


MITSUBISHI HEAVY INDUSTRIES, LTD.
16-5, KONAN 2-CHOME, MINATO-KU
TOKYO, JAPAN

December 31, 2007

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

Attention: Mr. R. William Borchardt
Director, Office of New Reactors

Project No.0751
MHI Ref: UAP-HF-07170

Subject: Mitsubishi Heavy Industries, Ltd. Application for Design Certification of the US-APWR Standard Plant Design

Pursuant to Subpart B of 10 C.F.R. Part 52 (10 C.F.R. §§ 52.45 *et seq.*), Mitsubishi Heavy Industries, Ltd. ("MHI") is pleased to submit to the U.S. Nuclear Regulatory Commission ("Commission") its Application for the Certification of the US-APWR Standard Plant Design ("Application"). The Application provides the information required by Subpart B of 10 C.F.R. Part 52 for the certification of the US-APWR standard plant design.

The following general information is provided in accordance with 10 C.F.R. § 52.46 and 10 C.F.R. § 50.33 (a) through (c):

(a) Name of applicant: Mitsubishi Heavy Industries, Ltd.;

(b) Address of applicant: 16-5, Konan 2-chome, Minato-Ku, Tokyo, Japan;

(c) Description of business or occupation of applicant: MHI is a member of the Mitsubishi Group. It is a global manufacturer and supplier of industrial facilities, equipment and components, including, among other items, nuclear power plants, aircraft, missiles, space systems, ships, freighters, tankers, and offshore marine structures. In the commercial nuclear power area, MHI operates facilities in Kobe and Takasago (Japan) as well as a nuclear fuel manufacturing plant in Tōkai, Japan. In addition to its design and manufacture of the US-APWR, which is the subject of this Application, MHI has been selected by the Japanese government as the core company to develop a new generation of fast breeder reactors.

This Application is submitted under oath or affirmation of the undersigned as duly authorized by MHI. See Enclosure 1 hereto. The Application consists of the above general information and the following documents being submitted simultaneously herewith:

X The "Design Control Document for the US-APWR" ("DCD"). This document constitutes the final safety analysis report ("FSAR") for the US-APWR standard plant design required by 10 C.F.R. § 52.47(a). The DCD describes the standard facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components of the standard facility as a whole.

DOB1
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- The DCD is being submitted electronically, under a separate cover letter, on compact discs ("CDs") in two versions: The first version (in CD 1) includes certain information, designated pursuant to Commission guidance as sensitive unclassified non-safeguards information, referred to as security-related information ("SRI"), that is to be withheld from public disclosure under 10 C.F.R. § 2.390. The second version (in CD 2) omits the SRI and is suitable for public disclosure.
- In accordance with 10 C.F.R. § 52.47(b)(1), the DCD includes – in the volume designated as "Tier 1 – Certified Design Material" – the proposed inspections, tests, analyses, and acceptance criteria ("ITAAC") that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the certified design has been constructed and will be operated in conformity with the design certification, the provisions of the Atomic Energy Act, and the Commission's rules and regulations.

X Applicant's Environmental Report – Standard Design Certification, submitted in accordance with 10 C.F.R. § 52.47(b)(2). The Environmental Report is being submitted electronically under a separate cover letter.

X 15 technical reports that contain analyses and other information that supplement the materials included in the DCD and are incorporated by reference therein. Enclosure 2 hereto is the US-APWR report submittal plan. This plan lists the technical reports that are being submitted simultaneously as part of this Application. Each of the individual technical reports is being submitted electronically under a separate cover letter. Also, the plan identifies additional technical reports that will be provided at a future date in support of the Application.

Also submitted for the NRC's information is a report entitled "US-APWR Probabilistic Risk Assessment, MUAP-07030" ("PRA"). This report is not part of the Application; however, a description of the PRA and summary of the PRA results are included in the DCD, as required by 10 C.F.R. § 52.47(a)(27),

A document entitled "Design Certification Physical Security Element Review," prepared in accordance with NUREG-0800, Standard Review Plan (SRP) 13.6.2 (draft) will be submitted to the NRC separately after MHI's personnel receive clearance to review and access safeguards information. That submittal, which will be classified as security safeguards information and withheld from public disclosure pursuant to 10 C.F.R. § 73.21, will identify the vital areas and vital equipment for the US-APWR standard design and provide other physical protection information for the US-APWR standard design in accordance with draft SRP 13.6.2.

On November 26-30, 2007, the NRC Staff conducted a pre-application audit of the completeness and sufficiency of the US-APWR DCD, as it existed in draft form at that time. As a result of the audit, the Staff identified several instances in which there were potential gaps in the information contained in the DCD when compared against the guidance in Regulatory Guide 1.206 (discussed at the daily audit closing sessions); other instances in which the information contained in the DCD appeared insufficient for the Staff to undertake its technical review; and still other instances in which the DCD presentations would likely elicit requests for additional information from the Staff.

Since the audit was conducted, MHI has included additional technical information in the DCD to address most of the issues raised by the Staff during the audit. MHI is filing 15 technical reports concurrently with the DCD that contain analyses and other information that supplement the materials included in the DCD, and is providing the NRC with its plan and schedule for the future filing of additional technical reports identified in Enclosure 2. These technical reports provide analyses that were not included in the draft DCD made available at the audit.

Furthermore, the DCD has been modified to identify MHI's use of design acceptance criteria (DAC). MHI's DAC-ITAAC approach is summarized in Attachment 2 of Enclosure 3 hereto and appropriate changes have been made to Tier 1 and Tier 2 to incorporate this approach into the DCD. As reflected in Attachment 2, MHI's intent is to close most DAC during the DCD review process. The DCD has also been modified to identify and define the inclusion of the Auxiliary Building, the Turbine Building and the Access Building within the scope of the DCD. Again, this scope is summarized in the Attachment 1 of Enclosure 3 with appropriate changes made to Tier 1 and Tier 2 to incorporate the approach into the DCD.

Other items identified by the NRC Staff in its audit are being addressed in their related chapters of the DCD, or in technical reports that are referenced in the attached table which identifies the title of the reports and the expected submittal dates.

Enclosure 3 lists those items that were identified by the NRC during the daily closing sessions as potential gaps in the draft DCD and also identifies where those items are covered in the DCD or in the technical reports. To the extent an item is not addressed in the DCD or the technical reports being submitted concurrently with the DCD, the date is identified when this item will be addressed via an additional submittal or submittals.

MHI looks forward to interacting with the NRC in its technical review of the US-APWR Application for design certification and promptly providing any additional information necessary for the successful completion of the NRC's review. Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,



Masahiko Kaneda
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, Ltd.

Enclosures:

1. Oath or Affirmation
2. US-APWR Report submittal plan
3. MHI response to the NRC comments in the daily closing sessions of US-APWR Pre-Application Audit

Contact Information

C. Keith Paulson, Senior Technical Manager
Mitsubishi Nuclear Energy Systems, Inc.
300 Oxford Drive, Suite 301
Monroeville, PA 15146
E-mail: ckpaulson@mnes.com
Telephone: (412) 373 – 6466

ENCLOSURE 1

OATH OR AFFIRMATION

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
)
 MITSUBISHI HEAVY INDUSTRIES, LTD.)
)
 United States Advanced Pressurized Water Reactor)
)
 Standard Plant Design Certification Application)
)

AFFIDAVIT OF MASAHIKO KANEDA

I, Masahiko Kaneda, being duly sworn according to law, depose and state the following:

1. I am General Manager, APWR Promoting Department, of Mitsubishi Heavy Industries, Ltd. ("MHI").

2. I am authorized to sign and file with the United States Nuclear Regulatory Commission, on behalf of MHI, the enclosed Application for Certification of MHI's United States Advanced Pressurized Water Reactor ("US-APWR") Standard Plant Design ("Application").

3. I declare under penalty of perjury that all the statements made in the Application, including the Design Control Document, the Environmental Report, and Technical Reports, are true and correct to the best of my knowledge, information and belief.

Executed on this 31th day of December, 2007.

M. Kaneda

Masahiko Kaneda

ENCLOSURE 2

US-APWR REPORT SUBMITTAL PLAN

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch. 1 Introduction and General Description of the Plant										
Requirements for Additional Technical Information	-	-	-	(1) APWR Reactor Internals 1/5 Scale Model Flow Test Report	Technical Report	12/2007 (With DCD)	US-APWR Reactor Vessel Lower Plenum 1/7 Scale Model Flow Test Report	Technical Report	7/2008	-
Ch. 3 Design of Structures, Components, Equipment, and Systems										
Inner Concrete	-	-	-	-	-	-	Dynamic analysis of the coupled RCL-R/B-PCCV-CIS Lumped Mass Stick Model [In DCD, the seismic design load is considered the margin to the results of a non-coupled building model. This technical report will demonstrate that the design load in DCD envelopes building-RCL coupled model analysis results.]	Technical Report	4/2008	Design Report of Building (PCCV, CIS, R/B, PS/B) will be provided for ITAAC prior to fuel loading (Appendix C to SRP3.8.4)
Power Source Building (Emergency Power Building)	-	-	-	Enhanced information for PS/B design	Technical Report	2/2008	-	-	-	-
Reactor Internals	-	-	-	(2) Comprehensive Vibration Assessment Program for US-APWR Reactor Internals	Technical Report	12/2007 (With DCD)	Summary of stress analysis results	Technical Report ⁽¹⁾	6/2009	ASME Design Report for ITAAC
Components (ASME class 1)	-	-	-	-	-	-	Summary of design transients	Technical Report ⁽¹⁾	1/2009	-
	-	-	-	-	-	-	CRDM: Summary of stress analysis results (R/V, S/G, Pzr, RCP: See Ch.5)	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Components (ASME class 2, 3)	-	-	-	-	-	-	Advanced accumulator: Summary of stress analysis results	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC
	-	-	-	-	-	-	-	-	-	Other components: ASME Design Report for ITAAC
Piping (ASME class 1)	-	-	-	-	-	-	Pzr Surge line; Summary of stress analysis results (RCL piping : See Ch.5)	Technical Report ⁽¹⁾	6/2009	ASME Design Report for ITAAC
	-	-	-	-	-	-	-	-	-	Other piping: ASME Design Report for ITAAC
Piping (ASME class 2, 3)	-	-	-	-	-	-	M/S line; Summary of stress analysis results	Technical Report ⁽¹⁾	6/2009	ASME Design Report for ITAAC
	-	-	-	-	-	-	-	-	-	Other piping: ASME Design Report for ITAAC
Environmental Qualification of Mechanical and Electrical Equipment	-	-	-	-	-	-	Environment Qualification Program	Technical Report	12/2008	-

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch. 4 Reactor										
Fuel System Design	Mitsubishi Fuel Design Criteria and Methodology	Topical Report	5/2007	-	-	-	FINDS: Mitsubishi Fuel Assemblies Seismic Analysis Code	Topical Report	3/2008	-
	-	-	-	-	-	-	Evaluation Results of Structural Response Analysis of US-APWR Fuel System under Seismic and LOCA	Technical Report ⁽¹⁾	6/2009	-
	-	-	-	(3) US-APWR Fuel System Design Parameters List	Technical Report	12/2007 (With DCD)	-	-	-	-
	-	-	-	US-APWR Fuel System Design Evaluation	Technical Report	2/2008	-	-	-	-
Nuclear Design	-	-	-	(4) Qualification of Nuclear Design Methodology using PARAGON/ANC	Technical report	12/2007 (With DCD)	-	-	-	-
	-	-	-	(5) Validation of Criticality Safety Methodology	Technical report	12/2007 (With DCD)	-	-	-	-
	-	-	-	(6) US-APWR In-Core Power Distribution Evaluation Methodology	Technical report	12/2007 (With DCD)	-	-	-	-
Thermal-Hydraulic Design	Thermal Design Methodology	Topical Report	5/2007	-	-	-	-	-	-	
Functional Design of Reactivity Control Systems	-	-	-	(7) FMEA for Control Rod Drive Mechanism Control System	Technical Report	12/2007 (With DCD)	-	-	-	-

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch. 5 Reactor Coolant and Connecting Systems										
Reactor Vessel	-	-	-	-	-	-	Summary of stress analysis results	Technical Report ⁽¹⁾	6/2009	ASME Design Report for ITAAC
Reactor Coolant Pumps	-	-	-	(8) Structure Analysis for US-APWR Reactor Coolant Pump Motor Flywheel	Technical Report	12/2007 (With DCD)	Summary of stress analysis results	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC
Steam Generator	-	-	-	-	-	-	Summary of stress analysis results	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC
Reactor Coolant Loop Piping	-	-	-	-	-	-	Summary of stress analysis results	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC
Pressurizer	-	-	-	-	-	-	Summary of stress analysis results	Audit ⁽¹⁾	9/2009	ASME Design Report for ITAAC
Ch. 6 Engineered Safety Features										
Containment Systems	LOCA Mass and Energy Release Analysis Code Applicability	Topical Report	7/2007	Subcompartment analyses for US-APWR Design Confirmation [The design of sub-compartment is performed based on the design pressures conservatively derived from MHI's PWR design experience in Japan. This technical report will demonstrates that the design pressures in DCD envelopes the subcompartment analyses results.]	Technical Report	2/2008	-	-	-	-
Emergency Core Cooling System	Advanced accumulator	Topical Report	3/2007	-	-	-	-	-	-	-

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch. 7 Instrumentation and Controls										
I & C	Safety I & C system design process and description	Topical Report	3/2007	(9) Software Program Manual	Technical Report	12/2007 (With DCD)	-	-	-	-
	Safety system digital platform - MELTAC -	Topical Report	3/2007		-	-	-	-	-	-
	Defense-in-Depth and Diversity	Topical Report	4/2007	(10) Defense in Depth and Diversity Coping Analysis	Technical Report	12/2007 (With DCD)	-	-	-	-
Ch. 8 Electrical Power										
Offsite Power System	Qualification and test plan for gas turbine generator	Technical Report	11/2007	-	-	-	-	-	-	-
Ch. 9 Auxiliary Systems										
Fuel Storage and Handling	-	-	-	Criticality analysis for US-APWR new and spent fuel racks	Technical Report	2/2008	-	-	-	-
	-	-	-	-	-	-	Mechanical analyses for US-APWR new and spent fuel racks	Technical Report ⁽¹⁾	3/2009	-
Ch.10 Steam and Power Conversion System										
Turbine Generator	-	-	-	(11) Probability of Missile Generation from Low Pressure Turbines	Technical Report	12/2007 (With DCD)	-	-	-	-
	-	-	-	(12) Probabilistic Evaluation of Turbine Valve Test Frequency	Technical Report	12/2007 (With DCD)	-	-	-	-

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch.13 Conduct of Operations										
Security		-	-	Design Certification Physical Security Elements Review (Identification of Vital equipment, Vital areas, and Other minimum information)	Technical Report	2 weeks after MHI will have clearance for SGI	Security assessment report - High assurance evaluation - Mitigative measures evaluation - Cyber assurance evaluation	Technical Report	7/2008	-
Ch.15 Transient and Accident Analyses										
Event Evaluation	Large Break LOCA Code Applicability	Topical Report	7/2007	-	-	-	-	-	-	-
	Small Break LOCA Methodology	Topical Report	7/2007	(13) Small Break LOCA Sensitivity Analyses for US-APWR	Technical Report	12/2007 (With DCD)	-	-	-	-
	Non-LOCA Analysis Methodology	Topical Report	7/2007	-	-	-	-	-	-	-
Ch.16 Technical Specifications										
Technical Specifications		-	-	(14) Justification for deviations between NUREG-1431 rev.3.1 and US-APWR Technical Specification	Technical Report	12/2007 (With DCD)	-	-	-	-
		-	-	(15) Mitsubishi Reload Evaluation Methodology	Technical Report	12/2007 (With DCD)	-	-	-	-
Ch.17 Quality Assurance and Reliability Assurance										
Quality Assurance During the Design and Construction Phase	Quality assurance program description for design certification of the US-APWR	Topical Report	1/2007	-	-	-	-	-	-	-

Notes:
(1): DAC closure

US-APWR Report Submittal Plan

Item	Pre-application Review Phase			DCD Acceptance Review Phase			DCD Review Phase			Remarks
	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	Information to be provided	Style of Information to be provided	Date	
Ch.18 Human Factors Engineering										
Design	HSI system description and HFE process	Topical Report	4/2007				HSI design	Technical Report ⁽¹⁾	6/2009	Information to be provided prior to fuel loading: - Display design and design of computer based on procedures and training
Verification and Validation							US operator static V & V results (including HFE analysis results)	Technical Report ⁽¹⁾	12/2008	
Ch.19 Probabilistic Risk Assessment and Severe Accident Evaluation										
Level 3 PRA							Probabilistic Risk Assessment (Level 3)	Technical Report	3/2008	
Additional Information										
PRA Report (Submitted for Information only)				Probabilistic Risk Assessment (Detailed design-specific Level 1 and Level 2PRA and severe accident evaluation)	Technical Report	12/2007 (With DCD)				
Beyond DBT							Evaluation of mitigation of Beyond DBT aircraft crash	Technical Report	To be determined later	
Environmental Report				SAMDA	Environmental Report	12/2007 (With DCD)				

Notes:
(1): DAC closure

ENCLOSURE 3

**MHI RESPONSE TO THE NRC COMMENTS IN THE DAILY CLOSING SESSIONS OF
US-APWR PRE-APPLICATION AUDIT**

**MHI Response to the NRC Comments
in the daily closing sessions of US-APWR Pre-application Audit**

Chapter	Section	NRC Comments	MHI Response
Tier 1	-	The access building, turbine building, and auxiliary building have been left out of the DCD scope, contrary to 10 CFR 52.47 which requires the DCD to be essentially complete.	MHI does include the Auxiliary Building, Turbine Building and Access Building in the DCD scope as shown in Attachment 1 to this Enclosure, "US-APWR DCD Scope for Building and Structures."
Tier 1	2.2	Tier 1, Section 2.2 and Tier 2, Section 1.8 are inconsistent with regard to the Auxiliary Building, Turbine Building and Access Building in that ITAACs are not provided for these buildings.	MHI has revised the DCD to be in accordance with the information presented in the table in Attachment 1.
Tier 1	-	MHI should clearly identify areas in which it is using DAC. Tier 1 is currently unclear in this respect.	MHI limits the use of DAC to stress analyses of piping, components and new/spent fuel storage racks, structural response analysis of fuel assemblies/RCC under seismic and LOCA, and HSI design/US operator V & V, as shown in Attachment 2 to this Enclosure "US-APWR Approach for DAC-ITAC (including Design Completion and Technical Report Submittal Plan)." MHI has revised Tier 1 to be in accordance with the information presented in the table in Attachment 2.
Tier 1	2.2	Tier 1 and Tier 2 information is inconsistent. Specifically, Figure 2.2-14 and Table 2.2.-2 in Tier 1 could not be found in Tier 2.	Consistency between Tier 1 and Tier 2 has been achieved. Tables and figures, which are in Tier 1 but did not appear in Tier 2, are now included in the proper chapter of Tier 2. An identical figure to Figure 2.2-14 of Tier 1 is included in Chapter 1 of Tier 2. An identical table to Table 2.2-2 of Tier 1 is included in Section 3.8 of Tier 2.
Tier 1	2.2	Figure 2.2-1 in Tier 1 is inconsistent with Table 3.7.1-3 in Section 3.7.1 of Tier 2 with respect to building dimensions. Because these dimensions have significant impact on load calculations, the application should provide specific dimensions.	The purpose of Figure 2.2-1 in Tier 1 is to show the building outline, so dimensions are taken from wall to wall. (This means from the outside surface of one wall to the outside surface of the other wall.) On the other hand, Subsection 3.7.1 of Tier 2 describes the seismic analysis so that the dimensions in Table 3.7.1-3 are taken from column center to column center. Note 3 has been added in Table 3.7.1-3: "Dimensions are taken from column center to center." Exact dimensional numbers are used in both cases.

**MHI Response to the NRC Comments
in the daily closing sessions of US-APWR Pre-application Audit**

Chapter	Section	NRC Comments	MHI Response
3	3.7	Sections 3.7 and 3.8 of the DCD do not include a set of structural drawings or floor plans, or key dimensions for structural analysis.	MHI has added the requested information in Section 3.7 and 3.8 of the DCD.
3	3.7.2.1 to 3.7.2.5	Sections 3.7.2.1 to 3.7.2.5 of the DCD do not provide the final seismic in-structural response spectra for components or structures.	MHI has included the final seismic in-structural response spectra in App.3I.
3	3.8	Section 3.2 classifies the East and West PS/B as Category 1 structures but does not provide detailed descriptions of building structures, methods, loadings or figures. Although the DCD states that MHI would provide a design analysis by May, 2008, or make it a COL item, the NRC indicated that the above information should appear in the DCD itself.	MHI has provided detailed descriptions of building structures, methods, loadings, and figures for PS/Bs in Section 3.8. Additionally, MHI will provide detailed design information for PS/B in a technical report by end of February, 2008.
3	3.12.5.10	Section 3.12.5.10 of the DCD does not include a program description for thermal stratification to ensure the continued integrity of piping systems, as required by SRP 3.1.2.	MHI has included the program description for thermal stratification in Section 3.12.5.10 of the DCD.
5	5.2.1.2	In Section 5.2.1.2 there is no table listing the components for which a code case has been applied.	MHI has provided a listing of the components for which it may apply for code case in Table 5.2.1-2 of the DCD.
5	5.2.3.1	Section 5.2.3.1 of the DCD does not identify the material specifications for weld filler material (specification for the material is missing from tables in this section)	MHI has provided the Class, Grade, or Type of the weld material in Table 5.2.3.1 of Section 5.2.3.1 of the DCD.
5	5.2.3.1	The Table in Section 5.2.3.1 of the DCD does not identify material grade for Alloy 690 material.	The material grade is specified as UNS N06690 (ASME standard designation) in the DCD.
5	5.2.3.3.2	Section 5.2.3.3.2 of the DCD does not provide the details of the minimum preheat temperature or maximum interpass temperature.	MHI has provided these details in Section 5.2.3.3.2 of the DCD.
5	5.4.1.1	Section 5.4.1.1 contains a statement of compliance of the reactor coolant pump flywheel with Reg. Guide 1.14 but no details are provided to demonstrate compliance.	MHI is submitting a Technical Report on compliance with Reg. Guide 1.14 with the DCD submittal.

**MHI Response to the NRC Comments
in the daily closing sessions of US-APWR Pre-application Audit**

Chapter	Section	NRC Comments	MHI Response
5	5.4.7.2.2.1	Section 5.4.7.2.2.1 does not provide pump characteristic curves, power requirements, or NPSH limits for the RHR pumps, as required by Reg. Guide 1.206.	MHI has added pump characteristic curves and pump power requirements in Section 5.4.7.2.1, Table 5.4.7-2, and Figure 5.4.7-3 of the DCD.
6	6.2.1.1	Section 6.2.1.1 should identify locations in the containment where water may be trapped and not returned to the containment sump and discuss how the retained water may affect the head of the recirculation pumps.	Figure 6.2.1-9 shows locations in the containment where water may be trapped and not returned to the containment sump. Section 6.2.1.1.2, Figure 6.2.1-10, and Figure 6.2.1-11 show the minimum water level of RWSP considering the retained water.
6	6.2.2.3	Section 6.2.2.3 of the DCD should describe the extent to which the containment accident pressure is credited in calculating the NPSH and the uncertainties in this calculation. The discussion in Section 6.2.2.3 does not include a discussion of the uncertainties.	MHI has added a description of the uncertainties in the calculation in Section 6.2.2.3 of the DCD. The NPSH is calculated assuming that the containment pressure equals the vapor pressure of RWSP water.
7	-	The MHI Topical Report on I&C Safety Design commits to providing information as part of future licensing submittals. MHI should identify this information either in the DCD, in the ITAACs or as a COL item.	MHI has checked to ensure that the information referred to in the Topical Report as being included in future licensing submittals has been included in the DCD. This check identified that two of the items had not yet been incorporated into the DCD. MHI has included these two items in the DCD.
9	9.3.2.1	Section 9.3.2.1 of the DCD should provide the design basis for the post accident sampling system in accordance with 10 CFR 50.34(f)(2)(viii) and 50.34(f)(2)(xvii).	MHI has added the design basis for the post accident sampling system in Section 9.3.2.1 of the DCD.
9	9.3.3	Section 9.3.3 of the DCD does not contain the general design criteria, as required by Regulatory Guide 1.206, for the floor drain system.	MHI has added the general design criteria for the floor drain system in Section 9.3.3 of the DCD.
11	11.2.1.2 11.2.1.3 11.2.2.1	Sections 11.2.1.2, 11.2.1.3, and 11.2.2.1 provide no analysis to demonstrate compliance with SRP Section 11.2 and Branch Technical Position 11.6.	MHI has provided a dose calculation with assumed site conditions in compliance with SRP Section 11.2 and BTP 11.6 in Sections 11.2.2.1.2, 11.2.1.3, and 11.2.2.1 of the DCD.
11	11.2.1.5	Section 11.2.1.5 applies a wrong interpretation of an NEI topical report. The topical report provides a bounding envelope for ALARA cost-benefit analysis, but MHI provides no analysis to show that it falls within the envelope.	Since this information is site-specific, it is provided as a COLA item. MHI has revised the description of the DCD to identify the information as a COLA item.
11	11.2.2	Section 11.2.2 references Figures 11.2-2A to 11.2-2H, which are not included in the DCD.	The referenced figure numbers needed to be corrected to Figures 11.5-2a to 11.5-2j. MHI has revised the referenced figure numbers in Section 11.2.2 of the DCD.

**MHI Response to the NRC Comments
in the daily closing sessions of US-APWR Pre-application Audit**

Chapter	Section	NRC Comments	MHI Response
11	11.2.3	Section 11.2.3 provides no analysis to demonstrate compliance with the dose criteria in Section 2.A of Appendix I to 10 CFR Part 50.	MHI has provided the dose analysis under assumed site boundary conditions in Section 11.2.3 of the DCD.
11	11.3	Figure 11.3-1C and Figure 11.3-2 are referenced but are not included in the DCD.	MHI has changed "11.3-1A through C" and "11.3-2" to correct the figure numbers.
11	11.3.1.2	Section 11.3.1.2 does not provide design criteria for cross contamination of radioactive material between systems.	MHI has provided design criteria for cross contamination of radioactive material between systems in Section 11.3.1.2 of the DCD.
11	11.3.1.2	Section 11.3.1.2 does not have an analysis specified by Regulatory Guide 1.140 for the design of filtration exhaust systems.	MHI has provided a design description for the filtration exhaust systems in Section 11.3.1.2.
11	11.3.1.4	Section 11.3.1.4 refers to Table 11.3-4, which describes the assessment of a component failure of the gas waste management system. However, the DCD does not provide any model assumptions and there is no demonstration that failure of the gas surge tank is more limiting than failure of the charcoal bed. The section provided no comparison to criteria in Branch Technical Position 11.5 referenced in SRP section 11.3.	MHI has provided model assumptions for its assessment of a component failure of the gas waste management system and has demonstrated that failure of the gas surge tank is more limiting than failure of the charcoal bed.
11	11.3.3	Review of Section 11.3.3 shows that Table 11.3-3 is not included in the DCD.	MHI has provided flow rate information, which is referred to in Section 11.3.3, in Figure 11.3-1 of Section 11.3.
11	11.3.3	Section 11.3.3 does not demonstrate compliance with Section 2B or 2C of Appendix I to 10 CFR Part 50. No dose results, no calculations for noble gases, and no dose criteria are provided.	MHI has provided a dose calculation with assumed site conditions in Section 11.3.3 of the DCD which provides dose results, includes calculations for noble gases and contains dose criteria.
11	11.4	Figure 11.4-5 is missing from the DCD.	There is no need to include Figure 11.4-5, because Figure 11.4-4 shows the system layout. MHI has deleted Figure 11.4-5.
11	11.4.4	Section 11.4.4 does not describe the design features or the operational characteristics for the evaporator or drum dryer in Figure 11.4-3.	MHI has provided the description of the drum dryer. MHI has deleted the evaporator from Figure 11.4-3 and provided a cross reference instead to Section 9.3, where the evaporator is described.

**MHI Response to the NRC Comments
in the daily closing sessions of US-APWR Pre-application Audit**

Chapter	Section	NRC Comments	MHI Response
11	11.5.1.2	Section 11.5.1.2 fails to include the applicable references for the design criteria, specifically, 50.34(f)(2), NUREG 0718, NUREG 0737, BTP 7-10, and Regulatory Guide 1.33.	MHI has added the cited references for the design criteria in the list of references for Section 11.5.1.2 of the DCD.
12	12.2.1.1.3 to 12.2.1.1.10	Sections 12.2.1.1.3 through 12.2.1.1.10 do not provide parameters for the sources, density, or self shielding for the locations discussed in these sections.	MHI has provided the description of these parameters in a table (Table 12.2-1) in Section 12.2 of the DCD.
12	12.3	Section 12.3 refers to Figure 12.3-2. This figure should be scaled, or a separate table should be provided, to show wall, floor and ceiling thicknesses which are necessary to confirm radiation shielding.	MHI has provided a table in Section 12.3 (Table 12.3-1) which shows wall, floor and ceiling thicknesses.
12	12.3.4.2.1	Section 12.3.4.2.1 of the DCD does not provide the sensitivity of the airborne radiation monitors. The DCD should indicate that the radiation monitors are capable of detecting 10 DAC hours for particulate and iodine for any compartment where radiation may exist.	MHI has provided the sensitivity of the airborne radiation monitor in section 12.3.4.2.1 of the DCD.
14	14.2	Section 14.2 does not describe the general prerequisites or specific objectives for each phase of the initial preoperational test program as specified by Reg. Guide 1.206.	MHI has incorporated the prerequisites and specific objectives for each phase of the preoperational test program into Section 14.2.1 of the DCD.
14	14.2	Section 14.2 has many Bin 2 or Bin 3 issues which in their aggregate raise a larger concern. The overall concern is that the test abstracts do not systematically address key test parameters, e.g., redundancy, loss of offsite power, etc.	MHI has provided the comparison table of Reg. Guide 1.68 Appendix A versus typical test abstracts so as to address systematically key test parameters, e.g., redundancy, loss of offsite power, etc. in Appendix 14A of Chapter 14.
19	-	In Chapter 19, the fire and flooding analysis does not include significant accident sequences and leading contributors for risk. This information is required by NRC guidance.	MHI has identified the significant accident sequences and leading contributors for risk in the DCD as well as in a Technical Report which is being submitted to the NRC at the same time of the DCD submittal.
19	19.2.6	Section 19.2.6 of the DCD should include a discussion of improvements in core heat removal and containment heat removal systems reliability that are significant and practicable as required by the TMI requirements. Substantively, this is the same issue as the SAMDA issue.	MHI has provided this information in section 19.2.6 of the DCD.
E/R	-	The Environmental Report (related to SAMDA) required by 52.47 and 51.55 that should be a part of the DCD has not been provided.	MHI has provided the Environmental Report related to SAMDA as a part of Design Certification Application.

US-APWR DCD Scope for Buildings and Structures

Building and Structure (1)	Required by 10CFR52.47	Seismic Category	Safety related systems housed in	Tier 1							Tier 2					
				Building and Structures				Systems in the Building			Building and Structures			Systems in the Building		
				Description	Layout Drawing	Building Dimensions (2)	ITAAC	Description	Process Flow Diagram	ITAAC	Description	Layout Drawing	Building Dimensions (2)	Description	Process Flow Diagram	
Reactor Building (incl. CV)	X	1	yes	X	X(3)	X	X	X	X	X	X	X	X(3)	X	X	X
Power Source Building	X	1	yes	X	X(3)	X	X	X	X	X	X	X	X(3)	X	X	X
Auxiliary Building	X	2	no	X	X(4)	-	X	X	X	X	X	X	X(5)	- (6)	X	X
Turbine Building	X	2	no	X	X(4)	-	X	X	X	X	X	X	X(5)	- (6)	X	X
Access Building	X	Non seismic	no	X	X(4)	-	X	X	-	X	X	X	X(5)	- (6)	X	X
Tunnel, Vault and Fuel Tank for Class 1E EPS (Seismic 1, ASME 3 piping)	X	1	yes	X	X(4)	-	X	X	-	X	X	X	X(4)	- (7)	X	X

Note)

- (1): Other buildings including site-specific elements such as the service water intake structure and the ultimate heat sink are not in the DCD scope.
- (2): Building dimensions include wall/slab thickness and structural element locations.
- (3): A general arrangement of the components in the building included.
- (4): Only a plot (typical) plan i.e. a building arrangement at site included.
- (5): A general arrangement of typical components (including radiation shielding wall thickness) for dose evaluation, fire hazard analysis, and flooding is provided.
- (6): Structural dimensions will be finalized considering radiation shielding, fire hazard analysis, and flooding requirements by COL Applicant.
- (7): Structural dimensions will be finalized based on the site specific arrangement by COL Applicant.

US-APWR Approach for DAC-ITAAC (including Design Completion and Technical Report Submittal Plan)

Areas	Use of DAC			Supplier		DCD at submittal			During DCD Review		COL / Construction		T/R or Audit Available Schedule
				MHI	Purchased	DAC	ITAAC		ITAAC met		ITAAC met		
							Design	Construction	Design	Construction	Design	Construction	
Components and piping	ASME Class CS	Reactor Internals	Stress Analyses	Yes	-	X	X	X	X (T/R)	-	-	Reconciliation	T/R 6/2009
		Reactor Vessel		Yes	-	X	X	X	X (T/R)	-	-	Reconciliation	T/R 6/2009
	Steam Generator	Yes		-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009	
	Pressurizer	Yes		-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009	
	Reactor Coolant Pump	Yes		-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009	
	ASME Class 1	CRDM		Yes	-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009
		Reactor Coolant Loop Piping		Yes	-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009
		RCL Branch Piping		-	Yes	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009
		Pressurizer Surge Line Piping		-	Yes	X	X	X	X (T/R)	-	-	Reconciliation	T/R 6/2009
	ASME Class 2	Valves		-	Yes	X	X	X	-	-	X	Reconciliation	N/A
		Accumulator		Yes	-	X	X	X	X (Audit)	-	-	Reconciliation	Audit 9/2009
		Other Components		-	Yes	X	X	X	-	-	X	Reconciliation	N/A
		MS Piping		-	Yes	X	X	X	X (T/R)	-	-	Reconciliation	T/R 6/2009
		Other Piping		-	Yes	X	X	X	-	-	X	Reconciliation	N/A
	ASME Class 3	Components		-	Yes	X	X	X	-	-	X	Reconciliation	N/A
		Piping		-	Yes	X	X	X	-	-	X	Reconciliation	N/A
Others	New and spent fuel storage racks	-	Yes	X	X	X	X (T/R)	-	-	Reconciliation	T/R 3/2009		
Fuel system	Fuel assemblies and RCC	structure response analysis under seismic and LOCA	Yes	-	X	X	-	X (T/R)	-	-	-	T/R 6/2009	
I & C	HSI Design					X	X	X	X (T/R)	-	-	X	T/R 6/2009
	US Operator V & V					X	X	X	X (T/R)	-	-	X	T/R 12/2008

Note) T/R: Technical Report; HSI: Human Interface System; V&V: Verification and Validation.