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TOKYO, JAPAN

February 20, 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-09059

Subject: MHI's Responses to US-APWR DCD RAI No.161-1812 Revision 0

Reference: 1) "REQUEST FOR ADDITIONAL INFORMATION NO. 161-1812 REVISION 0, SRP Section: 16 - Technical Specifications Application Section: 16, QUESTIONS for Technical Specification Branch (CTSB)" dated January 21, 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.161-1812 Revision 0."

Enclosed are the responses to the questions contained within Reference 1. Of these questions, question 16-117 will not be answered within this package. MHI will need additional internal discussions for the response to question 16-117. The date of the response to this question is currently under discussion.

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.158 Revision 0

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

D081
NRO

<u>Contact Information</u>

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Enclosure 1

UAP-HF-09059
Docket No. 52-021

Responses to Request for Additional Information No.161-1812
Revision 0

February 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 161-1812 REVISION 0**
SRP SECTION:	**16 - TECHNICAL SPECIFICATIONS**
APPLICATION SECTION:	**16**
DATE OF RAI ISSUE:	**1/21/2009**

QUESTION NO.: 16-115

GENERAL EDITORIAL

Improve the references in the US-APWR Bases to clearly define the material being referred within a FSAR Chapter. The US-APWR References listed in the Bases refer simply to "Chapter X" when referencing another chapter in the US-APWR FSAR, where X is the chapter number.

References in the Bases Section of US-APWR FSAR are inexact and do not provide sufficient information for the reader to locate the applicable referred information. References to the chapters and sections from the US-APWR FSAR should be more complete and annotated such as "US-APWR FSAR Rev. n, Chapter X, Section X.Y.Z.". Acceptable guidance on the inclusion of references can be found in TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specificatins."

ANSWER:

NRC suggested inserting "FSAR" before Chapter No., but our document submitted for design certification is named "Design Control Document (DCD)", not "FSAR". Moreover, since Chapter 16 itself is a part of DCD and it is clear that Chapter No. indicates other chapter within a same document, it is not necessary to insert "DCD" before each Chapter No. We would like to add that a plant specific TS (PTS) referencing US-APWR GTS should include a term "FSAR" or "DCD" because PTS will become an independent document from DCD and/or COLA. As for NRC suggestion to replace Chapter No. by Section No., we agree that it would be easer to find the specific location. So we accept NRC suggestion, though we use "Subsection x.y.z", instead of "Section x.y.z."

Impact on DCD

The DCD Chapter 16, TS 2.1.1 BASES, References are revised as follows:

2. Subsection 4.4.1.1~~Chapter 4~~
3. Subsection 7.2.1~~Chapter 7~~

The DCD Chapter 16, TS 3.1.1 BASES, References are revised as follows:

2. Section 15.1 and 15.4~~Chapter15~~

The DCD Chapter 16, TS 3.1.4 BASES, References are revised as follows:

3. Subsection 15.0.2.5 and 15.4.3~~Chapter15~~

The DCD Chapter 16, TS 3.1.5 BASES, References are revised as follows:

3. Section 15.1, 15.4 and Subsection 15.0.0.2.5~~Chapter15~~

The DCD Chapter 16, TS 3.1.6 BASES, References are revised as follows:

3. Section 15.1, 15.4 and Subsection 15.0.0.2~~Chapter15~~

The DCD Chapter 16, TS 3.1.7 BASES, References are revised as follows:

2. Section 15.1, 15.4 and Subsection 15.0.0.2.3~~Chapter15~~

The DCD Chapter 16, TS 3.1.8 BASES, on page B3.1.8-3, in the fifth paragraph are revised as follows:

> Section 14.2~~Chapter 14~~ (Ref.6) defines requirements for initial testing of the facility including PHYSICS TESTS. The zero, low power, and power tests are summarized in this section~~chapter~~.

And REFERENCES are revised as follows:

6. Section 14.2~~Chapter 14~~

The DCD Chapter 16, TS 3.1.9 BASES, on page B3.1.9-4, in the third paragraph are revised as follows:

> Section 14.2~~Chapter 14~~ (Ref.6) defines requirements for initial testing of the facility including PHYSICS TESTS. The zero, low power, and power tests are summarized in this section~~chapter~~.

And REFERENCES are revised as follows:

6. Section 14.2~~Chapter14~~

The DCD Chapter 16, TS 3.2.1 BASES, References are revised as follows:

2. Subsection 15.0.0.1.2~~Chapter15~~

The DCD Chapter 16, TS 3.2.2 BASES, References are revised as follows:

1. Subsection 15.0.0.1.2~~Chapter15~~

The DCD Chapter 16, TS 3.2.3 BASES, References are revised as follows:

2. Subsection 15.0.0.2.3~~Chapter15~~

The DCD Chapter 16, TS 3.2.4 BASES, References are revised as follows:

2. Subsection 15.0.0.1.2~~Chapter15~~

The DCD Chapter 16, TS 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5, and 3.3.6 BASES, the revision of the references will be discussed in RAI answers to RAI No.167-1769.

The DCD Chapter 16, TS 3.4.9 BASES, References are revised as follows:

1. Subsection 15.0.0.2.2 ~~Chapter 15~~

The DCD Chapter 16, TS 3.4.10 BASES, References are revised as follows:

3. Subsection 5.2.2 ~~Chapter 5~~

The DCD Chapter 16, TS 3.4.14 BASES, References are revised as follows:

6. Subsection 3.9.6.3.4 ~~Chapter 3~~

The DCD Chapter 16, TS 3.5.1 BASES, References are revised as follows:

1. Subsection 6.2.1 ~~Chapter 6~~
3. Subsection 15.6.5 ~~Chapter 15~~
4. Subsection 19.1.4.1.2 ~~Chapter 19~~

The DCD Chapter 16, TS 3.5.2 BASES, References are revised as follows:

3. Subsection 6.2.1 ~~Chapter 6~~
4. Subsection 15.6.5 ~~Chapter 15~~

The DCD Chapter 16, TS 3.5.4 BASES, References are revised as follows:

1. Subsection 6.2.2 ~~Chapter 6~~
2. Subsection 15.6.5 ~~Chapter 15~~

The DCD Chapter 16, TS 3.5.5 BASES, References are revised as follows:

1. Section 6.3 ~~Chapter 6~~
2. Subsection 15.6.5.5 ~~Chapter 15~~

The DCD Chapter 16, TS 3.6.1. BASES, References are revised as follows:

2. Subsection 15.7.4~~Chapter 15~~
3. Subsection 6.2.1~~Chapter 6~~

The DCD Chapter 16, TS 3.6.2. BASES, References are revised as follows:

2. Subsection 6.2.1~~Chapter 6~~

The DCD Chapter 16, TS 3.6.3 BASES, References are revised as follows:

1. Subsection 15.6.5.5 ~~Chapter 15~~
2. Subsection 6.2.4 ~~Chapter 6~~

The DCD Chapter 16, TS 3.6.4. BASES, References are revised as follows:

1. Subsection 6.2.1~~Chapter 6~~

The DCD Chapter 16, TS 3.6.6 BASES, References are revised as follows:

3. Subsection 15.6.5.5 ~~Chapter 15~~
4. Subsection 6.2.1 ~~Chapter 6~~

The DCD Chapter 16, TS 3.7.1 BASES, References are revised as follows:

1. Subsection 10.3.2.3.2 ~~Chapter 10~~
3. Section 15.2 ~~Chapter 15~~

The DCD Chapter 16, TS 3.7.2 BASES, References are revised as follows:

1. Subsection 10.3.2.3.4 ~~Chapter 10~~
2. Subsection 6.2.1 ~~Chapter 6~~
3. Subsection 15.1.5 ~~Chapter 15~~

The DCD Chapter 16, TS 3.7.3 BASES, References are revised as follows:

1. Subsection 10.4.7.2.2 ~~Chapter 10~~

The DCD Chapter 16, TS 3.7.4 BASES, References are revised as follows:

1. Subsection 10.3.2.3.3 ~~Chapter 10~~
2. Subsection 15.6.3 ~~Chapter 15~~

The DCD Chapter 16, TS 3.7.5 BASES, References are revised as follows:

1. Subsection 10.4.9 ~~Chapter 10~~

The DCD Chapter 16, TS 3.7.6 BASES, References are revised as follows:

1. Subsection 10.4.9.2.1 ~~Chapter 10~~
2. Subsection 6.2.1.4 ~~Chapter 6~~

The DCD Chapter 16, TS 3.7.7 BASES, References are revised as follows:

1. Subsection 9.2.2 ~~Chapter 9~~

The DCD Chapter 16, TS 3.7.8 BASES, References are revised as follows:

1. Subsection 9.2.1 ~~Chapter 9~~
2. Subsection 5.4.7 ~~Chapter 5~~

The DCD Chapter 16, TS 3.7.13 BASES, References are revised as follows:

1. Section 9.1 ~~Chapter 9~~

The DCD Chapter 16, TS 3.8.1 BASES is revised as follows:

The last sentence of third paragraph in BACKGROUND of TS 3.8.1 BASES on page B3.8.1-1 is revised as follows:

A detailed description of the offsite power network and the circuits to the Class 1E 6.9kV buses is found in Section 8.2~~Chapter 8~~ (Ref. 2).

The second paragraph in LCO of TS 3.8.1 BASES on page B3.8.1-3 is revised as follows:

Qualified offsite circuits are those that are described in Section 8.2~~Chapter 8~~ (Ref. 2) and are part of the licensing basis for the unit.

The REFERENCES of TS 3.8.1 BASES on page B3.8.1-29 is revised as follows:

2. Section 8.2~~Chapter 8~~

The DCD Chapter 16, TS 3.8.2 BASES is revised as follows:
The last sentence of second paragraph in LCO of TS 3.8.2 BASES on page B3.8.2-2 is revised as follows:

Qualified offsite circuits are those that are described in Section 8.2~~Chapter 8~~ (Ref. 1) and are part of the licensing basis for the unit.

The REFERENCES of TS 3.8.2 BASES on page B3.8.2-5 is revised as follows:

1. Section 8.2~~Chapter 8~~

The DCD Chapter 16, TS 3.8.3 BASES is revised as follows:

The first sentence of first paragraph in BACKGROUND of TS 3.8.3 BASES on page B3.8.3-1 is revised as follows:

Each Class 1E Gas Turbine Generator (GTG) is provided with a storage tank having a fuel oil capacity sufficient to operate that gas turbine for a period of 7 days while the Class 1E GTG is supplying maximum post loss of coolant accident load demand discussed in Subsection 9.5.4~~Chapter 9~~ (Ref. 1).

The REFERENCES of TS 3.8.3 BASES on page B3.8.3-8 is revised as follows:

2. Subsection 9.5.4~~Chapter 9~~

The DCD Chapter 16, TS 3.8.4 BASES is revised as follows:

The first sentence of eighth paragraph in BACKGROUND of TS 3.8.4 BASES on page B3.8.4-2 is revised as follows:

Each battery has adequate storage capacity to meet the duty cycle(s) discussed in Subsection 8.3.2~~Chapter 8~~ (Ref 4).

The last sentence of eleventh paragraph in BACKGROUND of TS 3.8.4 BASES on page B3.8.4-2 is revised as follows:

Each battery charger also has sufficient excess capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads discussed in Subsection 8.3.2~~Chapter 8~~ (Ref. 4).

The REFERENCES of TS 3.8.4 BASES on page B3.8.4-9 is revised as follows:

2. Subsection 8.3.2~~Chapter 8~~

The DCD Chapter 16, TS 3.8.7 BASES is revised as follows:

The last sentence of first paragraph in BACKGROUND of TS 3.8.7 BASES on page B3.8.7-1 is revised as follows:

Specific details on inverters and their operating characteristics are found in Subsection 8.3.2~~Chapter 8~~ (Ref. 1).

The REFERENCES of TS 3.8.7 BASES on page B3.8.7-4 is revised as follows:

1. Subsection 8.3.1~~Chapter 8~~

The DCD Chapter 16, TS 3.9.1 BASES, References are revised as follows:

2. Subsection 15.4.6~~Chapter 15~~

The DCD Chapter 16, TS 3.9.2 BASES, References are revised as follows:

1. Subsection 15.4.6~~Chapter 15~~

The DCD Chapter 16, TS 3.9.4 BASES, References are revised as follows:

1. Subsection 15.7.4~~Chapter 15~~

The DCD Chapter 16, TS 3.9.5 BASES, References are revised as follows:

1. Subsection 5.4.7~~Chapter 5~~

The DCD Chapter 16, TS 3.9.6 BASES, References are revised as follows:

1. Subsection 5.4.7~~Chapter 5~~

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 161-1812 REVISION 0**
SRP SECTION:	**16 - TECHNICAL SPECIFICATIONS**
APPLICATION SECTION:	**16**
DATE OF RAI ISSUE:	**1/21/2009**

QUESTION NO.: 16-116

GENERAL

Justify in the Bases the frequency of 24 months for many Surveillance Requirements performed during plant outages. The justification presented in the Bases should include additional explanations related to consideration of design reliability and operating experience (refer to GL 91-04 for guidance). The discussion presented in NUREG-1431, Rev 3.1 justifies a frequency of 18 months and is not directly applicable.

The frequency of the Surveillance Requirements conducted during plant outages in the US-APWR TS is 24 months based on the need to perform the Surveillance under conditions that apply during a plant outage. For US-APWR, the plant outages are planned at 24 month intervals. [Examples of these requirements are SR 3.4.14.2, SR 3.4.15.3, SR 3.4.15.4, SR, 3.4.15.5, and 3.8.1.8 through 3.8.1.18]. This is different from NUREG-1431, Rev. 3.1 where such surveillances are conducted at a frequency of 18 months. The justification provided in the Bases in NUREG-1431 addresses two aspects: (a) need to perform the Surveillance under conditions that apply during a plant outage, and (b) consideration of design reliability and operating experience of the equipment. For US-APWR, operating experience with 24 month surveillance frequency is not available. However, the available operating experience with 18 month surveillance can be used to justify a 24 month surveillance frequency. Acceptability of 24 monthsurveillance frequency can be presented for design reliability using operating experience data from 18 month surveillance frequency. US-APWR uses the same sentence in NUREG-1431,"The Frequency is acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment." This explanation should be revised based on evaluations performed to justify the 24 month frequency.

ANSWER:

The related Bases will be revised as this RAI pointed out.

Impact on DCD

In Bases of DCD Chapter 16, the explanations of 24 month surveillance frequency will be revised as shown in Attachment 1 except the SRs, which are already justified in their Bases.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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2/20/2009

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RAI NO.: NO. 161-1812 REVISION 0

SRP SECTION: 16 - TECHNICAL SPECIFICATIONS

APPLICATION SECTION: 16

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QUESTION NO.: 16-118

Section 1.1 Definitions: (ACTUATION LOGIC TEST, Page 1.1-1)

Expand the discussion of the term, "ACTUATION LOGIC TEST," to differentiate the two separate applications of the term. Separate the term "ACTUATION LOGIC TEST" into two different terms to distinguish between the application of the test for analog equipment and the application of the test for digital equipment.

The applicant added new material to the term's definition to reflect the features of the US-APWR using digital equipment. The applicant added the words "For analog equipment" at the beginning of the first paragraph. Thus the applicant is using two different definitions for the same term. Revise the wording into two separate terms to remove any ambiguity.

ANSWER:

Definitions are revised to incorporate the comments in QUESTION NO.16-118.

Definition of “ACTUATION LOGIC TEST” in DCD Rev.1 is integrated for analog and digital equipment such that it is easy to relate to NUREG 1431. To remove ambiguity, “ACTUATION LOGIC TEST” will be separated to “ACTUATION LOGIC TEST – Analog” for application of test for analog equipment and “ACTUATION LOGIC TEST” for application of test for digital equipment, PSMS.

Impact on DCD

The description for ACTUATION LOGIC TEST in Section 1.1 of DCD Chapter 16 will be replaced as follows:

ACTUATION LOGIC TEST – Analog (application of test for analog equipment)
An ACTUATION LOGIC TEST - Analog (the application of the test for analog equipment) shall be the application of various simulated or actual input combinations in conjunction with each possible interlock logic state required for OPERABILITY of a logic circuit and the verification of the required logic output. The ACTUATION LOGIC TEST - Analog, as a minimum, shall include a continuity check of output devices.

ACTUATION LOGIC TEST (application of test for digital equipment, PSMS)
An ACTUATION LOGIC TEST is a check of the PSMS software memory integrity to ensure there is no change to the internal PSMS software that would impact its functional operation or the continuous self-test function.
The PSMS is self-tested on a continuous basis from the digital side of all input modules to the digital side of all output modules. Self-testing also encompasses all data communications within a PSMS train, between PSMS trains and between the PSMS and PCMS. For the PSMS the self-testing is described in Topical Report, "Safety I&C System Description and Design Process," MUAP-07004 Section 4.3 and Topical Report, "Safety System Digital Platform - MELTAC-," MUAP-07005 Section 4.1.5. The software
memory integrity test is described in Topical Report, "Safety I&C System Description and Design Process," MUAP-07004 Section 4.4.1 and Topical Report, "Safety System Digital Platform -MELTAC-," MUAP-07005 Section 4.1.4.1.c.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

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SRP SECTION:	**16 - TECHNICAL SPECIFICATIONS**
APPLICATION SECTION:	**16**
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QUESTION NO.: 16-119

Section 1.1, Definitions.

Include the term Risk-Managed Technical Specifications (RMTS), Surveillance Frequency Control Program (SFCP), and other terms associated with RMTS and SFCP to the list of definitions. These associated terms include:
Risk-Informed Completion Time (RICT)
Risk-Management Action Time (RMAT)
Configuration Risk Management (CRM)

Two Risk-Informed Technical Specification Initiatives (4b and 5b) have been accepted by USNRC for the implementation of risk-managed and risk-informed Technical Specifications. These initiatives are discussed in: i) NEI-06-09 (Revision 0), "Risk-Managed Technical Specifications (RMTS) Guidelines," November 2006 and ii) NEI-04-10 (Revision 1), "Risk-Informed Technical Method for Control of Surveillance Frequencies," April 2007. US-APWR TS is adopting these initiatives and accordingly, the associated terms used in the US-APWR TS should be defined. NEI 06-09 and NEI 04-10 contain definition of the terms.

ANSWER:

There is a note in 1.1 Definitions of STS (NUREG-1431, Rev.3.1), which states "(t)he defined terms of this section appear in capitalized type". Moreover, it is obvious that not all of the technical terms used in STS are included in this definition list. Though it is not perfectly clear about the criteria which terms have been selected to be included in this list, US-APWR Tech. Specs.(TS) has simply followed the current STS manner, which are supposed that the terms appearing in capitalized type in TS and/or in style of acronyms without definition have been selected. Based on this understanding, we don't think we should add the terms related Risk-Informed TS Initiatives 4b and 5b in Section 1.1. More specifically, it is justified as follows:
Regarding the Initiative 4b, we have used CRMP, RICT and RMTS as acronyms and defined each of them at the first appearance in TS as "Configuration Risk Management Program", "Risk-Informed Completion Time" and "Risk-Managed Technical Specifications" respectively. In addition, they do not appear in capitalized type.
Regarding the Initiative 5b, we don't use any acronym such as SFCP in TS. If the term "Surveillance Frequency Control Program" would be considered to be included in the definition list,

other terms such as "Inservice Testing Program", which appears in the same manner in FREQUENCY column of SURVEILLANCE REQUIREMENTS, should already be included in the list of STS. But actually it's not.
Consequently, we think it is not necessary to include the terms related Initiatives 4b and 5b used in US-APWR TS in the definition list.

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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2/20/2009

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QUESTION NO.: 16-120

Section 1.1, Definitions, (CHANNEL CALIBRATION, Page 1.1-2).

Identify, with examples, all of the devices listed in the first paragraph of "CHANNEL CALIBRATION" that are subject to drift. The applicant added new material to the term to reflect the unique features of the US-APWR. The new features include the calibration of devices that are subject to drift between surveillance intervals.

ANSWER:

For PSMS the devices subjected to drift between surveillance intervals, whose drift will affect the channel uncertainty, are limited to transmitters or sensors, and analog input modules. For the DAS the devices subjected to drift between surveillance intervals, whose drift will affect the channel uncertainty, are limited to transmitters or sensors, isolation modules, bistable modules and analog indicators.

There are no new devices subject to drift between surveillance intervals compared with existing US nuclear power plant.

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

2/20/2009

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QUESTION NO.: 16-121

Section 1.1, Definitions, (CHANNEL CALIBRATION, Page 1.1-2).

Indicate/justify the need for adding two new paragraphs for the definition of the term "CHANNEL CALIBRATION", one for the analog and the other for the binary measurements.

The two new paragraphs are details discussing the confirmation of the accuracy of the measurements, which are not considered part of the definition.

ANSWER

For conventional analog safety systems, Channel Calibration for analog measurements typically includes confirmation of signal processing functions, such as bistable actuation at specific setpoints. But for the PSMS, Channel Calibration is limited to the accuracy of the transmitter and analog input devices. Signal processing functions, such as bistable actuation at specific setpoints, are included in the Channel Operability Tests. But for binary inputs to the PSMS, actuation at specific setpoints is checked during Channel Calibration. Therefore, it is important to distinguish the tests for analog and binary devices.

In responding to this RAI, an error was identified. For binary Channel Calibration, the DCD will be changed to reference Section 4.4.1 of MUAP-07004.

Impact on DCD

The third paragraph on CHANNEL CALIBRATION in Section 1.1 of DCD Chapter 16 will be revised as follows:

> For binary measurements, the CHANNEL CALIBRATION confirms the accuracy of the channel's state change, as described in Topical Report, "Safety I&C System Description and Design Process," MUAP-07004 Section 4.4.21.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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QUESTION NO.: 16-122

Section 1.1, Defintions, (CHANNEL OPERATIONAL TEST - Page 1.1-3).

Expand the discussion of the term, "CHANNEL OPERATIONAL TEST," to differentiate the two separate applications of the term. Separate the term "CHANNEL OPERATIONAL TEST" into two different terms to distinguish between the application of the test for analog equipment and the application of the test for digital equipment.

The applicant added new material to the term's definition to reflect the features of the US-APWR using digital equipment. The applicant added the words "For analog equipment" at the beginning of the first paragraph. Thus the applicant is using two different definitions for the same term. Revise the wording into two separate terms to remove any ambiguity.

ANSWER:

Definitions are revised to incorporate the comments in QUESTION NO.16-122.

Definition of "CHANNEL OPERATIONAL TEST" in DCD Rev.1 is integrated for analog and digital equipment such that it is easy to relate to NUREG 1431. To remove ambiguity, "CHANNEL OPERATIONAL TEST" will be separated to "CHANNEL OPERATIONAL TEST – Analog" for application of test for analog equipment and "CHANNEL OPERATIONAL TEST" for application of test for digital equipment, PSMS.

Impact on DCD

The description for CHANNEL OPERATIONAL TEST in Section 1.1 of DCD Chapter 16 will be replaced as follows:

CHANEL OPERATIONAL TEST (COT) – Analog (application of test for analog equipment)
A COT - Analog shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY of all devices in the channel required for channel OPERABILITY. The COT - Analog shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints required for channel OPERABILITY such that the

setpoints are within the necessary range and accuracy. The COT- Analog may be performed by means of any series of sequential, overlapping, or total channel steps.

CHANNEL OPERATIONAL TEST (COT) (application of test for digital equipment, PSMS)
A CHANNEL OPERABILITY TEST is a check of the PSMS software memory integrity to ensure there is no change to the internal PSMS software that would impact its functional operation or the continuous self-test function.
The PSMS is self-tested on a continuous basis from the digital side of all input modules to the digital side of all output modules. Self-testing also encompasses all data communications within a PSMS train, between PSMS trains and between the PSMS and PCMS. For the PSMS the selftesting is described in Topical Report, "Safety I&C System Description and Design Process," MUAP-07004 Section 4.3 and Topical Report, "Safety System Digital Platform - MELTAC-," MUAP-07005 Section 4.1.5. The software memory integrity test is described in Topical Report, "Safety I&C System Description and Design Process," MUAP-07004 Section 4.4.1 and Topical Report, "Safety System Digital Platform -MELTAC-," MUAP-07005 Section 4.1.4.1.c.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-123

Section 1.1, Definitions, (TRIP ACTUATIING DEVICE OPERATING TEST (TADOT) - Page 1.1-8).

Add the TADOT to non-binary adjustable devices.

The applicant replaced "TADOT shall include adjustment" by "TADOT does not include adjustment" to reflect the added new text to the definition for using binary devices. However, unless there are no adjustable non-binary devices, the definition needs to add this possibility to the text, as indicated in the STS.

ANSWER:
The description will be revised same as indicated in the STS.

Impact on DCD
The description for TADOT in Section 1.1 of DCD Chapter 16 will be revised as follows:

A TADOT shall consist of operating the trip actuating device and verifying the OPERABILITY of all devices in the channel required for trip actuating device OPERABILITY. ~~A TADOT does not include adjustment of the trip actuating device so that it actuates at the required setpoint within the necessary accuracy. Therefore, a TADOT is typically applicable only to binary devices that are not subject to drift. However, some binary devices that are subject to drift and are calibrated infrequently, may also require a TADOT, on a more frequent basis, to confirm gross operability.~~ The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the necessary accuracy. The TADOT may be performed by means of any series of sequential, overlapping, or total channel steps.

Impact on COLA
There are impacts on the COLA to incorporate the DCD change.

Impact on PRA
There is no impact on the PRA.

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RAI NO.:	**NO. 161-1812 REVISION 0**
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QUESTION NO.: 16-124

Section 1.3, Completion Time, Example 1.3-8.

Revise the discussion in Example 1.3-8 to reflect the format suggested in NEI 06-09 regarding applications of the newly proposed Configuration Risk Management Program (CRMP).

The Risk-Informed Technical Specification Initiatives 4b, NEI-06-09 (Revision 0), "Risk-Managed Technical Specifications (RMTS) Guidelines," November 2006, discusses the requirement to establish a risk management approach for voluntary extensions of completion times for certain LCOs. Table 3-2 of NEI-06-09 (Revision 0) provides an example format for implementation of RMTS. The table is consistent with the format in STS NUREG-1431 and adheres to the human factors principles used in STS.

ANSWER:

Please see ANSWER to QUESTION NO. 16-134.

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.: 16-125

TS Section 1.1, Definitions, (STAGGERED TEST BASIS - Page 1.1-7).

Revise the text of this definition by placing the text of "Staggered Test Basis" between brackets.

As stated in TSTF-425, Rev 2, plants that adopt TSTF-425 will no longer use this defined term in the Technical Specifications and should remove it from Section 1.1. As written in Section 1.1 (page 1.1-7) "Staggered Test Basis" is not consistent with the Risk-Informed Technical Specification Initiative 5b in TSTF-425, Rev 2 for the markup to NUREG-1431.

The applicant needs to put the text between brackets, as the definition may need to be altered for those implementing a Surveillance Frequency Control Program (SFCP).

ANSWER:

Brackets are not needed for "Staggered Test Basis" in TS Section 1.1 Definition, because "Staggered Test Basis" is used in TS Subsection 5.5.20 Control Room Envelop Habitability Program based on TSTF-448 Rev.3.

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.: 16-126

Section 1.4, Frequency, (New addition).

Explain the implementation of a "Surveillance Frequency Control Program (SFCP)" by providing an example to illustrate the application of SFCP, similar to other examples in Section 1.4.

The Risk-Informed Technical Specification Initiatives 5b, NEI-04-10 (Revision 1), "Risk-Informed Technical Method for Control of Surveillance Frequencies," April 2007, discusses the requirement to establish a licensee control of surveillance test frequencies for majority of technical specifications surveillances. The surveillance test requirements (test methods) are not changed and remain in the specification. This methodology uses risk-informed performance based approach for establishment of surveillance frequencies, consistent with NRC RG 1.174. Probabilistic Risk Assessment (PRA) methods are used to determine the risk impact of revised intervals. The use of SFCP involves concepts that are different from the use and application of Frequency requirements presented in Section 1.4. An example explaining the concept used in defining the surveillance frequency and its implementation is necessary.

ANSWER:

We don't think it is necessary to provide a new example of SFCP in Section 1.4 by the following reasons:

1. The Technical Specifications Task Force Traveler, TSTF-425 Rev.2 titled "Relocate Surveillance Frequencies to Licensee Control - RITSTF Initiative5b" provides the format to incorporate SFCP into STS. But it doesn't provide any addition to Section 1.4, or any additional example for the explanation of surveillance requirements when incorporating SFCP.

2. Other programs such as "Inservice Testing Program", "Stream Generator Program" and so on appear in FREQUENCY columns of SURVEILLANCE REQUIREMENTS in STS in the same manner as SFCP does in US-APWR TS. Nevertheless there is no description regarding these programs in Section 1.4 of STS.

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.: 16-127

TS Section 3.0 (EDITORIAL).

The following typographical error was noted in US-APWR TS 3.0:

1. Page B 3.0-12, SR 3.0.1 BASES: A paragraph break is missing before the first full sentence on this page. The break should be before the word "Upon" for consistency with NUREG-1431 Rev 3.1 SR 3.0.1 BASES.

ANSWER:

The related Bases will be revised as this RAI pointed out.

Impact on DCD

The DCD will be revised to insert a paragraph break before the word "Upon" on Page B 3.0-12 as shown below.

Surveillances, including Surveillances invoked by Required Actions, do not have to be performed on inoperable equipment because the ACTIONS define the remedial measures that apply. Surveillances have to be met and performed in accordance with SR 3.0.2, prior to returning equipment to OPERABLE status.

Upon completion of maintenance, appropriate post maintenance testing is required to declare equipment OPERABLE. This includes ensuring applicable Surveillances are not failed and their most recent performance is in accordance with SR 3.0.2. Post maintenance testing may not be possible in the current MODE or other specified conditions in the Applicability due to the necessary unit parameters not having been established. In these situations, the equipment may be considered OPERABLE provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a MODE or other specified condition where other necessary post maintenance tests can be completed.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-128

LCO 3.0.6

Provide examples of a loss of safety function related to cross train checks in the USAPWR TS LCO 3.0.6 BASES.

NUREG-1431 Rev 3.1 provides several cross train check examples supported by a train/system configuration diagram. NUREG-1431, Rev 3.1 LCO TS 3.0.6 BASES provides additional discussion including a summary of the three conditions for loss of safety function provided in the Safety Function Determination Program, together with examples of each type of loss of safety function. This amplifies understanding of a potential loss of safety function.

ANSWER:

The related Bases will be revised as this RAI pointed out.

Impact on DCD

The DCD will be revised to include examples of a loss of safety function related to cross train checks as shown in Attachment 2.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-129

TS Section 4 - EDITORIAL.

The following are editorial notes need attention in US-APWR TS 4.0:

1. Page 4.0-1: Change the expression "24 rodlets" to "24 rods per assembly", as it is used in Table 4.2-2, of the FSAR.

2. Page 4.0-2: add the words "of the FSAR" after using the word, "Chapter 9" in 4.3.1.1a, 4.3.1.2b, and 4.3.1.2c.

3. Page 4.0-2: add the words "as described in Chapter 9 of the FSAR" after the phrase "an allowance for uncertainty" 4.3.1.1c.

ANSWER:

TS 4.0 of the DCD will be revised to incorporate the comments in QUESTION NO.16-129 and also in QUESTION NO.16-115.

Impact on DCD

1. The DCD Chapter 16, TS 4.2.2 will be revised as follows:

The reactor core shall contain 69 Rod Cluster Control Assemblies (RCCAs) each with 24 rods per assembly~~rodlets/RCCA~~. The RCCA adsorber material shall be silver indium cadmium as approved by the NRC.

2.and 3. The DCD Chapter 16, TS 4.3.1 will be revised as follows:

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent,

b. keff < 1.0 if fully flooded with unborated water, which includes an allowance for uncertainties as described in ~~Chapter 9~~Subsection 9.1.1 of the DCD,

c. keff = 0.95 if fully flooded with water borated to [200] ppm which includes an allowance for uncertainties as described in Subsection 9.1.1 of the DCD, and

d. A nominal 11.1 inch center to center distance between fuel assemblies placed in spent fuel storage racks.

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent,

b. keff = 0.95 if fully flooded with unborated water, which includes an allowance for uncertainties as described in ~~Chapter 9~~Subsection 9.1.1 of the DCD,

c. keff = 0.98 if moderated by aqueous foam, which includes an allowance for uncertainties as described in ~~Chapter 9~~Subsection 9.1.1 of the DCD, and

d. A nominal 16.9 inch center to center distance between fuel assemblies placed in the storage racks.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-130

TS Section 5.0 - EDITORIAL.

The following editorial note needs attention in US-APWR TS 5.0:

1. Page 5.6-4, Section 5.6.4b: Add the words "of the FSAR" after the word "Chapter 5" in subsection 5.6.4b. Also change "Chapter 5" by "Section (5.x.y)" to identify the specific location "x.y" of the referred section in the FSAR.

ANSWER:

Please see the answer of QUESTION 16-115.
This section will be revised in accordance with the above answer.

Additionally, there is a similar portion in Subsection 5.5.5. This section will be also revised.

Impact on DCD

The DCD Chapter 16, Subsection 5.6.4 is revised as follows:

b. the analytical methods used to determine the RCS pressure and temperature limits shall be those previously reviewed and approved by the NRC, specifically those described in Subsection 5.3.2 ~~the Chapter 5~~.

The DCD Chapter 16, Subsection 5.5.5 is revised as follows:

5.5.5 Component Cyclic or Transient Limit

This program provides controls to track Subsection 3.9.1~~the Chapter 3~~, cyclic and transient occurrences to ensure that components are maintained within the design limits.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-131

TS 5.5.19, Surveillance Frequency Control Program (SFCP).

Justify the use of SFCP to define a surveillance frequency in situations where the surveillance frequency is in the range of 24 months or longer.

Application of SFCP for such SRs may imply extending the SF until the next refueling outage, i.e., extending for another 24 months. Such extensions may be difficult to justify given that there is minimal or no experience for the 24 months surveillance frequency.

The US-APWR TS provides the option for using the SFCP for many surveillance requirements where the surveillance frequency is 24 months or 60 months. These surveillances are conducted during refueling outages. In many cases, the 24 months surveillance frequency can be considered an extension of the 18 months surveillance frequency since for this design the refueling interval is 24 months. Significant experience exists for 18 months surveillance frequency, but limited experience is available for the 24 months frequency. Justification for extending another 24 months is considered difficult based on operating experience and component reliability. Also, the risk analyses models may not be detailed enough to assess the risk implication of these surveillances. The surveillances conducted at the interval of 60 months can be considered to have as long a surveillance interval as is desirable for safety purposes. Any additional extension may not be desirable. The US-APWR should discuss the applicable considerations of NEI 04-10 and the analyses to be performed for use of SFCP for these types of SRs. It should also discuss the justification and need for using SFCP for these SRs.

ANSWER:

First of all, it should be emphasized that the application of SFCP to an existing fixed surveillance frequency does not mean the immediate extension of a surveillance time interval (STI) but only granting the possibility to change it. In general, there may be the case to shorten it.
The NRC mentions its concern to apply SFCP to a surveillance frequency of 24 months due to limited or lack of experience of 24 months cycle operation or longer. It can be understood that immediate extension over 24 months STI cannot be possible because there is no experience of 24 months cycle operation. But after sufficient experience would be accumulated with 24 months cycle operation, the situation might be different. The application of SFCP gives the future

possibility of STI extension over 24 months.
Moreover, assume the application of SFCP to, for example, a component with one month surveillance frequency requirement. There are operating experiences of the component only with surveillance per month. The SFCP allows one to consider the possibility to extend over one month of STI through integrated decision making based on the existing operating experience with surveillance per month and PRA insight. If the extension of one month STI can only be possible based on the operating experience with more than one month STI, one can never extend it. Such a situation is considered to be opposed to the SFCP concept.
We would like to say again that the application of SFCP is only to give the possibility to change of STI in future, not to make the decision to extend it immediately. Moreover the extension can only be considered using the existing experience and performance as well as the PRA insight. As for the application of SFCP to 60 months surveillance, it should be noticed that TSTF-425 gives the format for granting it.
From the above mentioned discussion, we conclude the application of SFCP to 24 months or longer surveillance frequency is justified.

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.: 16-132

TS 5.5.19, Configuration Risk Management Program (CRMP).

Locate the key elements of CRMP in the APWR FSAR.

NEI 06-09 Chapter 2, RMTS Program Requirements, includes Configuration Risk Management Process & Application of Technical Specifications, Documentation, Training, PRA Technical Adequacy, and Configuration Risk Management (CRM) Tools. In Chapter 4, it addresses PRA attributes and CRM Tool Attributes. In addition, it provides guidance for RMTS implementation. These requirements and attributes identified in NEI 06-09 will need to be addressed by the COL applicant implementing RMTS. Examples of some of the aspects that would need to be described in some detail might include, but are not limited to, PRA technical adequacy, development of CRM tool, qualitative/quantitative consideration in Risk Management Action Time (RMAT) and RICT calculations, cumulative risk tracking and uncertainty considerations, documentation and training requirements. These items have not been addressed by MHI in the FSAR.

ANSWER:

We think the requirements specified in NEI 06-09 are not necessary to be fully described in US-APWR TS, though we have described some examples in TS 5.5.18. By this RAI, we have found that the current description may be misleading as if it covers all the requirements. Hence we will replace the 1st sentence of TS 5.5.18 c., "This program shall have the following as specified in NEI 06-09:" by "This program shall satisfy all the requirements specified in NEI 06-09 including, but not limited to, the following:"

Impact on DCD

The DCD Chapter 16, TS 5.5.18 c., the first sentence is revised as follows:

This program shall satisfy all the requirements~~have the following as~~ specified in NEI 06-09 including, but not limited to, the following:

Impact on COLA

There is an impact on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

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QUESTION NO.: 16-133

TS 5.5.19, Configuration Risk Management Program (CRMP).

Revise/clarify the applicability of Modes for Risk-Managed Technical Specifications (RMTS) to the US-APWR. Plant-specific basis for application of RMTS for Mode 3 is not addressed.

As stated in NEI 06-09, RMTS Guidelines, Nov. 06, "PRAs that support RMTS are typically plant-specific at-power PRAs. Thus, these PRAs are directly applicable to plant configurations during operations in Modes 1 and 2. For PWRs, RMTS may be extended on a plant-specific basis to apply in operating Modes 3 and 4 (with cooling via steam generators) .. However, licensees who want to apply RMTS for plant configurations in these other operational modes shall either have a PRA and configuration risk calculation tool that adequately calculates a Risk-Informed Completion Time (RICT) in these modes for the specific plant configurations or perform sufficient analyses to demonstrate that at power PRA results provide conservative bounding estimates of risk, and thus can be used to set the RICT. Applicability to these Modes must be justified as part of the license application, and approved by NRC." Table 2-1 of NEI 06-09 summarizes the applicability of the at-power PRA to Plant Operational Modes.

RMTS is implemented in the US-APWR in Sections which apply to Modes 1, 2, and 3. It is not applied in MODE 4 and includes a Note "The Required Action is not applicable in MODE 4." The US-APWR FSAR PRA addresses at-power and shutdown conditions covering internal and external initiators. But, the FSAR does not discuss the use of the PRA models for configuration risk calculations, as needed for implementation of RICT in RMTS, particularly for Mode 3 (Hot Standby). The FSAR did not provide any discussion of a configuration risk calculation tool that adequately calculates a RICT in Mode 3, considering that the at-power PRA will be used. It did not provide any analyses to demonstrate that the at-power PRA results provide conservative bounding estimates of risk, and thus can be used to set the RICT. Neither did the FSAR discuss the use of a separate or modified PRA for these modes.

ANSWER:

The differences between MODE 3 and MODEs 1 and 2 are that, during MODE3, the ECCS actuation signal will be blocked when the RCS pressure is below P-11 (Pressurizer Pressure) interlock and that the reactor is sub-critical in MODE 3. Although these differences in plant conditions may impact the CDF and LERF results, they have negligible impact on the ΔCDF and ΔLERF calculations as discussed below:

The sub-critical core condition in MODE 3 eliminates the likelihood of ATWS events compared to at-power condition. There will be no impact on other initiating events. Since the CDF from ATWS will be zero in MODE 3, the resulting ΔCDF and ΔLERF caused by component outages also zero and will not impact the CT calculation.

When the RCS pressure is below P-11 interlock, the ECCS actuation signal needs to be manually actuated by the operator when LOCA events occur. Therefore, the conditional core damage frequency given LOCA events is expected to be high in MODE 3, when the pressure is below P-11 interlock. Frequencies of core damage scenarios that involve failure of operators to initiate ECCS actuation signals after LOCA will significantly increase in MODE 3. However, the frequency of these core damage scenarios will not be highly influenced by the number of equipments that are out of service. This is based on the consideration that since the dependency of operator tasks to initiate each ECCS signal is very high, it is likely that the operator will fail to initiate all ECCS actuation signals when the operator fails to initiate one train of the ECCS actuation signal. And if the operator fails to initiate ECCS actuation signal the core will be damaged eventually. This implies that this new core damage scenario, which involves operator error to initiate ECCS actuation signal, in MODE 3 will not have impact to ΔCDF and ΔLERF.

Since other core damage scenarios than the above two of MODE 3 are equivalent to that of MODEs 1and 2, the ΔCDF and ΔLERF calculations based on the at-power PRA are applicable to MODE 3. Hence, the at-power PRA results are applicable to CT calculations of MODE 1, 2 and 3.

Impact on DCD

There are no impacts on the DCD.

Impact on COLA

There are no impacts on the COLA.

Impact on PRA

There is no impact on the PRA.

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TS 5.5.18, Configuration Risk Management Program (CRMP).

Justify the formatting change of the Risk-Managed Technical Specification (RMTS) in the US-APWR Technical Specifications. The formatting followed is not consistent with the guidance provided in NEI 06-09 and does not adhere to good human factors principles.

NEI 06-09, Risk-Managed Technical Specifications (RMTS) Guideline, November 2006, was accepted by USNRC for implementation of risk-informed Technical Specifications under Risk-Informed Technical Initiatives 4b. Table 3-2 of NEI 06-09 provides an example format for implementation of RMTS. Table 3-2 is consistent with the format in STS NUREG-1431 and adheres to the human factors principles used in STS. Implementation of RMTS in the US-APWR TS in Chapter 16, however, is done differently. The Required Action column in the LCO Actions refers to requirements of the specification under Section 5.5.18 where the requirements are provided in a narrative. For example, in TS Section 3.8.1, LCO ACTIONS, A.2.2 the Required Actions Column states, "Apply the requirements of Section 5.5.18." Section 5.5.18 of the US-APWR TS discusses the Configuration Risk Management Program (CRMP) listing the different requirements for required actions and completion times. The format provided in Table 3.2 of NEI 06-09 is not followed. Justification/discussion are needed for the changes in the specifications defined under the LCO ACTIONS that do not follow the format of Table 3.2 of NEI 06-09.

ANSWER:

Our understanding is that the format given in Table 3-2 of NEI 06-09 is only an example and not the specified format for RMTS. If NEI 06-09 gave the complete format for RMTS like TSTF travelers, we could easily follow them, but actually is does not. It includes the description, "In accordance with the RMTS Program", but is does not provide any description for "the RMTS program", which should be included somewhere in TS. We had in any way to develop the appropriate description for the RMTS program in the administrative control section even if we adopted the example format in NEI 06-09. We thought that the format of NEI 06-09 was not efficient because it had to repeat describing a series of required actions in every REQUIRED ACTION column of LCO Action which adopted RMTS. So we integrated a series of actions required for RMTS in TS 5.5.18, and it became possible to simply indicate "Apply the requirements

of specification 5.5.18".
It should be noticed that the RMTS for South Texas Project, which is the only RMTS approved by the NRC, did not follow the format of NEI 60-09. In fact, our format is similar to that of STP.

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.: 16-135

Section 4.3, Fuel Storage.

Justify the value [200] ppm added to the borated water (in 4.3.1.1c) for "keff <= 0.95" if fully flooded with borated water.

10 CFR 50.68(4), "Criticality Accident Requirements," specifically states that "K-effective must not exceed 0.95 at a 95% probability and 95% confidence level, if flooded with borated water." The applicant needs to justify, (e.g., by a reference), the 200 ppm value specified for the borated water.

ANSWER:

Justification of the value 200 ppm is shown in Subsection 3.3.2 of the Technical Report, "Criticality Analysis for US-APWR New and Spent Fuel Storage Racks", MUAP-07032-P(R0), which was submitted to NRC in February 2008. The report states that K-effective including uncertainty at a 95% probability and 95% confidence level is 0.93779 with 200 ppm borated water.

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.: 16-136

TS 5.5.11, Ventilation Filter Testing Program (VFTP).

Confirm that the face velocity provided for the MCREFS in TS 5.5.11.c is 2400 fps (feet per second).

The expressed unit for the face velocity in APWR TS is in "fps". The Westinghouse STS shows the face velocity in "fpm". A typical face velocity in current operating filtration units is in the order 500 fpm (feet per minute) or lower. 2400 fps is equivalent to 14400 fpm which appears to be very high.

ANSWER:

The face velocity of charcoal adsorber for the MCREFS is designed as 40 fps. This face velocity is based on the charcoal adsorber residence time (0.25 seconds per 2 inches of adsorbent bed) recommended by RG 1.52.
Furthermore, the following sentence is stated in "REVIEWER'S NOTE" of Section 5.5.11, STS, NUREG-1431:

> If the system has a face velocity greater than 110 percent of 0.203 m/s (40 ft/min), the face velocity should be specified.

So, the face velocity of charcoal adsorber is not required to be specified in TS of US-APWR.
The DCD Chapter 16, 5.5.11 will be revised to reflect these correct informations.

Impact on DCD

The DCD Chapter 16, 5.5.11 will be revised as follows:

c. Demonstrate for each of the ESF systems that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 3, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and the relative humidity specified below.

ESF Ventilation System Penetration RH ~~Face Velocity~~

MCREFS	2.5%	70%	~~2400 fps~~

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 161-1812 REVISION 0**
SRP SECTION:	**16 - TECHNICAL SPECIFICATIONS**
APPLICATION SECTION:	**16**
DATE OF RAI ISSUE:	**1/21/2009**

QUESTION NO.: 16-137

TS Section 5.5.11 Ventilation Filter Testing Program (VFTP).

Justify the value (70%) used for the relative humidity (RH) for the ESF ventilation system (Section 5.5.11c, page 5.5.-10).

According to NUREG-1431 - STS, "the use of any standard other than ASTM D3803-1989 to test the charcoal sample may result in an overestimation of the capability of the charcoal to adsorb radioiodine. As a result, the ability of the charcoal filters to perform in a manner consistent with the licensing basis for the facility is indeterminate. ASTM D 3803-1989 is a more stringent testing standard because it does not differentiate between used and new charcoal, it has a longer equilibration period performed at a temperature of 30°C (86°F) and a relative humidity (RH) of 95% (or 70% RH with humidity control), and it has more stringent tolerances that improve repeatability of the test." The applicant needs to justify their choice of 70% RH as specified in the NRC guidance.

ANSWER:

The main control room (MCR) emergency filtration unit is provided the safety-related electric heater to control the relative humidity less than 70%. The heat-up rate by the safety-relate electric heater, 13 deg F, is decided to be able to reduce the relative humidity of inlet air from 100% to 70%. It is understood by a psychrometric chart that the heat-up rate can cover all the air that is assumed to flow in the filtration unit.

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

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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SRP SECTION: 16 - TECHNICAL SPECIFICATIONS

APPLICATION SECTION: 16

DATE OF RAI ISSUE: 1/21/2009

QUESTION NO.: 16-138

TS Section 5.5.16 Containment Leakage rate Testing Program.

Identify the approved exceptions for the program established, at the end of Section 5.5.16a, page 5.5-16, for the leakage rate testing of the containment.

Following NUREG 1431, Rev.3, page 5.5.-16, the applicant selected OPTION B for the containment leakage rate testing program, as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B. In NUREG-1431, Rev. 3, there is a list of some exceptions for the leakage rate testing program. The applicant deleted those exceptions and left the paragraph unfinished. The applicant needs to specify the approved exceptions for this program. Otherwise, this item needs be considered a COLA open item.

ANSWER:

TS 5.5.16 of the DCD will be revised to incorporate the comments in QUESTION NO.16-138.

Impact on DCD

The DCD Chapter 16, TS 5.5.16 a. is revised as follows:

a. A program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September, 1995, as modified by approved exceptions:

   1. The visual examination of containment concrete surfaces intended to fulfill the requirements of 10 CFR 50, Appendix J, Option B testing, will be performed in accordance with the requirements of and frequency specified by the ASME Section XI Code, Subsection IWL, except where relief has been authorized by the NRC.

   2. The visual examination of the steel liner plate inside containment intended to fulfill the requirements of 10 CFR50, Appendix J, Option B, will be performed in accordance with the

requirements of and frequency specified by the ASME Section XI Code, Subsection IWE, except where relief has been authorized by the NRC.

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

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QUESTION NO.: 16-139

TS Section 5.6.4 Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR).

1. Identify the quoted reports in Subsection 5.6.4b, as shown in NUREG-1431, Rev.3.

According to NUREG-1431, Revision 3, the applicant is needed to specify in detail each document quoted in this section (e.g., title, date, and type of report or letter) or the section in the FSAR where these reports are specified.

2. The item "LTOP arming" is missing in Subsection 5.6.4.a.

ANSWER:

1. Please see the answer of QUESTION 16-130. Subsection 5.6.4 will be revised to quote specific section.

2. Subsection 5.6.4.a will be revised to add the item "LTOP arming".

Impact on DCD

The DCD Chapter 16 TS 5.6.4 a is revised as follows:

a. RCS pressure and temperature limits for heat up, cooldown, low temperature operation, criticality, and hydrostatic testing, LTOP arming, as well as heatup and cooldown rates shall be established and documented in the PTLR for the following

Impact on COLA

There are impacts on the COLA to incorporate the DCD change.

Impact on PRA

There is no impact on the PRA.

2/20/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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SRP SECTION:	**16 - TECHNICAL SPECIFICATIONS**
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QUESTION NO.: 16-140

TS 5.6.3, Core Operating Limits Report (COLR).

Revise TS 5.6.3.c to reflect implementation of TSTF-487.

APWR GTS adopted TSTF-487 requirements as shown in TS 3.4.1 and the associated Bases B 3.4.1. However, a conforming change to TS 5.6.3 was not incorporated regarding the assumed rated thermal power when establishing the core operating limits.

This is required to ensure consistency and completeness of APWR GTS requirements.

ANSWER:

US-APWR applies NUREG-1431 Rev.3.1 as the licensing basis for the Technical Specifications. TSTF-487 Rev.1 specifically applies to plants using NUREG-1432 as a licensing basis. The rewording applied to Specification 5.6.3.c for Combustion Engineering PWRs "assuming operation at RATED THERMAL POWER" is not included in the corresponding Specification 5.6.3.c of NUREG-1431. Therefore MHI believes it is not appropriate to apply TSTF-487 Rev.1 to US-APWR GTS.

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.

SR 3.4.9.2
The SR is satisfied when the power supplies are demonstrated to be capable of producing the minimum power and the associated pressurizer heaters are verified to be at their design rating. This may be done by testing the power supply output and by performing an electrical check on heater element continuity and resistance. [The Frequency of 24 months is considered adequate to detect heater degradation and based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. has been shown by operating experience to be acceptable. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.4.11.2
SR 3.4.11.2 requires a complete cycle of each PORV. Operating a SDV through one complete cycle ensures that the SDV can be manually actuated for mitigation of an SGTR. [The Frequency of 24 months is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. a typical refueling cycle and industry accepted practice. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.4.14.1 3rd paragraph
Testing is to be performed every 12 months, but may be extended if the plant does not go into MODE 5 for at least 7 days. [The 24month Frequency is consistent with 10 CFR 50.55a(g) (Ref. 8) as contained in the Inservice Testing Program, is within frequency allowed by the American Society of Mechanical Engineers (ASME) Code (Ref. 7), and is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. the need to perform such surveillances under the conditions that apply during an outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.4.14.2
Verifying that the RHR suction valve interlock is OPERABLE ensures that RCS pressure will not pressurize the RHR system its design pressure of 900 psig. The interlock setpoint is set so the actual RCS pressure must be < 425 psig to open the valves. This setpoint ensures the RHR design pressure will not be exceeded and the RHR relief valves will not lift. [The 24month Frequency is based on the need to perform the Surveillance under conditions that apply during a plant outage. The 24 month Frequency is also acceptable based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it

is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. From the instrumentation aspects, the Frequency is justified by the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. consideration of the design reliability (and confirming operating experience) of the equipment. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.4.15.3, SR 3.4.15.4, and SR 3.4.15.5

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. [The Frequency of 24 months is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. From the instrumentation aspects, the Frequency is justified by the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this Frequency is acceptable. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.5.2.4

This Surveillance demonstrates that each SI pump starts on receipt of an actual or simulated ECCS actuation signal. [The 24 month Frequency is based on the need to perform these Surveillances under the conditions that apply during a plant outage and the potential for unplanned plant transients if the Surveillances were performed with the reactor at power. The 24 month Frequency is also acceptable based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of ESF Actuation System testing, and equipment performance is monitored as part of the Inservice Testing Program. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.5.2.5

Periodic inspections of the ECC/CS STRAINER ensure that it is unrestricted and stays in proper operating condition. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to have access to the location, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been

~~found to be sufficient to detect abnormal degradation and is confirmed by operating experience.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.6.3.6

Automatic containment isolation valves close on a containment isolation signal to prevent leakage of radioactive material from containment following a DBA. This SR ensures that each automatic containment isolation valve will actuate to its isolation position on a containment isolation signal. This surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass this Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.6.6.3 and SR 3.6.6.4

These SRs require verification that each automatic containment spray valve actuates to its correct position and that each containment spray pump starts upon receipt of an actual or simulated High-3 containment pressure signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform these Surveillances under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillances were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillances when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.2.2

This SR verifies that each MSIV can close on an actual or simulated actuation signal. This Surveillance is normally performed upon returning the plant to operation following a refueling outage. [The Frequency of MSIV testing is every 24months. The 24month Frequency for testing is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the refueling cycle. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.~~

~~Therefore, this Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.3.2 2nd paragraph
[The Frequency for this SR is every 24 months. The 24 month Frequency for testing is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the refueling cycle. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, this Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.4.1
To perform a controlled cooldown of the RCS, the MSDVs must be able to be opened either remotely or locally and throttled through their full range. This SR ensures that the MSDVs are tested through a full control cycle at least once per fuel cycle. Performance of inservice testing or use of an MSDV during a unit cooldown may satisfy this requirement. [The Frequency of 24 months is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. The Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.4.2
The function of the block valve is to isolate a failed open MSDV. Cycling the block valve both closed and open demonstrates its capability to perform this function. Performance of inservice testing or use of the block valve during unit cooldown may satisfy this requirement. [The Frequency of 24 months is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. The Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.5.3
This SR verifies that EFW can be delivered to the appropriate steam generator in the event of any accident or transient that generates an ESFAS, by demonstrating that each automatic valve in the flow path actuates to its correct position on an actual or simulated actuation signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required

position under administrative controls. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 24 month Frequency is acceptable based on operating experience and the design reliability of the equipment.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.5.4

This SR verifies that the EFW pumps will start in the event of any accident or transient that generates an ESFAS by demonstrating that each EFW pump starts automatically on an actual or simulated actuation signal in MODES 1, 2, and 3. In MODE 4, the required pump is already operating and the autostart function is not required. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.] However, for the turbine driven EFW train, this SR must be performed when steam is available to run the pump.

SR 3.7.7.2

This SR verifies proper automatic operation of the CCW valves on an actual or simulated actuation signal. The CCW System is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.7.3

This SR verifies proper automatic operation of the CCW pumps on an actual or simulated actuation signal. The CCW System is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment.~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.8.2

This SR verifies proper automatic operation of the ESWS valves on an actual or simulated actuation signal. The ESWS is a normally operating system that cannot be fully actuated as part of normal testing. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.8.3

This SR verifies proper automatic operation of the ESWS pumps on an actual or simulated actuation signal. The ESWS is a normally operating system that cannot be fully actuated as part of normal testing during normal operation. [The 24month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.10.3

This SR verifies that each MCRVS train starts and operates on an actual or simulated actuation signal. [The Frequency of 24 months is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~industry operating experience and is consistent with the typical refueling cycle.~~ OR The Surveillance

Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.7.11.3

This SR verifies that the annulus emergency exhaust system starts and operates on an actual or simulated actuation signal. [The 24 month Frequency is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This equipment is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment. ~~is consistent with that specified in Regulatory Guide 1.52 (Ref. 5).~~ OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

SR 3.8.1.8

Each Class 1E GTG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the Class 1E GTG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. This Surveillance may be accomplished by:

a. Tripping the Class 1E GTG output breaker with the Class 1E GTG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus, or

b. Tripping its associated single largest post-accident load with the Class 1E GTG solely supplying the bus.

As required by IEEE-308 (Ref. 11), the load rejection test is acceptable if the increase in Class 1E GTG speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the Class 1E GTG. SR 3.8.1.8.a corresponds to the maximum frequency excursion, while SR 3.8.1.8.b and SR 3.8.1.8.c are steady state voltage and frequency values to which the system must recover following load rejection. [The 24 month Frequency of this SR is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. The reliability proved in Technical Report MUAP-07024 for Class 1E GTG is based on operating experience of non-nuclear gas turbine generator with reduced surveillance from nuclear. The Class 1E GTG in US-APWR should be more reliable by performing the SRs. The 24 month Frequency is also consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3). Or The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.]

This SR is modified by two Notes. The reason for Note 1 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

Note 2 ensures that the Class 1E GTG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of = 0.9. This power factor is representative of the actual inductive loading a Class 1E GTG would see under design basis accident conditions. Under certain conditions, however, Note 2 allows the Surveillance to be conducted at a power factor other than = 0.9. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to = 0.9 results in voltages on the emergency busses that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.9 while still maintaining acceptable voltage limits on the emergency busses. In other circumstances, the grid voltage may be such that the Class 1E GTG excitation levels needed to obtain a power factor of 0.9 may not cause unacceptable voltages on the emergency busses, but the excitation levels are in excess of those recommended for the Class 1E GTG. In such cases, the power factor shall be maintained as close as practicable to 0.9 without exceeding the Class 1E GTG excitation limits.

<u>SR 3.9.4.3</u>
This Surveillance demonstrates that each containment purge isolation valve actuates to its isolation position on manual initiation or on an actual or simulated high radiation signal. [The 24 month Frequency maintains consistency with other similar ESFAS instrumentation and valve testing requirements<u>, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle length. This valve is not at risk of imminent damage as it is designed to remain functional and in good condition while in operation, thus significant degradation due to a longer surveillance interval should not be of major concern. The design reliability is, therefore, maintained by taking these considerations based on sound engineering judgment</u>. In LCO 3.3.6, the Containment Purge Isolation instrumentation requires a CHANNEL CHECK every 12 hours and a COT every 92 days to ensure the channel OPERABILITY during refueling operations. Every 24 months a CHANNEL CALIBRATION is performed. The system actuation response time is demonstrated every 24 months, during refueling, on a STAGGERED TEST BASIS. OR The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.] SR 3.6.3.5 demonstrates that the isolation time of each valve is in accordance with the Inservice Testing Program requirements. These Surveillances performed during MODE 6 will ensure that the valves are capable of closing after a postulated fuel handling accident to limit a release of fission product radioactivity from the containment.

The SR is modified by a Note stating that this Surveillance is not required to be met for valves in isolated penetrations. The LCO provides the option to close penetrations in lieu of requiring automatic actuation capability.

The DCD Chapter 16, TS 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5, and 3.3.6 BASIS, the revision for the basis of the 24 month frequency SR will be discussed in RAI answers to RAI No.167-1769 and 166-1784.

LCO 3.0.6

LCO 3.0.6 establishes an exception to LCO 3.0.2 for supported systems that have a support system LCO specified in the Technical Specifications (TS). This exception is provided because LCO 3.0.2 would require that the Conditions and Required Actions of the associated inoperable supported system LCO be entered solely due to the inoperability of the support system. This exception is justified because the actions that are required to ensure the unit is maintained in a safe condition are specified in the support system LCO's Required Actions. These Required Actions may include entering the supported system's Conditions and Required Actions or may specify other Required Actions.

When a support system is inoperable and there is an LCO specified for it in the TS, the supported system(s) are required to be declared inoperable if determined to be inoperable as a result of the support system inoperability. However, it is not necessary to enter into the supported systems' Conditions and Required Actions unless directed to do so by the support system's Required Actions. The potential confusion and inconsistency of requirements related to the entry into multiple support and supported systems' LCOs' Conditions and Required Actions are eliminated by providing all the actions that are necessary to ensure the unit is maintained in a safe condition in the support system's Required Actions.

However, there are instances where a support system's Required Action may either direct a supported system to be declared inoperable or direct entry into Conditions and Required Actions for the supported system. This may occur immediately or after some specified delay to perform some other Required Action. Regardless of whether it is immediate or after some delay, when a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

Specification 5.5.15, "Safety Function Determination Program (SFDP)," ensures loss of safety function is detected and appropriate actions are taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other limitations, remedial actions, or compensatory actions may be identified as a result of the support system inoperability and corresponding exception to entering supported system Conditions and Required Actions. The SFDP implements the requirements of LCO 3.0.6.

BASES

LCO 3.0.6 (continued)

Cross train checks to identify a loss of safety function for those support systems that support multiple and redundant safety systems are required. The cross train check verifies that the supported systems of the redundant OPERABLE support system are OPERABLE, thereby ensuring safety function is retained. A loss of safety function may exist when a support system is inoperable, and:

a. A required system redundant to system(s) supported by the inoperable support system is also inoperable (EXAMPLE B 3.0.6-1),

b. A required system redundant to system(s) in turn supported by the inoperable supported system is also inoperable (EXAMPLE B 3.0.6-2), or

c. A required system redundant to support system(s) for the supported systems (a) and (b) above is also inoperable (EXAMPLE B 3.0.6-3).

EXAMPLE B 3.0.6-1

If System 2 of Train A is inoperable and System 5 of Train B is inoperable, a loss of safety function exists in supported System 5.

EXAMPLE B 3.0.6-2

If System 2 of Train A is inoperable, and System 11 of Train B is inoperable, a loss of safety function exists in System 11 which is in turn supported by System 5.

EXAMPLE B 3.0.6-3

If System 2 of Train A is inoperable, and System 1 of Train B is inoperable, a loss of safety function exists in Systems 2, 4, 5, 8, 9, 10 and 11.

If this evaluation determines that a loss of safety function exists, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

BASES

LCO 3.0.6 (continued)

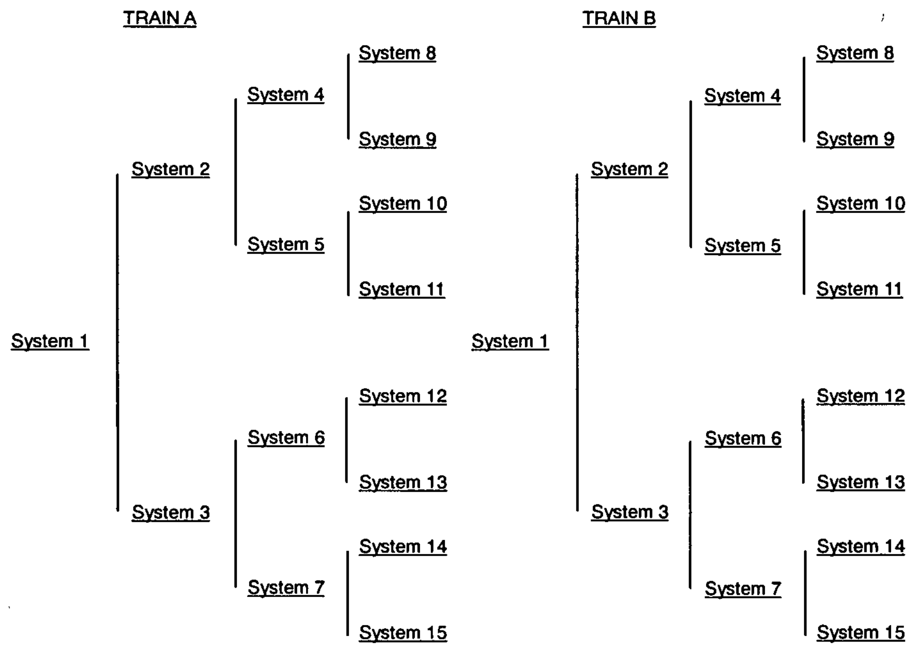

Figure B 3.0-1
Configuration of Trains and Systems

This loss of safety function does not require the assumption of additional single failures or loss of offsite power. Since operations are being restricted in accordance with the ACTIONS of the support system, any resulting temporary loss of redundancy or single failure protection is taken into account. Similarly, the ACTIONS for inoperable offsite circuit(s) and inoperable gas turbine generator(s) provide the necessary restriction for cross train inoperabilities. This explicit cross train verification for inoperable AC electrical power sources also acknowledges that supported system(s) are not declared inoperable solely as a result of inoperability of a normal or emergency electrical power source (refer to the definition of OPERABILITY).

When loss of safety function is determined to exist, and the SFDP requires entry into the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists, consideration must be given to the specific type of function affected. Where a loss of function is solely due to a single Technical Specification support system (e.g., loss of automatic start due to inoperable instrumentation, or loss of pump suction

BASES

LCO 3.0.6 (continued)

source due to low tank level) the appropriate LCO is the LCO for the support system. The ACTIONS for a support system LCO adequately address the inoperabilities of that system without reliance on entering its supported system LCO. When the loss of function is the result of multiple support systems, the appropriate LCO is the LCO for the supported system.