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TOKYO, JAPAN

February 25, 2013

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-13039

Subject: **Amended MHI's Response to US-APWR DCD RAI No. 978-6931 (SRP 03.02.02)**

Reference: 1) "Request for Additional Information No. 978-6931, SRP Section 03.02.02 – System Quality Group Classification - Application Section: 3.2.2", dated December 3, 2012.
2) MHI Letter UAP-HF-13012, "MHI's Response to US-APWR DCD RAI No.978-6931 (SRP 03.02.02)", dated February 1, 2013

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Amended Response to Request for Additional Information No. 978-6931".

Enclosed is the amended response to Question 03.02.02-25 that is contained within Reference 1. This amended response is submitted to address comments provided by the NRC staff.

Please contact Mr. Joseph Tapia, General Manager of Licensing Department, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Y. Ogata

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

Enclosure:

1. Amended Response to Request for Additional Information No. 978-6931

D081
NRO

CC: J. A. Ciocco
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Docket No. 52-021
MHI Ref: UAP-HF-13039

Enclosure 1

UAP-HF-13039
Docket No. 52-021

Amended Response to Request for Additional Information
No. 978-6931

February 2013

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

2/25/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 978-6931

SRP SECTION: 03.02.02 – SYSTEM QUALITY GROUP CLASSIFICATION

APPLICATION SECTION: 3.2.2

DATE OF RAI ISSUE: 12/3/2012

QUESTION NO.: 03.02.02-25

In response to various RAIs, Sections 3.1 and 3.2 and Table 3.2-2 of the DCD have been significantly revised to address the classification methodology and to reflect the design process for risk-significant SSCs. For example, the response to RAI 667-5235 include DCD markups to Sections 3.1 and 3.2 and Table 3.2-2 showing numerous changes resulting from RAI 667-5235 and additional RAIs. As a result of these changes, the staff needs further information to determine that the design basis for quality group classifications and special treatment has been finalized and verified. Therefore, the applicant is requested to provide the basis for quality group classification of each component listed in DCD Table 3.2-2, including the specific safety function that each component performs and any special treatment. (Safety function of each component can be defined in terms of reactor coolant pressure boundary, containment boundary, specific ECCS function, minimize radiation release, etc.; special treatment includes any codes and standards defined in the design basis (Ref. Note 3 (5) of Table 3.2-2).) In addition, the applicant is requested to describe the process for verifying design basis for quality group classifications with the design of the plant. If design basis for quality group classifications is not currently available, clarify when this information will be available.

ANSWER:

1) Basis for Equipment/Quality Group Classification

Equipment Classes 1 thru 3 consist of ASME Code Section III piping systems and components (PSC) and non-ASME Code Section III PSC as described in DCD Tier 2 Sections 3.2.2.1 thru 3.2.2.3. Both types of components (ASME and non-ASME) are classified as safety-related and, therefore, controlled by Appendix B to 10 CFR 50. The quality group classification and special treatment basis, including applicable code and standards, for ASME Code Section III PSC conforms to 10 CFR 50.55a requirements and RG 1.26 Quality Groups B and C as described in Section 3.2.2 and Table 3.2-2. For example, the components with reactor coolant pressure boundary function are classified as Equipment Class 1 and meet requirements of Quality Group A and ASME Code Section III Class 1 as required by 10 CFR 50.55a.

Table 1 provides a comprehensive list of Equipment Class 2 and 3 non-ASME Code Section III components where the design basis code and standard is described in the applicable

DCD design bases section [i.e., Note 3 (5) of Table 3.2-2 as provided in the DCD revisions attached with RAI 667-5235 response, MHI Ref. UAP-HF-12210, (ML12215A147)]. Table 1 identifies equipment classification basis (e.g., safety function) as described in Sections 3.2.2.1 thru 3.2.2.3 and special treatment of these components, such as a required quality control and DCD Tier 2 location in which the applicable design basis codes and standards are addressed.

Table 1 to this response also lists the Equipment Class 5 components from DCD Table 3.2-2, identifies the specific basis for the Equipment Class 5 designation and identifies the locations in the DCD where the applicable codes and standards are described. The design basis codes and standards are addressed in corresponding DCD chapters as stated in MHI response to RAI 914, 03.02.02-22, MHI Ref. UAP-HF-12290, (ML12311A147) and proposed DCD changes were attached with the RAI 914 response.

For Equipment Classes 4, 6, 7 and 8, the specific basis for the Class designation and the applicable codes and standards are clearly indicated in DCD Table 3.2-2 that was proposed with the RAI 667-5235 responses.

Equipment Classes 9 and 10 are nonsafety-related components that do not require any special treatment.

2) Process for Verifying Quality Group Classification Information with the Design

Quality group classification of ASME Code Section III piping systems and components is generally determined in accordance with the following processes:

i) Identification of system function and Quality Group Classification

System functions and design requirements have been identified and documented in a design document (e.g., system design package) and quality group classification has been determined based on the design document and SSCs Classification Principle Document whose contents are consistent with DCD Subsection 3.2.2. This classification provides the initial basis for the quality classification of the system or component. Note that the level of detail is similar to DCD Table 3.2-2.

ii) SSCs Data Sheet Development

Based on the initial quality classification results and associated design document above, SSCs Data Sheets have been developed to provide the sufficient information to prepare the purchase specification and design specification. The data sheets typically include the description about safety functions that have to be achieved by the PSC. The data sheet is also documented as part of Quality Group Classification basis for the PSC.

iii) Design Specification

Design Specification provides more detail quality group classification and basis for the PSC, such as these for individual parts/component of the PSC, using the data sheets and classification principle. The level of detail is determined by the nature and/or type of the PSC. The design specification will be used to develop the purchase specification. Thus, the design specification is the primary basis for the quality group classification and some design documentation (e.g, data sheet and the system design package, as applicable) will support the determination basis for the quality group classification.

As described in MHI PSC completion plan letter (UAP-HF-12322), the design specification for the risk-significant ASME Code Section III PSCs will be available for the NRC audit on December, 2013. At this time, the quality group classification basis for those components will also be available with the design specification and ready for the audit.

Quality group classification of non-ASME Code Section III components follows the similar design process and the design specification will be available per the engineering progress and procurement timing. The design/purchase specification for non-ASME Code Section III components will be available prior to the procurement phase and will not be available during the design certification review.

Table 1 Equipment Classification Bases and Design Basis Code and Standards

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
Primary System				
1. Reactor Systems				
Fuel assemblies	2	2.i and 2.ii	Q	4.2.1
Rod cluster control	2	2.i and 2.ii	Q	4.2.1.6(Note 5)
Upper core support assembly	3	3.i and 3.ii	Q	3.9.5.3
Lower core support assembly	3	3.i and 3.ii	Q	3.9.5.3
Guide tube assemblies	3	3.iii	Q	3.9.5.3
Surveillance capsule guide basket	5	5.i	A	3.9.5.3(Note 5)
Internal structures	5	5.i	A	3.9.5.3
2. Reactor Coolant System				
Surveillance capsule guide basket	5	5.i	A	3.9.5.3
Reactor vessel insulation (shell)	5	5.i	A	5.2.3.2.3
Reactor vessel insulation (closure head)	5	5.i	A	5.2.3.2.3
Reactor coolant pump insulation	5	5.i	A	5.2.3.2.3
Pressurizer insulation	5	5.i	A	5.2.3.2.3
Steam generator insulation	5	5.i	A	5.2.3.2.3
Main coolant piping insulation	5	5.i	A	5.2.3.2.3
4. Safety Injection System				
Emergency core cooling / containment spray strainer	2	2.i	Q	6.2.2.3.14
6. Emergency Feedwater System				
Emergency feedwater pits	3	3.i	Q	3.8.4.2
10. Post Accident pH Control System				
NaTB baskets	2	2.i	Q	6.3.2.3(Note 4)
11. Component Cooling Water System				
Nitrogen gas supply line valves from and including the valves NCS-VLV-041A,B up to and excluding the valves NCS-PCV-012,022 and NCSVLV-045B	5	5.ii	A	9.2.2.1.1(Note 4)
Nitrogen gas supply line piping from and including the valves NCS-VLV-041A,B up to and excluding the	5	5.ii	A	9.2.2.1.1(Note 4)

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
valves NCS-PCV-012,022 and NCSVLV-045B				
17. Refueling Water Storage System				
Refueling water storage pit	2	2.i	Q	3.8.4.2
Debris interceptor	2	2.i	Q	6.2.2.3.15
26. Potable and Sanitary Water System				
Potable and Sanitary Water System components and valves	5	5.i	A	This system is CDI and specific codes/standards are not defined in the DCD.
Potable and Sanitary Water System piping	5	5.i	A	This system is CDI and specific codes/standards are not defined in the DCD.
27. Emergency Gas Turbine Auxiliary System				
Emergency gas turbine	3	3.v	Q	8.3.1.1.3
Starting system air compressor	5	5.ii	A	Table 9.5.6-1
Lube oil main oil pumps	3	3.v	Q	Table 9.5.7-1
Lube oil cooler	3	3.v	Q	Table 9.5.7-1
Lube oil reduction gear reservoir	3	3.v	Q	Table 9.5.7-1
Main oil filters	3	3.v	Q	Table 9.5.7-1
Main lube oil strainers	3	3.v	Q	Table 9.5.7-1
Piping, fittings , and valves	3	3.v	Q	Table 9.5.7-1
Ventilation and cooling equipment	3	3.v	Q	9.5.8.1
Combustion air intake equipment and ductwork, turbine exhaust	3	3.v	Q	Table 9.5.8-1
Combustion air intake and exhaust system intake silencers	3	3.v	Q	Table 9.5.8-1 (Note 4)
Combustion air intake and exhaust system turbine exhaust silencers	3	3.v	Q	Table 9.5.8-1 (Note 4)
Combustion air intake and exhaust system piping	3	3.v	Q	Table 9.5.8-1
GTG Room ventilation system supply side equipment and ductwork and exhaust side equipment and ductwork	3	3.v	Q	9.5.8.1

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
Piping and valves (Safety related portion: On skid)	3	3.v	Q	Table 9.5.4-1, Table 9.5.6-1, Table 9.5.7-1
PSFSV Ventilation system containing exhaust fan, backdraft dampers, in-duct electric heater	5	5.i	A	9.5.4.3(Note 4)
PSFSV Ventilation system ductwork	5	5.i	A	App. 3A.1.2
28. Alternate alternating current Gas Turbine System				
Alternate alternating current Gas Turbine	5	5.ii	A	8.4.2.2(Note 3) (Note 4)
Fuel oil storage tanks	5	5.ii	A	8.4.2.2(Note 4)
Fuel oil transfer pumps	5	5.ii	A	8.4.2.2(Note 4)
Fuel oil day tanks	5	5.ii	A	8.4.2.2(Note 4)
Lube oil main oil pumps	5	5.ii	A	8.4.2.2(Note 4)
Lube oil cooler	5	5.ii	A	8.4.2.2(Note 4)
Lube oil reservoir	5	5.ii	A	8.4.2.2(Note 4)
Ventilation and cooling equipment	5	5.ii	A	8.4.2.2(Note 4)
Combustion air intake equipment and ductwork, turbine exhaust	5	5.ii	A	8.4.2.2(Note 4)
GTG Room ventilation system supply side equipment and ductwork and exhaust side equipment and ductwork	5	5.ii	A	8.4.2.2(Note 4)
Piping and valves (Off skid)	5	5.ii	A	8.4.2.2(Note 4)
Piping and valves (On skid)	5	5.ii	A	8.4.2.2(Note 4)
PSFSV Ventilation system containing exhaust fan, backdraft dampers, in-duct electric heater and ductwork	5	5.ii	A	8.4.2.2(Note 4)
29. Fuel Handling and Refueling System				
Refueling machine	5	5.i	A	9.1.4.1
Fuel handling machine	5	5.i	A	9.1.4.1
New fuel storage rack	3	3.iv	Q	9.1.2.1, 9.1.2.2.4
Spent fuel storage rack	3	3.iv	Q	9.1.2.2.4
Spent fuel pit	3	3.ii, 3.iv	Q	3.8.4.2 9.1.2.2.2
New fuel pit	3	3.iv	Q	3.8.4.2

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
				9.1.2.2.1
Fuel transfer canal	3	3.iv	Q	9.1.2.2.4 (Note 4)
Cask pit	3	3.iv	Q	9.1.2.2.4 (Note 4)
Cask washdown pit	3	3.iv	Q	9.1.2.2.4 (Note 4)
Spent fuel pit gates	3	3.iv	Q	9.1.2.2.4 (Note 4)
Fuel inspection pit	3	3.iv	Q	9.1.2.2.4 (Note 4)
Fuel transfer system	5	5.i	A	9.1.4.1
Suspension hoist and aux. hoist on spent fuel cask handling crane	5	5.i	A	9.1.4.1
New fuel elevator	5	5.i	A	9.1.4.1
Containment rack	3	3.iv	Q	9.1.2.2.3, 9.1.2.2.4
Permanent Cavity Seal	3	3.iv	Q	9.1.4.2.1.13
30. Containment System				
Containment vessel	2	2.iii	Q	Table 3.2-2 (ASME III, MC) (Note 3)
Equipment hatch	2	2.iii	Q	Table 3.2-2 (ASME III, MC) (Note 3)
Personnel airlock	2	2.iii	Q	Table 3.2-2 (ASME III, MC) (Note 3)
31. Miscellaneous Plant Equipment				
PCCV polar crane	5	5.i	A	9.1.5.1
Spent fuel cask handling crane	5	5.i	A	9.1.5.1
Equipment hatch hoist	5	5.i	A	9.1.5.1
Miscellaneous cranes and hoists in reactor building	5 or 10	5.i	A or N	9.1.5.1 (Note 3)
Miscellaneous hoists in power source buildings	5	5.i	A	9.1.5.1 (Note 3)
32. Containment Purge System				
Dampers of the containment high/low volume purge system (supply/exhaust) in areas containing safety-related equipment	5	5.i	A	9.4.6.1.2.4 (Note 3)
Ductwork of the containment high/low volume purge system (supply/exhaust) in areas containing safety-related equipment	5	5.i	A	App. 3A.1.2

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
33. Containment Fan Cooler System				
Class 5 components	5	5.i	A	9.4.6.1.2.1(Note 3)
Class 5 ductwork	5	5.i	A	App. 3A.1.2
34. Control Rod Drive Mechanism Cooling System				
Class 5 components	5	5.i	A	9.4.6.1.2.2(Note 3)
Class 5 ductwork	5	5.i	A	App. 3A.1.2
35. Reactor Cavity Cooling System				
Class 5 components	5	5.i	A	9.4.6.1.2.3(Note 3)
Class 5 ductwork	5	5.i	A	App. 3A.1.2
36. Annulus Emergency Exhaust System				
Emergency exhaust filtration units including fans and filters	2	2.i	Q	9.4.5.1.1.1
Dampers	2	2.i	Q	6.5.1.2, Table 6.5-3
Ductwork	2	2.i	Q	App. 3A.2
37. MCR Heating, Ventilation, and Air Conditioning System				
Air handling units including fans and heating coils	3	3.vii	Q	9.4.1
Emergency exhaust filtration units including fans, heating coils, filters and charcoal adsorbers	3	3.vii	Q	9.4.1, 9.4.1.1.1
Class 3 Dampers	3	3.vii	Q	9.4.1
Class 3 Ductwork	3	3.vii	Q	App. 3A.2
Class 5 components	5	5.i	A	9.4.1.1.2(Note 3)
Class 5 ductwork	5	5.i	A	App. 3A.1.2
38. Class 1E Electrical Room Heating, Ventilation, and Air Conditioning System				
Air handling units including fans and heating coils	3	3.vii	Q	9.4.5.1.2
Fans	3	3.vii	Q	9.4.5.1.2
Dampers	3	3.vii	Q	9.4.5.1.2
Ductwork	3	3.vii	Q	App. 3A.2
Duct heaters	3	3.vii	Q	9.4.5.1.2

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
39. Safeguard Component Area Heating, Ventilation, and Air Conditioning System				
Air handling units including fans and heating coils	3	3.vii	Q	9.4.5.1.2
Dampers	3	3.vii	Q	9.4.5.1.2
Ductwork	3	3.vii	Q	App. 3A.2
40. Emergency Feedwater Pump Area Heating, Ventilation, and Air Conditioning System				
Air handling units including fans and heating coils	3	3.vii	Q	9.4.5.1.2
Dampers	3	3.vii	Q	9.4.5.1.2
Ductwork	3	3.vii	Q	App. 3A.2
Dampers in areas containing safety-related equipment	5	5.i	A	9.4.5.1.2
Ductwork in areas containing safety-related equipment	5	5.i	A	App. 3A.1.2
41. Safety-related Component Area Heating, Ventilation, and Air Conditioning System				
Air handling units including fans and heating coils	3	3.vii	Q	9.4.5.1.2
Dampers	3	3.vii	Q	9.4.5.1.2
Ductwork	3	3.vii	Q	App. 3A.2
42. Main Steam/Feedwater Piping Area Heating, Ventilation, and Air Conditioning System				
Dampers in areas containing safety-related equipment	5	5.i	A	9.4.3.1.2.3 (Note 3)
Ductwork in areas containing safety-related equipment	5	5.i	A	App. 3A.1.2
43. Auxiliary Building Heating, Ventilation, and Air Conditioning System				
Penetration and Safeguard Component area isolation dampers and ductwork between Penetration and Safeguard Component area isolation damper	2	2.iii	Q	6.5.1.2 Table 6.5-3

EC 2, 3 and 5 Piping Systems and Components with Design Basis Code and Standard in Table 3.2-2	Equipment Class	Equipment Classification Basis (Note 1)	Special Treatment	
			Quality Control (Note 2)	Codes and Standards (DCD Location)
Exhaust line isolation dampers	2	2.iii	Q	9.4.3.1.1.1 (Note 4)
Supply ductwork and dampers of the auxiliary building HVAC system in areas containing safety-related equipment	5	5.i	A	9.4.3.1.2.1 (Note 3)
Exhaust ductwork and dampers of the auxiliary building HVAC system in areas containing safety-related equipment	5	5.i	A	App. 3A.1.2
46. Essential Chilled Water System				
Essential chilled water chemical feed tank	5	5.i	A	9.2.7.1.1.2 (Note 3)
Nitrogen gas supply line piping and valves from and including the valves VWS-VLV-251A,B,C,D up to and excluding the valves VWS-VLV-252A,B,C,D	5	5.i	A	9.2.7.1.1.2 (Note 3) (Note 4)
Essential chilled water chemical feed tank supply and return line piping and between and excluding the valves VWS-VLV0271A,B,C,D and VWS-VLV-274A,B,C,D	5	5.i	A	9.2.7.1.1.2 (Note 3) (Note 4)
47. Non-Essential Chilled Water System				
Piping and valves within areas containing safety-related equipment (except portion of the containment penetration)	5	5.i	A	9.2.7.1.2.2 (Note 3) (Note 4)
48. Containment Hydrogen Control System				
Igniters	5	5.i and 5.ii	A	6.2.5.1 (Note 4)

Note 1:

Equipment Class 2 Classification Bases for Non-ASME Code Section III Piping Systems and Components

2.i) not part of the RCPB but are part of ECCS, post accident containment heat removal or post accident fission product removal

2.ii) not part of the RCPB but are part of reactor shutdown or residual heat removal

2.iii) Containment isolation system

Equipment Class 3 Classification Bases for Non-ASME Code Section III Piping Systems and Components

3.i) not part of equipment class 2 but part of safety-related cooling water and emergency feedwater systems or portions of those systems that are designed

for ECCS, post accident containment heat removal or post accident containment atmosphere cleanup

3.ii) Residual heat removal from the reactor and from the spent fuel storage pit (including primary and secondary cooling systems)

3.iii) Cooling water and seal water systems or portions of those safety-related systems that are designed for the functioning of safety-related components and systems, such as RCPs and the MCR.

3.iv) Systems, other than RWMS, not covered above, that contains or may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body.

3.v) Emergency power sources

3.vi) Equipment and floor drainage system

3.vii)Plant ventilation systems for areas such as the MCR and ESF rooms

Equipment Class 5 Classification Bases

5.i) Special seismic requirements such as seismic category II

5.ii) Risk significant

Note 2:

Q means the quality assurance requirements of 10 CFR 50 Appendix B are applied. A means augmented quality assurance requirements applied in accordance with Part III of US-APWR Quality Assurance Program Description referenced in Chapter 17.

Note 3:

Design basis codes and standards are addressed in a markup attached with MHI response to RAI 914, 03.02.02-22 (MHI Ref.: UAP-HF-12290).

Note 4:

DCD mark-ups are attached in this RAI response.

Note 5:

Modifications to correct component name and categorization in DCD Table 3.2-2 are also included in the attached DCD mark-ups.

Impact on DCD

This part will be updated per the answer above.

Impact on R-COLA

There is no impact on R-COLA.

Impact on S-COLA

There is no impact on S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Reports

There is no impact on the Technical/Topical Reports.

Table 3.2-2 Classification of Mechanical and Fluid Systems, Components, and Equipment (Sheet 1 of 58)

System and Components	Equipment Class	Location	Quality Group	~~10 CFR 50 Appendix B (Reference 3.2-8)~~Quality Assurance Classification[5]	Codes and Standards[3]	Seismic Category[4]	Notes	
Primary System								DCD_03.02.02-17
1. Reactor Systems								
Fuel assemblies	2	PCCV	~~B~~N/A	~~YES~~Q	5	I		DCD_03.02.02-17
Rod ~~control~~ cluster control	2	PCCV	~~B~~N/A	~~YES~~Q	5	I		DCD_03.02.02-25
(Deleted)								
(Deleted)								
Upper core support assembly	3	PCCV	~~C~~N/A	~~YES~~Q	ASME III, CS	I		DCD_03.02.02-17
Lower core support assembly	3	PCCV	~~C~~N/A	~~YES~~Q	ASME III, CS	I		
Guide tube assemblies	3	PCCV	~~C~~N/A	~~YES~~Q	5	I		
Control rod drive mechanism latch housing	1	PCCV	A	~~YES~~Q	1	I		
Control rod drive mechanism rod travel housing	1	PCCV	A	~~YES~~Q	1	I		DCD_03.02.02-17
Surveillance capsule guide basket	5	PCCV	N/A	A	5	II	Note 5.a	DCD_03.02.02-25
Internal structures	~~4~~5	PCCV	~~D~~N/A	~~N/A~~A	~~4~~5	II		DCD_03.02.02-17
2. Reactor Coolant System								
Reactor vessel	1	PCCV	A	~~YES~~Q	1	I		DCD_03.02.02-17
Reactor vessel head	1	PCCV	A	~~YES~~Q	1	I		
~~Surveillance capsule guide basket~~	~~5~~	~~PCCV~~	~~N/A~~	~~N/AA~~	~~5~~	~~II~~	~~Note 5.a~~	DCD_03.02.02-25
Reactor vessel insulation (shell)	5	PCCV	N/A	~~N/A~~A	5	II	Note 5.a	
Reactor vessel insulation (closure head)	5	PCCV	N/A	~~N/A~~A	5	II	Note 5.a	
Reactor coolant pump casing	1	PCCV	A	~~YES~~Q	1	I		
Reactor coolant pump main flange	1	PCCV	A	~~YES~~Q	1	I		
~~Reactor coolant pump thermal barrier~~	~~1~~	~~PCCV~~	~~A~~	~~YES~~	~~1~~	~~I~~		
Reactor coolant pump thermal barrier heat exchanger	1	PCCV	A	~~YES~~Q	1	I		
Reactor coolant pump #1 seal housing	1	PCCV	A	~~YES~~Q	1	I		DCD_03.02.02-17
Reactor coolant pump #2 seal housing	2	PCCV	B	~~YES~~Q	2	I		

Atmosphere Cleanup." ~~The systems~~The containment hydrogen monitoring and control system and the containment spray system also address the recommendations of RG 1.7, "Control of Combustible Gas Concentrations in Containment;" and NUREGs 0737 and 0660, as presented in Section 1.9. The hydrogen igniters are designed in accordance with NEMA 250 (Ref. 6.2-52). DCD_06.02.05-43 DCD_03.02.02-25

As noted in RG 1.7 (Ref. 6.2-29), the potential for combustible gases (principally hydrogen) to be generated may arise from an accident that is more severe than a postulated design-basis accident. Thus, in the unlikely occurrence of such an accident, the availability of containment hydrogen monitoring and control provides the added assurance that a significant challenge to the containment integrity (up to and including containment breach) is prevented.

6.2.5.2 System Design

The containment hydrogen monitoring and control system design includes the following:

- One hydrogen monitor that measures hydrogen concentration in containment air
- Hydrogen concentration indication in the MCR
- Power supply from two non-Class 1E buses capable of cross-connection and non-Class 1E alternate alternating current (ac) gas turbine generator backed,in addition, dedicated batteries with the capacity to provide power for at least 24 hours DCD_19-560
- Twenty hydrogen igniters, ~~located in the containment~~eleven of which are powered by batteries in addition to AC power located in the containment. Battery backed-up igniters are as follows:
  - One near the PRT
  - One in the lower area of the pressurizer compartment
  - One in each of the four SG/reactor coolant loop subcompartments
  - Two in the second floor of containment, near the PRT
  - Three in the containment dome (two near the top of SG compartment and one near the top of pressurizer compartment)
- Capability for operability testing during plant operation
- Materials of construction compatible with severe accident environment

A diagram of the containment hydrogen monitoring and control system is presented in Figure 6.2.5-1. Containment hydrogen monitoring and control design parameters are found in Table 6.2.5-1.

6.2-41 Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants, Regulatory Guide 1.54 Revision 1, July, 2000, USNRC. DCD_06.02.02-55

6.2-42 Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, ANSI N101.2.

6.2-43 Standard Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions, ASTM D 3911.

6.2-44 WCAP-16530-NP, Topical Report "Evaluation of Post-Accident Chemical Effects on Containment Sump Fluids to Support GSI-191 (ML073521072).

6.2-45 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.54, Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants, Revision 2.

6.2-46 Letter from William H. Ruland (NRR) to Alexander Marion (NEI) dated April 6, 2010, Revised Guidance regarding Coatings Zone of Influence for Review of Final Licensee Responses to Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors. (ML100960495)

6.2-47 Letter from William H. Ruland (NRR) to Alexander Marion (NEI) dated July 29, 2010, Draft version of Table 3-2 for protective coating ZOIs including NEI 04-07. (ML100900172)

6.2-48 Letter from Thomas O. Martin (NRR) to J.A. Gresham (WEC) dated July 14, 2006, Nuclear Regulatory Commission Response to Westinghouse Letter LTR-NRC-06-46 regarding Pressurized Water Reactor (PWR) Containment Sump Downstream Effects. (ML062070451)

6.2-49 US-APWR Sump Strainer Stress Report, MUAP-08012-NP (R1), March 2011.

6.2-50 ASME Boiler & Pressure Vessel Code, Section III, Division 1, 2001 edition, up to and including 2003 Addenda

6.2-51 U.S. Nuclear Regulatory Commission, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, NUREG-0800, Branch Technical Position 6-3, Determination of Bypass Leakage Paths in Dual Containment Plants, Revision 4, 2007. DCD_06.02.06-34

6.2-52 National Electrical Manufacturers Association, Enclosures for Electrical Equipment (1000 Volts Maximum), NEMA 250-2008. DCD_03.02.02-25

6.3.2.2.6.19 Accumulator Nitrogen Supply Containment Isolation Check Valve

One swing check valve is aligned in the accumulator nitrogen supply line as a containment isolation valve. The accumulator nitrogen supply containment isolation check valve (SIS-VLV-115) is Equipment Class 2, seismic category I.

6.3.2.2.6.20 Accumulator Nitrogen Supply Containment Isolation Valve

One normal closed air operated globe valve is aligned in the accumulator nitrogen supply line as a containment isolation valve. The valve is closed automatically on receipt of a containment phase "A" isolation signal. The open or closed valve position is indicated in the MCR and RSC. The accumulator nitrogen supply containment isolation valve (SIS-AOV-114) is Equipment Class 2, seismic category I.

6.3.2.2.6.21 Direct Vessel Injection Line Check Valve

Two swing check valves in series are aligned in each direct vessel injection line. The 1st and 2nd direct vessel injection line check valves (SIS-VLV-012A, B, C, and D) and (SIS-VLV-013A, B, C, D) are Equipment Class 1, seismic category I.

6.3.2.2.6.22 Hot Leg Injection Check Valve

One swing check valve is aligned in each hot leg injection line. The hot leg injection check valves (SIS-VLV-015A, B, C and D) are Equipment Class 1, seismic category I.

6.3.2.2.6.23 Safety Injection Pump Discharge Check Valve

One swing check valve is aligned in each safety injection pump discharge line. The valve serves to prevent discharge line drain-down. The safety injection pump discharge check valves (SIS-VLV-004A, B, C and D) are Equipment Class 2, seismic category I.

6.3.2.3 Applicable Codes and Classifications

Design codes and classifications applicable to the SIS are described in Chapter 3, Sections 3.2. ECCS are seismic category I as required by 10 CFR 50, Appendix A, GDC 2.

The NaTB baskets are used to raise the pH of the RWSP. Therefore, the NaTB baskets are categorized as Equipment Class 2, seismic category I. An NaTB basket is not a "Component" defined in ASME Section III, Division I NCA-9200 "DEFINITIONS", so that it is non-ASME equipment. Subsection NF is applied mutatis mutandis to the stress evaluation of the NaTB baskets. DCD_03.02.02-25

The design and classification of instrumentation and controls applicable to the SIS are described in Chapter 7, "Instrumentation and Controls."

The plant can be kept in the safe shutdown condition by the above operations performed only on one Class 1E train.

8.4.2.2 Conformance with Regulatory Guidance

The offsite and onsite emergency power supply systems meet 10 CFR 50, Appendix A, GDC 17 and 18 (Reference 8.1-3).

RG 1.155, "Station Blackout," (Reference 8.3.1-21) provides a means acceptable to the NRC staff for meeting the requirements of 10 CFR 50.63 (Reference 8.2-5). NUMARC-87-00 (Reference 8.4-1) also provides guidance acceptable to the staff for meeting these requirements. RG 1.155 (Reference 8.3.1-21) takes precedence when noted in Table 1 of RG 1.155 (Reference 8.3.1-21). The AAC power sources are designed in accordance with RG 1.155 (Reference 8.3.1-21) and manufacturer's standards. NUMARC 87-00 (Reference 8.4-1) is used for clarification, as permitted by RG 1.155. The PSFSV ventilation system is designed in accordance with manufacturer's standards. DCD_03.02.02-22 DCD_03.02.02-25

The non-Class 1E AAC power supplies and the connections to the onsite emergency Class 1E power supply system meet all the requirements of RG 1.155 (Reference 8.3.1-21). The AAC power sources meet the recommendations listed under Section C.3.3.5 of RG 1.155 as discussed in the following paragraphs.

Two AAC GTGs, which are independent and of different manufacturer~~have different rating with diverse starting mechanism~~ from the Class 1E ac power sources, are provided as AAC sources to minimize common mode failures. This meets the criterion of having power sources that are independent and diverse from the normal Class 1E ac power sources in accordance with Section C.3.2.5 of RG 1.155 (Reference 8.3.1-21). DCD_08.03.01-38

The AAC GTGs are not normally connected to the offsite or onsite emergency ac power supply systems. The AAC GTGs are connected to the non-Class 1E 6.9 kV permanent buses, P1 and P2 only during LOOP or online test of AAC GTG conditions. The AAC GTGs and their associated non-Class 1E selector circuits A and B are located in separate rooms. The AAC GTGs and the onsite Class 1E ac power system are electrically isolated by a disconnect switch (non-Class 1E) and a circuit breaker (Class 1E) in series. The auxiliaries and support systems for the AAC GTGs are separate and are not shared with the onsite Class 1E ac systems. Therefore, no single point vulnerability exists whereby a weather-related event or single active failure could disable any portion of the blacked-out unit's onsite Class 1E power sources or the offsite power sources and simultaneously fail the AAC GTGs. This meets the criteria 1 and 2 of Section C.3.3.5 of RG 1.155 (Reference 8.3.1-21).

The AAC GTGs are automatically started by the undervoltage signal on the 6.9 kV permanent buses, P1 or P2, and are automatically connected to their respective permanent buses within 100 seconds. The AAC GTGs can be connected manually to the onsite Class 1E buses by closing the non-Class 1E disconnect switch in the selector circuit and the Class 1E incoming circuit breaker in the Class 1E 6.9 kV switchgear as described in Subsection 8.4.1.3. Power supply to at least one of the onsite Class 1E ac train can be restored from the AAC sources within 60 minutes. The availability of power supply to one of the four Class 1E trains is adequate for coping with an SBO event. This

- An increase in thickness at any point should not exceed 10% of the initial thickness at that point.

(2) *Neutron attenuation measurements are a precise instrumental method of chemical analysis for Boron-10 content using a nondestructive technique in which the percentage of thermal neutrons transmitted through the panel is measured and compared with predetermined calibration data. Boron-10 is the nuclide of principal interest since it is the isotope responsible for neutron absorption in the Metamic panel.*

Changes in excess of either of these two criteria requires investigation and engineering evaluation, which may include early retrieval and measurement of one or more of the remaining coupons to provide corroborative evidence that the indicated changes are real. If the deviation is determined to be real, an engineering evaluation shall be performed to identify further testing or any corrective action that may be necessary.

The remaining measurement parameters serve a supporting role and should be examined for early indications of the potential onset of Metamic degradation that would suggest a need for further attention and possibly a change in measurement schedule. These include 1) visual or photographic evidence of unusual surface pitting, corrosion or edge deterioration, or 2) unaccountable weight loss in excess of the measurement accuracy.

Design of the spent fuel storage facility is in accordance with Regulatory Guide 1.13.

The SFP is also provided with an array of 12 storage spaces for damaged fuel assembly containers. These racks do not contain the neutron absorber and the center-to-center spacing of this array is 24 inches.

No overhead crane, except the light load fuel handling machine, pass over the SFP. The fuel handling machine is designed to withstand seismic category I loads to preclude its fall or collapse due to an SSE.

9.1.2.2.3 Containment Racks

DCD_12.03-12.04-40
DCD_12.03-12.04-42

Two containment racks are installed in the refueling cavity on the north and west walls (Figure 9.1.2-3) to temporarily store six new or irradiated fuel assemblies. The containment rack design is identical to the new fuel storage racks. This design is considered conservative because the center-to-center spacing provides minimum separation to maintain a subcritical array. Additionally, surfaces that come into contact with the fuel assemblies are made of annealed austentic stainless steel, and are smooth (125AA) in accordance with the requirement of ANSI/ANS-57.2.

9.1.2.2.4 New Fuel Storage Rack and Spent Fuel Storage Rack Design

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The fuel storage facilities, including the fuel transfer canal, the cask pit, the cask washdown pit, the spent fuel pit gates and the fuel inspection pit, are designed to meet the guidelines of ANS 57.2 (Ref. 9.1.7-7) and ANS 57.3 (Ref. 9.1.7-9). Structural design and stress analysis of the new and spent fuel storage racks are evaluated in accordance with the seismic category I requirements of Regulatory Guide 1.29.

9.2.2.1.1 Safety Design Basis

The CCWS design bases to meet the safety-related functional requirements are :

- The CCWS consists of two independent subsystems, with each subsystem providing 100% of the cooling capacity required for safe function during all operating modes, including accident conditions. Each of the subsystems contains two fifty percent (2 x 50%) trains, for a total of four 50% trains. DCD_09.02.02-84
- The CCWS is designed to have the capability to provide cooling water using either offsite power supply or onsite Class 1E power supply. Each train is powered by Class 1E power supplies respectively.
- The CCWS is designed to perform its safety function of accident mitigation assuming that one 50% train is out of service for maintenance coincident with the loss of offsite power and a single failure in another train.
- The CCWS is designed to seismic category I requirements so as to remain functional during and following a SSE.
- The CCWS is designed to have the capability to isolate the non-safety portions of the system during accident mitigation.
- The CCWS is designed against natural phenomena and internal missiles.
- The CCWS safety components are designed to withstand design loadings.
- The CCWS is protected against adverse environmental, operating, and accident conditions that can occur, such as flooding, high energy line break (HELB), thermal overpressurization, and water hammer.
- The CCWS is designed for periodic inservice testing and inspection of components in accordance with ASME Code Section XI.
- The CCWS is designed to withstand leakage in one train without loss of the system's safety function.
- Applicable codes and standards for the CCWS are listed in Section 3.2. The containment isolation valves and the piping between the isolation valves are designed and constructed to the requirements of ASME section III, Class 2. The remainder of the system is designed and constructed to the requirements of ASME Section III, Class 3, except for the portion that is not required to perform safety functions. Piping and valves of Equipment Class 5 SSCs in the CCWS are designed in accordance with ASME B31.1. DCD_03.02.02-25
- The CCWS, in conjunction with the Essential Service Water System (ESWS) and the Ultimate Heat Sink (UHS), is capable of removing sufficient heat from the essential heat exchangers to ensure a safe reactor shutdown and cooling following a postulated accident coincident with a loss of offsite power and

- The essential chilled water system equipment and component pressure boundary are designed in compliance with ASME Section III.
- A single failure of any active component, or LOOP, cannot result in a loss of chilled water service to the plant safety-related cooling and ventilation systems.
- The essential chilled water system and its distribution piping loop are designed to equipment class 3 and seismic category I to remain functional during and following a SSE.
- The safety-related portions of the ECWS are protected against natural phenomena and internal missiles.
- The essential chilled water system withstands the effects of adverse environmental, operating and accidental conditions.
- The essential chilled water system withstands the effects of tornadoes and hurricanes and tornado missiles and hurricane missiles. DCD_02-03 S01
- The essential chilled water system withstands the design loadings.
- The essential chilled water system meets GDC 2, by compliance, meeting the guidance of Regulatory Guide (RG) 1.29. The applicable sections of RG 1.29 include Position C.1 for safety related portions and Position C.2 for non-safety related portions.

9.2.7.1.1.2 Power Generation Design Bases

The essential chilled water system is designed to satisfy the following power generation design bases.

- The essential chilled water system supplies 40° F chilled water to the HVAC systems cooling coils during normal operation and design basis accidents.
- The essential chilled water system provides accessibility for adjustment, periodic inspection, and maintenance activities to assure continuous functional reliability.
- The essential chilled water system components are designed in accordance with ASME Section III or ASME Section VIII. Piping and valves of Equipment Class 5 in the essential chilled water system are designed in accordance with ASME B31.1. DCD_03.02. 02-22 DCD_03.02. 02-25

9.2.7.1.2 Non-Essential Chilled Water System

The non-essential chilled water system is designed to meet the relevant requirements of GDC 45, and GDC 46 (Ref.9.2.11-1).

9.2.7.1.2.1 Safety Design Bases

The non-essential chilled water system, with the exception of piping and valves between and including the safety-related and seismic category I containment isolation valves, is

classified as non-safety related~~, non-seismic category I system~~. This system is designed to satisfy the following safety design basis. DCD_09.02.02-70

- The non-essential chilled water system provides containment isolation of the chilled water lines penetrating the containment.
- The safety-related portion of the non-essential chilled water system meets GDC 2, by compliance, meeting the guidance of Regulatory Guide (RG) 1.29. The applicable sections of RG 1.29 include Position C.1 for safety-related portions and Position c.2 for non-safety related portions.

9.2.7.1.2.2 Power Generation Design Bases

The non-essential chilled water system is designed to satisfy the following power generation design bases.

- The non-essential chilled water system supplies 40° F chilled water to the HVAC systems cooling coils during plant normal operation and LOOP.
- The non-essential chilled water system pressure boundary and pressure boundary components are designed to meet ASME Section VIII, and ASME/ANSI B31.1.
- The non-essential chilled water system does not serve any safety function. Therefore, the single failure criterion does not apply.
- The non-essential chilled water system provides accessibility for adjustment, periodic inspection, and maintenance activities to assure continuous functional reliability.
- The non-essential chilled water system non-pressure boundary and pressure boundary components are designed in accordance with ASME/ANS B31.1 and manufacturer's standards. Piping and valves of Equipment Class 5 in the non-essential chilled water system are designed in accordance with ASME B31.1. DCD_03.02.02-22 DCD_03.02.02-25

9.2.7.2 System Description

9.2.7.2.1 Essential Chilled Water System

The essential chilled water system flow diagram is shown in Figure 9.2.7-1, equipment and component data is presented in Table 9.2.7-1. The operating data in Table 9.2.7-1 are determined at the system operating point, which is based on the abnormal operation condition, and are considered bounding values. DCD_09.02.02-72

The essential chilled water system consists of four independent trains and each train consists of one 50% capacity system. Each system includes, a water-cooled chiller, a chilled water pump, a compression tank with a make-up water line, a chilled water distribution loop, and instrumentation and control system. The condenser (heat rejection) section of each chiller is supplied with cooling water from the respective essential service water system during both normal and emergency operating conditions. The ECWS heat

9.4.3.1 Design Bases

The auxiliary building ventilation system is classified as a non-safety related system. Non-safety related equipment and ductwork within areas containing safety-related equipment are seismic Category II and the safety-related isolation dampers and associated ductwork are seismic Category I.

9.4.3.1.1 Safety Design Bases

9.4.3.1.1.1 Auxiliary Building HVAC System

The auxiliary building HVAC system is designed to satisfy the following design bases.

- The auxiliary building HVAC system has the capability to close the safety-related, seismic category I isolation dampers during a design basis accident.
- The safety-related isolation damper assemblies isolate the penetration and the safeguard component areas, and the vent stack from the auxiliary building HVAC system.
- The isolation damper assemblies are designed in accordance with ASME N509 (Ref.9.4.8-1) and AG-1 (Ref. 9.4.8-2). DCD_03.02.02-25
- The isolation damper assemblies are connected to separate electrical safety buses that satisfy the single active failure criteria.
- During a design basis accident, the penetration and the safeguard component areas are isolated in order that operation of the annulus emergency exhaust system maintains a negative pressure and mitigates the release of airborne fission product to the atmosphere (Section 9.4.5).
- During a design basis accident, the auxiliary building HVAC system discharge duct is isolated in order to prevent backflow of discharge air from the annulus emergency exhaust system into the auxiliary building HVAC system.
- The isolation damper assemblies are designed to withstand the effect of adverse environmental conditions.
- The ductwork in the reactor building and power source building will be supported to prevent adverse interaction with other safety-related systems during a seismic event. Non-safety related equipment and ductwork within areas containing safety-related equipment are seismic Category II.

9.4.3.1.1.2 Non-Class 1E Electrical Room HVAC System

There are no safety design bases for the non-Class 1E electrical room HVAC system.

The PSFSV ventilation system is classified as equipment class 5 (Non-Safety) and seismic category II and is designed to manufacturer's standards. This equipment is in a seismic category I structure with equipment classified as safety-related. DCD_03.02.02-25

The ventilation openings at the ceiling will have a seismic missile enclosure to protect the safety-related fuel oil tank. The ventilation backdraft dampers and exhaust fans for ease of access for maintenance are to be located within these missile enclosures. The backdraft damper is designed to withstand the effects of a tornado.

The unit heaters in the Power Source Fuel Storage Vault are explosion proof, safety-related and Seismic Category I.

9.5.4.4 Inspection and Testing Requirements

The FOS is tested prior to initial startup. Preoperational testing is described in Section 14.2. System performance is verified during periodic GTG testing. Periodic inspection of the fuel oil storage tank vents is performed to assure there are no obstructions.

Inservice inspection of piping is performed in accordance with the requirements of ASME Section XI, as discussed in Section 6.6 (Ref. 9.5.4-11).

Technical Specification surveillance testing and inspection of the FOS is performed to assure operational readiness, without loss of system function as described in Chapter 16.

Periodic sampling of the fuel oil quality in fuel oil storage tank is performed.

Prior to addition of new fuel oil into the storage tanks, samples will be tested for specific gravity, cloud point, viscosity and water and sediment content in accordance with ASTM D975 limits.

The GTG FOS operability may be demonstrated during tests of the GTG, or testing may be performed by operation of the system in recirculation mode (bypassing the service day tank) and pumping fuel through the recirculation line back to the fuel oil storage tank.

Vents, drains, and necessary connections required for the calibration of the instrumentation shall be provided.

Fuel oil storage tanks and fuel oil day tanks interior coating will be inspected in accordance with ASTM D5163 Standard requirements. The inspection of the coating used on the interior surfaces of the tanks will be every 10-year intervals when the tanks are emptied and cleaned.

9.5.4.5 Instrumentation Requirements

The fuel oil storage tanks are provided with level instrumentation for level indication in the GTG control cabinet. Low and high fuel oil level in the fuel oil storage tanks are alarmed in the MCR.

Each fuel oil day tank is provided with level instrumentation to control the fuel oil transfer pumps, provide level indication on the GTG control cabinet, and indicate low and high level alarms in the GTG Room and in the MCR.

Table 9.5.8-1 Combustion Air Intake and Exhaust System Component Data

Intake silencer	
Quantity (per engine)	1
Make/model/size	AAF, 4R, 24
Type	Pulsco tubular duct
Design flow at 100 °F (cfm)	49,440
Design pressure/temperature (psig/°F)	Atmospheric/120
Codes and standards	Manufacturer's standard
Seismic Category	I
Turbine Exhaust silencer	
Quantity (per engine)	1
Type	Vertical
Design flow at 1,103 °F (cfm)	135,255
Design pressure/temperature (psig/°F)	Atmospheric/1103
Codes and standards	Manufacturer's standard
Seismic Category	I
Piping	
Intake piping	Manufacturer's standard
Intake air pressure loss (including intake silencer)	less than 980 Pa
Exhaust piping	Manufacturer's standard
Exhaust air pressure loss (including turbine exhaust silencer)	less than 2940 Pa
Flexible connectors	Manufacturer's standard
Ventilation/Cooling	Manufacturer's standard
Seismic Category	I
Ventilation	
Intake Flowrate (cfm)	31,783

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