipment qualification process, parameters that would be analyzed include:

Materials: Are materials equivalent to the original? Are the materials acceptable for the installed environment? Is the source of the materials known and acceptable? Are there any changes to the materials used in the component which would compromise the component's operation during all anticipated environmental conditions? Will the component's materials allow it to perform its safety function?

Manufacturing Process: Is the manufacturing process similar to or better than the original process? Are there changes during the manufacturing process which could impact the components ability to function in all anticipated environmental conditions?

Manufacturer's Qualify Programs: Are quality programs equivalent or better than the original supplier's program?

Design: Is the design similar to or comparable to the original design? Are there changes in the design which could impact the component's ability to function?

Form, Fit and Function: Is the replacement or substitute component equivalent to the original component in relation to form, fit and function? Are components interchangeable or will other components need to be modified? Will the substitute component be capable of performing its intended safety function?

An evaluation including a review of the components critical characteristics, qualification of the vendor and product examination as well as other evaluations, including the required applicable EQ parameter qualification will be performed and documented when and if need arises to use substitute components during the initial construction of a US-APWR. These requirements are delineated in the project specific EQ program procedures as described in Sections 8 and 9 of this Report."

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-18:

Section 6.2.1, "Similarity," of MHI Technical Report MUAP 08015, Rev 0, states, "If the qualified life of one module can be established, then modules of similar types will have an equivalent qualified life if the modules have similar failure mechanisms." Section 6.2.1 then delineates the attributes that are to be compared to define and establish similarity under the MHI EQ program. These attributes are: "Type of technology used to design and manufacture the module," "Type of critical components," "Packaging, mounting and type of connections," "Service conditions," and "Safety functions." However, these attributes are not sufficient to establish similarity in terms of durability and satisfactory application-specific performance in a harsh environment at end-of-life conditions, because they lack consideration of material properties that determine the critical materials' durability, aging characteristics, and application-specific harsh environment performance in end-of-life condition. For example, it is not sufficient to consider only failure mechanisms when using similarity analysis for qualified life comparison. Revise Section 6.2.1 of MUAP-08015, to include consideration of key material properties and aging characteristics (e.g., application/failure mode-specific activation energy), known exposure sequence effects, known radiation type/dose rate/configuration effects and known synergistic effects for all application-relevant environmental stressors, including thermal and radiation as required, that can affect accelerated aging equivalent degradation and end-of-life harsh environment durability and performance.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project.

These project-specific procurement and QA procedures are where any impacts of item similarity for important to safety and safety-related components are normally addressed. Typically, component similarity is not a limiting factor for design or in producing acceptable components. The EQ process that addresses similarity is generally more applicable to operating plants than new construction, that is, where the need for replacement parts may necessitate the need for the use of similar but not exact replacement components. Where applicable, project specific designs for important to safety and safety-related components that may be impacted by the use of similar components are addressed in project-specific procurement and QA procedures.

If a plant specific design for important to safety and safety-related components is impacted by the procurement of dissimilar components, then the specific requirements are delineated in the procurement documents and the variations are evaluated accordingly. This situation would be the same for original component design or for substitution of an original component design. Project-specific procurement and QA procedures provide guidance in dealing with dissimilar components and this will be reviewed on a case-by-case basis when and if it occurs.

The US-APWR EQP complies with the referenced codes, standards and applicable industry practices endorsed by the NRC. These documents provide adequate guidance in the qualification process as it applies to the qualification of similar equipment. MUAP-08015, R1 discusses the qualification process in Chapters 6, 7 and 8 and the specific similarity program requirements in section 6.2.1. Additional guidance in the use of similar components will be provided in the next revision to MUAP-08015.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

Section 6.2.1. of MUAP-08015, R1 will be revised in a future revision to provide additional clarification on the use of similarity analysis as part of the component qualification process for qualifying similar components during the design, procurement and construction phases of a US-APWR Project. The planned change to this section will read as follows:

"6.2.1 Similarity

The US-APWR the equipment qualification program may use similarity evaluations and analysis to assist in the qualification of equipment. Similarity is often employed to facilitate the qualification process for both environmental and seismic parameters. Similarity analysis may be performed to show that results of previous equipment tests (type or seismic) may be applied to the qualification of similar equipment. Similarity analysis is often performed when the variations between the "as-tested" and "to-be-qualified" equipment are minor and these differences can be evaluated by analysis. The use of similarity analysis is based on evaluations to demonstrate that the SSC to be

qualified is an acceptable representative of the previously qualified SSC. Supporting analysis is used to demonstrate that the results of previous tests can be appropriately used to demonstrate the qualification of similar equipment. The various factors involved in similarity analysis are complex and depend, in part, on the type of SSC and the type of similar test. The guidance provided in following references, where applicable, is used to provide a basis for the US-APWR EQP implementing procedures governing the qualification of SSCs when similarity analysis and evaluations are utilized:

IEEE 323, "Standard for the Qualifying of Class 1E Equipment for Nuclear Power Generating Stations"

IEEE 344, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations"

ASME QME-1, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants"

The use of similarity analysis requires the documented evaluation of qualification parameters. These evaluation requirements include the following considerations:

Mechanical Equipment:

a. Are the service conditions and concurrent loads for the active mechanical equipment similar? Examples of such parameters are earthquakes, internal and external pressures/temperatures, relative humidity, radiation, vibration, corrosion effects, transients, etc.
b. Is the required margin in the qualification parameters similar?
c. Is the active mechanical component that is to be qualified subject to similarity of excitation, physical system, and function? Similarity of excitation constitutes likeness of the following parameters: spectral characteristics, duration, directions of excitation axes, and location of measurement for the motions relative to the equipment mounting.
d. Are mechanical components/part that are subject to aging, chemical exposure and radiation similar and were the qualifying tests similar to the conditions that the "to-be-qualified" component will be exposed to?
e. Are the qualified components environmental stressors similar to the "to-be-qualified component" environment?
f. Is the qualified life for the equipment similar?
g. Is the manufacturing process similar?
h. ASME QME-1 provides specific guidance in the use of similarity analysis for various active mechanical equipment.

Electrical Equipment:

a. Is the technology used to design and manufacture the equipment similar?
b. Is the type of the equipment similar (e.g., breaker-for-breaker)?
c. Is the mounting and installation arrangement similar?
d. Are the service conditions similar?
e. Are the safety functions similar?
f. Is the required margin in the qualification parameters similar?
g. Are aging parameters and characteristics similar?
h. Are aging mechanisms, synergistic effects and environmental stressors including thermal and radiation similar?

i. Was seismic testing similar?
j. Is similar equipment in service at other nuclear facilities and are the service conditions similar?
k. Are key material properties similar?
l. Is the qualified life for the equipment similar?
m. Are the effects from radiation type dose rate and configuration similar?
n. Are the exposure sequence effects similar?
o. The references listed in this report provide additional guidance in the use of similarity.

Certain SSCs may require additional attributes and parameters to be evaluated when qualification by similarity is employed in the EQ process. Extrapolation or interpolation to other equipment by similarity can be used when the following conditions apply: same or equivalent materials, size differences are related by known scale factors, differences in shape shall not adversely impact performance, operating and environmental stresses are equal to or less than similarly qualified equipment, aging mechanism applicable to the tested equipment apply to the new equipment, and the equipment has the same safety function. Detailed similarity requirements are delineated in the project specific EQ program procedures as described in Sections 8 and 9 of this Report."

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-19:

MHI Technical Report MUAP 08015, Rev 0, Section 3.11, titled "10 CFR 50.49 Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," states: "An alternate methodology for qualifying equipment in harsh environments is to follow commercial dedication procedures, where applicable, in EPRI and NRC approved EPRI topical reports." Also, MUAP- 08015, Rev 0, Section 3.7, states, in part: "EPRI commercial-grade dedication methodologies, as approved by the NRC, are encompassed in the US-APWR EQP." Section 3.7 further states: "NUPIC [Nuclear Procurement Issues Committee] commercial dedication methodologies, as approved by the NRC, are encompassed by the US-APWR EQP." However, with the exception of NRC's SERs, which approved the use of TR-106439 and TR-107330 by the Electric Power Research Institute (EPRI) for mild-environment qualification of a specific vendor's digital I&C equipment, there are no topical (or technical) reports on commercial-grade dedication produced by EPRI that the NRC has approved for use specifically as a method of harsh environmental or dynamic qualification. In addition, while the cited references provide general guidance on commercial-grade dedication, they do not provide specific guidance on demonstrating EQ of each commercial-grade item production unit (designed and built without the benefit of a 10CFR Part 50, Appendix B, Quality Assurance Criteria) without degrading or destructive type tests on each unit. Revise Section 3.7 of MUAP 08015, to describe how the applicant's EQ program will provide for EQ of commercial-grade items, especially those that will be located in a harsh environment.

ANSWER:

EPRI NP 5652 "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety-related Applications (NCIG-07), 1988" is specifically endorsed with some conditions in NRC GL 89-02. In the endorsement there are no conditions limiting such use of Commercial Grade Items for harsh environments. NRC Inspection Procedure 43004 also references EPRI NP-5652 in section 43004-05.

Further mention of EPRI NP 5652 along with EPRI TR-112579 "Critical characteristics for Acceptance of Seismically Sensitive Items (CCASSI), 2000" and EPRI TR-1003105 "Dedicating

Commercial-Grade Items Procured from ISO 9000 Suppliers, 2001" are acknowledged in the NRC Workshop on Vendor Oversight for New Reactor Construction "Commercial Grade Dedication: Historical Perspective" Richard McIntyre, Senior Reactor Engineer, Office of New Reactors, December 10, 2008. Also referenced in the same presentation are:

> EPRI Report TR-122690, "Supplemental Guidance for the Application of EPRI Report 5652 on the Utilization of Commercial Grade Items, March 1994
>
> EPRI Report TR-106439, Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications, 1996

Additionally, the US Department of Energy uses a procedure "Request for Dedication of Commercial Grade Items and Services" to qualify components for its nuclear materials facilities. This procedure references both EPRI NP-5652 and its follow on EPRI Report:

> EPRI Report TR-122690, "Supplemental Guidance for the Application of EPRI Report 5652 on the Utilization of Commercial Grade Items, March 1994

This procedure is used for harsh environment component qualification for new construction. The use of commercial dedication methodologies has been examined and accepted by the NRC as indicated above. The US-APWR EQP complies with the referenced codes, standards and applicable industry practices endorsed by the NRC. These documents provide adequate guidance in the application of commercial dedication methodologies to the equipment qualification process.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

NRC Inspection Manual, Inspection Procedure 43004, "Inspection of Commercial Grade Dedication Programs", and Inspection Procedure 38703, "Commercial Grade Dedication", provides additional guidance on the acceptability of qualifying entity's use of commercial grade dedication. These NRC documents reference EPRI NP-5652 as well as documents pertaining to Commercial Grade Dedication. Commercial Grade Dedication programs are currently accepted and being routinely audited by the NRC. Inspection Procedure 38703, Appendix B, specifically defines "Basic Component" essentially the same as Important to Safety components and allows them to be located in both harsh and mild environments. Therefore, the NRC is recognizing commercial grade dedication as an acceptable method for qualifying important to safety equipment.

The first paragraph in MUAP-08015, R1, Section 3.1.1 will be changed in a future revision to MUAP-08015 to read as follows:

"3.1.1. 10 CFR 50.49 Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants

This is the key statute regarding EQ for important to safety electrical equipment. It should be noted that this statute defines which equipment needs to be qualified and the specifications to which it needs to be qualified. 10 CFR 50.49 requirements are clarified in RG 1.89 and together they reference IEEE Std 323 as an acceptable methodology to follow in qualifying electrical equipment. In 10 CFR 50.49 and IEEE Std 323, a distinction is made between Harsh and Mild environments. In general SSCs, located in harsh environments are qualified pursuant to IEEE Std 323 (and other applicable IEEE standards) while mild environment SSCs can be considered qualified provided the environmental conditions are specified in a purchase specification and the vendor provides appropriate documentation for the equipment demonstrating that it complies with the purchase specification requirements. An alternate methodology to qualifying equipment in harsh environments is to use commercial dedication methodologies to meet the 10 CFR 50.49 requirements for harsh electrical equipment environment qualification. This qualification method uses commercial grade dedication when the supplier lacks a 10 CFR 50, Appendix B QA program. Commercial grade dedication is based on nuclear industry documents (standards, codes, etc.) as outlined in NRC Inspection Procedures 38703, "Commercial-Grade Dedication" and IP 43004, "Inspection of Commercial Grade Dedication Programs" and the EPRI reports referenced or endorsed therein. Of particular importance is the critical parameter characteristics definition for important to safety and safety-related equipment and the verification of these critical characteristics during the Environmental Qualification Program's harsh environment evaluation."

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-20:

Under Section 4.0, "Qualification Criteria," of MUAP 08015, Rev 0, Section 4.2 and Section 4.5.2 address aging. Section 4.2 is very general and simply describes the relevant regulatory requirements in 10 CFR 50.49(d)(5), stating that aging requirements are SSC-specific and are implemented on a project-specific basis. Section 4.5.2 provides guidance on thermal aging parameters, including that the aging period must be at least 100 hours, the aging temperature must be greater than assumed normal service conditions, but less than the state-change temperature for materials critical to the performance of the safety function in a harsh environment, and that a conservative, material property-relevant activation energy is used for critical materials in the aging calculation. Provide additional information on how the applicant's EQ program provides for verification that the assumptions used in qualified life calculations remain valid, or how adjustments are to be made if they are found not to be valid and how components will be examined periodically to determine if they are aging faster than predicted in a manner that could shorten qualified life, and how to deal with that situation.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project. The plant licensee's Equipment Qualification Program is formulated to assure that only qualified SSCs remain in service for the life of the facility. 10CFR50.49(e)(5) identifies the need to factor in expected aging effects on equipment during the qualification process. The intent is to qualify equipment based on its expected condition (maximum aging) for a designated service location and qualified life. The implication is that if the equipment will function at the end of its service life (fully aged) then adverse effects associated with aging will not prevent the SSC from of fulfilling its intended safety function. The section also

indicates that the service life of a piece of equipment can be extended provided ongoing qualification indicates that the piece of equipment has additional life. IEEE 323, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations, and ASME QME-1, Qualification of Active Mechanical Equipment Used in Nuclear Power Plants, indicates that the normal practice for dealing with aging is to determine the appropriate aging conditioning for a piece of equipment. The process generally involves accounting for thermal, radiation, wear, vibration, use and other factors that are as or more severe than the expected plant environment. The application of simulated aging effects requires engineering evaluations as discussed in IEEE 323 and IEEE 1205, IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations. The need to factor in aging effects depends on the type of SSC, the location in the plant, the SSC's function and the environment (pre and post accident). The US-APWR EQP documents the aging parameters applicable to each SSC in the qualification file. The qualified life is identified as well as the parameters or basis for defining the qualified life. This information can and will be used by the plant licensee in implementing long term aging monitoring programs pursuant to the guidance provided in IEEE 1205 and QME-1. Age monitoring programs are licensee programs and are implemented to identify and resolve issues with premature aging effects to SSCs. MUAP-08015, R1 discusses the qualification process in Chapters 6, 7 and 8 and the specific aging program requirements in section 6.5.1.1. Additional guidance in the use of aging techniques will be provided in the next revision to MUAP-08015.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

To improve upon aging requirements, section 4.5.2 of MUAP-08015, R1 will be revised in a future revision. The planned change to this section will read as follows:

"The requirements for addressing aging are contained, in part, in 10 CFR 50.49 (d)(5), which reads: "Equipment qualified by test must be preconditioned by natural or artificial (accelerated) aging to its end-of-installed life condition." This regulation describes the considerations for the aging testing including preconditioning a given SSC before any further aging tests. This testing is used to help determine the service life of an important to safety SSC. Aging requirements are SSC specific and are implemented on a project specific basis. Aging analysis addresses concerns regarding the design life, shelf life, and qualified life of SSCs located in harsh environments. Qualified Life addresses issues relative to in service thermal, radiation, vibration and chemical effects. IEEE 323 as well as other technical references, provides guidance in addressing Aging and Qualified Life analysis requirements.

Qualified life of a component is based on the components limiting operable time. In most cases this is caused by the effects of use and aging for both mechanical and electrical components. Qualified life is based on a specific set of service conditions. An alternate to qualified life is to establish an end condition (end of life condition). Age testing simulates the effects of aging on a

component subject to aging degradation. Factors impacting aging include design, function, humidity, radiation levels, materials, storage, wear and tear, oxidation, loss of material strength, cycling, temperature, vibration and other items (see IEEE 1205, "IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Stations"). Margin is normally applied to aging simulations for the various parameters being evaluated. No margin is applied for the time component. Aging simulations are conducted in accordance with guidelines provided in IEEE 323, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations" and IEEE 1205. Mechanical components are also subject to degradation by the aging process. Methodologies for addressing aging during the qualification of mechanical components are delineated in ASME QME-1. There are various methods that have been established to extend the qualified life of a component. These are discussed in IEEE 323 and IEEE 1205 and generally involve additional surveillances and an analysis of the conservatism in the original qualification process."

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-21:

Under the center columns, "Inspections, Test and Analyses," of the ITAAC tables for the applicable subsystems in DCD Tier 1, Sections 2.4, "Reactor Systems," Section 2.5, I&C Systems," Section 2.6, "Electrical Systems," and Section 2.7, "Plant Systems," the inspections, tests and analyses that correspond to the design commitments relating to EQ ("6.a," being the most common item number) use very similar language. Most state: "Type tests and/or analyses will be performed on the Class 1E equipment located in a harsh environment." Some state: "Type tests or analyses will be performed on the specified equipment to verify that it can withstand the postulated environmental conditions." Since harsh environment qualification by analysis alone is not in noncompliance with 10 CFR 50.49(f), revise the above ITAAC tables to reflect that "Type tests or testing and analysis in accordance with 10 CFR 50.49(f) will be performed.

ANSWER:

The EQ-related ITAAC in DCD Tier 1 are revised to state, "Type tests, analyses, or a combination of type tests and analyses will be performed" to use wording consistent with 10CFR50.49(f). This wording of "Inspections, Tests, and Analyses" (ITA) column is consistent with the ITA description of other applications.

The following ITAAC in Tier 1 are affected:

Table 2.4.1-2 ITAAC #10
Table 2.4.2-5 ITAAC # 9.a
Table 2.4.4-5 ITAAC # 6.a
Table 2.4.5-5 ITAAC # 6.a
Table 2.4.6-5 ITAAC # 6.a
Table 2.5.1-6 ITAAC # 6
Table 2.5.4-2 ITAAC # 3
Table 2.6.8-1 ITAAC # 7
Table 2.7.1.2-5 ITAAC # 6.a
Table 2.7.1.9-5 ITAAC # 6.a

Table 2.7.1.10-4 ITAAC # 12
Table 2.7.1.11-5 ITAAC # 6.a
Table 2.7.3.3-5 ITAAC # 6.a
Table 2.7.6.7-5 ITAAC # 6.a
Table 2.7.6.13-3 ITAAC # 3
Table 2.11.2-2 ITAAC # 6.a
Table 2.11.3-5 ITAAC # 6.a

The DCD Tier 1 Subsection 1.4.4 description of EQ ITAAC is revised to be consistent with the revised ITAAC.

DCD Tier 2 Table 14.3-2 is also revised to be consistent with the wording of the above ITAAC.

Impact on DCD

See Attachment 1 for the mark-up of DCD Tier 1, Section 1.4.4, changes to be incorporated.

Table 2.4.1-2 ITAAC #10 has been revised as follows:

10. The Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment is designed to withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function.	10.i Type tests, ~~and/or~~ analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.	10.i The results of type tests, ~~and/or~~ analyses or a combination of type tests and analyses conclude that the Class 1E equipment identified in Table 2.4.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function.
	10.ii Inspections will be performed on the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.	10.ii The as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.4.1-1 as being qualified for a harsh environment are bounded by type tests, ~~and/or~~ analyses, or a combination of type tests and analyses.

Refer to Attachment 1 for the mark-up of the ITAAC cited in the above response. The revised ITAAC will be revised similarly to the above changes.

See Attachment 2 for the mark-up of DCD Tier 2, Table 14.3-2, changes to be incorporated.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

Important to Safety Equipment, including Class 1E equipment is qualified both environmentally and seismically. Statements made in the DCD and MUAP-08015 refer to high level qualification methodologies and cover both environmental and seismic qualifications. The qualification of environmental parameters for Class 1E equipment in harsh environments is controlled by 10 CFR 50.49. The seismic qualification of Class 1E equipment is governed by 10 CFR 50, Appendix A, GDC 2 and 4. Seismic qualification can rely on test or analysis or a combination of both. Mechanical components are often integral to electrical Class 1E components (i.e., motor operated valve) and these components are often analyzed as an assembly. Analysis in conjunction with various tests may be used to qualify these types of components. As written, the text in the DCD is in compliance with these approved qualification methods. This wording is consistent with other vendor's design certification applications and the wording is intended to address 50.49 f (3) for electrical components as well as seismic qualification methodologies.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/25/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 511-3739 REVISION 0**
SRP SECTION:	**03.11 – Environmental Qualification of Mechanical and Electrical Equipment**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**12/15/2009**

QUESTION NO. RAI 03.11-22:

In DCD Tier 1, Section 2.4, 2.5, 2.6 and 2.7 ITAAC tables, the center column of each table, "Inspections, Tests and Analyses," (ITA) states that type tests and/or analyses will be performed on Class 1E equipment located in a harsh environment, and an inspection will be performed on the as-built Class 1E equipment and associated wiring, cables and terminations located in a harsh environment (e.g., ITA 9.a.i for the RCS in Table 2.4.2-5). However, for several systems that have equipment that is required to be qualified for a harsh environment, no field inspection was specified. For example, ITAAC tables for reactor systems (Table 2.4.1-2), electrical penetration assemblies (Table 2.6.8-1), and the containment high-range radiation monitor (Table 2.7.6.13-3), require no inspection. Revise all ITAAC tables as required to indicate that all as-built or as-installed equipment required to be qualified by 10 CFR 50.49, including associated wiring, cables, connections, and terminations, is to be inspected to verify that it is installed properly and in a manner that is consistent with or enveloped by the configuration in which the EQ samples on which its EQ is based were qualified by type test or provide justification for not performing such inspections.

ANSWER:

ITAAC #10 in Table 2.4.1-2 has been revised in revision 2 of DCD Tier 1 as stated in the response to RAI 193, question 14.03.04-22, (ML091040156) to include inspections of the as-built equipment including the associated wiring, cables, and terminations.

ITAAC #3 in Table 2.7.6.13-3 has been revised in revision 2 of DCD Tier 1 as stated in the response to RAI 184-1912, question 14.03.07-24, (ML091040177) to include inspections of the as-built equipment including the associated wiring, cables, and terminations.

ITAAC #7 in Table 2.6.8-1 has been added in revision 2 of DCD Tier 1 as stated in the response to RAI 182-1888, question 14.03.06-08 (ML090980467). This ITAAC item includes field inspections of the containment electrical penetration assemblies (EPAs). ITAAC #7 in Table 2.6.8-1 does not separately refer to inspection of associated wiring, cables and terminations

because qualification of the EPAs includes the wiring, cables, and terminations that are integral to the assemblies.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

SUPPLEMENTAL RESPONSE

The ITAAC changes identified in the above response are based on a review to identify similarly affected ITAAC and are the complete set of changes to DCD Tier 1 in response to this question. One ITACC item was added as a result of this review.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. RAI 03.11-23:

DCD Tier 1, Table 2.7.1.10-1, "Steam Generator Blowdown System (SGBS) Equipment Characteristics," lists certain steam generator blowdown isolation valves and sampling isolation valves and indicates that they include Class 1E equipment that is to be qualified for a harsh environment. However, Table 2.7.1.10-3, SGBS ITAAC, does not show any EQ-related ITAAC. Revise Table 2.7.1.10-3 to include complete "EQ-related ITAAC" as explained in other RAI input questions in this group and confirm that there are no other Sections in DCD Tier 1 with a similar discrepancy, and if any are found, correct them accordingly.

ANSWER:

EQ ITAAC #12 has been added to DCD Tier 1 Table 2.7.1.10-4, Revision 2, as stated in response to RAI 191-2048, question 14.03.04-03 (ML091000604). This ITAAC item includes inspections of associated wiring, cables, and terminations.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Supplemental Response

The ITAAC changes identified in the above response are based on a review to identify similarly affected ITAAC and are the complete set of changes to DCD Tier 1 in response to this question.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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QUESTION NO. RAI 03.11-24:

DCD Tier 1, Section 2.7.3.5.1, "Essential Chilled Water System," (ECWS) page 2.7-104, under "Equipment to be Qualified for Harsh Environments," refers to "...equipment identified in Table 2.7.3.5-2 as being qualified for a harsh environment...". However, the column for harsh environment qualification indicates 'No' for all equipment listed in Table 2.7.3.5-2. Accordingly, there is no EQ-related ITAAC in the corresponding ITAAC table (2.7.3.5-5). It was not clear from the piping and instrumentation diagram (P&ID) on Pages 2.7-114, 115 whether any ECWS equipment is located in a harsh environment. The same is true for Spent Fuel Pit Cooling & Purification System, Subsection 2.7.6.3.1 and Area Radiation Airborne Radioactivity Monitoring System (ARARMS), Subsection 2.7.6.13.1. Clarify or confirm that there is indeed no equipment in the ECWS, the SFPC&PS (or any other system with a similar discrepancy), and ARARMS, that is required to be qualified for a harsh environment.

ANSWER:

The DCD Tier 1 equipment characteristics tables identify the Class 1E equipment which is subject to a harsh environment. "Harsh environment" is defined in DCD Tier 1 Section 1.3 as "the limiting environmental conditions resulting from a design basis accident." MHI has reviewed the equipment characteristics tables to determine consistency with the EQ design descriptions and ITAAC. The results of the review are as follows:

DCD Tier 1 Subsection 2.7.3.5.1 has a discrepancy between the ECWS design description under "Equipment to be Qualified for Harsh Environments" and Table 2.7.3.5-2. MHI has corrected the design description under "Equipment to be Qualified for Harsh Environments" to "Not applicable".

Subsection 2.7.6.3.1 (page 2.7-240) was revised in Revision 2 of DCD Tier 1 to correct the discrepancy between the SFPCS design description and equipment characteristics table.

The Area Radiation and Airborne Radioactivity Monitoring Systems equipment in a harsh environment is identified in Table 2.7.6.13-1. The design description and ITAAC are correctly addressed in Subsection 2.7.6.13.1.1 and Table 2.7.6.13-3 Item 3.

ITAAC Item 3 in Tier 1 Table 2.5.4-2 addresses environmental qualification of the harsh environment field instrumentation for Post Accident Monitoring (PAM) variables listed in Table 2.5.4-1. Table 2.5.4-1 is the list of PAM variables and does not include the same information as equipment characteristics tables. MHI has revised ITAAC Item 3 in Tier 1 Table 2.5.4-2 for consistency with Table 2.5.4-1.

Impact on DCD

Later revision required.

The Design Commitment (DC) and Acceptance Criteria (AC) in Tier 1 Table 2.5.4-2, Item 3 is revised as follows:

DC: "3. The field instrumentation for the PAM variables identified in Table 2.5.4-1 and that is subjected to a harsh environment is designed to withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function."

AC: "3.i The results of the type tests and/or analyses conclude that the field instrumentation for the PAM variables identified in Table 2.5.4-1 and that is subjected to a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function for the time required to perform the safety function."

"3.ii The as-built field instrumentation and the associated wiring, cables, and terminations identified in Table 2.5.4-1 and that is subjected to a harsh environment are bounded by type tests and/or analyses."

Tier 1 Subsection 2.7.3.5.1 is revised as follows:

"Equipment to be Qualified for Harsh Environments

Not applicable.
~~The equipment identified in Table 2.7.3.5-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis event without loss of safety function."~~

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. RAI 03.11-25:

DCD Tier 2, Subsection 3.11.2, "Qualification Tests and Analyses", states that "equipment will be qualified for aging by test or analysis, while 10 CFR 50.49(d)(5) states that "equipment qualified by test must be preconditioned by natural or artificial (accelerated) aging to its end-of-installed life condition." From the language of Subsection 3.11.2, it is not clear that EQ test samples for all equipment required by 10 CFR 50.49 to be qualified by test would be preconditioned. Revise by deleting "or analysis" from Subsection 3.11.2 and add language to make it clear that the requirements of 10 CFR 50.49(d)(5) will be met.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev. 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project. SSCs are qualified following documented and approved procedures. The requirements of 10CFR50.49(d)(5) apply only to those important to safety SSCs that may be impacted by the effects of aging. Therefore, it is not necessary to delete "or analysis" because the qualification of these SSCs is discussed in MUAP-08015, R1. Equipment requiring age testing will be preconditioned as appropriate for the expected aging effects in question pursuant to the guidance provided in various standards including IEEE 323, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations, and ASME QME-1, Qualification of Active Mechanical Equipment Used in Nuclear Power Plants. Adherence to these standards ensures that the requirements of 10CFR50.49 (d)(5) will be met. MUAP-08015, R1 discusses the qualification process in Chapters 6, 7 and 8 and the specific EQP aging requirements in section 6.5.1.1.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Supplemental Response

IEEE 323, "Standard for Qualifying Class 1E Equipment for Nuclear Power Generation Stations", 2003, in section 6.2.1 reads as follows:

"**6.2.1 Aging**

The ability of Class 1E equipment to perform its safety function might be affected by changes due to environmental and operational conditions over time. The qualification program shall specifically address effects of aging in evaluating the significances. The techniques available to address the effects of aging include operating experience, testing, analysis, in-service surveillance, condition monitoring and maintenance activities."

10CFR50.49 e (5), (Aging) requires important to safety equipment located in harsh environments that is qualified by test to be pre-conditioned by natural or artificial (accelerated) aging to its end-of-life condition prior to type testing. ASME QME-1, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants", requires aging assessments as part of the qualification process. Items with significant aging mechanisms shall have qualified lives established by engineering analysis. IEEE 1205, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment used in Nuclear Power Plants" requires on going aging assessments for operating power facilities. For Class 1E equipment in harsh environments that is qualified by testing, the test program will include aging preconditioning as listed in IEEE 323, Section 6.3.1.1, Test Plan.

The US-APWR EQP is based on these standards. These details are implemented on a project specific basis as delineated in MUAP-08015, R1 and no further changes are anticipated in the DCD or Technical Report at this time to address this question.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. RAI 03.11-26:

Section 4.1.1 of MUAP 08015, Rev 0, states: "Compliance by the licensee (owner) with 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," and the associated guidance in RG 1.160 is considered sufficient to provide reasonable assurance that environmental considerations established during design are reviewed every refueling outage and maintained on a continuing basis to ensure that the qualified design life has not been reduced by thermal, radiation, and/or cyclic degradation resulting from unanticipated operational occurrences or service conditions." This statement is incorrect because compliance with the minimum requirements of 10 CFR 50.65, the Maintenance Rule, provides no reasonable assurance whatsoever that the specific areas in question are reviewed, such as environmental considerations for every refueling outage. Revise Section 4.1.1 of MUAP 08015, to state how specific maintenance requirements provided by vendors and determined by engineering judgment (periodic tests, calibrations, and inspections) for EQ, condition monitoring and preventive maintenance activities should provide reasonable assurance that the qualified design life has not been reduced and remains capable of fulfilling its intended function.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev. 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project. The licensee's EQP addresses the long term surveillance of qualified SSCs once the plant enters service. Specifics of the licensee's long term programs are beyond the scope of the US-APWR EQP. However, the licensee will formulate and implement an EQP as a condition of licensure. This program will be reviewed and accepted by the NRC prior to fuel load (see NUREG 0800 Section 3.11 which states: "For COL reviews, the description of the operational program and proposed implementation milestone(s) for the

environmental qualification program are reviewed in accordance with 10 CFR 50.49. The implementation milestone for the environmental qualification program is to have all qualification requirements met prior to the loading of fuel. Implementation is required by a license condition."). The reference in MUAP 08015 R1, US-APWR Equipment Qualification Program, Section 4.1.1 indicates that the as worded, reference to adherence to Regulatory Guide 1.160 is sufficient to meet licensee commitments to long term equipment qualification monitoring. Regulatory Guide (RG) 1.160 provides clear guidance that the intent of the Maintenance Rule, 10CFR50.65, is to be interpreted in the broadest sense and that licensee programs are to be integrated (e.g., surveillances, calibration, testing and repairs along with equipment qualification requirements). It is the licensee's responsibility to comply with the guidance in RG 1.160 in meeting the requirements of 10CFR50.65 and in so doing will meet the programmatic requirements applicable to long term monitoring of equipment qualification conditions. MUAP-08015, R1 discusses the EQP implementation for a specific project in Chapter 9 and 10 and the licensee's program implementation in Ch 11.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Supplemental Response

Section 11 of MUAP-08015, R1, discusses the licensee's Operating Equipment Qualification Program (OEQP). The intent of the last paragraph of Section 4.1.1 of MUAP-08015, R1 is to indicate that the on going verification of continued qualification of qualified components is an operational concern and is addressed in the OEQP. The wording in Section 4.1.1 of MUAP-08015, R1, concerning 10CFR50.65 and Reg. Guide 1.160 is consistent with the specific guidance provided by the NRC in NUREG 0800, Sec. 3.11, Item 15, page 10.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. RAI 03.11-27:

In US-APWR, DCD, Tier 2, Section 3.11, an equivalent qualification process is used for qualifying equipment subject to a loss of ventilation (3.11.4), estimated chemical and radiation environment (3.11.5), and mechanical equipment (3.11.6). All site-specific equipment will be qualified by using the equivalent qualification process "to that delineated for the US-APWR standard plant." By contrast, equipment subject to chemical and radiation exposures under Chemical Environment (3.11.5.1) and Radiation Environment (3.11.5.2) indicated to be qualified "pursuant to the implementation of the US-APWR EQ program." Explain the difference in equipment qualification that is performed by the equivalent qualification process vs. the US-APWR EQ program. Provide details of what parameters are used to establish the equivalency in the process. Identify where the equivalent qualification process is defined or explained.

ANSWER:

An overview of the US-APWR Equipment Qualification Program (EQP) is provided in the US-APWR DCD Section 3.11 and in greater detail in MUAP 08015, Rev 1, US-APWR Equipment Qualification Program. MUAP-08015 has been revised and is no longer issued as Rev. 0. The EQP is implemented on a project specific basis by the implementation of project specific equipment qualification procedures as explained in MUAP 08015, Rev 1. The US-APWR EQP is a manufacturer's EQP pursuant to the distinction in 10CFR50.49(a) and 10CFR52. As such, the US-APWR EQP is implemented to provide qualified and documented structures, systems and components (SSCs) to the specific project. The licensee's EQP addresses the long term surveillance of qualified SSCs once the plant enters service. The question relates to the phrase "equivalent qualification process". This expression "equivalent qualification process" was addressed in the answer to RAI 445-2795, Question 3.11-16. Site specific qualification processes are addressed in the answer to COLA RAI 2765 (CP RAI #73), Question 03.11-08, 09, and 10.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Supplemental Response

No additional supplemental response to this RAI is provided or was requested.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO. RAI 03.11-28:

The ITAAC for systems that contain equipment required to be qualified for a harsh environment typically only mention Class 1E (safety-related) electrical equipment. This language would include equipment in these systems required by 10 CFR 50.49(b)(1) to be qualified, but does not state whether the applicant has determined that there is no equipment that is non-Class 1E, the failure of which could impact a safety function, which equipment, if any, would be required to be qualified under 10 CFR 50.49(b)(2). In addition, such equipment, if any, must not fail in a manner adverse to safety, nor mislead the operator. Therefore, the applicant is requested to provide additional information, specifically to revise its ITAAC to address all applicable equipment important to safety that would be required to be qualified by 10 CFR 50.49(b)(1) and (b)(2), if any, or explain whether it has determined, and the basis for that determination, that there is no 50.49(b)(2) equipment among these systems.

ANSWER:

The ITAAC for qualification of safety-related electrical equipment subjected to a harsh environment apply to the DCD Tier 1 equipment to which 10CFR50.49(b)(1) applies. Based on MHI's review of the Environmental Qualification Equipment List in DCD Tier 2 Table 3D-2 Revision 2, there is no non-safety related electrical equipment in the EQ program that is required to be qualified to a harsh environment to meet 10CFR50.49(b)(2). Therefore, no specific ITAAC to address 10CFR50,49(b)(2) are applicable. Post accident monitoring (PAM), which may be subject to both 10CFR50.49(b)(1) and 10CFR50.49(b)(3), are addressed by ITAAC Item 3 in Table 2.5.4-1.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

Supplemental Response

It is not necessary to establish a broad ITACC item for 10 CFR 50.49 b(2) items as existing programs implemented during the design, procurement, construction, startup and subsequent operation of a US-APWR provide adequate assurance that these items are properly qualified for their service conditions. Specifically, the US-APWR Equipment Qualification Program provides for the identification and qualification for every SSC, whether safety class or non-safety class, used to construct a US-APWR. Examples of this include items such as electrical cables used in containment. Regardless of the SSC that is served by these cables, they will be properly selected and qualified for such items as temperature, radiation, chemicals, aging, pressure and fire (retardation) and be so documented. Existing administrative and quality controls, specific SSC programs (e.g., IEEE 344 per RG 1.89) and design review procedures provide mechanisms to properly identify and document that b(2) items are environmentally and seismically qualified. The approach applicable to b(2) items used in the US-APWR licensing documents is consistent with the approach employed by the other Nuclear plant suppliers.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's responses to the NRC's questions.