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September 8, 2009

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

Attention: Mr. Jeffrey A. Ciocco,

Docket No. 52-021
MHI Ref: UAP-HF-09441

Subject: MHI's Responses to US-APWR DCD RAI No. 424-3281 Revision 0

Reference: 1) "Request for Additional Information No. 424-3281 Revision 0, SRP Section: 14.03.06 – Electrical Systems - Inspections, Tests, Analyses, and Acceptance Criteria Application Section: SRP 14.03.06" dated July 27, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 424-3281 Revision 0."

Enclosed are the responses to Questions 14.03.06-15 through 14.03.06-18 that are contained within Reference 1.

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

Sincerely,

Y. Ogata

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

Enclosure:

1. Responses to Request for Additional Information No.424-3281 Revision 0

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

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NRO

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Docket No. 52-021
MHI Ref: UAP-HF-09441

Enclosure 1

UAP-HF-09441
Docket No. 52-021

Responses to Request for Additional Information No. 424-3281
Revision 0

September 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

09/08/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 424-3281 REVISION 0**

SRP SECTION: **14.03.06 - ELECTRICAL SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: SRP 14.03.06

DATE OF RAI ISSUE: **07/27/2009**

QUESTION NO.: 14.03.06-15

In RAI 32-738, Question 14.03.-1 the staff requested MHI to provide COL applicant (COLA) interface requirements in the US-APWR DCD for site-specific ITAACs for the switchyard and offsite power systems that are needed for operation and safe shutdown of the plant. The ITAACs should include provisions to verify by inspection and/or test the direct connections of offsite power sources to the class 1E divisions including the adequacy of voltage, capacity, independence/separation and stability of frequency of the offsite sources. In this RAI, the staff listed ten offsite power system items (a through j) that require ITAACs in accordance with the guidelines of RG 1.206, C111.7.2.

MHI in its response to the staff RAI stated that it will add an interface requirement in Tier 1, Section 3.0, for the specified items for the verification of the as-built system by the COL applicant. Further MHI stated that some of the items listed in the staff RAI are addressed in Section 8.2 (4) and (5) of the US-APWR, DCD Rev 1. The staff has examined Section 8.2 (4) and (5) of the US-APWR, DCD Rev 1 and finds that the description provided in Section 8.2 (4) and (5) of Revision 1 of the DCD does not adequately answer the staff's concern on the site-specific ITAACs.

The staff and MHI discussed the site-specific ITAACs listed in the staff RAI 32-738, Question 14.03.-1 (items a through j) during the teleconference held on March 23, 2009. During these discussions, MHI agreed with the staff that it will provide interface requirements in the upcoming revisions of the US-APWR DCD (Rev 2) for the COL applicant to develop site-specific ITAACs for the switchyard and offsite power systems as listed below.

a. A minimum of two independent offsite transmission circuits from the transmission network (TN) to the safety buses with no intervening non-safety buses (direct connection).

   An ITAAC is required to verify the as-built electrical system conforms to the configuration cited in (a) above and can perform its intended safety function. MHI agreed to add an inspection of the as-built design as a COL interface requirement in the DCD Tier 1, Revision 2.

b. Voltage variations of the offsite TN during steady-state operation shall not cause voltage variations at the loads of more than plus or minus 10 percent of the loads' nominal ratings.

   MHI agreed to add an analysis of the as-built design as a COL interface requirement in DCD Tier 1, Revision 2.

c. The normal steady state frequency of the offsite TN shall be within plus or minus 2 Hz of 60 Hz during recoverable periods of system instability.

MHI agreed to add an analysis of the as-built design as a COL interface requirement in DCD Tier 1, Revision 2.

d. The capacity and capability of each circuit to power the required loads during steady state, transient, and postulated events and accident conditions. This should include proper operation and load carrying capability of breakers, switchgear buses, transformers, and cables.

MHI agreed to add an analysis of the as-built design as a COL interface requirement in DCD Tier 1, Revision 2.

e. The independence and separation of the offsite circuits and onsite class 1E electrical system and components.

MHI agreed to add an analysis and inspection of the as-built design as a COL interface requirement in DCD Tier 1, Revision 2.

f. The appropriate lightning protection and grounding features for the system and components of the offsite circuits from the TN to the safety buses.

MHI agreed to add an inspection of the as-built design as COL interface requirement in DCD Tier 1 Revision 2 that appropriate lightning protection and grounding features for the system and components are provided.

g. Instrumentation, controls and alarms used for monitoring switchyard equipment status.

Appropriate instrumentation and alarms are required for monitoring switchyard equipment and their status in order for the plant operators to assess whether the offsite power system is available or not, or has adequate voltage and frequency. MHI agreed to add an inspection of the as-built design as COL interface requirement in DCD Tier 1 Revision 2 to assure that appropriate instrumentation, controls and alarms are available to NPP operators for monitoring switchyard equipment and its status,

h. The proper operation of the automatic fast transfer capability of the preferred power supply to the non-preferred power supply, i.e., from the reserve auxiliary transformer (RAT) to the unit auxiliary transformer (UAT).

MHI agreed to add an inspection of the as-built design as COL interface requirement in DCD Tier 1 Revision 2 to ensure that the offsite power system is constructed and installed in accordance with the approved designed and the installed system can perform its intended safety function.

i. Switchyard interface agreement and protocols with the TN system operator/owner in accordance with the guidance given in GL 2006-2.

In order for plant operators to assess whether the offsite power system has adequate voltage, capacity and stability (one contingency operation), switchyard interface agreement and protocols between the nuclear power plant (NPP) and the TN system operator are required in accordance with the guidance given in GL 2006-2. MHI agreed to add an inspection of switchyard agreement and protocols between the NPP and TN Operator as a COL interface requirement in DCD Tier 1 Revision 2 for ensuring reliable offsite power is available to the NPP.

j. Because of its importance to safety, provide ITAAC or interface requirements (such as transient stability analysis) for the offsite power system (switchyard) to assess minimizing the probability of losing electric power from any of the remaining supplies as a result of or coincident with, the loss of power generated by the nuclear unit, the loss of power from the TN, or the loss of the largest load.

MHI agreed to add an analysis of the as-built design as a COL interface requirement in DCD Tier 1, Revision 2 for the transient stability analysis.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

ANSWER:

a. *A minimum of two independent offsite transmission circuits from the transmission network (TN) to the safety buses with no intervening non-safety buses (direct connection).*

MHI will add an interface requirement to Section 3.2 for a minimum of two independent offsite transmission circuits from the transmission network (TN) to the safety buses with no intervening non-safety buses.

b. *Voltage variations of the offsite TN during steady-state operation shall not cause voltage variations at the loads of more than plus or minus 10 percent of the loads' nominal ratings.*

MHI will add an interface requirement to Section 3.2 to verify the voltage variations of the offsite TN during steady state operations do not cause voltage variations beyond an acceptable tolerance of the loads' nominal ratings.

c. *The normal steady state frequency of the offsite TN shall be within plus or minus 2 Hz of 60 Hz during recoverable periods of system instability.*

MHI will add an interface requirement to Section 3.2 for the normal steady state frequency of the offsite TN to be within an acceptable tolerance of 60 Hz during recoverable periods of instability.

d. *The capacity and capability of each circuit to power the required loads during steady state, transient, and postulated events and accident conditions. This should include proper operation and load carrying capability of breakers, switchgear buses, transformers, and cables.*

MHI will add an interface requirement to Section 3.2 for the as-built system to have the capacity and capabilities to power the required loads during steady state, transient, and postulated events and accident conditions.

e. *The independence and separation of the offsite circuits and onsite class 1E electrical system and components.*

MHI will add an interface requirement to Section 3.2 for the as-built electrical system to verify the independence and separation of the offsite circuits and the onsite Class 1E electrical system and components.

f. *The appropriate lightning protection and grounding features for the system and components of the offsite circuits from the TN to the safety buses.*

MHI will add an interface requirement to Section 3.2 for the COL applicant to verify the appropriate as-built lightning protection and grounding features exist for the offsite circuits from the TN to the safety buses.

g. *Instrumentation, controls and alarms used for monitoring switchyard equipment status.*

MHI will add an interface requirement to Section 3.2 for the COL applicant to verify the as-built electrical system has alarms and displays for monitoring the switchyard

equipment status.

h. *The proper operation of the automatic fast transfer capability of the preferred power supply to the non-preferred power supply, i.e., from the reserve auxiliary transformer (RAT) to the unit auxiliary transformer (UAT).*

MHI will add an interface requirement to Section 3.2 for the COL applicant to verify that the as-built electrical system will automatically transfer power supply from the RAT to the UAT.

i. *Switchyard interface agreement and protocols with the TN system operator/owner in accordance with the guidance given in GL 2006-2.*

MHI will add an interface requirement to Section 3.2 for the COL applicant for switchyard agreements and protocols between the NPP and the TN operator in accordance with GL 2006-2.

j. *Because of its importance to safety, provide ITAAC or interface requirements (such as transient stability analysis) for the offsite power system (switchyard) to assess minimizing the probability of losing electric power from any of the remaining supplies as a result of or coincident with, the loss of power generated by the nuclear unit, the loss of power from the TN, or the loss of the largest load.*

MHI will add an interface requirement to Section 3.2 for the COL applicant to assess the probability of losing electric power caused by the loss of power generated by the nuclear unit, the loss of power from the TN, or the loss of the largest load.

Impact on DCD

MHI will revise DCD Tier 1 Chapter 3 and Tier 2 Chapter 14 as shown in Attachments 1 and 2.

Impact on COLA

COLA Part 10 will include ITAAC to address the DCD Tier 1 Chapter 3 interface requirements shown in Attachment 1. FSAR Subsection 14.3.4.6 will also refer to the site-specific electrical systems ITAAC.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

09/08/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 424-3281 REVISION 0**

SRP SECTION: **14.03.06 - ELECTRICAL SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: SRP 14.03.06

DATE OF RAI ISSUE: **07/27/2009**

QUESTION NO.: 14.03.06-16

In RAI 32-738, Question 14.03.-2 the staff requested MHI to provide interface requirements in the US-APWR DCD for the transmission switchyard and onsite power system in accordance with 10 CFR 52.79(b) under Tier 2 interface requirements. Also, the staff questioned MHI on the COL interface requirements with respect to GDC 17 for offsite transmission system analysis for loss of the unit or the largest unit, for voltage operating range, for maintaining transient stability, and for the RCP bus voltage to remain above the voltage required to maintain the flow assumed in Chapter 15 analyses following a turbine trip.

During the teleconference held on March 23, 2009, MHI agreed that it will revise Section 8.2 (3) in the upcoming revisions of the DCD (Rev 2) to include COLA interface requirements for grounding and lightning protection. Also, MHI agreed that it will revise Section 8.2 (11) in the upcoming revisions of the DCD (Rev 2) to include COLA interface requirements for Stability study analysis in accordance with GDC requirements to address the loss of the unit, or the largest unit, or largest load, or the most critical transmission line including voltage operating range, for maintaining transient stability.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

ANSWER:

MHI will revise COL Item 8.2(3) to include a COLA interface requirement for grounding and lightning protection.

MHI will revise COL item 8.2(11) to include COLA interface requirements for Stability study analysis in accordance with the GDC requirements to address loss of the unit, or loss of the largest unit, or largest load or loss of the most critical transmission line including operating range, for maintaining transient stability.

Impact on DCD

The descriptions of COL items 8.2(3) and 8.2(11) in Tier 2 Table 1.8-2 will be revised as follows (only the affected table rows are shown):

COL 8.2(3)	*The COL applicant is to address **the** plant switchyard **which** includes layout, control system and characteristics of circuit breakers and buses, **and lightning and grounding protection equipment**.*
COL 8.2(11)	*The COL applicant is to address **the** stability and reliability study of the offsite power system. Stability study is to be addressed in accordance with BTP 8-3 (Reference 8.2-17). **The study addresses the loss of the unit, loss of the largest unit, loss of the largest load, or loss of the most critical transmission line including operating range, for maintaining transient stability.** A failure modes and effects analysis (FMEA) is to be provided.*

Tier 2 Section 8.2 COL Item 8.2(3) will be revised as follows to include the interface requirement for lightning and grounding protection:

"The COL applicant is to address **the** plant switchyard **which** includes layout, control system and characteristics of circuit breakers and buses**, and lightning and grounding protection equipment**."

Tier 2 Section 8.2 COL Item 8.2(11) will be revised as follows to include the interface requirement for stability study analysis in accordance with the GDC requirements.

"The COL applicant is to address **the** stability and reliability study of the offsite power system. Stability study is to be addressed in accordance with BTP 8-3 (Reference 8.2-17). **The study addresses the loss of the unit, loss of the largest unit, loss of the largest load, or loss of the most critical transmission line including operating range, for maintaining transient stability.** A failure modes and effects analysis (FMEA) is to be provided."

Impact on COLA

The FSAR, including Table 1.8-201 and Section 8.2, is impacted by the changes to COL 8.2(3) and COL 8.2(11).

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

09/08/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 424-3281 REVISION 0**

SRP SECTION: **14.03.06 - ELECTRICAL SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: SRP 14.03.06

DATE OF RAI ISSUE: **07/27/2009**

QUESTION NO.: 14.03.06-17

In RAI 32-738, Question 14.03-4 the staff requested MHI to provide a description of the applicable tests and acceptance criteria for the tests that will be conducted for the onsite electric power system to assess its continuity, availability and condition of system components as listed under item 9 in Table 2.6.1-3.

During the teleconference held on March 23, 2009, MHI agreed that it will describe the tests required for assessing condition of system components and acceptance criteria in Table 2.6.1-3 for the onsite electric power system in upcoming Revision 2 of the DCD.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

ANSWER:

ITAAC Item 9 in Table 2.6.1-3 has the following AC:

> "The as-built Class 1E ac power systems can perform appropriate periodic inspection and testing in order to assess the system continuity, availability and condition of the system components."

This ITAAC addresses the 10 CFR 50 Appendix A General Design Criterion (GDC) 18 requirement for inspectability and testability of electric power systems, per SRP 14.3 Appendix C Electrical Systems Review Checklist Item 1.G.

IEEE 308 provides the criteria for design of Class 1E power systems including pre-operational testing and periodic testing. Criteria for the establishment of the periodic test program are referred to IEEE 338. ITAAC Item 9 in Table 2.6.1-3 is not intended to require additional specific tests other than those required in other ITAAC items, pre-operational testing, periodic testing and maintenance. The ITA of Item 9 in Table 2.6.1-3 will be revised in response to RAI 32 to include testing as a means of verifying the system design capability to permit testing. The AC of Item 9 in Table 2.6.1-3 will be revised to clarify this item.

Impact on DCD

DCD Tier 1 Table 2.6.1-3 will be revised as follows:

9. The Class 1E ac power systems are designed to permit appropriate periodic inspection and testing in order to assess the system continuity, availability and condition of the system components.	9. ~~An inspection~~ Inspections **and testing** of the as-built Class 1E ac power systems will be performed.	9. ~~The as-built Class 1E ac power systems can perform appropriate~~ Periodic inspection and testing **of the as-built Class 1E ac power systems can be performed** in order to assess the system continuity, availability and condition of the system components.

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

09/08/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 424-3281 REVISION 0**

SRP SECTION: **14.03.06 - ELECTRICAL SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: SRP 14.03.06

DATE OF RAI ISSUE: **07/27/2009**

QUESTION NO.: 14.03.06-18

In RAI 32-738, Question 14.03.-5 the staff requested MHI to revise Table 2.6.1-1 of the US-APWR DCD to include ac distribution equipment listed in RG 1.206, Appendix A, (pages C.I1.1-A-19 - C.11.1-A-22).

During the teleconference held on March 23, 2009, MHI agreed that it will include ITAACs for items listed below in the Table 2.6.1-1 of Revision 2 of the US-APWR DCD.

1. Lightning protection to verify that lightning protection is provided, installed and tested to perform its intended function;

2. Breaker coordination and medium voltage cables susceptible to moisture and electrical issues that are identified via functional inspections, generic letters, circulars, RISs, NRC bulletins and Ins;

3. Tiebreakers in the 480 volt systems and vital instrument buses to assure their design and operational features;

4. Post fire safe shutdown circuit analysis and supporting breaker coordination and a testing program for the protective devices credited in the safe shutdown circuit analysis; and

5. Harmonics introduced by non-linear loads and their potential effects on class 1E equipment.

The staff requests that MHI docket its response confirming the above actions to resolve this RAI question.

ANSWER:

NRC Item 1: *Lightning protection to verify that lightning protection is provided, installed and tested to perform its intended function.*

MHI Response: ITAAC item for lightning protection will be added to Table 2.6.7-1.

NRC Item 2: *Breaker coordination and medium voltage cables susceptible to moisture and electrical issues that are identified via functional inspections, generic letters, circulars, RISs, NRC bulletins and Ins.*

MHI Response: ITAAC for breaker coordination will be added to Table 2.6.1-3.
NRC Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," applies to inspection, testing and monitoring programs to detect the degradation of inaccessible or underground power cables that support systems that are within the scope of the maintenance rule (10 CFR 50.65). Therefore, MHI considers the potential for medium voltage cable degradation as described in GL 2007-01 to be in the scope of maintenance rule implementation. The COL applicant is responsible to develop and implement the maintenance rule program per COL 17.6(1). MHI will revise DCD Subsection 8.1.5.3.4 to reference GL 2007-01.

NRC Item 3: Tiebreakers in the 480 volt systems and vital instrument buses to assure their design and operational features.

MHI Response: NRC Generic Letter (GL) 91-11, Resolution Of Generic Issues 48, "LCOs For Class 1E Vital Instrument Buses," and 49, "Interlocks and LCOs For Class 1E Tie Breakers" Pursuant To 10 CFR 50.54(f), addresses improper lineups for Class 1E buses that have the potential to result in plant operation that does not meet the plant design bases, including single failure criteria. The recommended actions of GL 91-11 are as follows:

"Ensure that your plant has procedures that include time limitations and surveillance requirements for

1. Vital instrument buses (typically 120V ac buses),

2. Inverters or other onsite power sources to the vital instrument buses, and

3. Tie breakers that can connect redundant Class 1E buses (ac or dc) at one unit or that can connect Class 1E buses between units at the same site."

These actions are primarily addressed via administrative controls including compliance with DCD Chapter 16 Technical Specifications (TS), i.e.:

- TS 3.8.7 and 3.8.8 require inverter operability and verification of proper inverter alignments to the vital ac buses.
- TS 3.8.8. and 3.8.9 require operability of the Class 1E ac and dc buses, including verification of proper breaker alignment.

Implementation of administrative controls to maintain proper electrical system lineup is an operational matter that is addressed outside of the ITAAC process. DCD Tier 1, Revision 2 will include ITAAC to verify the design features related to electrical division independence and separation, including:

- ITAAC items 2 and 3 in DCD Tier 1 Table 2.6.1-3, for independence of Class 1E electrical distribution system equipment
- ITAAC items 4 and 5 in Table 2.6.2-2, for independence of dc power system divisions
- ITAAC items 6 and 7 in Table 2.6.3-3, for independence of Class 1E I&C power supply system divisions
- ITAAC items 8 and 9 in Table 2.6.3-3, for Class 1E I&C power supply transfer capability to provide uninterruptible power supply (UPS).

NRC Item 4: *Post fire safe shutdown circuit analysis and supporting breaker coordination and a testing program for the protective devices credited in the safe shutdown circuit*

analysis.

MHI Response: ITAAC item for post fire safe shutdown circuit analyses, breaker coordination and testing program will be added to Table 2.6.1-3.

NRC Item 5: *Harmonics introduced by non-linear loads and their potential effects on class 1E equipment.*

MHI Response: ITAAC item for harmonics introduced by non-linear loads and their potential effects on class 1E equipment will be added to Table 2.6.1-3.

Impact on DCD

The AC Electric Power Systems Design Description of DCD Tier 1 Subsection 2.6.1.1 will be revised to add the following after the eighth paragraph:

Class 1E ac electric distribution system overcurrent protection is set for proper coordination.

The post-fire safe-shutdown circuit analysis ensures that one success path of shutdown SSCs remains free of fire damage.

The potential effects of harmonics introduced by non-linear loads are evaluated for effects on Class 1E equipment.

DCD Tier 1 Table 2.6.1-3 will be revised to add ITAAC items 21 through 23 as follows:

21. Class 1E ac electric distribution system overcurrent protection is set for proper coordination.	**21. Analyses of ac electrical distribution system overcurrent protection will be performed to verify proper coordination.**	**21. A report exists and concludes that the as-built Class 1E ac electric distribution system overcurrent protection is set for proper coordination.**
22. The post-fire safe-shutdown circuit analysis ensures that one success path of shutdown SSCs remains free of fire damage.	**22. Analyses of post fire safe shutdown circuit analysis and supporting breaker coordination will be performed.**	**22. A report exists and concludes that the post-fire safe-shutdown circuit analysis ensures that one success path of shutdown SSCs remains free of fire damage.**
23. The potential effects of harmonics introduced by non-linear loads are evaluated for effects on Class 1E equipment.	**23. Analyses will be performed to determine the potential effects on class 1E equipment of harmonics introduced by non-linear loads.**	**23. A report exists and concludes that the potential effects of harmonics introduced by non-linear loads do not adversely affect Class 1E equipment.**

DCD Tier 1 Table 2.6.7-1 will be revised to add ITAAC Item 2 as follows:

1. The ~~follow~~ **following** grounding ~~and lightning protection~~ **systems connect** ~~system connects~~ to the station grounding grid:	1. An inspection of the as-built grounding ~~and lightning protection~~ system will be performed to verify :	1. The **following** as-built **grounding ~~and lightning protection~~ systems ~~connection~~** connect to **the** station grounding grid ~~exists for the following~~:

a. the system ~~natural~~ **neutral** grounding of the MG, MT, UATs, RATs, SSTs, Class 1E EPSs and AAC power ~~AAC s~~ **sources** b. the equipment grounding of the equipment enclosures, raceways and metal structures c. the I&C grounding ~~d. the lightning protection~~	a. the system ~~natural~~ **neutral** grounding connects to station grounding grid b. the equipment grounding connects to station grounding grid c. the I&C grounding connects to station grounding grid ~~d. the lightning protection connects to station grounding grid~~	a. the system ~~natural~~ **neutral** grounding **of the MG, MT, UATs, RATs, SST, Class 1E EPSs and AAC power sources.** b. the equipment grounding **of the equipment enclosures, raceways and metal structures** c. the I&C grounding ~~d. the lightning protection.~~
2. Lightning protection system is provided for US-APWR buildings and exposed structures.	**2. Inspection of the as-built lightning protection system will be performed.**	**2. The as-built lightning protection system for plant buildings and exposed structures exist.**

DCD Tier 2 Subsection 8.1.5.3.4, "NRC Generic Letters," will be revised to add Generic Letter 2007-01 after Generic Letter 2006-02 as follows:

- **Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients."**

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

3.0 INTERFACE REQUIREMENTS

3.1 Design Description

This section identifies the safety significant interfaces between the US-APWR standard plant design and the Combined License (COL) applicant.

The US-APWR standard plant design consists of several buildings (reactor building including the prestressed concrete containment vessel and containment internal structure, power source buildings, auxiliary building, turbine building and access building); the equipment located in those buildings, and structures (power source fuel storage vaults and essential service water pipe tunnel). As allowed by the regulations, conceptual designs for systems that are not part of the US-APWR standard design are included in the DCD for purposes of allowing the NRC to evaluate the overall acceptability of the design. However, the final details of these conceptual designs are subject to change due to site-specific conditions.

An interface requirement as specified in this section is the portion of a system that must be added to the standard design package to complete the design of the US-APWR at a specific site.

A COL applicant referencing the certified design is responsible to assure that the site-specific design meets the interface requirement and verify the conformance in the ITAAC process that is similar to those provided in the certified design.

3.2 Interface Requirements

3.2.1 Ultimate Heat Sink

Ultimate heat sink (UHS) is a safety-related system and is site-specific. The maximum supply water temperature is 95 °F under the peak heat loads condition to provide sufficient cooling capacity to ESWS.

The UHS keeps the water level at a net positive suction head (NPSH) greater than the pump's required NPSH.

3.2.2 Fire Protection System

The seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.

3.2.3 Electrical System

The offsite power system and components are site-specific. The following features are important interface requirements:

a. The electrical system has a minimum of two independent offsite transmission circuits from the transmission network (TN) to the safety buses with no intervening non-safety buses (direct connection).

b. The offsite TN voltage variations during steady state operation do not cause voltage variations beyond an acceptable tolerance of the loads' nominal ratings.

c. The offsite TN normal steady state frequency shall be within an acceptable tolerance of 60Hz during recoverable periods of instability.

d. The offsite transmission circuits have the capacity and capability to power the required loads during steady state, transient, and postulated events and accident conditions.

e. There is physical separation and electrical independence between the offsite circuits and onsite class 1E electrical system and components.

f. Lightning protection and grounding features exist for the systems and components of the offsite circuits from the TN to the safety buses.

g. The electrical system has alarms and displays for monitoring the switchyard status.

h. The electrical system has the capability to automatically fast transfer from the preferred power supply to the non-preferred power supply.

i. The switchyard agreement and protocols between the NPP and the TN owner/operator assess the risk and probability of a loss of offsite power due to performing maintenance activities on the electrical system.

j. The electrical system design assesses the probability of losing power during the loss of power generated by the nuclear unit, the loss of power from the TN, or the loss of the largest load.

~~COL applicant referencing the certified design is responsible to assure that the site-specific design meets the interface requirement and verify the conformance in the ITAAC process that is similar to those provided in the certified design.~~

Attachment 2

14.3.4.6 ITAAC for Electrical Systems

Section 2.6 of Tier 1, which addresses electrical systems, is prepared in accordance with the guidance in RG 1.206 (Reference 14.3-1), SRP 14.3 (Reference 14.3-2), and SRP 14.3.6 (Reference 14.3-10). ITAAC are provided for the entire station electrical system, including Class 1E portions of the system, the offsite power system (including site-specific interfaces addressed in Tier 1 Chapter 3), equipment qualification, major portions of the non-Class 1E system, and portions of the plant lighting, grounding, lighting systems, and containment electrical penetrations. ITAAC for electrical systems and equipment verify the following:

- Equipment qualification for seismic and harsh environments, verifying that Class 1E equipment is seismic Category I and that equipment located in a harsh environment is qualified
- Redundancy and independence, verifying Class 1E divisional assignments and independence of electric power by both inspections and tests
- Capacity and capability, including such attributes as adequate sizing of the electrical system equipment and its ability to respond to postulated events and its ability to power the loads
- Electrical protection features, including attributes such as analyzing the ability of the as-built electrical system equipment to withstand and clear electrical faults analyzing the protection feature coordination
- Displays, controls, and alarms, verifying by inspection the ability to retrieve the information (displays and alarms) and to control the electrical power system in the MCR and/or at locations provided for remote shutdown
- Offsite power, verifying by inspection the direct connection of offsite power sources to the Class 1E divisions as well as the adequacy of voltage, capacity, and independence/separation of the offsite sources and appropriate lightning protection and grounding features
- Containment electrical penetrations, including verifying that all electrical containment penetrations are protected against postulated currents greater than their continuous current rating
- The alternate ac power source, verifying through inspection and testing of the gas turbines and their auxiliaries the availability of the this power source for station blackout (SBO) events, as well as its independence from other ac sources
- Lighting, including the continuity of power sources for plant lighting systems to assure that portions of the plant lighting remain available during accident scenarios and power failures

portion of the design is in conformance with the certified design. The site-specific portions of the design are those portions of the design that are dependent on characteristics of the site.

Chapter 3 of Tier 1 also identifies the scope of the design to be certified by specifying the systems that are completely or partially out of scope of the certified design. Thus, interface requirements are defined for: (a) systems that are entirely outside the scope of the design, and (b) the out-of-scope portions of those systems that are only partially within the scope of the standard design based on the above methodology.

14.3.6 Combined License Information

COL 14.3(1) *The COL applicant provides the ITAAC for the site specific portion of the plant systems specified in Subsection 14.3.5, Interface Requirements. [14.3.4.6, 14.3.4.7]*

COL 14.3(2) *The COL applicant provides proposed ITAAC for the facility's emergency planning not addressed in the DCD in accordance with RG 1.206 (Reference 14.3-1) as appropriate. [14.3.4.10]*

COL 14.3(3) *Deleted*

14.3.7 References

14.3-1 Combined License Applications for Nuclear Power Plants (LWR Edition). Regulatory Guide 1.206, U.S. Nuclear Regulatory Commission, Washington, DC, June 2007.

14.3-2 'Inspections, Tests, Analyses, and Acceptance Criteria,' "Initial Test Program and ITAAC – Design Certification," Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants. NUREG-0800, SRP 14.3, Initial Issuance, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

14.3-3 'Issuance of Combined Licenses,' "Licenses, Certifications, and Approvals for Nuclear Power Plants," Energy. Title 10, Code of Federal Regulations, Part 52.97, U.S. Nuclear Regulatory Commission, Washington, DC.

14.3-4 'Contents of Applications; Additional Technical Information,' "Licenses, Certifications, and Approvals for Nuclear Power Plants," Energy. Title 10, Code of Federal Regulations, Part 52.80, U.S. Nuclear Regulatory Commission, Washington, DC.