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TOKYO, JAPAN

April 6, 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-09156

Subject: MHI's Responses to US-APWR DCD RAI No. 183-1935 Revision 0

Reference: 1) "Request for Additional Information No. 183-1935 Revision 0, SRP Section: 14.03.07 - Plant Systems - Inspections, Tests, Analyses, and Acceptance Criteria Application Section: DCD Section 2.7" dated February 09, 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. 183-1935 Revision 0."

Enclosed is the responses to Questions 14.03.07-7 through 14.03.07-15 that are contained within Reference 1.

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

Sincerely,

Y. Ogata

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

Enclosure:

1. Responses to Request for Additional Information No.183-1935 Revision 0

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-09156
Docket No. 52-021

Responses to Request for Additional Information No. 183-1935
Revision 0

April 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

04/06/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 183-1935 REVISION 0**
SRP SECTION:	**14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**
APPLICATION SECTION:	**DCD SECTION 2.7**
DATE OF RAI ISSUE:	**02/09/2009**

QUESTION NO.: 14.03.07-7

Discuss why inspections are not required by US-APWR DCD Tier 1 Table 2.7.6.7-3, item 5 to verify that seismic category I PSS equipment, identified in US-APWR DCD Tier 1 Table 2.7.6.7-1, are located in a seismic structure.

An important aspect of the seismic design commitment for item 5 is that the PSS components are located in a seismic structure. An inspection for component location relative to seismically protected structures is necessary. Example 5.a.i in Tier 2 Table 14.3-2 provides an acceptable verification of the commitment.

Also applicable to following ITAAC:

ITAAC Item 2 in Table 2.7.6.13-3

ANSWER:

ITAAC Item 5 in Table 2.7.6.7-3 and ITAAC Item 2 in Table 2.7.6.13-3 will be revised to include an inspection to confirm that seismic Category I equipment is located in seismic Category I structures. A similar ITAAC, Item 2 in Table 2.7.6.6-2 for the Process Effluent Radiation Monitoring and Sampling System, will also be revised as shown below.

Tier 1 Tables 2.7.6.6-1, 2.7.6.13-1 and 2.7.6.13-2 will be revised to include a column to indicate which radiation monitors are seismic Category I.

In addition to the above change, Table 2.7.6.6-1 will be revised to include a column to indicate which radiation monitors are safety-related.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

ITAAC item 5 in Tier 1 Table 2.7.6.7-3 will be revised as follows:

5. The seismic Category I equipment, identified in Table 2.7.6.7-1, can withstand seismic design basis loads without loss of ~~its~~ safety function.	**<u>5.i Inspections will be performed to verify that the as-built, seismic Category I equipment identified in Table 2.7.6.7-1, are located in the containment or the reactor building.</u>**	**<u>5.i The as-built seismic Category I equipment identified in Table 2.7.6.7-1 are located in the containment or the reactor building.</u>**
	5.<u>ii</u>a Type tests and/or analyses of the seismic Category I equipment will be performed.	5.<u>ii</u>a The seismic Category I equipment **<u>can</u>** withstand~~s~~ seismic design basis loads without loss of safety function.
	5.<u>iii</u>~~b~~Inspections will be performed on the as-built equipment including anchorage.	5.<u>iii</u>~~b~~ The as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.

Tier 1 Table 2.7.6.13-1 will be revised as follows:

ARMS Monitor Name	Detector Number	Safety Related	**Seismic Category I**	Class 1E/ Harsh
MCR Area Radiation	RMS-RE-1	No	**No**	No/No
Containment Air Lock Area Radiation	RMS-RE-2	No	**No**	No/No
Radio Chemical Lab. Area Radiation	RMS-RE-3	No	**No**	No/No
SFP Area Radiation	RMS-RE-5	No	**No**	No/No
Nuclear Sampling Room Area Radiation	RMS-RE-6	No	**No**	No/No
ICIS Area Radiation	RMS-RE-7	No	**No**	No/No
Waste management system Area Radiation	RMS-RE-8	No	**No**	No/No
TSC Area Radiation	RMS-RE-9	No	**No**	No/No
Containment High Range Area Radiation	RMS-RE-91A,B, 92A,B,93A,B, 94A,B	Yes	**Yes**	Yes/Yes

Tier 1 Table 2.7.6.13-2 will be revised as follows:

Radiation Gas Monitor Name	Detector Number	Safety Related	**Seismic Category I**	Class 1E/ Harsh
Fuel Handling Area HVAC Radiation Gas	RMS-RE-49	No	**No**	No/No
Annulus and Safeguard Area HVAC Radiation Gas	RMS-RE-46	No	**No**	No/No
Reactor Building HVAC Radiation Gas	RMS-RE-48A	No	**No**	No/No
Auxiliary Building HVAC Radiation Gas	RMS-RE-48B	No	**No**	No/No
Sample and Lab Area HVAC Radiation Gas	RMS-RE-48C	No	**No**	No/No

ITAAC Item 2 in Tier 1 Table 2.7.6.13-3 will be revised as follows:

2. The ~~Class 1E~~ **seismic Category I** radiation monitors identified in Table 2.7.6.13-1 can withstand seismic design basis loads without loss of safety function.	**2.i Inspections will be performed to verify that the as-built seismic Category I radiation monitors, identified in Table 2.7.6.13-1, are located in the containment or the reactor building.**	**2.i The as-built seismic Category I radiation monitors identified in Table 2.7.6.13-1 are located in the containment or the reactor building.**
	~~2.i~~ **2.ii** Type tests and/or analyses of the seismic Category I radiation monitors will be performed.	~~2.i~~ **2.ii** The seismic Category I radiation monitors identified in Table 2.7.6.13-1 can withstand seismic design basis loads without loss of safety function.
	~~2.ii~~ **2.iii** An inspection will be performed on the as-built radiation monitors including anchorage.	~~2.ii~~ **2.iii** The as-built radiation monitors identified in Table 2.7.6.13-1 including anchorage **are** ~~is~~ seismically bounded by the tested or analyzed conditions.

Tier 1 Table 2.7.6.6-1 will be revised as follows:

PERMS Monitor Name	Detector Number	**Safety Related**	**Seismic Category I**	**Class 1E/ Harsh**
Containment Radiation Gas	RMS-RE-41	**No**	**No**	No/No
Containment Radiation Particulate	RMS-RE-40	**No**	**Yes**	No/No
Containment Low Volume Purge Radiation Gas	RMS-RE-23	**No**	**No**	No/No
Containment Exhaust Radiation Gas	RMS-RE-22	**No**	**No**	No/No
High Sensitivity Main Steam Line (N-16ch.)	RMS-RE-65A,B,66A,B, 67A,B,68A,B	**No**	**No**	No/No
Main Steam Line	RMS-RE-87,88, 89,90	**No**	**No**	No/No
Gaseous Radwaste Discharge	RMS-RE-72	**No**	**No**	No/No
Main Control Room Outside Air Intake Gas Radiation	RMS-RE-84A,B	**Yes**	**Yes**	Yes/No
Main Control Room Outside Air Intake Iodine Radiation	RMS-RE-85A,B	**Yes**	**Yes**	Yes/No
Main Control Room Outside Air Intake Particulate Radiation	RMS-RE-83A,B	**Yes**	**Yes**	Yes/No
TSC Outside Air Intake Gas Radiation	RMS-RE-101	**No**	**No**	No/No
TSC Outside Air Intake Iodine Radiation	RMS-RE-102	**No**	**No**	No/No
TSC Outside Air Intake Particulate Radiation	RMS-RE-100	**No**	**No**	No/No
CCW Radiation	RMS-RE-56A,B	**No**	**No**	No/No
Auxiliary Steam Condensate Water Radiation	RMS-RE-57	**No**	**No**	No/No
Primary Coolant Radiation	RMS-RE-70	**No**	**No**	No/No
Turbine Building Floor Drain Radiation	RMS-RE-58	**No**	**No**	No/No
SG Blowdown Water Radiation	RMS-RE-55	**No**	**No**	No/No
SG Blowdown Return Water Radiation	RMS-RE-36	**No**	**No**	No/No
Plant Vent Radiation Gas (Normal Range)	RMS-RE-21A,B	**No**	**No**	No/No
Plant Vent Extended Radiation Gas (Accident Mid Range)	RMS-RE-80A	**No**	**No**	No/No
Plant Vent Extended Radiation Gas (Accident High Range)	RMS-RE-80B	**No**	**No**	No/No
Condenser vacuum pump exhaust line radiation (Normal Range)	RMS-RE-43A,B	**No**	**No**	No/No
Condenser vacuum pump exhaust line radiation (Accident Mid Range)	RMS-RE-81A	**No**	**No**	No/No
Condenser vacuum pump exhaust line radiation (Accident High Range)	RMS-RE-81B	**No**	**No**	No/No
GSS exhaust fan discharge line radiation (Normal Range)	RMS-RE-44A,B	**No**	**No**	No/No
GSS exhaust fan discharge line radiation (Accident Mid Range)	RMS-RE-82A	**No**	**No**	No/No
GSS exhaust fan discharge line radiation (Accident High Range)	RMS-RE-82B	**No**	**No**	No/No
Liquid Radwaste Discharge	RMS-RE-35	**No**	**No**	No/No
ESW Radiation	RMS-RE-74A,B,C,D	**No**	**No**	No/No

ITAAC item 2 in Tier 1 Table 2.7.6.6-2 will be revised as follows:

2.	The ~~Class 1E~~ **seismic Category I** radiation monitors identified in Table 2.7.6.6-1 are designed to withstand seismic design basis loads without loss of safety function.	**2.i**	**Inspections will be performed to verify that the as-built seismic Category I radiation monitors identified in Table 2.7.6.6-1 are installed in a seismic Category I structure.**	**2.i**	**The as-built seismic Category I radiation monitors, identified in Table 2.7.6.6-1, are installed in a seismic Category I structure.**
		2.~~a~~ii	Type tests and/or analyses of the seismic Category I radiation monitor**s** will be performed.	2.~~a~~ii	The seismic Category I radiation monitor**s** identified in Table 2.7.6.6-1 can withstand seismic design basis loads without loss of safety function.
		2.~~b~~iii	An inspection will be performed on the as-built radiation monitor**s** including anchorage.	2.~~b~~iii	The as-built radiation monitor**s** identified in Table 2.7.6.6-1 including anchorage ~~is~~ **are** seismically bounded by the tested or analyzed conditions.

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

04/06/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 183-1935 REVISION 0**

SRP SECTION: **14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: **DCD SECTION 2.7**

DATE OF RAI ISSUE: **02/09/2009**

QUESTION NO.: 14.03.07-8

Identify the source of signal to be evaluated in the test for item 10.b in US-APWR DCD Tier 1 Table 2.7.6.7-3.

The Logic section in Tier 1 Section 2.7.6.7.1 on page 2.7-212 indicates that a containment isolation signal will cause the valves listed in US-APWR DCD Tier 1 Table 2.7.6.7-1 to close. The specific valve positioning signal should be identified for clarity.

The design commitment should state that 'The PSS valves identified in Table 2.7.6.7-1 perform the active safety functions listed in that table upon receipt of a signal.'

The AC should mirror the revised design commitment.

ANSWER:

The only active safety function of the Process and Post-accident Sampling System is containment isolation. ITAAC item 10.b in Table 2.7.6.7-3 and Table 2.7.6.7-1will be revised accordingly.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

2.7.6.7.1 Design Description

Alarms, Displays, and Controls

~~There are no important alarms, displays, and controls.~~

The valves identified in table 2.7.6.7-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.

Table 2.7.6.7-3 Process and Post-accident Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.b The valves identified in Table 2.7.6.7-1 as having PSMS control perform an active **safety** function **after receiving a signal from PSMS.**	10.b Tests will be performed on the as-built remotely operated-valves listed in Table 2.7.6.7-1 using ~~real or~~ simulated signals.	10.b The as-built remotely operated valves identified in Table 2.7.6.7-1 **perform the active function identified in the table** after receiving a **simulated** signal.

Table 2.7.6.7-1 Process and Post-accident Sampling System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	<u>PSMS Control</u>	Active Safety Function /	Loss of Motive Power Position
Isolation valves on RHR down stream of containment spray and residual heat removal heat exchanger	PSS-MOV-052A,B	2	Yes	Yes	Yes / No	<u>**Containment Isolation Phase A**</u>	Transfer Closed	As Is
Containment isolation valves inside CV on sample from RCS Hot Leg	PSS-MOV-013,023	2	Yes	Yes	Yes/Yes	<u>**Containment Isolation Phase A**</u>	Transfer Closed	As Is
Containment isolation valves outside containment on sample from RCS Hot Leg	PSS-MOV-031A,B	2	Yes	Yes	Yes/ No	<u>**Containment Isolation Phase A**</u>	Transfer Closed	As Is
Containment isolation valve outside CV on post-accident liquid sample return to containment sump	PSS-MOV-071	2	Yes	Yes	Yes/ No	<u>**Containment Isolation Phase A**</u>	Transfer Closed	As Is
Containment isolation valve inside CV on post-accident liquid sample return to containment sump	PSS-VLV-072	2	Yes	No	— / —	=	Transfer Closed	—
Containment isolation valve inside CV on gas sample from Pressurizer	PSS-AOV-003	2	Yes	Yes	Yes/Yes	<u>**Containment Isolation Phase A**</u>	Transfer Closed	Closed
Containment isolation valve inside CV on liquid sample from Pressurizer	PSS-MOV-006	2	Yes	Yes	Yes/Yes	<u>**Containment Isolation Phase A**</u>	Transfer Closed	Closed
Containment isolation valves inside CV on sample from Accumulator	PSS-AOV-062A,B,C,D	2	Yes	Yes	Yes /Yes	<u>**Containment Isolation Phase A**</u>	Transfer Closed	Closed
Containment isolation valve outside CV on sample from Accumulator	PSS-AOV-063	2	Yes	Yes	Yes /No	<u>**Containment Isolation Phase A**</u>	Transfer Closed	Closed

Note: Dash (-) indicates not applicable

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 183-1935 REVISION 0

SRP SECTION: 14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

APPLICATION SECTION: DCD SECTION 2.7

DATE OF RAI ISSUE: 02/09/2009

QUESTION NO.: 14.03.07-9

ITAAC Item 2 in Table 2.7.6.9-2

This ITAAC if necessary asks an inspector to verify that fire detectors actuate when they are not identified by reference to a table or a listing of them. Both the design commitment and AC should identify those fire detectors. In additions, the AC would be better stated like the following: 'The tests of the as-built fire detectors conclude that all the fire detectors (reference) responded to simulated fire conditions and initiated fire alarms.'

ANSWER:

The types of detectors and detection system used in each fire area are identified in the Fire Hazards Analysis (DCD Tier 2, Appendix 9A). Based on NUREG-0800 Section 14.3 guidance, detailed equipment lists in DCD Tier 2 are not referenced in Tier 1. For example, NUREG-0800 Section 14.3, Appendix C, *Fluid Systems Checklist,* states:

"Reference should not be made from Tier 1 to Tier 2 because this effectively makes Tier 2 part of Tier 1."

ITAAC Item 2 in Table 2.7.6.9-2 will be revised to make the Acceptance Criteria consistent with the Design Commitment, and modify the Inspection, Tests and Analyses column as shown below.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

ITAAC Item 2 in Table 2.7.6.9-2 will be revised as follows:

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. Individual fire detectors provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment.	2. Tests will be performed on the as-built individual fire detectors. ~~using simulated fire conditions~~.	2. ~~The tests of as-built individual~~ **Individual** fire detectors **provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment.** ~~respond to simulated fire conditions.~~

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

04/06/2009

US-APWR Design Certification

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RAI NO.: NO. 183-1935 REVISION 0

SRP SECTION: 14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

APPLICATION SECTION: DCD SECTION 2.7

DATE OF RAI ISSUE: 02/09/2009

QUESTION NO.: 14.03.07-10

ITAAC Item 3 in Table 2.7.6.9-2

This ITAAC should identify the number of fire pumps and their percentage capacity rather than referring to a sufficient number of them. It should also identify the largest fire pump. The failure of largest fire pump seems applicable to single failure criteria.

ANSWER:

The ITAAC item 3 in Table 2.7.6.9-2 will be revised to identify the number of fire pumps and their percentage capacity. The corresponding Key Design Feature in Subsection 2.7.6.9.1 will be revised for consistency.

Tier 2 Subsection 9.5.1.2.2 will be revised to be aligned with the description of Tier 1 clearly.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

ITAAC item 3 in Table 2.7.6.9-2 will be revised as follows:

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. **<u>There are two 100 percent capacity fire pumps: one pump is motor driven and one pump is diesel driven.</u>** ~~A sufficient number of fire pumps is provide to maintain 100 percent of fire pump design capacity, assuming failure of the largest fire pump or the loss of offsite power (LOOP).~~	3. An inspection of the as-built fire pumps will be performed.	3. **<u>Two as-built fire pumps each have 100 percent capacity: one pump is motor driven and one pump is diesel driven.</u>** ~~The sufficient number of as-built fire pumps is provide to maintain 100 percent of fire pump design capacity, assuming failure of the largest fire pump or the loss of offsite power (LOOP).~~

See Attachment 3 for a mark-up of DCD Tier 2 Subsection 9.5.1.2.2, with the following changes.

Revise Subsection 9.5.1.2.2 "Fire Protection Water Supply System" by changing the second paragraph as follows:

> As discussed in Subsection 9.5.1.2, the fire pump arrangement provides ~~one diesel or electric fire pump to be the lead fire pump and another fire pumps for secondary service. Each pump is capable of providing~~ **two** 100% ~~of the system flow requirements~~ **capacity pumps. One is a diesel driven fire pump and the other is an electric-motor driven fire pump. One is designated as the lead fire pump.** This ~~provides complete redundancy and~~ **system arrangement** allows one pump to be out of service ~~for maintenance~~ **and still maintain the capability to provide 100% of the system flow requirements**. An electric-motor driven jockey pump (or acceptable pressure source) is used to keep the fire water system full of water and pressurized, as required. Piping between the fire water sources and the fire pumps is in accordance with the guidance of NFPA 20 (Ref. 9.5.1-15). A failure in one water source or its piping cannot cause both water sources to be unavailable.

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

04/06/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

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DATE OF RAI ISSUE:	**02/09/2009**

QUESTION NO.: 14.03.07-11

ITAAC Item 4 in Table 2.7.6.9-2

This ITAAC is actually two ITAAC configured as one. The two ITAAC should be shown as two ITAAC.

In addition, the ITAAC should direct the reader to a listing of the equipment required for safe shutdown or a report/study listing them.

Applicable also to following ITAAC:

ITAAC Item 6 in Table 2.7.6.9-2 - Only in regard to listing two ITAAC instead of one.

ANSWER:

The two ITAAC items identified in the question will each be revised to split the single ITAAC into two individual ITAAC. Also, the AC for ITAAC Item 4 in Table 2.7.6.9-2 will be revised to be consistent with the DC and the Design Description, as shown below.

The major safe shutdown functions and related process systems are provided in Table 2.5.2-1 for Hot Standby and Table 2.5.2-2 for Cold Shutdown. Details of safe shutdown equipment locations with respect to the standpipe system must be addressed by the report required per ITAAC Item 4.a of Table 2.7.6.9-2, below.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

ITAAC Item 4 in Tier 1 Table 2.7.6.9-2 will be revised as follows:

4.a Under safe-shutdown earthquake loading, the standpipe system remains functional in areas containing equipment required for safe shutdown. ~~The seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.~~	4.a An inspection **will be performed** of the as-built standpipe system ~~will be performed~~ **as documented in a seismic design report.**. ~~An inspection of the as-built safety-related water source to the standpipe system will be performed.~~	4.a. The seismic design reports exists and concludes that the as-built standpipe system remains functional in areas containing equipment required for safe shutdown under safe-shutdown earthquake loading. ~~The as-built seismic standpipe system is cross-connected to the safety-related water source. The capacity of the as-built safety-related water source is at least 18,000 gallons.~~
4.b The seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.	**4.b An inspection of the as-built safety-related water source to the standpipe system will be performed.**	**4.b The as-built seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.**

ITAAC Item 6 in Tier 1 Table 2.7.6.9-2 will be revised as follows:

6.a The FPS fire water supply is available as an alternative component cooling water source for severe accident prevention. ~~Also, the FPS water supply is available to the containment spray system and water injection to the reactor cavity for severe accident mitigation.~~	6.a Inspection will be performed ~~of each~~ **of the** as-built **FPS** fire water **supply.** ~~source~~.	6.a The as-built FPS fire water supply is provided as an alternative component cooling water source for severe accident prevention. ~~Also, the as-built FPS water supply is provided to the containment spray system and water injection to the reactor cavity for severe accident mitigation.~~
6.b The FPS fire water supply is available to the containment spray system and water injection to the reactor cavity for severe accident mitigation.	**6.b Inspection will be performed on the as-built FPS fire water supply.**	**6.b The as-built FPS fire water supply is provided to the containment spray system and water injection to the reactor cavity for severe accident mitigation.**

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

04/06/2009

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SRP SECTION: 14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

APPLICATION SECTION: DCD SECTION 2.7

DATE OF RAI ISSUE: 02/09/2009

QUESTION NO.: 14.03.07-12

ITAAC Item 5 in Table 2.7.6.9-2

This ITAAC is very confusing how it is presently written. Suggested changes are the following:

'The fire protection water supply system has at least 300,000 gallons available from primary or redundant sources for the largest US-APWR sprinkler system plus manual hose streams to support those fire suppression activities for two hours or longer.'

Both the design commitment and the AC could use those words.

ANSWER:

The ITAAC item 5 in Table 2.7.6.9-2 will be revised for clarity as shown below.

Impact on DCD

See Attachment 1 for a mark-up of DCD Tier 1 Section 2.7, with the following changes.

ITAAC item 5 in Table 2.7.6.9-2 will be revised as follows:

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. ~~The fire protection water supply system is sized such that sufficient water for the largest US-APWR sprinkler system plus manual hose streams to support fire suppression activities for two hours or longer, but not less than 300,000 gallons is provided. Redundant water supply capability is provided.~~ **The fire protection water supply system has at least two water sources. Each source can supply the largest US-APWR sprinkler system plus manual hose streams (500 gpm) to**	5. Inspections will be performed of each as-built fire **protection** water source's capability.	5. ~~The capability of each as-built fire water source supplying the FPS is sized such that sufficient water for the largest US-APWR sprinkler system plus manual hose streams to support fire suppression activities for two hours or longer, but not less than 300,000 gallons is provided. Redundant water supply capability is provided.~~ **Each of the two as-built fire protection water supply sources has the capability to supply the largest US-APWR**

support these fire suppression activities for a period of two hours or longer. The capacity of each source shall be not less than 300,000 gallons.		sprinkler system plus manual hose streams (500 gpm) to support these fire suppression activities for a period of two hours or longer, and the capacity of each source shall be not less than 300,000 gallons.

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

04/06/2009

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SRP SECTION: 14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

APPLICATION SECTION: DCD SECTION 2.7

DATE OF RAI ISSUE: 02/09/2009

QUESTION NO.: 14.03.07-13

The following typographical or editorial errors were noted in US-APWR Tier 2, Chapter 14, Section 14.3.4.8 and Tier 1, Chapter 2, Section 2.8:

Page 2.8-2, Design Commitment, Item 2: The word "is" should be "are."

ANSWER:

The typographical error will be corrected.

Impact on DCD

See Attachment 2 for a mark-up of DCD Tier 1 Section 2.8, with the following changes.

ITAAC Item 2 in Table 2.8-1 will be revised as follows:

2. Area radiation and airborne radioactivity monitoring systems ~~is~~ <u>are</u> provided to monitor radioactivity concentrations.	2. Refer to Subsection 2.7.6.13.	2. Refer to Subsection 2.7.6.13.

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

04/06/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: **NO. 183-1935 REVISION 0**

SRP SECTION: **14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**

APPLICATION SECTION: DCD SECTION 2.7

DATE OF RAI ISSUE: **02/09/2009**

QUESTION NO.: 14.03.07-14

Explain the link between the Design Commitment specified in US-APWR DCD Tier 1 Table 2.8-1, items 1.a and 1.b, and the reference to radiation zones identified in US-APWR DCD Tier 1 Table 2.8-2.

US-APWR DCD Tier 1 Table 2.8-2 is not discussed in Tier 1 Section 2.8. The zones identified in Table 2.8-2 are not tied to any specific Tier 1 Figures. The USAPWR DCD Tier 1 Table 2.8-1, items 1.a and 1.b design commitment is that shielding walls and doors are provided to maintain the maximum radiation levels specified in Table 2.8-2. Any radiation level is possible per US-APWR DCD Tier 1 Table 2.8-2. As written and explained, it is not possible for an inspector to verify the design commitments listed in US-APWR DCD Tier 1 Table 2.8-1, items 1.a and 1.b.

For item 1.b, why no reference to a listing of shielding walls and floor in auxiliary building like for item 1.a.

ANSWER:

Tier 1 Table 2.8-1 contains a commitment to shielding walls and floors so that the dose rate in each area stays within the limits set forth based on that area's zone classification, as presented in Tier 1 Table 2.8-2. For clarity, a description of this table will be added to the text in Tier 1 Section 2.8.

Tier 1 Table 2.8-2 provides the dose rate limit based on zone classification. All plant areas are categorized into radiation zones in which the dose rate must be kept under the given limit. These zone classifications are given in Tier 2, Chapter 12, Figure 12.3-1 (Sheets 1-34). The design commitment for shielding walls and floors is based on the zones in this figure, in order to maintain the dose rate below the limits in Tier 1 Table 2.8-2.

The thickness of the shielding walls and floors in 1.a are given in Tier 1 Table 2.2-2, because they are part of safety-related structures. The shielding walls and floors in the auxiliary building (1.b) are not safety-related, and therefore will be given in DCD Tier 2.

Impact on DCD

See Attachment 2 for a mark-up of DCD Tier 1 Section 2.8, with the following changes.

Tier 1 Section 2.8.2 will be revised as follows:

"Table 2.8-1 describes the ITAAC or corresponding design acceptance criteria for radiation protection. **These ITAAC ensure that all areas of the plant are kept within the limits of each area's radiation zone designation, given in Table 2.8-2**."

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

04/06/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 183-1935 REVISION 0**
SRP SECTION:	**14.03.07 - PLANT SYSTEMS - INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA**
APPLICATION SECTION:	**DCD SECTION 2.7**
DATE OF RAI ISSUE:	**02/09/2009**

QUESTION NO.: 14.03.07-15

ITAAC Item 2 in Table 2.8-1

The reference for this ITAAC seems confusing. If everything is covered in Section 2.7.6.13, what is the need for this ITAAC?

ANSWER:

The description of the area radiation monitoring and airborne radioactivity monitoring systems is part of the radiation protection program. ITAAC Item 2 in Table 2.8-1 is provided as a cross-reference to the ITAAC and Design Description for the radiation monitoring systems because they support the radiation protection program.

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.

Attachment 1

US-APWR DCD Tier 1 Section 2.7 Mark-up

RESPONSE TO RAI No. 183-1935 Revision 0

RAI 183
14.03.07-7

Table 2.7.6.6-1 Process Effluent Radiation Monitoring and Sampling System Equipment Characteristics (Sheet 1 of 2)

PERMS Monitor Name	Detector Number	Safety Related	Seismic Category I	Class 1E/ Harsh
Containment Radiation Gas	RMS-RE-41	No	No	No/No
Containment Radiation Particulate	RMS-RE-40	No	Yes	No/No
Containment Low Volume Purge Radiation Gas	RMS-RE-23	No	No	No/No
Containment Exhaust Radiation Gas	RMS-RE-22	No	No	No/No
High Sensitivity Main Steam Line (N-16ch.)	RMS-RE-65A,B,66A,B, 67A,B,68A,B	No	No	No/No
Main Steam Line	RMS-RE-87,88, 89,90	No	No	No/No
Gaseous Radwaste Discharge	RMS-RE-72	No	No	No/No
Main Control Room Outside Air Intake Gas Radiation	RMS-RE-84A,B	Yes	Yes	Yes/No
Main Control Room Outside Air Intake Iodine Radiation	RMS-RE-85A,B	Yes	Yes	Yes/No
Main Control Room Outside Air Intake Particulate Radiation	RMS-RE-83A,B	Yes	Yes	Yes/No
TSC Outside Air Intake Gas Radiation	RMS-RE-101	No	No	No/No
TSC Outside Air Intake Iodine Radiation	RMS-RE-102	No	No	No/No
TSC Outside Air Intake Particulate Radiation	RMS-RE-100	No	No	No/No
CCW Radiation	RMS-RE-56A,B	No	No	No/No
Auxiliary Steam Condensate Water Radiation	RMS-RE-57	No	No	No/No
Primary Coolant Radiation	RMS-RE-70	No	No	No/No
Turbine Building Floor Drain Radiation	RMS-RE-58	No	No	No/No
SG Blowdown Water Radiation	RMS-RE-55	No	No	No/No
SG Blowdown Return Water Radiation	RMS-RE-36	No	No	No/No
Plant Vent Radiation Gas (Normal Range)	RMS-RE-21A,B	No	No	No/No
Plant Vent Extended Radiation Gas (Accident Mid Range)	RMS-RE-80A	No	No	No/No
Plant Vent Extended Radiation Gas (Accident High Range)	RMS-RE-80B	No	No	No/No
Condenser vacuum pump exhaust line radiation (Normal Range)	RMS-RE-43A,B	No	No	No/No
Condenser vacuum pump exhaust line radiation (Accident Mid Range)	RMS-RE-81A	No	No	No/No
Condenser vacuum pump exhaust line radiation (Accident High Range)	RMS-RE-81B	No	No	No/No

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14.03.07-7

Table 2.7.6.6-1 Process Effluent Radiation Monitoring and Sampling System Equipment Characteristics (Sheet 2 of 2)

PERMS Monitor Name	Detector Number	Safety Related	Seismic Category I	Class 1E/ Harsh
GSS exhaust fan discharge line radiation (Normal Range)	RMS-RE-44A,B	No	No	No/No
GSS exhaust fan discharge line radiation (Accident Mid Range)	RMS-RE-82A	No	No	No/No
GSS exhaust fan discharge line radiation (Accident High Range)	RMS-RE-82B	No	No	No/No
Liquid Radwaste Discharge	RMS-RE-35	No	No	No/No
ESW Radiation	RMS-RE-74A,B,C,D	No	No	No/No

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Table 2.7.6.6-2 Process Effluent Radiation Monitoring and Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The radiation monitors identified in Table 2.7.6.6-1 are provided in accordance with the applicable NRC regulations.	1. An inspection of the as-built radiation monitors will be performed.	1. Each of the as-built radiation monitor identified in Table 2.7.6.6-1 exists.
2. The ~~Class 1E~~ seismic Category I radiation monitors identified in Table 2.7.6.6-1 are designed to withstand seismic design basis loads without loss of safety function.	2.i Inspections will be performed to verify that the as-built, seismic Category I radiation monitors identified in Table 2.7.6.6-1, are located in a seismic Category I structure.	2.i The as-built seismic Category I radiation monitors identified in Table 2.7.6.6-1 are located in a seismic Category I structure.
	2.~~a~~ii Type tests and/or analyses of the seismic Category I radiation monitors will be performed.	2.~~a~~ii The seismic Category I radiation monitors identified in Table 2.7.6.6-1 can withstand seismic design basis loads without loss of safety function.
	2.~~b~~iii An inspection will be performed on the as-built radiation monitors including anchorage.	2.~~b~~iii The as-built radiation monitors identified in Table 2.7.6.6-1 including anchorage ~~is~~ are seismically bounded by the tested or analyzed conditions.
3.a The Class 1E radiation monitors identified in Table 2.7.6.6-1 are powered from their respective Class 1E division.	3.a A test will be performed on the as-built PERMS by providing a simulated test signal in each Class 1E division.	3.a A simulated test signal exists at the as-built Class 1E radiation monitors identified in Table 2.7.6.6-1 when the assigned Class 1E division is provided the test signal.
3.b Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.	3.b Inspections of the as-built Class 1E divisional cables ~~and raceways~~ will be performed.	3.b ~~The as-built Class 1E electrical cables and communication cables associated with only one division are routed in raceways assigned to the same division. There are no other safety division electrical cables in a raceway assigned to a different division.~~ Physical separation or electrical isolation is provided between the as-built cables of Class 1E divisions and between Class 1E divisions and non-Class 1E cables.

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Alarms, Displays, and Controls

~~There are no important alarms, displays, and controls.~~The valves identified in table 2.7.6.7-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.

Logic

The containment isolation valves in the PSS operate properly with receipt of a containment isolation signal as described in Subsection 2.11.1.

Interlocks

There are no interlocks needed for direct safety functions related to the PSS.

Class 1E Electrical Power Sources and Divisions

The PSS components identified in Table 2.7.6.7-1 as Class 1E are powered from their respective Class 1E divisions, and separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.

Equipment to be Qualified for Harsh Environments

The equipment identified in Table 2.7.6.7-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

Interface Requirements

There are no safety-related interfaces with systems outside of the certified design.

Numeric Performance Values

Not applicable.

2.7.6.7.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.6.7-3 describes the ITAAC for process and post-accident sampling system.

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14.03.07-8

Table 2.7.6.7-1 Process and Post-accident Sampling System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated Valve	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
Isolation valves on RHR down stream of containment spray and residual heat removal heat exchanger	PSS-MOV-052A,B	2	Yes	Yes	Yes / No	Containment Isolation Phase A	Transfer Closed	As Is
Containment isolation valves inside CV on sample from RCS Hot Leg	PSS-MOV-013,023	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	As Is
Containment isolation valves outside containment on sample from RCS Hot Leg	PSS-MOV-031A,B	2	Yes	Yes	Yes/ No	Containment Isolation Phase A	Transfer Closed	As Is
Containment isolation valve outside CV on post-accident liquid sample return to containment sump	PSS-MOV-071	2	Yes	Yes	Yes/ No	Containment Isolation Phase A	Transfer Closed	As Is
Containment isolation valve inside CV on post-accident liquid sample return to containment sump	PSS-VLV-072	2	Yes	No	—/—	-	Transfer Closed	—
Containment isolation valve inside CV on gas sample from Pressurizer	PSS-AOV-003	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	Closed
Containment isolation valve inside CV on liquid sample from Pressurizer	PSS-MOV-006	2	Yes	Yes	Yes/Yes	Containment Isolation Phase A	Transfer Closed	Closed
Containment isolation valves inside CV on sample from Accumulator	PSS-AOV-062A,B,C,D	2	Yes	Yes	Yes /Yes	Containment Isolation Phase A	Transfer Closed	Closed
Containment isolation valve outside CV on sample from Accumulator	PSS-AOV-063	2	Yes	Yes	Yes /No	Containment Isolation Phase A	Transfer Closed	Closed

Note: Dash (-) indicates not applicable

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14.03.07-7

Table 2.7.6.7-3 Process and Post-accident Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PSS is as described in Subsection 2.7.6.7.1 Design Description, and Figure 2.7.6.7-1.	1. An inspection of the as-built PSS will be performed.	1. The as-built PSS conforms with the functional arrangement as described in Design Description of this Subsection 2.7.6.7.1 and Figure 2.7.6.7-1.
2. The components identified in Table 2.7.6.7-1as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	2. An inspection will be conducted of the as-built components as documented in the ASME design reports.	2. The ASME Code Section III design reports exist for the as-built components identified in Table 2.7.6.7-1.
3. Pressure boundary welds in components identified in Table 2.7.6.7-1 as ASME Code Section III meet ASME Code Section III requirements.	3. An inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	3. The ASME Code Section III requirements are met for non-destructive examination of the as-built pressure boundary welds.
4. The ASME Code Section III components, identified in Table 2.7.6.7-1, retain their pressure boundary integrity at their design pressure.	4. Hydrostatic tests will be performed on the as-built components required by the ASME Code Section III to be hydrostatically tested.	4. The results of the hydrostatic tests of the as-built components identified in Table 2.7.6.7-1 as ASME Code Section III conform with the requirements of the ASME Code Section III.
5. The seismic Category I equipment identified in Table 2.7.6.7-1 can withstand seismic design basis loads without loss of ~~its~~ safety function.	5.i Inspections will be performed to verify that the as-built, seismic Category I equipment identified in Table 2.7.6.7-1, are located in the containment or the reactor building.	5.i The as-built seismic Category I equipment identified in Table 2.7.6.7-1 are located in the containment or the reactor building.
	5.~~a~~ii Type tests and/or analyses of the seismic Category I equipment will be performed.	5.~~a~~ii The seismic Category I equipment can \withstand~~s~~ seismic design basis loads without loss of safety function.
	5.~~b~~iii Inspections will be performed on the as-built equipment including anchorage.	5.~~b~~iii The as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.

6.a The Class 1E equipment identified in Tables 2.7.6.7-1 as being qualified for a harsh environment is designed to withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of their safety function, for the time required to perform the safety function.	6.a.i Type tests and/or analyses will be performed on the Class 1E equipment located in a harsh environment.	6.a.i The Class 1E equipment identified in Table 2.7.6.7-1 as being qualified for a harsh environment withstands the environmental conditions that would exist before, during, and following a design basis accident without loss of their safety function, for the time required to perform the safety function.
	6.a.ii An inspection will be performed on the as-built Class 1E equipment and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii The as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.7.6.7-1 as being qualified for a harsh environment are bounded by type tests, and/or analyses.
6.b The Class 1E components identified in Table 2.7.6.7-1 are powered from their respective Class 1E division.	6.b Tests will be performed on the as-built PSS by providing a simulated test signal in each Class 1E division.	6.b A simulated test signal exists at the as-built Class 1E equipment identified in Table 2.7.6.7-1 when the assigned Class 1E division is provided the test signal.
6.c Separation is provided between PSS Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions.	6.c Inspections of the as-built Class 1E divisional cables ~~and raceways~~ will be conducted.	6.c ~~The as-built Class 1E electrical cables with only one division are routed in raceways assigned to the same division. There are no other safety division electrical cables in a raceway assigned to a different division.~~ Physical separation or electrical isolation is provided between the as-built cables of Class 1E divisions and between Class 1E divisions and non-Class 1E cables.
7. The PSS provides the safety-related function of preserving containment integrity by isolation of the PSS lines penetrating the containment.	7. See Subsection 2.11.2 (Containment Isolation)	7. See Subsection 2.11.2 (Containment Isolation)
8. The PSS provides the nonsafety-related function of providing the capability of obtaining reactor coolant and containment atmosphere samples.	8. Tests of the as-built system will be performed to obtain samples of the reactor coolant and containment atmosphere.	8. A sample is drawn from the reactor coolant and the containment atmosphere.

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14.03.07-8

Table 2.7.6.7-3 Process and Post-accident Sampling System Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.a Controls exist in the MCR to close remotely operated valves identified in Table 2.7.6.7-1.	10.a Tests will be performed on the as-built remotely operated valves identified in Table 2.7.6.7-1 using the controls in the MCR.	10.a Controls in the MCR operate to open and close the as-built remotely operated valves identified in Table 2.7.6.7-1.
10.b The valves identified in Table 2.7.6.7-1 as having PSMS control perform an active safety function after receiving a signal from PSMS.	10.b Tests will be performed on the as-built remotely operated valves listed in Table 2.7.6.7-1 using ~~real or~~ simulated signals.	10.b The as-built remotely operated valves identified in Table 2.7.6.7-1 perform the active function identified in the table after receiving a simulated signal.
11. After loss of motive power, the remotely operated valves identified in Table 2.7.6.7-1 assume the indicated loss of motive power position.	11. Tests of the as-built valves will be performed under the conditions of loss of motive power.	11. After loss of motive power, each as-built remotely operated valve identified in Table 2.7.6.7-1 assumes the indicated loss of motive power position.

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14.03.07-9
14.03.07-10
14.03.07-11

Table 2.7.6.9-2 Fire Protection System Inspections, Tests, Analys Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the FPS is as described in the Design Description Subsection in 2.7.6.9.	1. Inspections will be performed of the as-built FPS.	1. The as-built FPS conforms to the functional arrangement described in the Design Description of this Subsection 2.7.6.9.
2. Individual fire detectors provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment.	2. Tests will be performed on the as-built individual fire detectors. ~~using simulated fire conditions.~~	2. ~~The tests of as-built i~~Individual fire detectors provide fire detection capability and can be used to initiate fire alarms in areas containing safety-related equipment.~~respond to simulated fire conditions.~~
3. There are two 100 percent capacity fire pumps: one pump is motor driven and one pump is diesel driven.~~A sufficient number of fire pumps is provide to maintain 100 percent of fire pump design capacity, assuming failure of the largest fire pump or the loss of offsite power (LOOP).~~	3. An inspection of the as-built fire pumps will be performed.	3. Two as-built fire pumps each have 100 percent capacity: one pump is motor driven and one pump is diesel driven.~~The sufficient number of as-built fire pumps is provide to maintain 100 percent of fire pump design capacity, assuming failure of the largest fire pump or the loss of offsite power (LOOP).~~
4.a Under safe-shutdown earthquake loading, the standpipe system remains functional in areas containing equipment required for safe shutdown. ~~The seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.~~	4. An inspection will be performed of the as-built standpipe system ~~will be performed~~ as documented in a seismic design report. ~~An inspection of the as-built safety-related water source to the standpipe system will be performed.~~	4. The seismic design reports exists and concludes that the as-built standpipe system remains functional in areas containing equipment required for safe shutdown under safe-shutdown earthquake loading. ~~The as-built seismic standpipe system is cross-connected to the safety-related water source. The capacity of the as-built safety-related water source is at least 18,000 gallons.~~
4.b The seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.	4.b An inspection of the as-built safety-related water source to the standpipe system will be performed.	4.b The as-built seismic standpipe system can be supplied from a safety-related water source which capacity is at least 18,000 gallons.

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14.03.07-11
14.03.07-12

**Table 2.7.6.9-2 Fire Protection System Inspections, Tests, Analy
Acceptance Criteria (Sheet 2 of 2)**

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. ~~The fire protection water supply system is sized such that sufficient water for the largest US-APWR sprinkler system plus manual hose streams to support fire suppression activities for two hours or longer, but not less than 300,000 gallons is provided. Redundant water supply capability is provided.~~ The fire protection water supply system has at least two water sources. Each source can supply the largest US-APWR sprinkler system plus manual hose streams (500 gpm).to support these fire suppression activities for a period of two hours or longer. The capacity of each source shall be not less than 300,000 gallons.	5. Inspections will be performed of each as-built ~~fire-~~fire protection water source capability.	5. ~~The capability of each as-built fire water source supplying the FPS is sized such that sufficient water for the largest US-APWR sprinkler system plus manual hose streams to support fire suppression activities for two hours or longer, but not less than 300,000 gallons is provided. Redundant water supply capability is provided.~~Each of the two as-built fire protection water supply sources has the capability to supply the largest US-APWR sprinkler system plus manual hose streams (500 gpm) to support these fire suppression activities for a period of two hours or longer, and the capacity of each source shall be not less than 300,000 gallons.
6.a The FPS fire water supply is available as an alternative component cooling water source for severe accident prevention. ~~Also, the FPS water supply is available to the containment spray system and water injection to the reactor cavity for severe accident mitigation.~~	6.a Inspection will be performed of ~~each~~ the as-built FPS fire-water supply~~source~~.	6.a The as-built FPS fire water supply is provided as an alternative component cooling water source for severe accident prevention. ~~Also, the as-built FPS water supply is provided to the containment spray system and water injection to the reactor cavity for severe accident mitigation.~~
6.b The FPS fire water supply is available to the containment spray system and water injection to the reactor cavity for severe accident mitigation.	6.b Inspection will be performed on the as-built FPS fire water supply.	6.b The as-built FPS fire water supply is provided to the containment spray system and water injection to the reactor cavity for severe accident mitigation.
7. The FPS containment isolation valves and their associated piping are safety-related (ASME Class 2) and seismic Category I.	7. See Subsection 2.11.2 (Containment Isolation System).	7. See Subsection 2.11.2 (Containment Isolation System).
8. Displays of the system parameters identified in Table 2.6.9-1 can be retrieved in the MCR.	8. Inspections will be performed for retrievability of the as-built system parameters in the as-built MCR.	8. The as-built display indications of system parameters identified in Table 2.6.9-1 are verified and are retrieved in the as-built MCR.

Table 2.7.6.13-1 Area Radiation Monitoring System Equipment Characteristics

ARMS Monitor Name	Detector Number	Safety Related	Seismic Category I	Class 1E/ Harsh
MCR Area Radiation	RMS-RE-1	No	No	No/No
Containment Air Lock Area Radiation	RMS-RE-2	No	No	No/No
Radio Chemical Lab. Area Radiation	RMS-RE-3	No	No	No/No
SFP Area Radiation	RMS-RE-5	No	No	No/No
Nuclear Sampling Room Area Radiation	RMS-RE-6	No	No	No/No
ICIS Area Radiation	RMS-RE-7	No	No	No/No
Waste management system Area Radiation	RMS-RE-8	No	No	No/No
TSC Area Radiation	RMS-RE-9	No	No	No/No
Containment High Range Area Radiation	RMS-RE-91A,B, 92A,B, 93A,B, 94A,B	Yes	Yes	Yes/Yes

Table 2.7.6.13-2 Airborne Radioactivity Monitoring System Equipment Characteristics

Radiation Gas Monitor Name	Detector Number	Safety Related	Seismic Category I	Class 1E/ Harsh
Fuel Handling Area HVAC Radiation Gas	RMS-RE-49	No	No	No/No
Annulus and Safeguard Area HVAC Radiation Gas	RMS-RE-46	No	No	No/No
Reactor Building HVAC Radiation Gas	RMS-RE-48A	No	No	No/No
Auxiliary Building HVAC Radiation Gas	RMS-RE-48B	No	No	No/No
Sample and Lab Area HVAC Radiation Gas	RMS-RE-48C	No	No	No/No

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14.03.04-03
RAI 183
14.03.07-7

Table 2.7.6.13-3 Area Radiation and Airborne Radioactivity Monitoring Systems Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The radiation monitors identified in Tables 2.7.6.13-1 and 2.7.6.13-2 are provided in accordance with the applicable NRC regulations.	1. An inspection of the as-built radiation monitors will be performed.	1. Each of the as-built radiation monitors identified in Tables 2.7.6.13-1 and 2.7.6.13-2 exists.
2. The ~~Class 1E~~ seismic Category I radiation monitors identified in Table 2.7.6.13-1 can withstand seismic design basis loads without loss of safety function.	2.i Inspections will be performed to verify that the as-built, seismic Category I radiation monitors identified in Table 2.7.6.13-1, are located in the containment or the reactor building.	2.i The as-built seismic Category I radiation monitors identified in Table 2.7.6.13-1 are located in the containment or the reactor building.
	2.ii Type tests and/or analyses of the seismic Category I radiation monitors will be performed.	2.ii The seismic Category I radiation monitors identified in Table 2.7.6.13-1 can withstand seismic design basis loads without loss of safety function.
	2.iii An inspection will be performed on the as-built radiation monitors including anchorage.	2.iii The as-built radiation monitors identified in Table 2.7.6.13-1 including anchorage ~~is~~ are seismically bounded by the tested or analyzed conditions.
3. The Class 1E radiation monitors identified in Table 2.7.6.13-1 ~~can~~ as being designed for harsh environment are designed to withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	3. Type tests and/or analyses will be performed on the Class 1E radiation monitor.	3. The results of the type tests and/or analyses conclude that the Class 1E radiation monitors identified in Table 2.7.6.13-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
4.a The Class 1E radiation monitors identified in Table 2.7.6.13-1 are powered from their respective Class 1E division.	4.a A test will be performed on the as-built Monitoring Systems by providing a simulated test signal in each Class 1E division.	4.a A simulated test signal exists at the as-built Class 1E radiation monitors, are identified in Tables 2.7.6.13-1, when the assigned Class 1E division is provided the test signal.

Attachment 2

US-APWR DCD Tier 1 Section 2.8 Mark-up
RESPONSE TO RAI No. 183-1935 Revision 0

RAI 183
14.03.07-14

2.8 RADIATION PROTECTION

2.8.1 Design Description

The US-APWR is designed to keep radiation exposures to plant personnel and off-site members of the public within applicable regulatory limits, and as low as reasonably achievable (ALARA).

The radiation shielding design (as provided by the plant structures or by shielding included in the design) is adequate so that the maximum radiation levels in plant areas are commensurate with the areas access requirements. The presence of this shielding allows radiation exposures to plant personnel to be maintained ALARA during normal plant operations and maintenance.

Adequate shielding is provided for those plant areas that may require occupancy to permit operators to aid in the mitigation of or the recovery from an accident.

The plant provides ventilation flow for the radioactive controlled area to control the concentrations of airborne radioactivity specified in 10 CFR 20 Appendix B.

Area radiation and airborne radioactivity monitoring systems are described in section 2.7.6.13.

2.8.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.8-1 describes the ITAAC or corresponding design acceptance criteria for radiation protection. These ITAAC ensure that all areas of the plant are kept within the limits of each area's radiation zone designation, given in Table 2.8-2.

RAI 183
14.03.07-13

Table 2.8-1 Radiation Protection
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a Shielding walls and floors listed in Table 2.2-2 are provided to maintain the maximum radiation levels specified in Table 2.8-2.	1.a Inspections of the as-built shielding walls and floors thicknesses will be performed. Refer to Section 2.2 ITAAC.	1.a The as-built shielding walls and floors listed in Table 2.2-2 are consistent with the designed concrete wall thicknesses. Refer to Section 2.2 ITAAC.
1.b Shielding walls and floors in the auxiliary building are provided to maintain the maximum radiation levels specified in Table 2.8-2.	1.b Inspections of the as-built shielding walls and floors thicknesses will be performed.	1.b The as-built shielding walls and floors in the auxiliary building are consistent with the designed concrete wall thicknesses.
2. Area radiation and airborne radioactivity monitoring systems ~~is~~are provided to monitor radioactivity concentrations.	2. Refer to Subsection 2.7.6.13.	2. Refer to Subsection 2.7.6.13.
3. Ventilation flow for the radioactive controlled area is provided to control the concentrations of airborne radioactivity specified in 10 CFR 20 Appendix B.	3. Tests of the as-built containment purge system and auxiliary building HVAC system will be performed.	3. The as-built containment purge system and auxiliary building HVAC provide ventilation flow to control the concentrations of airborne radioactivity specified in 10 CFR 20 Appendix B.

Table 2.8-2 Radiation Zone Designations

Zone	Dose Rate
I	≤0.25 mrem/h
II	≤1.0 mrem/h
III	≤2.5 mrem/h
IV	≤15.0 mrem/h
V	≤100.0 mrem/h
VI	≤1.0 rem/h
VII	≤10.0 rem/h
VIII	≤100.0 rem/h
IX	≤500.0 rad/h
X	>500.0 rad/h

Attachment 3

US-APWR DCD Tier 1 Section 9.5.1.2.2 Mark-up
RESPONSE TO RAI No. 183-1935 Revision 0

As discussed in Subsection 9.5.1.2, the fire pump arrangement provides ~~one diesel or electric fire pump to be the lead fire pump and another fire pumps for secondary service. Each pump is capable of providing~~ **two**100% ~~of the system flow requirements~~ **capacity pumps. One is a diesel driven fire pump and the other is an electric-motor driven fire pump. One is designated as the lead fire pump.** This **system arrangement** ~~provides complete redundancy and~~ allows one pump to be out of service ~~for maintenance~~ **and still maintain the capability to provide 100% of the system flow requirements**. An electric-motor driven jockey pump (or acceptable pressure source) is used to keep the fire water system full of water and pressurized, as required. Piping between the fire water sources and the fire pumps is in accordance with the guidance of NFPA 20 (Ref. 9.5.1-15). A failure in one water source or its piping cannot cause both water sources to be unavailable.

The COL Applicant is responsible to designate a specific fire protection water supply system that complies with the guidance of RG 1.189 (Ref. 9.5.1-12) and the applicable NFPA codes and standards (See COL item 9.5(2)).

9.5.1.2.3 Fire Water Supply Piping, Yard Piping, and Yard Hydrants

Fire protection water is distributed by an underground yard main loop, designed in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). The yard main also includes a building interior header that distributes water to suppression systems within the main plant buildings. Post-indicator valves provide sectionalized control and permit isolation of portions of the yard main for maintenance or repair. A post-indicator valve also separates the individual fire pump connections to the yard main.

Sprinkler and standpipe systems are supplied by connections from the fire main. Where plant areas, other than the containment and outlying buildings, are protected by both sprinkler systems and standpipe systems, the connections from the fire main are arranged so that a single active failure or crack in a moderate energy line (such as fire protection) cannot impair both systems.

Manual valves for sectionalized control of the fire main or for shutoff of the water supply to suppression systems are electrically supervised.

Hydrants are provided on the yard main in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). They are located at intervals of up to 250 feet in accordance with NFPA 804(Ref.9.5.1-14). They provide hose stream protection for every part of each building and two hose streams for every part of the interior of each building not covered by standpipe protection. The lateral connection to each hydrant is controlled by an underground isolation valve. Curb boxes are provided for each hydrant isolation valve.

Hose houses are provided in accordance with the guidance of NFPA 24 (Ref. 9.5.1-16). They are located at intervals of not more than 1000 feet along the yard main in accordance with NFPA 804 (Ref.9.5.1-14).

Outdoor fire water piping and water suppression systems located in unheated areas of the plant are protected from freezing.