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September 29, 2009

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-09463

Subject: MHI's Responses to US-APWR DCD RAI Nos. 444-2531 and 445-2759

References:
1) "Request for Additional Information No. 444-2531 Revision 1, SRP Section: 03.11 – Environmental Qualification of Mechanical and Electrical Equipment, Application Section: 3.11," dated 8/25/2009.
2) "Request for Additional Information No. 445-2759 Revision 0, SRP Section: 03.11 – Environmental Qualification of Mechanical and Electrical Equipment, Application Section: 3.11," dated 8/25/2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. 444-2531, Revision 1," and "Response to Request for Additional Information No. 445-2759, Revision 0."

Enclosed are the responses to 10 RAIs contained within Reference 1.

Enclosed is the response to 1 RAI contained within Reference 2.

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.

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NRO

Enclosures:

1. Responses to Request for Additional Information No. 444-2531, Revision 1
2. Response to Request for Additional Information No. 445-2759, Revision 0

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

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Enclosure 1

UAP-HF-09463
Docket No. 52-021

Responses to Request for Additional Information No. 444-2531,
Revision 1

September, 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/29/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 444-2531 REVISION 1**
SRP SECTION:	**03.11 – ENVIRONMENTAL QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-6:

10 CFR 52.47(a)(9) requires evaluation of the design against NRC Standard Review Plan (SRP) in effect 6 months before docket date. The SRP states that a process must be established to determine the suitability of materials, parts, and equipment needed for safety-related functions, and to verify that the design of such materials, parts, and equipment is adequate. The SRP also states that verification of design (i.e., qualification) for components located in harsh environments shall be demonstrated by appropriate testing and analysis. The NRC staff considers that testing at the actual conditions desired for qualification will normally provide the most assurance that the nonmetallic will perform acceptably. Analysis can be an effective method of demonstrating the information for one nonmetallic to the qualification of another. However, great care should be taken to ensure that the methods used for the comparison are valid and appropriate for the specific qualification activity. Details of the material analysis such as description of analytical methods, assumptions, justifications, supporting test data, conclusions, and limitations shall be recorded in the qualification documentation for each component. The test/analysis shall establish a qualification life or replacement schedule for the nonmetallic which shall be recorded in the qualification documentation.

Qualification for mechanical components is limited to non-metallic materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, and diaphragms.) Section 6.2.3 of Technical Report MAUP-08015(R0), USAPWR Equipment Environmental Qualification Program," provides a general description of the US-APWR qualification process for safety-related mechanical equipment. Section 6.2.3 does not fully describe the qualification process for mechanical components. The program description and its implementation should include attributes such as equipment identification, safety-related function, performance criteria, identification of service conditions, material capabilities, description of potential failures, qualification procedure, and equipment qualification maintenance records. The applicant is requested to further describe the qualification process for safety-related mechanical equipment or provide a COL information item for the COL applicant to address these issues.

ANSWER:

The qualification process for mechanical components will be further described in the Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program," to be issued in October 2009. The program description and its implementation includes: equipment identification, safety-related function, performance criteria, identification of service conditions, type of materials, qualification procedures and the transition from the project specific equipment qualification program used during the design, procurement, construction, testing phases of the project and the COL Applicant's equipment qualification program including the maintenance of environmental qualification (EQ) records for the life of the facility.

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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RAI NO.:	**NO. 444-2531 REVISION 1**
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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-7:

Section 6.2 of Technical Report MAUP-08015(R0), US-APWR Equipment Environmental Qualification Program," states that qualification by analysis is generally limited to equipment where the Design Basis Accident (DBA) does not impose stresses additive to those imposed during normal operation in such a manner as to cause common mode failure. NRC staff does not consider this statement to be accurate for qualification of nonmetallic components in a harsh environment. The NRC staff considers that testing at the actual conditions will provide the most assurance that the nonmetallic will perform acceptably and is the desired method of qualification. If an analysis is performed for qualification of nonmetallics, the analysis shall include verification of the stresses during normal operation plus those during the DBA. The purpose of this qualification is to ensure the component will perform its intended function throughout its required operating time. Details of the material analysis shall be documented in the equipment qualification list for each component. If the DBA does not impose stresses additive to those imposed during normal operation, the cumulative effect of the stresses and operation time are to be considered in the qualification process. The qualification needs to verify the qualified life. The applicant is requested to further describe the process for qualification by testing and analysis as it relates to the mechanical equipment.

ANSWER:

The process for qualification by testing and analysis as it relates to the mechanical equipment will be further described in the Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. The qualification processes for mechanical equipment will be identified to comply with QME-1, including applicable appendices, as well as other standards identified in MUAP-08015(R1).

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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Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 444-2531 REVISION 1**
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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-8:

Section 6.2.2 of Technical Report MAUP-08015(R0), US-APWR Equipment Environmental Qualification Program," states that substitution of parts or materials is acceptable if a comparison or analysis of their "form, fit, and function" supports the conclusion that the equipment performance is equal or better than the originally qualified equipment. NRC staff does not consider this substitution method to be sufficiently clear for staff acceptance. If alternate nonmetallics or change in configuration of nonmetallic is used, the effects of these changes should be evaluated to determine if the nonmetallics qualification has been affected. If it has been affected, testing or analysis should be performed to qualify the substitute nonmetallic. Analysis may be used provided it is documented; it demonstrates that the substituted nonmetallics are equal or superior to the qualified nonmetallics in material, design, and application, and it demonstrates that they do not compromise the performance of the mechanical equipment under any postulated normal, abnormal, and/or accident condition. If analysis cannot demonstrate qualified life, then the substitute nonmetallic should be qualified by testing. All testing and/or analysis evaluations are to be documented in the equipment qualification records. The applicant is requested to further describe the process for substitution of parts or materials.

ANSWER:

The qualification process for substitution of parts or materials for mechanical and nonmetallic components will be further described in the Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. The qualification processes for mechanical equipment will be identified to comply with ASME QME-1, including applicable appendices, as well as other standards, such as those provided by EPRI and NUPIC as identified in MUAP-08015(R1).

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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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-9:

Section 4.1.1 of Technical Report MAUP-08015(R0), US-APWR Equipment Environmental Qualification Program," states that for mechanical equipment located in a mild environment, acceptable design can be demonstrated by design/purchase specification process for the equipment. NRC staff does not consider this section to fully describe the design/purchase specification process. This section should clarify the following attributes of an acceptable design/purchase specification process.

a. The vendor shall provide a certificate of conformance that the component meets all environmental parameters. The certificate shall include qualified life, replacement schedule, replacement instructions, and shelf life for each nonmetallic.

b. To ensure the nonmetallic meets the design/purchase specification and remains qualified for the design life determined by the vendor, the COL applicant must develop a maintenance/surveillance/preventive maintenance program to monitor the nonmetallic to ensure it remains qualified for the design life. The SRP (Section II, SRP Acceptance Criteria, item 15) provides guidance for using the 10CFR 50.65 program and associated guidance in RG1.160 to provide reasonable assurance that nonmetallic remain qualified for the designed life.

The applicant is requested to further describe the process for demonstrating an acceptable design using design/purchase specifications or provide a COL information item for the COL applicant to address this item.

ANSWER:

The process for demonstrating an acceptable design using design/purchase specifications will be further described in the Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009.

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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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-10:

Tier 2, Section 3.11.2.2 and Section 6.2.3 of Technical Report MAUP-08015(R0), USAPWR Equipment Environmental Qualification Program," describe the environmental qualification process for mechanical equipment. However, these sections do not describe the qualification process for evaluating the cumulative effect of all environmental conditions (including radiation and chemical) for the length of time the component is required to operate. The operation time includes both normal service plus required operation during the postulated environment. The applicant is requested to further describe the qualification process for evaluating the cumulative effect of all environmental conditions (including radiation and chemical) for the length of time the component is required to operate or provide a COL information item for the COL applicant to address this item.

ANSWER:

The qualification process for evaluating the cumulative effect of all environmental conditions (including radiation and chemical) for the length of time the component is required to operate will be further described in the Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. MUAP-08015(R1) will describe the role of the COL Applicant's EQ program as it applies to long term surveillances and inspections that are intended to detect long term deterious effects of radiation, chemical and aging. The COL Applicant's EQ program, as described in Chapter 13 of the COLA, provides that the operating EQ program is to be implemented prior to initial fuel load. To be in compliance with the applicable requirements, the COL Applicant's EQ program includes provisions to address long term cumulative effects on equipment qualification.

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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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-11:

US-APWR Environmental Qualification Program does not address degradation of electric motor output under high temperature conditions. The applicant is requested to further describe the process for verifying electric motor output under high temperature conditions.

ANSWER:

The process for verifying electric motor output under high temperature conditions will be further described in Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. MUAP-08015(R1) will describe the role of the COL Applicant's EQ program as it applies to long term surveillances and inspections that are intended to detect long term effects of high temperatures to important to safety electric motors. The COL Applicant's EQ program, as described in Chapter 13 of the COLA, provides that the operating EQ program is to be implemented prior to initial fuel load. To be in compliance with the applicable requirements, the COL Applicant's EQ program includes provisions to address degradation of important to safety electric motors due to high temperature.

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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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-12:

The US-APWR Environmental Qualification Program does not address the environmental qualification process for dynamic restraints (snubbers) and their nonmetallic subcomponents. The applicant is requested to further describe the environmental qualification process for dynamic restraints (snubbers) and their nonmetallic subcomponents.

ANSWER:

The environmental qualification process for dynamic restraints (snubbers) and their nonmetallic subcomponents will be further described in Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. The Snubber preventative maintenance program, surveillance and replacement part EQ program are part of the COL Applicant's long term surveillance, inspection and calibration programs described in Chapter 13 of the COLA. It should be noted per DCD Subsection 6.2.1.2.1, the US-APWR design does not rely on piping restraints to limit the break area of potential high-energy piping failures within these sub-compartments.

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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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-13:

The SRP provides guidance which states that well-supported maintenance/surveillance and preventive maintenance programs ensure that equipment that meets the design/purchase specifications is qualified for the designed life. Compliance with 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and associated guidance is necessary 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. The US-APWR EQ program does not specify use of these types of programs to ensure that equipment that meets the design/purchase specifications is qualified for the designed life. The applicant is requested to further describe the use of maintenance/surveillance and preventive maintenance programs to ensure that equipment that meets the design/purchase specifications is qualified for the designed life or provide a COL information item for the COL applicant to address this in its FSAR.

ANSWER:

The use of maintenance/surveillance and preventive maintenance programs, that ensures equipment meets the design/purchase specifications and is qualified for the designed life, will be further described in Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009. The COL Applicant's EQ program is described in Chapter 13 of the COLA and is to be implemented prior to initial fuel load. The Technical Report MUAP-08015(R1) will indicate that the ongoing testing and inspection program implemented by the COL Applicant (and subsequently accepted by the NRC) addresses the issue of on-going surveillance of SSCs.

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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US-APWR Design Certification

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RAI NO.:	**NO. 444-2531 REVISION 1**
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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-14:

Tier 2, Chapter 3, Section 3.11.2 states that an applicant or licensee who references the US-APWR Design Certification rule performs and demonstrates conformance with the ITAAC in conjunction with the licensing process. The applicant is requested to discuss the intent of this statement and clarify the meaning regarding ITAAC.

ANSWER:

The US NRC Reg. Guide 1.68, "Initial Test Programs (ITP) for Water-Cooled Nuclear Power Plants" identifies that requirements regarding ITAAC for DC and COL applications are set forth in 10 CFR 52.47, 52.80 and 52.158. DCD Subsection 3.11.2 states that the US-APWR COL Applicant performs and demonstrates ITAAC by performing a number of tests and design verification listed in Table 3.11-1 as related to the US-APWR EQ Program. The DCD further states that "Verification of conformance to the EQ Program objectives includes performance of various construction and startup tests and then after turnover to the licensee, periodic surveillances and inspections. Routine maintenance and calibrations performed by the licensee are intended to detect degradations in SSCs in time to allow repairs or replacement of these items. Licensee ISI programs as well as replacement of plant components within the plant's 60-year lifetime assure compliance with EQ Program requirements. These licensee programs minimize the possibility of unknown effects, including common mode failures going undetected."

US NRC Reg. Guide 1.68 states that requirements of ITAAC overlap with ITP preoperational tests. Technical Report MUAP-08015(R1), "US-APWR Equipment Qualification Program" will describe the qualification process for mechanical components during the design, procurement, construction and testing phases of a US-APWR project and the subsequent turnover of the EQ program to the COL Applicant (licensee). The ITAAC items are cleared as the project progresses.

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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US-APWR Design Certification

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RAI NO.:	**NO. 444-2531 REVISION 1**
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APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-15:

In Attachment A of Technical Report MAUP-08015(R0), the applicant references ASME QME-1-2007 to provide the requirements and guidelines for qualification of active mechanical equipment. Will the guidance in ASME QME-1-2007 be used for the qualification of non-metallic mechanical components? If not, the applicant is requested to describe the how the qualification of nonmetallics for US-APWR will differ from the process described in Appendix QR-B of ASME QME-1-2007.

ANSWER:

The guidance given in ASME QME-1 and associated appendices (QR-B, QP, QDR, QV) will be used to qualify non metallic components and will be stated in the Technical Report, MUAP-08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009.

The qualification of non-metallic components of active mechanical equipment is performed per requirements and guidelines of Appendix QR-B of ASME QME-1-2007.

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.

Enclosure 2

UAP-HF-09463
Docket No. 52-021

Responses to Request for Additional Information No. 445-2759,
Revision 0

September, 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/29/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 445-2759 REVISION 0**
SRP SECTION:	**03.11 – ENVIRONMENTAL QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT**
APPLICATION SECTION:	**3.11**
DATE OF RAI ISSUE:	**08/25/09**

QUESTION NO. RAI 03.11-16:

US-APWR DCD Tier 2, Section 3.11.6, "Qualification of Mechanical Equipment," specifies that the COL Applicant is to provide the site-specific mechanical equipment requirements, and that this equipment is to be qualified using an equivalent qualification process to that delineated for the US-APWR standard plant. The NRC expectation is that site-specific mechanical equipment be qualified using methods described in Section 3.11 of the DCD and in Technical Report MAUP-08015(R0), US-APWR Equipment Environmental Qualification Program." The DC applicant is requested to describe and justify the "equivalent qualification process," including how this qualification process differs from the qualification process for mechanical equipment as described in Section 3.11 of the DCD and in Technical Report MAUP-08015(R0) or delete reference to the equivalent qualification process.

ANSWER:

As discussed in DCD Subsection 3.11.4, 3.11.5 and 3.11.6, the COL Applicant is responsible for assuring that site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) is qualified. The phrase, "equivalent qualification process" simply means that site specific electrical and mechanical equipment will be qualified following the guidance that will be provided in MUAP 08015(R1), "US-APWR Equipment Qualification Program" to be issued in October 2009, which will describe the implementation of a project and site specific equipment qualification process. However, the statement will be grammatically corrected to indicate "a qualification process that is equivalent" to the US-APWR standard plant.

Impact on DCD

See Attachment 1 for the mark-up of DCD Tier 2, Section 3.11 changes to be incorporated.

- Change the first sentence of the second paragraph in Subsection 3.11.4 to the following: "The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using

a qualification process that is equivalent to that delineated for the US-APWR standard plant, as described in Technical Report MUAP-08015(R1)."

- Change the second sentence in Subsection 3.11.5 to the following: "This equipment is to be qualified using a qualification process that is equivalent to that delineated for the US-APWR standard plant, as described in Technical Report MUAP-08015(R1)."

- Change the second sentence of the second paragraph in Subsection 3.11.6 to the following: "This equipment is to be qualified using a qualification process that is equivalent to that delineated for the US-APWR standard plant, as described in Technical Report MUAP-08015(R1)."

- Change *COL 3.11(6)* in Subsection 3.11.7 to the following:

  COL 3.11(6) *The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using a qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).*

See Attachment 2 for the mark-up of DCD Tier 2, Section 1.8 changes to be incorporated.

- Change *COL 3.11(6)* in Table 1.8-2 to the following:

  COL 3.11(6) *The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using a qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).*

Impact on COLA

FSAR sections corresponding to the impacted DCD sections will need to be revised to be consistent with the DCD, including revising the COL Item statement in FSAR Table 1.8-201.

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using ~~an equivalent~~ qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1). This includes equipment that is subject to environmental control systems including heat tracing and air conditioning.

3.11.5 Estimated Chemical and Radiation Environment

The COL Applicant is to identify chemical and radiation environmental requirements for site-specific qualification of electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment). This equipment is to be qualified using ~~an equivalent~~ qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).

3.11.5.1 Chemical Environment

The adverse effects of various chemicals used within the plant are normally contained by design. However, during a DBA, various chemicals can be released into the equipment's environment, which could impair the ability of the equipment to operate. The impact of the various chemicals used in the plant is factored into the design and EQ process. Chemical exposure also includes the potential for exposure to hydrogen based on a 100% fuel-clad metal-water reaction (10 CFR 50.44(c), [Reference 3.11-19]). Equipment subject to chemical exposure, including submergence, are qualified with concentrations of chemicals equivalent or more severe than those resulting from the most limiting mode of the plant operations associated with DBAs. Mechanical equipment is evaluated during the design (analysis) and procurement phases for exposure to various chemicals applicable to normal and off normal conditions. Requirements to be able to withstand the effects of chemical exposure are factored into the procurement process. Equipment subject to chemical exposure following a DBA is identified and qualified, pursuant to the implementation of the US-APWR EQ Program.

3.11.5.2 Radiation Environment

Areas in the plant are subject to varying levels of radiation exposure during normal and accident conditions. Radiation environments also exist in those plant areas where there is the potential for airborne contamination, for those process and effluent streams where contamination is possible, and in accessible areas as a result of unusual radiological events. The normal operational radiation exposure is based on the radiation sources (source term) provided in Chapter 12.

The radiation sources presented in this DCD are developed from the DBA available data and in accordance with NUREG-1465 (Reference 3.11-20). The radiation dose rates and integrated doses of neutrons, beta, and gamma radiation which are associated with normal, accident, post-accident, test, and harsh environmental conditions for various plant areas and systems, are presented in Appendix 3D. Their parameters are presented in time-based units, wherever applicable.

The expected levels of radiation exposure factored into the design process are based on the type of radiation, the total dose expected during normal operation over the installed

life of the equipment, and the radiation environment associated with the most severe DBA during or following an accident in which the equipment is required to remain functional, including the radiation resulting from re-circulating fluids for equipment located near the re-circulating lines and including dose-rate effects. Equipment that will not be exposed to total integrated doses of 10^4 Rads as a result of a DBA is not qualified for radiation exposure in most cases. In all cases, each piece of equipment in a potential harsh environment is evaluated for the need for qualification due to radiation exposure.

Electrical and mechanical equipment subject to radiation exposure is qualified for use in the US-APWR pursuant to the implementation of the US-APWR EQ Program. For equipment that is only located in areas considered harsh by the potential presence of radiation, this equipment is qualified by analysis and partial test data with the appropriate considerations for margins and aging effects.

3.11.6 Qualification of Mechanical Equipment

The qualification of mechanical equipment is included in Subsection 3.11.2.1.

The COL Applicant is to provide the site-specific mechanical equipment requirements. This equipment is to be qualified using ~~an equivalent~~ qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).

3.11.7 Combined License Information

COL 3.11(1) *The COL Applicant is responsible for assembling and maintaining the environmental qualification document, which summarizes the qualification results for all equipment identified in Appendix 3D, for the life of the plant.*

COL 3.11(2) *The COL Applicant is to describe how the results of the qualification tests are to be recorded in an auditable file in accordance with requirements of 10 CFR 50.49 (j).*

COL 3.11(3) *The COL Applicant is to provide a schedule showing the EQ Program proposed implementation milestones.*

COL 3.11(4) *The COL Applicant is to describe periodic tests, calibrations, and inspections to be performed during the life of the plant, which verify the identified equipment remains capable of fulfilling its intended function.*

COL 3.11(5) *The COL Applicant is to identify the site-specific equipment to be addressed in the EQ Program, including locations and environmental conditions.*

COL 3.11(6) *The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using ~~an equivalent~~ qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).*

Table 1.8-2 Compilation of All Combined License Applicant Items for Chapters 1-19 (sheet 16 of 44)

COL ITEM NO.	COL ITEM
COL 3.11(1)	*The COL Applicant is responsible for assembling and maintaining the environmental qualification document, which summarizes the qualification results for all equipment identified in Appendix 3D, for the life of the plant.*
COL 3.11(2)	*The COL Applicant is to describe how the results of the qualification tests are to be recorded in an auditable file in accordance with requirements of 10 CFR 50.49 (j).*
COL 3.11(3)	*The COL Applicant is to provide a schedule showing the EQ Program proposed implementation milestones.*
COL 3.11(4)	*The COL Applicant is to describe periodic tests, calibrations, and inspections to be performed during the life of the plant, which verify the identified equipment remains capable of fulfilling its intended function.*
COL 3.11(5)	*The COL Applicant is to identify the site-specific equipment to be addressed in the EQ Program, including locations and environmental conditions.*
COL 3.11(6)	*The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using a~~n equivalent~~ qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015(R1).*
COL 3.11(7)	*The COL Applicant is to identify chemical and radiation environmental requirements for site-specific qualification of electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment).*
COL 3.11(8)	*The COL Applicant is to provide the site-specific mechanical equipment requirements.*
COL 3.11(9)	*Optionally, the COL Applicant may revise the parameters based on site-specific considerations.*
COL 3.12(1)	*Deleted*