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March 31, 2014

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

Attention: Mr. Perry Buckberg

Docket No. 52-021
MHI Ref: UAP-HF-14037

Subject: Chapter Status Reports for US-APWR DCD

Reference:
(1) Notice of Forthcoming Design Center Working Group Public Meeting with Mitsubishi Heavy Industries, Ltd., and Luminant Generation Company, LLC. to Discuss the Program Status of the United States – Advanced Pressurized Water Reactor Design Center, dated October 19, 2013, ML13297A032.
(2) Notice of Forthcoming Public Meeting with Mitsubishi Heavy Industries Ltd. to Discuss United States – Advanced Pressurized Water Reactor Design Certification Safety Evaluation Chapter Statuses, dated February 11, 2014, ML14041A131.

With this letter, Mitsubishi Heavy Industries, Ltd. (MHI) is providing the Chapter Status Reports (CSRs) for all portions of the US-APWR Design Control Document (DCD). The CSRs are meant to capture the status of all portions of the DCD and facilitate future licensing activities. These documents were first identified for submittal to the Nuclear Regulatory Commission (NRC) at the November 14, 2013 Design Center Working Group meeting (Reference 1). At this meeting the committed submittal date was identified as March 31, 2014.

Subsequent to the initial identification of the CSR submittals, a final meeting was held to ensure appropriate alignment between the NRC staff and MHI. This meeting was held March 20, 2014 (Reference 2). Discussion during this meeting has been included this submittal.

Included in this submittal are CSR documents covering all 19 Chapters of the US-APWR DCD, with a separate CSR covering Sections 3.7 and 3.8. Appropriate updates to each CSR or CSRs will be made in the future as needed.

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 letter. His contact information is provided below.

Sincerely,

K. Takamura for

Yoshiki Ogata
Executive Vice President
Mitsubishi Nuclear Energy Systems, Inc.
On behalf of Mitsubishi Heavy Industries, Ltd.

D081
NRO

CC: P. Buckberg
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1.0 INTRODUCTION

This report summarizes the status of Chapter 1 "Introduction and General Description of the Plant" of the US-APWR Design Control Document (DCD), MUAP-DC001. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 1 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 1 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	Ongoing	N/A
3	TBD	N/A
4	TBD	N/A
5	TBD	N/A
6	TBD	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 1 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014). DCD Chapter 1 remains in Phase 2 with the NRC staff performing reviews of changes to the summary level information on a periodic basis, usually in conjunction with the submittal of a DCD revision or DCD tracking report. The other major review area is associated with the review of Fukushima-related activities (DCD Section 1.9.5 and Technical Report MUAP-13002), which are to be discussed in the NRC staff Safety Evaluation (SE) Chapter 20.

There have not been any ACRS meetings for DCD Chapter 1, although, there has been indication (page 29 of the September 18, 2013 portion of ML14010A089) that an informational briefing to the ACRS Subcommittee (SC) for Fukushima-related activities would be helpful. However, no ACRS meetings are currently scheduled.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public

meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of the interactions related to Chapter 1 have been clarification calls to ensure that MHI fully understood an NRC RAI before submitting an official response. However, a number of public and closed meetings were held in order for MHI to communicate the strategy for addressing the Fukushima orders. There has also been one audit related to MHI's Fukushima response. These interactions are summarized in Table 2.2-1.

Table 2.2-1 Summary of Major NRC-MHI Interactions for Fukushima Response

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
2/7/2012	Public Meeting	*Meeting Notice:* ML120390031	First NRC-MHI public meeting where MHI described lessons learned from the Fukushima event, the corresponding US-APWR hazard design basis, strategy for major design-related Fukushima actions, and proposed DCD licensing strategy.
3/26/2012	Closed Meeting	*Meeting Notice:* ML120680115 *Meeting Summary:* ML12101A355	MHI and NRC staff discussed the reactor coolant pump (RCP) seals 8 hour coping duration testing for the US-APWR design to address the Fukushima event. MHI also provided responses to NRC comments on the 2/7/12 presentation materials.
7/16/2012	Public Meeting	*Meeting Notice:* ML12171A373 *Meeting Summary:* ML12198A262 *Presentation:* ML12198A257 ML12240A191	NRC-MHI public meeting where MHI described the proposed US-APWR mitigation strategies for beyond-design-basis (BDB) external events, provided the Fukushima action item matrix, described the intended contents of the Fukushima technical report, and provided an update on the RCP Seal No. 2 test including resolution of NRC comments on the test plan.
1/9/2013	Public and Closed Meeting	*Meeting Notice:* ML12328A063 *Meeting Summary:* ML13064A364	NRC-MHI public meeting where MHI described the US-APWR mitigation strategies for BDB external events. The meeting also covered proposed Fukushima-related electrical system design changes, enhancements for the on-site communication systems, an update on the RCP Seal No. 2 test and proposed technical report contents, the plan for Probabilistic Risk Assessment (PRA) revision, the Alternate AC (AAC) Gas Turbine Generator (GTG) seismic capability confirmation plan, and the DCD revision strategy for Fukushima-related design changes.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
4/28/2013	Public Meeting	*Meeting Notice:* ML13094A098 *Meeting Summary:* ML13120A305 *Presentation:* ML13120A035 ML13120A332 ML13120A375 ML13142A081	NRC-MHI public meeting where MHI presented the highlights of the main technical areas of Technical Report MUAP-13002, the draft RAI 7076, the Fukushima-related containment thermal-hydraulic analysis, and the proprietary results of the US-APWR No. 2 Seal Test Report.
9/18/2013 through 11/1/2013	Electronic Audit	*Audit Plan:* ML13246A193 *Audit Report:* ML14069A059 ML14069A063*	The purpose of the audit was for the NRC staff to review the Fukushima containment analysis/calculations and supporting documents to gain in-depth understanding of the US-APWR containment analyses performed using the GOTHIC and MAAP computer codes, supporting assumptions, and uncertainties. Based on the audit report, MHI expects the staff to issue a follow-up RAI when the Fukushima review resumes.

* An asterisk denotes an ADAMS accession number that is not publically available.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 1, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 24 questions in 12 RAIs against DCD Chapter 1. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for fifteen are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this report.

Table 2.3.1-1 Overall Chapter 1 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	14
In Evaluation*	0
Confirmatory Action	1
Closed**	9
TOTAL	24

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).
** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the fifteen questions in DCD Chapter 1 that are not closed as of March 24, 2014. All of the open RAI questions in Chapter 1 are related to the review of MHI's Fukushima response.

Table 2.3.2-1 Status of Chapter 1 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
01.05-3	974-6924 (ML12310A138)	UAP-HF-12323 (ML12346A447)	Confirmatory Action Response officially submitted on 12/10/2012. Commitment to provide DCD changes as part of the Technical Report MUAP-13002 submittal. The NRC verified that the DCD markups submitted with UAP-HF-13052 are correctly captured in DCD Rev. 4. The RAI remains a confirmatory action because the response also commits to incorporating Fukushima-related information into a future revision of MUAP-07030 (PRA Technical Report).
01.05-4	1043-7175 (ML13184A086)	UAP-HF-13204 (ML13227A345)	Issued/Waiting for Response* Response officially submitted on 8/13/2013. The NRC review of MHI's response is on hold due to the slowdown. The response committed to revision of DCD Sections 9.1.3.2, 9.1.3.3.2, and 10.4.9.2.1; DCD Figures 9.1.3-1 and 10.4.9-1, and Technical Report MUAP-13002. The Technical Report changes were included as part of the 9/19/2013 submittal of MUAP-13002 Rev. 1. The DCD changes will be incorporated into the next revision of the DCD. The staff issued follow-up RAI 1089-7460 Question 01.05-18, but has not changed the status of this question because of the need to verify the outstanding DCD changes.
01.05-5	1053-7221 (ML13261A546)	UAP-HF-13248 (ML13283A191)	Issued/Waiting for Response* Response officially submitted on 10/8/2013. The NRC review of MHI's response is on hold due to the slowdown.
01.05-6			
01.05-7			
01.05-8			
01.05-9			

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
01.05-11	1057-7200 (ML13310A524)	UAP-HF-13286 (ML13339A419)	Issued/Waiting for Response* Response officially submitted on 12/3/2013. The NRC review of MHI's response is on hold due to the slowdown. The response commits to changes to Technical Report MUAP-13002. There is no DCD impact.
01.05-12	1086-7456 (ML14072A183)	N/A	Issued/Waiting for Response MHI response on hold due to slowdown. Question requests justification of charging pump operation at 36 hours.
01.05-13	1087-7458 (ML14073A150)	N/A	Issued/Waiting for Response MHI response on hold due to slowdown. Questions request COL items to address performance requirements for pumps, valves, and dynamic restraints.
01.05-14			
01.05-15			
01.05-16			
01.05-17	1088-7459 (ML14073A152)	N/A	Issued/Waiting for Response MHI response on hold due to slowdown. Question related to protecting the supplemental AC power from flooding.
01.05-18	1089-7458 (ML14073A154)	N/A	Issued/Waiting for Response MHI response on hold due to slowdown. Question is related to spent fuel cooling. This is a follow-up to RAI 1043-7175 Question 01.05-4.

* Reflects status that was communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), the Fukushima review is one of the areas that will be pursued during the slowdown period with a goal of completing the Chapter 20 SE with OIs. However, the remainder of Chapter 1 will resume in Phase 2 following the temporary slowdown.

3.2 COMMITMENTS

Prior to the start of the slowdown period, the NRC staff indicated potential RAIs would be issued on the following topics. As of March 24, 2014, no RAIs have been issued in relation to these topics.

- Strategy for portable equipment connections for electrical and cooling systems
- Justification for why robust AAC expected to survive BDBE while Class 1E GTG will not
- Supply replacement (fuel, etc.) related issues

- Follow-up RAI questions resulting from the Fukushima containment analysis audit report ML14069A063-Prop (NOTE: The original RAI associated with the audit was issued against SRP Section 6.2.1 and is therefore discussed in US-APWR Chapter Status Report – Chapter 6.)

MHI will respond to any issued RAIs listed (See Table 2.3.2-1) or revise a prior response as needed to close technical issues identified by the NRC staff review. Additionally, MHI has committed to incorporate editorial corrections and outstanding RAI changes that are identified in Table 2.3.2-1 into MUAP-13002 Revision 2. These activities will occur as part of the sequential work to be performed during the slowdown period described in Section 3.1 of this report.

3.3 NRC INTERFACES

As mentioned in Section 2.1 of this report, in addition to the typical ACRS meeting for DCD Chapter 1, there will likely be an ACRS SC meeting in support of a separate Fukushima orders related ACRS letter.

3.4 KEY REVIEW TOPICS

There are two main technical issues remaining within Chapter 1.

(1) AAC versus FLEX strategy for the US-APWR Fukushima response

All MHI submittals to date related to the topic of the Fukushima orders deviate from the Nuclear Energy Institute (NEI) 12-01 FLEX strategy for electrical power and instead rely upon the use of dc batteries for the first 8 hours of the event and then the AAC GTG for electrical power supply after 8 hours. The NRC staff is currently evaluating MHI's proposed strategy as outlined in DCD Section 1.9.5, Technical Report MUAP-13002, and related changes to supporting information throughout the rest of the DCD. The NRC staff will review the currently docketed material and issue additional RAIs, as necessary, to close out this issue. MHI will support any additional NRC staff requests as part of this review as described in Section 3.2 of this report.

(2) Tier 2* designation of selected portions of technical reports versus incorporation by reference in Chapter 1 (resolution of this issue potentially impacts seismic, turbine missile, and human factors engineering).

MHI is awaiting NRC staff guidance for how to best address this issue in a uniform manner throughout the DCD.

1.0 INTRODUCTION

This report summarizes the status of Chapter 2 "Site Characteristics" of the US-APWR Design Control Document (DCD), MUAP-DC002. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 2 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 2 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	05/18/2010	ML101030829
3	10/25/2011	ML112840392
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420). US-APWR DCD Chapter 2 is currently in Review Phase 4.

US-APWR DCD Chapter 2 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on August 22, 2012 (Package: ML101320253 – non-public, Letter to ACRS: ML101030829, Letter to MHI: ML101020462, SE: ML101330474).

For Phase 3, MHI and the NRC presented DCD Chapter 2 to the ACRS Subcommittee (SC) on June 7, 2010 and the ACRS Full Committee (FC) on September 9, 2011. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. The ACRS FC issued their letter for DCD Chapter 2 (and also Chapters 5, 8, 10, 11, 12, 13, and 16) of the Safety Evaluation Report (SER) with OIs for certification of the US-APWR design on September 22, 2011 (ML11256A206). The ACRS letter stated that there were no issues in DCD Chapter 2 that would preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 2. The NRC responded to the

ACRS letter on October 25, 2011 (ML112840392).

Table 2.1-1 ACRS Meetings Related to DCD Chapter 2

Meeting Date	Topic	Transcript	MHI Follow-Up
06/07/2010	SC meeting on DCD Chapter 2	ML101750054	UAP-HF-10235 (ML102430181)
09/09/2011	FC Meeting on DCD Chapter 2	ML11279A032	N/A

2.2 NRC INTERFACES

Some interactions between MHI and the NRC staff, including short conference calls, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 2. For the past year, there have not been any major interactions with the NRC staff regarding DCD Chapter 2.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 2, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 31, 2014, the NRC staff issued a total of 61 questions in 28 RAIs against DCD Chapter 2. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for 3 are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this document.

Table 2.3.1-1 Overall Chapter 2 RAI Question Status Summary

Status Description	Number of Questions
Issued/Waiting for Response	0
In Evaluation	0
Confirmatory Action	3
Closed*	58
TOTAL	61

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 3 questions in DCD Chapter 2 that are not closed as of March 31, 2014.

Table 2.3.2-1 Status of Chapter 2 Questions Not Closed as of March 31, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
02-3	907-6321 (ML120650441)	UAP-HF-13105 (ML13120A020)	Confirmatory Action Response officially submitted 04/26/2013. Commitments to change the DCD are included in DCD Revision 4.
02.05.02-3	993-6440 (ML12150A136)	UAP-HF-12198 (ML12194A505)	Confirmatory Action Response officially submitted 07/11/2012. This RAI is Confirmatory Action pending the completion of the review of the lateral earth pressures in MUAP-10006.
02.05.04-1	94-1491 (ML083170389)	UAP-HF-13064 (ML13107A669)	Confirmatory Action SE OI 02.05.04-1 Response officially submitted 03/29/2013. This RAI is Confirmatory Action pending the NRC staff's review of Sections 3.7 and 3.8 of DCD.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 2 is not one of the review areas that will be pursued during the slowdown period. Review of DCD Chapter 2 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 2 at this time.

3.3 NRC INTERFACES

There are no additional interfaces currently planned for DCD Chapter 2.

3.4 KEY REVIEW TOPICS

There are no outstanding review topics related to DCD Chapter 2.

1.0 INTRODUCTION

This report summarizes the status of Chapter 3 "Design of Structures, Systems, Components, and Equipment" of the US-APWR Design Control Document (DCD), MUAP-DC003, except Sections 3.7 and 3.8. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 3 review (except 3.7/3.8) to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 3 Phase Status (except 3.7/3.8)

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	10/03/2013	ML13268A159
3	Ongoing	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420). US-APWR DCD Chapter 3 is currently in Review Phase 3.

US-APWR DCD Chapter 3 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on October 3, 2013 (Package: ML13268A147 – non-public, Letter to ACRS: ML13268A159, Letter to MHI: ML13268A145, SE: ML13276A301 – non-public/ML14069A435 – public).

For Phase 3, MHI and the NRC presented DCD Chapter 3 to the ACRS Subcommittee (SC) on November 20 and 21, 2013 and the ACRS Full Committee (FC) on March 6, 2014. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. The ACRS FC issued their letter for Chapter 3 (and also Chapters 14) of the Safety Evaluation Report (SER) with OIs for certification of the US-APWR design on March 13, 2014 (ML14071A255). The ACRS letter stated that there were no issues in Chapter 3 that would

preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 3. The NRC staff response to the ACRS letter is expected to be issued in April 2014, officially closing Phase 3 of DCD Chapter 3, except for Sections 3.7 and 3.8.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 3

Meeting Date	Topic	Transcript	MHI Follow-Up
11/20-21/2013	SC meeting on DCD Chapter 3	ML14023A878	UAP-HF-14018
03/06/2014	FC Meeting on DCD Chapter 3	ML14077A287	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public conference calls, meetings, or audits, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 3. A summary of the major recent interactions between MHI and the NRC staff is provided in Table 2.2-1 below.

Table 2.2-1 Summary of Major NRC-MHI Interactions for Chapter 3 (except 3.7/3.8)

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
02/06/2013	Clarification Call	N/A	RAI951-6587, Question 3.10-18 regarding Seismic Qualification
02/20/2013	Clarification Call	N/A	RAI758-5680, Question 3.5.3-10 regarding automobile missile
03/21/2013	Clarification Call	N/A	RAI841-6055, Question 03.04.01-29 regarding internal flood analyses
04/17/2013	Audit	*Audit Plan:* ML13092A160 *Audit Summary:* ML13234A258	Review of internal documents on internal flood analyses
04/24/2013	Clarification Call	N/A	RAI901-6257, Question 3.11-55 regarding Environmental Qualification of nonmetallic parts
05/16/2013	Clarification Call	N/A	RAI1034-7055 regarding Environmental Qualification
05/29/2013	Clarification Call	N/A	RAI841-6055, Question 03.04.01-29 and RAI1030-7105, Question 03.04.01-33 regarding internal flood analyses
09/25/2013	Clarification Call	N/A	RAI1013-7031, Question 3.9.2-103 and 104 regarding the steam generator design
11/14/2013	Clarification Call	N/A	RAIs issued against Section 3.11 of the DCD and MUAP-08015 regarding Environmental Qualification

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
01/30/2014	Audit Entrance Conference Call	N/A	Clarification of documents made available for the Design and Procurement Specifications Audit
02/03-05/2014	Audit	*Audit Plan:* ML13353A159 *Audit Report:* ML14077A282	Review of MHI's Design and Procurement specifications under Standard Review Plan 3.2.1, 3.2.2, 3.9.3, 3.9.4, 3.9.5, 3.9.6, and 3.11.
02/06/2014	Audit Exit Conference Call	N/A	Conclusion of the Design and Procurement Specifications Audit
02/26/2014	Audit Follow-up Call	N/A	Clarification of comments received from the NRC regarding the design and procurement specifications that were reviewed during the audit.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 3, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 31, 2014, the NRC staff issued a total of 596 questions in 111 RAIs against DCD Chapter 3. MHI has officially submitted responses to all of the issued questions except two. As shown in Table 2.3.1-1 below, all of the questions except for 32 are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.4.2 of this document.

Table 2.3.1-1 Overall Chapter 3 RAI Question Status Summary

Status Description	Number of Questions
Issued/Waiting for Response	18
In Evaluation	0
Confirmatory Action	14
Closed*	565
TOTAL	596

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI

2.3.2 RAI RESPONSE DISCUSSION

Table 3-7 provides a summary of the 32 questions in Chapter 3 that are not closed as of March 31, 2014.

Table 2.3.2-1 Status of Chapter 3 Questions Not Closed as of March 31, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.02.02-26	1092-7462*	N/A	Issued/Waiting for Response MHI will respond to the RAI following the temporary slowdown.
03.04.02-5	489-3516 (ML13070A381)	UAP-HF-14005 (ML14024A072)	Issued/Waiting for Response Response officially submitted 01/10/2014. The NRC review of MHI's response is on hold due to the slowdown.
03.09.02-103	1013-7031 (ML13070A381)	UAP-HF-14030	Confirmatory Action SE OI in DCD Section 3.9.2 Response officially submitted 03/21/2014. Commitments to change DCD Revision 4 have been included in the Living DCD and are to be officially submitted in DCD Revision 5.
03.09.02-104			
03.09.03-31	1015-7054 (ML13084A132)	N/A	Confirmatory Action SE OI in DCD Sections 3.2.1, 3.2.2, and 3.9.3 This RAI had been issued to track the Design Specifications audit that was held on February 3-5, 2014. MHI has not responded to this RAI. The NRC indicated that the status of all RAIs associated with the audit will be changed to Confirmatory Actions pending the future follow-up audit.
03.09.04-1	107-1293 (ML083310071)	UAP-HF-13267 (ML13329A025)	Issued/Waiting for Response SE OI in DCD Section 3.9.4 Response officially submitted 11/21/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.09.04-14	848-6093 (ML112971646)	UAP-HF-13266 (ML13316B650)	Issued/Waiting for Response SE OI in DCD Section 3.9.4 Response officially submitted 11/21/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.09.04-15	1083-7433 (ML14058A406)	UAP-HF-14029	Confirmatory Action Response officially submitted 03/21/2014. This RAI was issued as a result of the design specifications audit held February 3-5, 2014, to document an observation related to the operating temperature for CRDM. Commitments to change DCD Revision 4 have been included in the Living DCD and are to be officially submitted in DCD Revision 5.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.09.05-34	663-4996 (ML103190244)	UAP-HF-13179 (ML13205A146)	Confirmatory Action Response officially submitted 07/19/2013. Commitments to change the DCD are to be officially submitted in DCD Revision 5.
03.09.06-1	288-2274 (ML090850137)	UAP-HF-09245 (ML091480400)	Confirmatory Action SE OI in DCD Section 3.9.6 Response officially submitted 05/25/2009. This RAI is Confirmatory Action pending the NRC staff's review of revised procurement specifications in a future follow-up audit (ML14077A282)
03.10-17	486-3861 (ML093140775)	UAP-HF-13311 (ML14002A353)	Issued/Waiting for Response SE OI in DCD Section 3.10 Response officially submitted 06/25/2013. MHI submitted Technical Report MUAP-10023 "Initial Type Test Result of Class 1E Gas Turbine Generator System" Revision 7 on 12/18/13. The NRC review of the report is on hold due to the slowdown.
03.11-17 03.11-18 03.11-20	511-3739 (ML093500706)	UAP-HF-10179 (ML101790460)	Confirmatory Action Response officially submitted 06/25/2010. Commitments to change MUAP-08015 are incorporated in MUAP-08015 Revision 2, submitted 12/16/2013 (ML13354B754).
03.11-34	512-3893 (ML093500713)	UAP-HF-12229 (ML12251A212)	Confirmatory Action Response officially submitted 09/05/2012. Commitments to change DCD are incorporated in DCD Revision 4. Commitments to change MUAP-08015 have been fulfilled with the submittal of MUAP-08015 Revision 2 (ML13354B754).
03.11-36	589-4536 (ML101600105)	UAP-HF-13082 (ML13120A524)	Issued/Waiting for Response SE OI in DCD Section 3.11 Response officially submitted 08/12/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-37	589-4536 (ML101600105)	UAP-HF-10200 (ML101960295)	Issued/Waiting for Response SE OI in DCD Section 3.11 Response officially submitted 07/09/2010. The NRC review of MHI's response is on hold due to the slowdown.
03.11-38	589-4536 (ML101600105)	UAP-HF-13082 (ML13120A524)	Issued/Waiting for Response SE OI in DCD Section 3.11 Response officially submitted 04/12/2013. The NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.11-39	650-5093 (ML102930595)	UAP-HF-13283 (ML13344B027)	Issued/Waiting for Response SE OI in DCD Section 3.11 Response officially submitted 12/06/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-42	880-6142 (ML113620541)	UAP-HF-13285 (ML13343A386)	Issued/Waiting for Response SE OI in DCD Section 3.11 Response officially submitted 12/06/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-44	880-6142 (ML113620541)	UAP-HF-12075 (ML12087A156)	Confirmatory Action Response officially submitted 03/23/2012. Commitments to change MUAP-08015 have been fulfilled with the submittal of MUAP-08015 Revision 2, submitted on 12/16/2013 (ML13354B754).
03.11-45			
03.11-46			
03.11-47			
03.11-62	1031-7108 (ML13129A137)	UAP-HF-13308 (ML13360A163)	Issued/Waiting for Response Response officially submitted 12/18/2013. Tier 1 changes proposed in the RAI response has been found unacceptable. The response needs a revision to address the feedback.
03.11-63	1034-7055 (ML13136A176)	UAP-HF-13284 (ML13343A410)	Issued/Waiting for Response Response officially submitted 12/06/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-64	1034-7055 (ML13136A176)	UAP-HF-13130 (ML131750013)	Issued/Waiting for Response Response officially submitted 06/13/2013. Commitments made to revise the RAI response to include a discussion about the applicability of RG1.209 to safety-related computer-based I&C.
03.11-65	1034-7055 (ML13136A176)	UAP-HF-13130 (ML131750013)	Issued/Waiting for Response Response officially submitted 06/13/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-66	1034-7055 (ML13136A176)	UAP-HF-13314 (ML13360A166)	Issued/Waiting for Response Response officially submitted 12/19/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-67	1034-7055 (ML13136A176)	UAP-HF-13130 (ML131750013)	Issued/Waiting for Response Response officially submitted 06/13/2013. Commitments made to revise the RAI response to include a discussion about the applicability of RG1.209 to safety-related computer-based I&C.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.11-68	1034-7055 (ML13136A176)	UAP-HF-13130 (ML131750013)	Issued/Waiting for Response Response officially submitted 06/13/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.11-69	1034-7055 (ML13136A176)	UAP-HF-13130 (ML131750013)	Issued/Waiting for Response Response officially submitted 06/13/2013. The NRC review of MHI's response is on hold due to the slowdown.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), Chapter 3 (except 3.7/3.8) is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 3 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

Outstanding commitments for DCD Chapter 3 at this time include:

- Submittal of revised responses to:
  - RAI1034-7055, Question 03.11-62
  - RAI1034-7055, Question 03.11-64
  - RAI1034-7055, Question 03.11-67
- Revise Design Specifications and supporting documents, as necessary, to address comments received from the NRC staff during the audit and make them available in a follow-up audit (RAI1015-7054, Question 03.09.03-31)
- Revise Procurement Specifications and supporting documents, as necessary, to address comments received from the NRC staff during the audit and make them available in a follow-up audit (RAI288-2274, Question 03.09.06-1)
- Discuss with the NRC staff how to address a comment from the ACRS SC meeting held on November 20-21, 2013 regarding analyses performed for Technical Report MUAP-07029, "Probabilistic Evaluation of Turbine Valve Test Frequency" (MUAP-07029: ML 13196A383, MHI Response to the NRC comment: UAP-HF-14018)

3.3 NRC INTERFACES

During the Design Specifications and Procurement Specifications audit, which was held on February 3-5, 2014, the NRC identified follow-up items (ML14077A282). MHI committed to address them by revising its design and procurement specifications and supporting documents and making them available in a future follow-up audit for the NRC staff's review. Therefore, an

additional audit needs to be scheduled following the temporary slowdown

3.4 KEY REVIEW TOPICS

Key review topics related to DCD Chapter 3 include the following items:

- The NRC identified follow-up items during the Design Specifications and Procurement Specifications audit (ML14077A282). MHI will revise Design Specifications, Procurement Specifications, and/or their supporting documents, as necessary, to address the follow-up items. An additional audit will be scheduled following the temporary slowdown and the revised documents will be made available for the NRC staff to review the changes.

1.0 INTRODUCTION

This report summarizes the status of Chapter 4 "Reactor" of the US-APWR Design Control Document (DCD), MUAP-DC004. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 4 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 4 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	08/21/2012	ML12181A120
3	05/24/2013	ML13127A299
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007(ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420). US-APWR DCD Chapter 4 is currently in Review Phase 4.

US-APWR DCD Chapter 4 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on August 22, 2012 (Package: ML12181A342 – non-public, Letter to ACRS: ML12181A120, Letter to MHI: ML12181A333, SE: ML14066A314 – public / ML12184A285 – non-public).

For Phase 3, MHI and the NRC presented DCD Chapter 4 to the ACRS Subcommittee on October 18, 2012 and the ACRS Full Committee (FC) on April 11, 2013. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. The ACRS FC issued their letter for DCD Chapter 4 (and also Chapters 15, 17, and 19) of the Safety Evaluation Report (SER) with OIs for certification of the US-APWR design on April 29, 2013 (ML13105A219). The ACRS letter stated that there were no issues in DCD Chapter 4 that would preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 4. The NRC responded to the ACRS letter on May 24,

2013 (ML13127A299).

Three Topical Reports were submitted in support of US-APWR DCD Chapter 4. One is MUAP-07008, "Mitsubishi Fuel Design Criteria and Methodology." This Topical Report was presented to the ACRS Subcommittee on October 18, 2012 and to the ACRS Full Committee on April 11, 2013. The ACRS letter was issued on April 29, 2013 (ML13105A219) and the NRC responded to the ACRS letter on May 24, 2013 (ML13127A299). The final Topical Report Safety Evaluation (TRSE) was published on June 6, 2013 (ML13155A219). The approved version of the Topical Report was submitted on the docket on July 17, 2013 (ML13318A827), per request from the NRC (ML13155A210).

Another Topical Report, MUAP-07009, "Thermal Design Methodology" was also presented to the ACRS Subcommittee on January 15, 2013 and then to the ACRS Full Committee on April 11, 2013. The ACRS letter was issued on April 29, 2013 (ML13105A219) and the NRC responded to the ACRS letter on May 24, 2013 (ML13127A299). The final TRSE was published on June 24, 2013 (ML13163A301). The approved version of the Topical Report was submitted on August 2, 2013 (ML13284A068), per request from the NRC (ML13163A301).

The other Topical Report, MUAP-07034 "FINDS Mitsubishi PWR Fuel Assemblies Seismic Analysis Code" is currently under review by the NRC staff. The ACRS Subcommittee was briefed on the Topical Report on January 15, 2013.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 4

Meeting Date	Topic	Transcript	MHI Follow-Up
10/18/2012	SC meeting on DCD Chapter 4	ML12325A614	N/A
10/18/2012	SC meeting on MUAP-07008	ML12325A614	UAP-HF-13079 (ML13092A017)
01/15/2013	SC meeting on MUAP-07009	Closed	UAP-HF-13037 (ML13066A111)
01/15/2013	Informational briefing to SC on MUAP-07034	Closed	UAP-HF-13070 (ML13091A050)
04/11/2013	FC meeting on DCD Chapter 4, MUAP-07008, and MUAP-07009	ML13112A254	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public conference calls, meetings, or audits, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 4. A summary of the major recent interactions between MHI and the NRC staff is provided in Table 2.2-1 below.

Majority of the recent interactions between MHI and the NRC staff were tied to the issue regarding the fuel seismic response analysis. At the ACRS SC meeting on DCD Chapter 4, held on October 18, 2012, the NRC staff expressed concerns that deformation of fuel assembly grid spacers under only Safe Shutdown Earthquake (SSE) forces, in limiting core locations, introduces Departure from Nucleate Boiling Ratio (DNBR) and Loss of Coolant Accident (LOCA)

evaluation concerns. The NRC's concerns are currently tracked as OIs of DCD Chapter 4 which are tied to the NRC staff's review of Technical Report MUAP-08007 "Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads." A public conference call and subsequent meeting were held on March 8 and 13, 2013 (ML13059A108 and ML13059A364), where MHI presented a strategy to resolve the issues mentioned above. Another public meeting was held on May 30, 2013 (ML13142A463) to discuss the final strategy and schedule for implementation of the final closure plan. After the meeting, the fuel seismic closure plan was submitted to the NRC on June 14, 2013(ML13169A008).

In accordance with the closure plan, MHI performed a test to measure the axial flow damping (AFD) response for a representative US-APWR mock-up fuel assembly under axial flow conditions. MUAP-13020 "Axial Flow Damping Test of the Full Scale US-APWR Fuel Assembly", which describes the test conditions and results, was submitted on the docket (ML14023A703). During the project conference call held on February 25, 2014, the NRC stated that the staff had completed reviewing the report and found it acceptable.

MHI also submitted a revised response to RAI 572-4583, Question 04.02-43 regarding the vibration characteristics of US-APWR fuel assemblies. In August 2013, the NRC provided feedback stating that the response had been found unacceptable, and a follow-up RAI1090-7461 was issued on March 14, 2014. This RAI will be responded to following the temporary slowdown.

The submittal of MUAP-08007 "Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads" Revision 3 will complete the implementation of the fuel seismic closure plan. Due to the temporary slowdown, the submittal of the report is not scheduled as of March 31, 2014.

Table 2.2-1 Summary of Major NRC-MHI Interactions for Chapter 4

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
11/14/2012	Public Meeting	ML12307A232	Fuel seismic response analysis
03/08/2013	Public Conference Call	ML13059A108	Fuel seismic response analysis
03/13/2013	Public Meeting	ML13059A364	Fuel seismic response analysis
05/30/2013	Public Meeting	ML13142A463	Fuel seismic response analysis
08/07/2013	Clarification Call	N/A	RAI 572-4583, Question 03.02-43 concerning uncertainties of vibration characteristics of fuel assemblies
01/17/2014	Clarification Call	N/A	RAI 1064-7302, Question 04.02-67 concerning axial flow damping test

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 4, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 31, 2014, the NRC staff issued a total of 234 questions in 43 RAIs against DCD Chapter 4. MHI has officially submitted responses to all of the issued questions except one. As shown in Table 2.3.1-1 below, all of the questions except for 10 are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.4.2 of this report.

Table 2.3.1-1 Overall Chapter 4 RAI Question Status Summary

Status Description	Number of Questions
Issued/Waiting for Response	1
In Evaluation	0
Confirmatory Action	9
Closed*	224
TOTAL	234

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 10 questions in DCD Chapter 4 that are not closed as of March 31, 2014.

Table 2.3.2-1 Status of Chapter 4 Questions Not Closed as of March 31, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
04.02-57	929-6380 (ML12135A708)	UAP-HF-13183 (ML13197A197)	Confirmatory Action SE OI 04.02-13 Response officially submitted 07/12/2013. Commitments made to submit updated fuel seismic evaluation in MUAP-08007 Revision 3.
04.02-58	948-6383 (ML12180A221)	UAP-HF-12204 (ML12226A405)	Confirmatory Action Response officially submitted 08/10/2012. Commitments made to submit MUAP-08007 Revision 3 to reflect the latest seismic inputs and modify the titles of some figures in the report.
04.02-59	948-6383 (ML12180A221)	UAP-HF-12204 (ML12226A405)	Confirmatory Action Response officially submitted 08/10/2012. Commitments made to submit MUAP-08007 Revision 3 to reflect the latest seismic inputs and modify some figures in the report.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
04.02-62	948-6383 (ML12180A221)	UAP-HF-12204 (ML12226A405)	Confirmatory Action SE OI 04.02-7 Response officially submitted 08/10/2012. Commitments made to submit MUAP-08007 Revision 3 to reflect the latest seismic and LOCA inputs.
04.02-63	948-6383 (ML12180A221)	UAP-HF-12204 (ML12226A405)	Confirmatory Action SE OI 04.02-2 Response officially submitted 08/10/2012. Commitments made to submit MUAP-08007 Revision 3 to reflect the latest seismic and LOCA inputs.
04.02-66	1039-7073 (ML13161A093)	UAP-HF-13160 (ML13190A485)	Confirmatory Action Response officially submitted 07/04/2013. Commitments made to submit MUAP-08007 Revision 3 in accordance with the fuel seismic closure plan (ML13169A008)
04.02-68	1090-7461 (ML14073A781)	N/A	Issued/Waiting For Response Follow-up to RAI572-4583, Question 04.02-43 (RAI: ML101040897, MHI Response: ML13182A537). MHI will respond to the NRC following the temporary slowdown.
04.04-43	994-7007 (ML13052A936)	UAP-HF-13156 (ML13190A482)	Confirmatory Action* Response officially submitted 07/05/2013. Commitments to change DNBR Design Limit values in DCD Chapter 4 and Chapter 16 are to be officially submitted in DCD Revision 5.
04.04-44	1063-7301 (ML13337A607)	UAP-HF-13300 (ML13345A733)	Confirmatory Action Response officially submitted 12/10/2013. Commitments to add a COL item to DCD Section 4.4.7 are to be officially submitted in DCD Revision 5.
04.05.02-2	269-2155 (ML090990400)	UAP-HF-09243 (ML091380160) UAP-HF-09355 (ML091890025)	Confirmatory Action SE CI 04.05-2 Response officially submitted 05/14/2009 and 06/30/2009. Commitments to add sentences to DCD Section 3.9.5 regarding sharp notches in the neutron reflector are to be officially submitted in DCD Revision 5.

* Reflects the status as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

The NRC staff's review of Topical Report MUAP-07034 "FINDS Mitsubishi PWR Fuel Assemblies Seismic Analysis Code" will continue after March 31, 2014, separately from DCD Chapter 4.

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 4 is one of the review areas that will be pursued during the slowdown period.

3.2 COMMITMENTS

There are 2 outstanding commitments for DCD Chapter 4 at this time:

- Submit a response to RAI1090-7461, Question 04.02-68 regarding the vibration characteristics of US-APWR fuel assemblies.
- Submit Revision 3 of MUAP-08007 "Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads"

3.3 NRC INTERFACES

There are no additional interfaces currently planned for DCD Chapter 4.

3.4 KEY REVIEW TOPICS

Key review topics related to DCD Chapter 4 include the fuel seismic response analysis. The fuel seismic closure plan was submitted to the NRC on June 14, 2013 (ML13169A008). The submittal of MUAP-08007 "Evaluation Results of US-APWR Fuel System Structural Response to Seismic and LOCA Loads" Revision 3 will complete the implementation of the fuel seismic closure plan. In addition, a response to RAI1090-7461, Question 04.02-68 will be submitted. Due to the slowdown, the submittal of the Technical Report and RAI response is not scheduled as of March 31, 2014.

The NRC has not completed reviewing MUAP-07034 "FINDS Mitsubishi PWR Fuel Assemblies Seismic Analysis Code." The latest revision of the report was submitted to the NRC on January 23, 2014 (Transmittal Letter: ML14035A473, Topical Report: ML14035A473). The NRC has agreed to continue the effort to finalize the TRSE during the temporary slowdown period.

1.0 INTRODUCTION

This report summarizes the status of Chapter 5 "Reactor Coolant and Connecting Systems" of the US-APWR Design Control Document (DCD), MUAP-DC005. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 5 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 5 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	04/28/2011	ML111030412
3	10/25/2011	ML112840392
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420). Chapter 5 of the DCD is currently in Review Phase 4.

US-APWR DCD Chapter 5 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to the ACRS on April 28, 2011 (Package: ML111030107 - non-public, Letter to ACRS: ML111030412, SE: ML111030441).

For Phase 3, MHI and the NRC presented DCD Chapter 5 to the ACRS Subcommittee (SC) on March 27, 2011 and the ACRS Full Committee (FC) on September 09, 2011. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. The ACRS FC issued their letter for DCD Chapter 5 (and also Chapters 2, 8, 10, 11, 12, 13, and 16) of the Safety Evaluation Report (SER) with Open Items for Certification of the US-APWR Design on September 22, 2011 (ML13105A219). The ACRS letter stated that there were no issues in DCD Chapter 5 that would preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 5. The NRC responded to the

ACRS letter on October 25, 2011 (ML112840392)

Table 2.1-1 ACRS Meetings Related to DCD Chapter 5

Meeting Date	Topic	Transcript	MHI Follow-Up
05/27/2011	SC meeting on DCD Chapter 5	ML111590018	UAP-HF-12199 (ML12201B407)
09/09/2011	FC meeting on DCD Chapter 5	ML11279A032	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public conference calls, meetings, or audits, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 5. A summary of the major recent interactions between MHI and the NRC staff is provided in Table 2.2-1 below.

Majority of the recent interactions between MHI and the NRC staff were aimed at discussing the adequacy of the residual heat removal system (RHRS) to perform its safety function at mid-loop conditions due to the possibility of vortex formation and subsequent pump air entrainment. Additional information has been provided in MHI's responses to RAI 897-6280 (05-04 Branch Technical Position-1), RAI 925-6413 (Question 05.04.07-14), and RAI 998-7025 (Question 05.04.07-16), and during conference calls and an audit.

Table 2.2-1 Summary of Major NRC-MHI Interactions for Chapter 5

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
08/08/2012	Public Conference Call	Meeting Notice: ML12207A390 Meeting Summary: ML12271A298	The possibility of vortex formation and subsequent pump air entrainment
10/09/2012	Audit	Audit Plan: ML12279A121 Audit Report: ML13051A580	The possibility of vortex formation and subsequent pump air entrainment
01/23/2013	Clarification Call	N/A	RAI 979-6936, Question 05.04.07-15 regarding the RHR pump test results reviewed during the October 2012 audit
06/20/2013	Clarification Call	N/A	RAI 998-7025, Question 05.04.07-16 regarding potential vortex induced air ingestion and its impact to the RHR pump performance
12/05/2013	Clarification Call	N/A	RAI 998-7025, Question 05.04.07-16 regarding potential vortex induced air ingestion and its impact to the RHR pump performance

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 5, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 31, 2014, the NRC staff issued a total of 139 questions in 45 RAIs against DCD Chapter 5. MHI has officially submitted responses to all of the issued questions. One hundred and thirty seven of the questions are considered closed at this time. The remaining 2 questions are Confirmatory Actions. Table 2.3.1-1 provides a summary of the total number of questions in each of four review status categories. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.4.2 of this report.

Table 2.3.1-1 Overall Chapter 5 RAI Question Status Summary

Status Description	Number of Questions
Issued/Waiting for Response	0
In Evaluation	0
Confirmatory Action	2
Closed*	137
TOTAL	139

*This includes RAI questions that are either resolved-closed or unresolved-closed.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 2 questions in DCD Chapter 5 that are not closed as of March 31, 2014.

Table 2.3.2-1 Status of Chapter 5 Questions Not Closed as of March 31, 2014

NRC RAI No. (Accession)	Question No.	MHI Letter No. (Accession)	Status
998-7025 (ML13058A189)	05.04.07-16	UAP-HF-14010 (ML14035A437)	Confirmatory Action* Response officially submitted 02/03/2014. Commitments to change DCD Revision 4 have been included in Living DCD and are to be submitted in DCD Revision 5.
762-5749 (ML111520224)	05.04.12-2	UAP-HF-14007 (ML14030A076)	Confirmatory Action Response officially submitted 01/27/2014. Commitments to change DCD Revision 4 have been included in Living DCD and are to be submitted in DCD Revision 5.

* Reflects the status as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 5 is one of the review areas that will be pursued during the slowdown period. Specifically, the slowdown plan includes the activity to finalize the Advanced Safety Evaluation Report for DCD Chapter 5.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 5 at this time.

3.3 NRC INTERFACES

There are no additional interfaces currently planned for DCD Chapter 5.

3.4 KEY REVIEW TOPICS

There are no remaining outstanding review topics.

1.0 INTRODUCTION

This report summarizes the status of Chapter 6 "Engineered Safety Features" of the US-APWR Design Control Document (DCD), MUAP-DC006. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

A summary of the current status of the NRC staff's review of the Topical Report, The Advanced Accumulator, MUAP-07001, and the long-term core cooling aspects of the sump strainer (GSI-191) are included as part of this report on DCD Chapter 6.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 6 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 6 Phase Status

Phase	Completion Date	Reference(s)
1	06/19/2009	N/A*
2	08/13/2013	ML14050A029 ML13219A782**
3	02/24/2014	ML13365A056 MI14027A254**
4	Ongoing	N/A
5	TBD	N/A
6	TBD	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.
** An asterisk denotes an ADAMS accession number that is not publically available.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 6 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the proprietary draft of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on August 15, 2013 (Package: ML13219B098; Memo to ACRS: ML13219A869; Letter to MHI: ML13219A930; SE: ML13219A782-non-public; ML14050A029-public). The Phase 2 SE contained 12 OIs and 25 Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD or technical report revision at the time of the SE.

For Phase 3, MHI and NRC presented DCD Chapter 6 to the ACRS Subcommittee (SC) on September 17, 2013 followed by the MUAP-07001 Topical Report presentation on September 18, 2013. MHI and the NRC returned to present GSI-191/LTCC to the ACRS SC on October 1, 2013. All three of the Chapter 6-related topics were then presented to the ACRS Full Committee (FC) on December 5, 2013. The FC issued the interim letter for Chapters 6 and 7 of the Safety Evaluation Report with Open Items for US-APWR design and related long-term core cooling (LTCC) issues on December 24, 2013 (ML13346A732). The NRC staff responded to the interim ACRS letter on February 24, 2014 (ML13365A056-public; ML14027A254-non-public). Phase 4 is currently ongoing.

The FC also issued a letter documenting approval of the NRC staff's review of Topical Report MUAP-07001, The Advanced Accumulator, on January 6, 2014 (ML13346A723-Prop; ML13352A413-Public). On February 5, 2014 the NRC staff issued the Final Topical Report Safety Evaluation for Topical Report MUAP-07001-P, Revision 5, "The Advanced Accumulator." Then on February 11, 2014 the NRC staff issued a response to the MUAP-07001 Topical Report ACRS FC letter (ML14017A272). MHI submitted the approved version of the Topical Report on March 6, 2014 completing the review activity for MUAP-07001 (Package: ML14072A332; MHI Transmittal Letter: ML14072A288; Proprietary Version of Report: ML14072A301, ML14072A302, ML14072A321, ML14072A322, ML14072A299; ML14072A300, ML14072A303, and ML14072A304; Public Version of Report: ML14072A292, ML14072A293, ML14072A290, and ML14072A291).

Table 2.1-1 provides a summary of the relevant milestones for the NRC staff review of the Topical Report associated with DCD Chapter 6.

Table 2.1-1 Chapter 6 Topical Report Milestones

Report No.	Adv. TRSE Date and ML No.	Final TRSE Date and ML No.	Approved Report Date and ML No.
MUAP-07001	08/07/2013 ML13168A021 (PKG) ML13169A070 (LTR) ML13168A022 (SE)	02/05/2014 ML14030A383 (PKG) ML14030A381 (LTR) ML14030A407 (SE) ML14030A412* (SE)	03/06/2014 ML14072A332 (PKG) ML14072A288 (LTR)

* An asterisk denotes an ADAMS accession number that is not publically available.

In an effort to aid the ACRS understanding of the unique features of the US-APWR, MHI provided several informational briefings on the advanced accumulator and the US-APWR GSI-191 design features prior to the completion of the staff's review of these areas. A summary of all of the ACRS meetings related to DCD Chapter 6 is provided in Table 2.1-2 below.

Table 2.1-2 ACRS Meetings Related to DCD Chapter 6

Meeting Date	Topic	Transcript	MHI Follow-Up
11/30/2011	GSI-191 Informational Briefing	ML12004A087*	UAP-HF-12095 (ML12108A155)

Meeting Date	Topic	Transcript	MHI Follow-Up
9/20/2012	GSI-191 & ACC Informational Briefings	ML122920097 ML122850160*	UAP-HF-13016 (ML13028A406)
9/17-18/2013	Chapter 6 and ACC SC Meeting	ML14010A072 ML14010A089*	UAP-HF-13290 (ML13343A409)
10/1/2013	GSI-191/LTCC SC Meeting	ML13346A185 ML13346A198*	UAP-HF-13313 (ML13361A196)
12/5/2013	Chapter 6, ACC, and GSI-191/LTCC FC Meeting	ML14014A299	N/A

* An asterisk denotes an ADAMS accession number that is not publically available.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, or audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. Between February 2011 and December 2013, MHI and the NRC held numerous regular scheduled (weekly or biweekly) conference calls, five public meetings, and one audit to bring the outstanding GSI-191 related issued to closure. A summary of the major GSI-191 interactions between MHI and the NRC staff during this period is provided in Table 2.2-1.

Similarly, a number of conference calls and public meetings were used to resolve the outstanding issues related to the use of computational fluid dynamics to determine the appropriate bias values for the accumulator flow used in the loss of coolant accident (LOCA) analysis in DCD Chapter 15. A summary of the major interactions between MHI and the NRC staff since 2011 for the advanced accumulator review are summarized in Table 2.2-2.

The majority of the remaining interactions for the rest of DCD Chapter 6 were clarification calls for RAIs. A few notable discussion items DCD Chapter 6 are summarized in Table 2.2-3.

Table 2.2-1 Summary of Major NRC-MHI Interactions for GSI-191

Date Held	Interface Type	Related Reference(s)*	Discussion Topic(s)
03/29/2011	Closed Public Meeting	*Meeting Notice:* ML110750483 *Meeting Summary:* ML111100593 *Presentation:* ML111100599	MHI announced the formation of the sump strainer task force and committed to the performance of additional strainer head loss and CIB testing. MHI agreed to provide the proposed closure plan as a formal docket submittal.
05/25/2011	Public and Closed Meeting	*Meeting Notice:* ML111170447 *Meeting Summary:* ML111680395 *Presentation:* ML222680444	MHI provided an update of closure plan activities, status and applicability of prior RAI responses, and schedule information.

Date Held	Interface Type	Related Reference(s)*	Discussion Topic(s)
9/21/2011	Public and Closed Meeting	*Meeting Notice:* ML112430329 *Meeting Summary:* ML112860242 *Presentations:* ML112860255 ML112860258 ML112860264	MHI Informed the NRC of the formation of the sump strainer task force at a public meeting on March 29, 2011. At the September 21, 2011, meeting, MHI presented its closure actions, status, and schedule.
2/9/2012	Public and Closed Meeting	*Meeting Notice:* ML120250019 *Meeting Summary:* ML120740538 *Presentation:* ML120740553	MHI informed the NRC staff of the GSI-191 recirculation flow path design change.
03/14/2012	Closed Teleconference	*Meeting Notice:* ML120670446 *Meeting Summary:* ML12125A314	MHI provided an overview of the strainer head loss and CI test plans. The NRC staff provided comments on the 2/9/2012 draft response to RAI 885-6264 related to temperature scaling in containment sump strainer head loss testing. MHI agreed to modify and submit the revised response to address the NRC staff feedback.
4/16-17/2012	Audit	*Audit Plan:* ML12100A014 *Audit Report:* ML12187A758	Audit of post-GSI-191 design change materials supporting the following topics: impact assessment for containment analysis; debris interceptor; hold-up volume; water volume for chemical calculation; design changes since 2/9/12 public meeting; debris transport delay time; and temperature scaling. The NRC staff issued additional RAIs as a result of the audit.
7/19/2012	Public and Closed Meeting	*Meeting Notice:* ML12184A105 *Meeting Summary:* ML14072A208	MHI provided a public overview of the GSI-191 closure activities. During the closed portion of the meeting MHI shared the initial results of the head loss and core inlet blockage tests.

*Non-public reference documents are not included in this table.

Table 2.2-2 Summary of NRC-MHI Interactions for ACC

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
01/31/2011	Closed Meeting	*Meeting Notice:* ML110240341 *Meeting Summary:* ML110560848	This meeting was focused on the presentation of the revised ACC computational fluid dynamics (CFD) results to the NRC staff.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
02/01/2011	Closed Meeting	*Meeting Notice:* ML110240332 *Meeting Summary:* ML110560848	This meeting was focused the discussion of uncertainty for the large break LOCA analysis and how that related uncertainty might impact the peak cladding temperature (PCT) analysis in DCD Chapter 15.
05/18-19/2011	Closed Meeting	*Meeting Notice:* ML111220474	Meeting postponed until June 1-2, 2011.
06/01-02/2011	Closed Meeting	*Meeting Notice:* ML111470861 *Meeting Summary:* ML111741256	MHI presented information regarding the status of the CFD-evaluated scaling effects issue; results of sensitivities of key phenomenological parameters; impact on the LOCA analysis; and resolution plans for the NRC staff's existing RAIs. MHI agreed to submit revisions to MUAP-07001 and MUAP-09025 by the end of August 2011.
10/27/2011	Clarification Call	N/A	MHI used this conference call to confirm NRC staff acceptance of the proposed analysis conditions for the pressure boundary sensitivity study and to ask whether or not both half and full scale CFD results were needed to resolve the issue in ACC RAI 90. The alternative cavitation model sensitivity study for ACC RAI 92 was also discussed. Staff and MHI were unable to reach agreement on a closure path for the CFD analysis during this call.
12/13/2011	Clarification Call	N/A	Discussion allowed MHI to understand the basis for ACC RAI 93 and the response followed the normal process.
2/1/2012	Clarification Call	N/A	Follow-up discussion of ACC RAI 92 where the NRC staff questioned the validity of the cavitation model used in the small flow CFD analysis. MHI model convergence issues were also discussed. The NRC staff provided comments on MHI's submitted response to ACC RAI 90 and MHI agreed to revise the response to address the feedback.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
3/1/2012	Clarification Call	N/A	The NRC requested additional statements be added to the Part (a) response to ACC RAI 92 and noted that they did not accept the current Part (b) 2D model. NRC staff required MHI to change the boundary conditions of the model. MHI agreed to review the model and provide an updated model, if necessary. The NRC staff requested that MHI revise ACC topical report Section 5.3 to clarify which LOCA analysis do and do not use the nitrogen effect. MHI did not agree to make this change.
3/19/2012	Clarification Call	N/A	Follow-up discussion on ACC RAI 92 specific to the boundary conditions of the 2D model. The NRC staff also provided feedback on MHI responses to ACC RAI 83-91 and 93. MHI agreed to revise MUAP-07001 Section 5.3 to add a basis for why the nitrogen gas effect is not used in the SB LOCA analysis.
4/4/2012	Clarification Call	N/A	The purpose of this call was for the NRC to provide feedback on the proposed ACC RAI 92 Closure Plan. The NRC staff also requested to discuss the GCI method described in Appendix A of MUAP-09025 and the response to ACC RAI 67 with respect to LOCA PCT. MHI actions included informal written white paper responses to latest round of questions and another follow-up call.
6/1/2012	Clarification Call	N/A	The NRC staff outlined 9 remaining issues for the closure ACC RAI 92.
8/1/2012	Clarification Call	N/A	MHI attempted the NRC staff's requested 2-D sensitivity analyses and was unable to obtain a converged result. The purpose of this call was to define the path forward for the closure of ACC RAI 92 since MHI was unable to provide the requested data. MHI prepared a white paper documenting that all reasonable options to address the NRC requests had been attempted.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
10/3/2012	Closed Teleconference	*Meeting Notice:* ML122630420 *Meeting Summary:* ML12290A225	NRC staff and MHI reviewed the status of ACC RAI 84, RAI 85, RAI 92(b), and RAI 94 and agreed upon a submittal schedule. Responses to the questions from the ACRS briefing were also discussed. (ML122630420)
4/8/2013	Clarification Call	N/A	Acknowledgement that the NRC staff and MHI have a fundamental difference of opinion regarding the p-value and F_s value used in the response to ACC RAI 94. MHI agreed to provide a white paper describing the technical basis for determining K_{acc} and the impact of using the worst case flow bias on the large and small break LOCA PCT result.

Table 2.2-3 Summary of NRC-MHI Interactions for DCD Chapter 6

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
10/28/2011	Clarification Call	N/A	The NRC staff requested clarification of some of the assumptions associated with the 1% containment bypass leakage calculation in MHIs response to RAI 794-5871 Question 6.5.2-1. No MHI actions resulted from the conference call discussion.
3/18/2013	Public and Closed Meeting	*Meeting Notice:* ML13059A349 *Meeting Summary:* ML13106A187	The NRC issued RAIs 923-6420 and 947-6540 in response to the audit of the design changes to the RWSP recirculation flow path. The NRC staff requested additional information, beyond that in the original RAI response, in order to close out the technical issue associated with each RAI. MHI agreed to revise RAI 923 and the NRC agreed to issue a follow-up question to request the additional information for RAI 947.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all issued RAIs issued against DCD Chapter 6, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 483 questions in 126 RAIs against DCD Chapter 6. MHI has officially submitted responses to all of the issued questions. As shown in

Table 2.3.1-1 below, all of the questions except for two are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this report.

Table 2.3.1-1 Overall Chapter 6 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	1
In Evaluation*	0
Confirmatory Action	1
Closed**	481
TOTAL	483

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).
** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the two questions in Chapter 6 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 6 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
06.02.05-46	873-6168 (ML113320352)	UAP-HF-12180 (ML12180A373)	Confirmatory Action SE CI 06.02.05-6-164a and also related to CI 06.02.05_6-164 and CI 06.02.05_6-163. This item is being held open to track the closure of the hydrogen igniter issue in DCD Chapter 19 (RAI 871-6121 Question 19-560).
06.03-115	1081-7417 (ML14043A129)	N/A	Issued/Waiting for Response The question follows up on an ACRS concern regarding the termination criteria for containment spray. MHI will submit the response to this RAI when the normal review resumes after the temporary slowdown period.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), Chapter 6 is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 6 will resume in Phase 4 following the temporary

slowdown.

3.2 COMMITMENTS

MHI has committed to updating DCD Chapter 6 for impacts of the safety reanalysis effort. This commitment was made in MHI letter UAP-HF-13170 dated July 1, 2013 (ML13189A283).

See Table 2.2-1 and Section 3.2 of the US-APWR Chapter Status Report – Chapter 1 for information regarding a new Chapter 6 RAI to be issued as a result of the Fukushima-response related containment analysis audit. Note that the RAI prompting the audit was MHI's response to RAI 1029-7076 Question 06.02.01-25 (UAP-HF-13117, ML13155A276), so MHI believes the additional RAI will also be issued against DCD Chapter 6.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 6.

3.4 KEY REVIEW TOPICS

The incorporation of the impacts of the safety reanalysis in DCD Chapter 6 is the only remaining technical issue requiring MHI action at this time. As described in US-APWR Chapter Status Report – Chapter 15, the safety reanalysis effort will be placed on hold during the slowdown period. The scheduling of the reanalysis, DCD changes, and subsequent NRC staff review will be determined following the temporary slowdown period.

There are two confirmatory actions in the Phase 2 SE that are not tied to any of the RAIs listed in Table 2.3.2-1 of this report. SE CI-SPR06.03-2 requires that the staff verify that the final DCD incorporates the information provided in US-APWR DCD Revision 3 Tracking Report MUAP-11021, Revision 1 dated December 2011 (ML12030A217). The information from MUAP-11021 was incorporated into DCD Revision 4, so there is no additional MHI action for this item. SE CI-06.02.04_6-147 requires staff verification that the DCD has been changed in accordance with the response to RAI 362-2278 Question 09.02.02-34. Question 09.02.02-34 was subsequently Unresolved-Closed to RAI 571-4365 Question 09.02.02-58 which is Unresolved-Closed to RAI 760-5576 Question 09.02.02-82. However, RAI 760-5576 Question 09.02.02-82 is currently Resolved-Closed, so there is no additional MHI action for this item.

1.0 INTRODUCTION

This report summarizes the status of Chapter 7, "Instrumentation and Controls," of the US-APWR Design Certification Document (DCD), MUAP-DC007. The status of the applicant, Mitsubishi Heavy Industries, Ltd. (MHI), submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 7 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 7 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	03/26/2013	ML12144A163
3	12/05/2013	ML13316A507
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 7 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 21 February, 2014). Phase 2 was completed with the issuance of the draft of the Phase 2 Safety Evaluation Report (SER) with Open Items (OI) to MHI on March 26, 2013 (ML12144A163). Phase 3 commenced with the presentation of DCD Chapter 7 to the ACRS Subcommittee (SC) on April 25-26, 2013 (ML13154A065) by MHI and the NRC. DCD Chapter 7 was presented to the ACRS Full Committee (FC) on December 5, 2013 (ML13316A507). The FC issued their letter for Chapter 7 of the SER with OIs for US-APWR Instrumentation & Controls (I&C) design on December 24, 2013 (ML13346A732). Phase 4 of the NRC review is ongoing.

The Chapter 7 ACRS SC posed 14 questions requiring follow-up by the NRC and MHI after the meeting. MHI provided responses to the ACRS and NRC on September 20, 2013 (ML13280A488). The Chapter 7 ACRS FC was conducted and a summary letter issued (ML13346A732). The summary letter recommended the NRC ensure that sufficient design information is available to provide assurance that watchdog timers will produce the desired reactor protection and engineered safety features actuation failure state signals independently

from the Mitsubishi Electric Total Advanced Controller (MELTAC) platform software. The NRC has responded to the ACRS' letter stating the Staff and MHI are working to resolve the issue (ML14027A296).

Table 2.1-1 ACRS Meetings Related to DCD Chapter 7

Meeting Date	Topic	Transcript	MHI Follow-Up
04/25-26/2013	I&C SC Meeting	ML13154A065	UAP-HF-13232 (ML13280A488)
12/05/2013	I&C FC Meeting	ML14014A299	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, and inspections have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of the interactions related to Chapter 7 have been clarification calls to ensure that MHI fully understood an NRC RAI before submitting an official response. However, a number of public meetings were held in order to facilitate a common understanding of ongoing review topics and closure approaches. A summary of recent interactions between MHI and the NRC regarding Chapter 7 is presented in Table 2.2-1 of this report. Interactions which have resulted in actions currently not completed are discussed below.

The NRC requested a clarification call be held on December 19, 2013 to discuss Probabilistic Risk Assessment (PRA) references in Chapter 7 along with RAIs 568-4588, 992-6999, and 996-7040. The NRC had looked at the DCD revisions described in the ACRS responses which included modifications to discussions related to PRA in Chapter 7. The NRC stated many references to PRA in Chapter 7 could be removed because the staff's evaluation does not rely on PRA to make a safety determination. The NRC proposed writing a new draft RAI against Chapter 7 to provide a specific list of references to PRA in Chapter 7 that the Staff believed should be removed. The NRC clarified that the RAI would be based on DCD Revision 4, but would consider the markups made in the ACRS responses. The RAI, once finalized, would be considered a follow-up to RAI 750-5675, Question 19-515 answered on November 14, 2013 (ML13325B104) and a Chapter 7 Open Item. The discussed RAI has since been issued final as RAI 1091-7447 and has been received by MHI.

The NRC expressed there was one remaining issue with the Post Accident Monitoring (PAM) response (RAI 568-4588). Type A variables supporting operator actions for the steam generator tube rupture (SGTR) scenario in DCD Section15.6.3 were not entirely clear to the Staff. The NRC questioned the significance of the N-16 alarm occurring at 2 minutes, and what would occur if the N-16 alarm was not available. It was explained the N-16 alarm leads to entry into the Alarm Response Procedure (ARP). In the ARP, a low pressurizer water level would cause the operators to manually trip the reactor. The PAM RAI response included a markup to DCD Section 15.6.3 that added the timing of the pressurizer water level alarm (5 minutes). The NRC hadn't reviewed the markup in detail at the time of the call, and stated the NRC staff would look at the DCD mark-up in more detail. The NRC had some specific questions about whether the pressurizer water level timing considered the fact that the control system may try to maintain the pressurizer water level. MHI did not have the details of the analysis regarding the pressurizer water level alarm at 5 minutes and whether or not control systems were considered during the

call. The NRC then asked whether smaller SGTRs are more limiting. MHI explained that the purpose of the DCD Chapter 15 analysis is to provide the bounding cases for 1) dose analysis, and 2) SG overfill, and that the timing of operator actions in Chapter 15 is based on a specific break size. MHI's position was that the Chapter 15 results are bounding, but the timing of the required actions depends on the break size. It was explained that a smaller break size would allow more time for operator actions and still be bounded by the Chapter 15 analysis. The NRC understood the analysis does not include a spectrum of break sizes compared to operator action times.

The NRC provided a listing of comments regarding the DCD mark-up included in MHI's response to RAI 992-6999. MHI acknowledged receipt of the Staff's suggestions and indicated more time would be needed to review the Staff's comments. The staff requested a separate ITAAC be created to describe the ability of the protection system to identify and mitigate the effects of abnormal data transmission, and that the ITAAC comprehensively list possible faults. MHI confirmed the Staff's request was understood. Multiple comments regarding Table H.1 of "Safety System Digital Platform –MELTAC-," MUAP-07005 (Attachment 2-2 of the response) were provided by the Staff and the Staff asked if MHI required clarification. MHI indicated the comments needed no clarification. The NRC stated an RAI to ask for further information regarding spurious non-safety commands and non-safety controller communication with MELTAC and more specific ITAAC regarding data communication faults would be drafted. RAI 1076-7368 has been issued by the NRC requesting that MHI demonstrate that the data communication system can mitigate the effects of abnormal data transmission and the creation of ITAAC which comprehensively addresses possible faults. MHI responded to the RAI by adding the ITAAC requested and descriptions to applicable documentation on February 25, 2014 via UAP-HF-14016 (ML14059A163). The ability of the protection system to identify and mitigate the effects of abnormal data transmission, and an ITAAC which comprehensively lists possible data communication faults, is the only open item in the DCD Chapter 14 Phase 2 SER with OIs.

The NRC had commented on the mark-up to "Safety I&C System Description and Design Process," MUAP-07004, Table J.1-1 "FMEA of PCMS for Single Control Group Failures" of RAI 996-7040. The NRC commented that the explanation of the evaluation of Plant Control and Monitoring System (PCMS) control group failures should be more thorough. It was stated the evaluation should include the initial conditions of events and the timing of interlocks in order for the NRC to be able to verify that the evaluations are bounded by the current DCD Chapter 15 analyses. The NRC also commented that it was unclear that all potential failures in a control group were analyzed. The NRC questioned whether it was MHI's intent to analyze all combinations or if some combinations were excluded intentionally due to some uniform logic applied to determine which cases were evaluated. The NRC noted only the evaluation for Groups 1 and 2 were reviewed in detail, and that the review was halted due to the apparent lack of information provided. The NRC stated an RAI to ask that MHI provide more detail regarding the FMEA evaluations of control groups in PCMS would be drafted. RAI 1093-7366 has been issued final and received by MHI.

After the ACRS FC meeting for Chapter 7, the ACRS sent the NRC a letter summarizing issues remaining with the Chapter 7 SER with OIs (ML13346A732). The letter encouraged the Staff to ensure that sufficient design details are provided to assure that the watchdog timers (WDT) will produce desired Reactor Protection System (RPS) and Emergency Safety Features Actuation System (ESFAS) failure state signals independent from the MELTAC platform software. The NRC and MHI held a call on January 30, 2014 to discuss the issue. The NRC asked MHI to clarify how the WDT is independent of MELTAC software. MHI explained the WDT is a hardware device which sends a hard-wired failure state output signal from the failed module. The NRC requested MHI provide more clarity regarding WDT independence and the failure state output signal path. The NRC stated an email would be produced to clearly describe to MHI what is needed to resolve the staff's concerns regarding the WDT. The email specifying the Staff's concerns was received by MHI on 2/20/2014. MHI unofficially responded to the NRC's concerns via email on March 7, 2014 further explaining the operation of the WDT. The NRC has indicated an RAI will be produced to officially document the staff's concerns. RAI 1094-7466 has been issued final and received by MHI.

Table 2.2-1 Summary of NRC-MHI Interactions for Chapter 7

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
01/24/2013	Clarification Call	N/A	Chapter 7 SER and ACRS Meeting, PAM RAI 568-4588, O-VDU Use RAI 972-6900
02/26/2013	Public Meeting	ML13045B080	PAM RAI 568-4588, D3 Coping Analysis RAI 988-7021, O-VDU Use RAI 992-6999, MELTAC Software Development RAI 993-7027, MELTAC Requirements RAI 995-7024, PCMS Failure RAI 996-7040
05/23/2013	Clarification Call	N/A	SE Open Items, ACRS SC Questions, Phase 4 Closure Plan
06/13/2013	Clarification Call	N/A	O-VDU Use RAI 992-6999, MELTAC Software Development RAI 993-7027, MELTAC Requirements RAI 995-7024,
07/25/2013	Public Meeting	ML13196A166	ACRS SC Questions, PRA references in Chapter 7, PAM RAI 568-4588, O-VDU Use RAI 992-6999, MELTAC Software Development RAI 993-7027, MELTAC Requirements RAI 995-7024, PCMS Failure RAI 996-7040, D3 Coping Analysis RAI 1041-7066,
12/19/2013	Clarification Call	N/A	PRA references in Chapter 7, PAM RAI 568-4588, O-VDU Use RAI 992-6999, PCMS Failure RAI 996-7040,
01/30/2014	Clarification Call	N/A	WDT independence from MELTAC software

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 7, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 305 questions in 61 RAIs against DCD Chapter 7. As shown in Table 2.3.1-1 below, all of the questions except for eight are considered closed at this time.

Table 2.3.1-1 Overall Chapter 7 RAI Question Status Summary

Status Description	No. of Questions
Issued/Waiting for Response**	7
In Evaluation**	0
Confirmatory Action	1
Closed*	297
TOTAL	305

*Includes both Resolved – Closed and Unresolved – Closed items in eRAI.
**Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131)

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the eight questions in Chapter 7 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 7 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
07-1	1091-7447 (ML14078A302)	N/A	Issued/Waiting for Response Response to be submitted after slowdown period. MHI to address PRA references in DCD Chapter 7.
07-2			
07.01-45	995-7024 (ML13052A945)	UAP-HF-13254 (ML13324A960)	Confirmatory Action Response officially submitted 11/11/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-07005 have been fulfilled with the official submittal of Rev. 9 on 12/9/2013 (ML13350A495).

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
07.05-18	568-4588 (ML101040076)	UAP-HF-13223 (ML13270A236)	Issued/Waiting for Response Response officially submitted 9/11/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-07004 have been fulfilled with the official submittal of Rev. 8 on 11/15/2013 (ML13326A822). The NRC staff has indicated the response will need to be reviewed in further detail and will likely need to be revised.
07.07-33	996-7040 (ML13056A245)	UAP-HF-13244 (ML13308C480)	Issued/Waiting for Response Response officially submitted 11/1/2013. The staff has not completed reviewing the response. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-07004 have been fulfilled with the official submittal of Rev. 8 on 11/15/2013 (ML13326A822).
07.07-34	1093-7366 (ML14085A253)	N/A	Issued/Waiting for Response MHI is to respond.
07.09-27	1076-7368 (ML14036A258)	UAP-HF-14016 (ML14059A163)	Issued/Waiting for Response Response officially submitted 2/25/2014. The staff has not completed reviewing the response.
07.01-46	1094-7466	N/A	Issued/Waiting for Response MHI is to respond.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 7 is one of the review areas that will be pursued during the slowdown period with a goal of completing the Chapter 7 Advanced SER without OIs.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 7 at this time.

3.3 NRC INTERFACES

The NRC has identified the need for an audit to examine failure effects of the PCMS on safety equipment and to confirm the data communication system can mitigate the effects of abnormal data transmission. No schedule for the audit has been communicated, nor has an audit plan been produced. The audit is to be performed after the slowdown period has ended.

Additionally, the NRC has indicated interaction regarding the PAM response (RAI 568-4588) will be necessary to communicate the findings of the NRC staff's review once a thorough review of the response has taken place, as discussed in Section 2.2 of this report.

3.4 KEY REVIEW TOPICS

A safety conclusion is yet to be reached by the Staff regarding the following key review topics:

- Closure of Confirmatory Action RAIs in Subsection 2.3.2 of this report
- PAM List RAI 568-4588
- PRA references in Chapter 7 which the Staff has identified as being inappropriate or unnecessary in RAI 1091-7447
- The effects of PCMS control group failures as described in RAI 1093-7366
- Independence of the WDT from MELTAC software as described in RAI 1094-7466
- Effects of Chapter 15 reanalysis on DCD Section 7.8 and MUAP-07006

As described in Section 3.1, the NRC will work to close Confirmatory Action RAIs identified in Subsection 2.3.2 once Chapter 7 assumes review priority. At that time, MHI will work to officially respond to the aforementioned RAIs, and provide the NRC further detail regarding the independence of the WDT from MELTAC software so the NRC staff can close associated SER OIs. Once an audit plan has been produced and an audit date has been determined, MHI will support the NRC in conducting an audit to examine failure effects of the PCMS on safety equipment and to confirm the data communication system can mitigate the effects of abnormal data transmission. The Chapter 15 reanalysis will need to be completed and effects of the reanalysis on DCD Section 7.8, "Diverse Instrumentation and Control Systems" and MUAP-07006, "Defense-in-Depth and Diversity" will need to be assessed by the NRC staff to determine if safety of the I&C design has been compromised. MHI anticipates completion of these activities will bring Phase 4 of the review of DCD Chapter 7 to a close with issuance of the Advanced SER (ASER) without OIs.

1.0 INTRODUCTION

This report summarizes the status of Chapter 8 "Electric Power" of the US-APWR Design Control Document (DCD), MUAP-DC008. The status of the applicant, Mitsubishi Heavy Industries, Ltd (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 8 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1 below.

Table 2.0-1 DCD Chapter 8 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	11/19/2010	ML103210393
3	10/25/2011	ML112840392
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 8 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to the ACRS on November 18, 2010 and to MHI on November 19, 2010 (Package: ML102850527 – non-public, Letter to ACRS: ML102850482, Letter to MHI: ML102850512, SE: ML103210393). The Phase 2 SE contained five OIs. The Phase 2 SE also contained four Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD revision at the time of the SE.

For Phase 3, MHI and the NRC presented DCD Chapter 8 to the ACRS Subcommittee (SC) on November 29, 2010 and the ACRS Full Committee (FC) on September 9, 2011. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. Following the meetings, the ACRS FC issued the letter documenting the ACRS evaluation of the SE with OIs for DCD Chapter 8 (and also DCD Chapters 2, 5, 10, 11, 12, 13, and 16) on

September 22, 2011 (ML11256A206). The ACRS letter stated that, other than the OIs identified in the SE, there were no issues in DCD Chapter 8 with potentially significant safety implications. The ACRS letter did request some additional information from MHI regarding the reliability data for gas turbine generators (GTGs). The NRC responded to the ACRS letter on October 25, 2011 (ML112840392) and indicated the staff would work with MHI to resolve the OIs as well as the additional ACRS request for reliability data. MHI provided the requested information by official submittal (ML11335A268), as indicated in Table 2.1-1.

Phase 4 is currently ongoing. Note that the five OIs and the four CIs from Phase 2 have now been closed. For a discussion of current and future activities in Phase 4, see Section 3 of this report.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 8

Meeting Date	Topic	Transcript	MHI Follow-Up
11/29/2010	Ch. 8 SC Meeting	ML103430613	N/A
09/09/2011	Ch. 8 FC Meeting	ML11279A032	UAP-HF-11414 (ML11335A268)

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 8. A summary of the major interactions between MHI and the NRC staff is provided in Table 2.2-1 below. In addition to these interactions, several clarification calls were held to discuss RAI questions.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 8

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
12/15/2011	Public Meeting	*Meeting Notice:* ML113330253 *Meeting Summary:* ML113540231	A public meeting was held to discuss RAIs and Technical Reports MUAP-07024 and MUAP-10023 related to the GTG testing. Following the public meeting, MHI submitted the relevant RAI responses and revisions to the two Technical Reports.
05/09/2012	Audit	*Audit Plan:* ML12115A205 *Audit Report:* ML12216A272	An audit was held on the transient heat-up analysis for the turbine-driven emergency feedwater (TDEFW) pump rooms. MHI had provided the calculation in an RAI response to show that the TDEFW pump room temperature did not exceed relevant limits following the loss of room cooling. The audit resulted in a follow-up RAI and additional interaction with the NRC on January 24, 2013 (see below).

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
06/05/2012 to 06/08/2012	Inspection	*Inspection Report & NOV:* ML12198A093 *MHI Response to NOV:* ML12241A265 & ML12293A237 *NRC Acceptance of NOV Response:* ML12255A233 & ML12310A056	An inspection was held on the processes and procedures for testing of the GTGs performed by Engine Systems, Inc. in support of the US-APWR. The inspection resulted in a Notice of Violation (NOV) for four items. MHI responded to the NOV to resolve each item. The NRC accepted the MHI responses to the NOVs.
01/24/2013	Public and Closed Tele-conference	*Meeting Notice:* ML13009A314 *Meeting Summary:* ML13031A491	A public and closed tele-conference was held to discuss the transient heat-up analysis for the TDEFW pump rooms. The MHI response to the RAI that was the follow-up to the May 9, 2012 audit (see above) was discussed. This tele-conference resulted in another follow-up RAI. The follow-up RAI and the general topic of the TDEFW pump room heatup have since been resolved.
02/28/2013	Public Meeting	*Meeting Notice:* ML13044A343 *Meeting Materials & Summary:* ML13066A774	A public meeting was held to discuss NRC Bulletin 2012-01 "Design Vulnerability in Electric Power System". The meeting was held between the NRC, the nuclear industry, and the Nuclear Energy Institute (NEI). During the meeting, the NRC staff discussed the response to Bulletin 2012-01 that had been provided by licensees to date. The NRC provided some feedback to the industry and NEI. MHI attended this meeting.
06/27/2013	Public Meeting	*Meeting Notice:* ML13161A158 *Meeting Materials & Summary:* ML13196A002	Another public meeting was held to discuss NRC Bulletin 2012-01. This meeting was a follow-up to the February 28, 2013 meeting. NEI provided an update on the progress of the NEI initiative to address this issue. The NRC provided some feedback to the industry and NEI. MHI attended this meeting.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
10/09/2013	Clarification Call	N/A	A clarification call was held to discuss MHI's Technical Report MUAP-10023. The call was held shortly after the submittal of Revision 6 of MUAP-10023. MHI explained the changes in Revision 6 and presented the plan for submitting Revision 7. The NRC did provide some preliminary feedback for MHI to address in Revision 7. The NRC had not reviewed Revision 6 in detail at the time.
11/01/2013	Public Meeting	*Meeting Notice:* ML13261A094 *Meeting Summary:* ML13309B117	Another public meeting was held to discuss NRC Bulletin 2012-01. This meeting was a follow-up to the June 27, 2013 meeting. NEI provided a further update on the progress of the NEI initiative to address this issue. MHI attended this meeting.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 8, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 102 questions in 22 RAIs against DCD Chapter 8. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for one are considered closed at this time.

Table 2.3.1-1 Overall Chapter 8 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	1
In Evaluation*	0
Confirmatory Action	0
Closed**	101
TOTAL	102

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 below provides a summary of the one question in DCD Chapter 8 that is not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 8 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
08.02-17	1017-7058 (ML13091A045)	UAP-HF-13312 (ML13360A164)	Issued/Waiting for Response MHI responded on December 18, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 8 is one of the review areas that will be pursued sequentially during the slowdown period. This was identified with a goal of completing the Advanced SE with no OIs.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 8 at this time.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 8.

3.4 KEY REVIEW TOPICS

As of March 24, 2014, all of the OIs and CIs from the Phase 2 DCD Chapter 8 SE have been closed. However, there are still two technical areas where review is needed. A brief summary of each technical topic is provided below. Refer to the discussion in Table 2.3.2-1 above for details of the specific open RAIs associated with these topics.

- NRC Bulletin 2012-01 – NRC Bulletin 2012-01 "Design Vulnerability in Electric Power System" was issued on July 27, 2012 (ML12074A115). To address this issue as it pertains to the US-APWR, the NRC issued RAI 1017-7058 Question 08.02-17 (ML13091A045). MHI responded to this RAI on May 10, 2013 (ML13133A363) and then provided a revised response on December 18, 2013 (ML13360A164). The revised response states that MHI plans to follow the NEI initiative for this issue. The NEI initiative has not yet been endorsed by the NRC at this time. MHI will follow the progress of the NEI initiative and work with the industry and the NRC staff to resolve this issue in the future.
- Technical Report MUAP-10023 – MHI has submitted the Technical Report entitled "Initial Type Test Result of Class 1E Gas Turbine Generator System," MUAP-10023, to support

DCD Chapter 8. Revision 6 of MUAP-10023 was submitted on October 2, 2013 (ML13284A107) and provided new testing and evaluation results. The NRC staff began reviewing Revision 6, and provided some preliminary feedback on a clarification call on October 9, 2013. The NRC did not complete the detailed review prior to the end of December 2013. MHI then submitted Revision 7 of MUAP-10023 on December 18, 2013 (Package: ML14002A353, Letter to NRC: ML14002A350) to provide additional testing and evaluation results. These two Technical Report revisions have not been reviewed in detail by the NRC and the NRC review is now on hold due to the slowdown. MHI will wait for the NRC's evaluation of the Technical Report. The Technical Report MUAP-10023 revisions are also related to DCD Chapter 3 RAI 486-3861 Question 03.10-17 (see US-APWR Chapter Status Report – Chapter 3).

1.0 INTRODUCTION

This report summarizes the status of Chapter 9 "Auxiliary Systems" of the US-APWR Design Control Document (DCD), MUAP-DC009. The status of the applicant, Mitsubishi Heavy Industries, Ltd (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 9 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1 below.

Table 2.0-1 DCD Chapter 9 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	02/22/2012	ML120530340
3	10/26/2012	ML12269A398
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 9 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to the ACRS on February 22, 2012 and to MHI on February 23, 2012 (Package: ML120390205 – non-public, Letter to ACRS: ML120390206, Letter to MHI: ML120390220, SE: ML120530340). The Phase 2 SE contained 20 OIs. The Phase 2 SE also contained 28 Confirmatory Items (CIs) related to DCD or technical report changes that MHI had committed to make which had not been included in an official DCD or technical report revision at the time of the SE.

For Phase 3, MHI and the NRC presented DCD Chapter 9 to the ACRS Subcommittee (SC) on March 22-23, 2012 and the ACRS Full Committee (FC) on September 6, 2012. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. Following the meetings, the ACRS FC issued the letter documenting the ACRS evaluation of the

SE with OIs for DCD Chapter 9 on September 18, 2012 (ML12261A356). The ACRS letter stated that, other than the OIs identified in the SE, there were no issues in DCD Chapter 9 with potentially significant safety implications. The ACRS letter did indicate two items where additional attention from the NRC staff was needed. The NRC responded to the ACRS letter on October 26, 2012 (ML12269A398) and indicated the staff would work with MHI to resolve the OIs as well as address the additional two ACRS requests; the two items subsequently became RAIs in Phase 4.

Phase 4 is currently ongoing. Note that 18 of the 20 OIs and 24 of the 28 CIs from Phase 2 have now been closed. For a discussion of current and future activities in Phase 4, see Section 3 of this report.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 9

Meeting Date	Topic	Transcript	MHI Follow-Up
03/22/2012 to 03/23/2012	Ch. 9 SC Meeting	ML120950597	UAP-HF-12253 (ML12251A213)
09/06/2012	Ch. 9 FC Meeting	ML12265A222	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 9. A summary of the major interactions between MHI and the NRC staff is provided in Table 2.2-1 below. In addition to these interactions, numerous clarification calls were held to discuss RAI questions.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 9

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
04/18/2012 to 04/19/2012	Audit	*Audit Plan:* ML120690146 *Audit Report:* ML12137A002 *MHI Response:* ML12361A034	An audit was held on the calculations associated with the systems described in DCD Section 9.2. The focus was on the essential service water system, the component cooling water system, the ultimate heat sink, and the essential chilled water system. The audit resulted in some MHI actions as described in the audit report. MHI notified the NRC of the completion of the actions in MHI letter UAP-HF-12334 dated December 20, 2012.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
05/23/2013	Closed Meeting	*Meeting Notice:* ML13127A434	A closed meeting was held to discuss MHI's plans for a safety reanalysis effort. MHI explained that all of the safety analyses would be re-run to ensure that the latest design information and changes from RAI responses were incorporated. The reanalysis was expected to have only minor changes to the results reported in various DCD chapters. One of the affected DCD chapters is Chapter 9.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 9, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 641 questions in 135 RAIs against DCD Chapter 9. MHI has officially submitted responses to all of the issued questions except for one. As shown in Table 2.3.1-1 below, all of the questions except for 38 are considered closed at this time.

Table 2.3.1-1 Overall Chapter 9 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	26
In Evaluation*	0
Confirmatory Action	12
Closed**	603
TOTAL	641

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 below provides a summary of the 38 questions in DCD Chapter 9 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 9 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
09.01.02-29	1032-7098 (ML13133A044)	UAP-HF-13162 (ML13182A467)	Confirmatory Action These RAI questions are confirmatory actions due to required technical report changes. MHI submitted the revised Technical Report MUAP-07033 on March 25, 2014. The NRC should be able to close these confirmatory actions based on Technical Report MUAP-07033 Revision 1.
09.01.02-30			
09.01.02-31			
09.01.02-32			
09.01.02-39			
09.01.02-40	1054-7235 (ML13276A489)	UAP-HF-13263 (ML13316A368)	Issued/Waiting for Response MHI responded on November 6, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
09.01.02-42			
09.01.02-41	1054-7235 (ML13276A489)	UAP-HF-13263 (ML13316A368)	Issued/Waiting for Response MHI responded on November 6, 2013. The response included a commitment to revise Technical Report MUAP-07033. The NRC is waiting for MHI to submit the revised Technical Report MUAP-07033.
09.01.02-43	1054-7235 (ML13276A489)	UAP-HF-13263 (ML13316A368)	Issued/Waiting for Response MHI responded on November 6, 2013. The response included a commitment to revise Technical Report MUAP-07033. MHI submitted the revised Technical Report MUAP-07033 on March 25, 2014. Although MHI has provided the Technical Report revision, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's Technical Report is on hold due to the slowdown.
09.01.02-44	1055-7184 (ML13280A656)	UAP-HF-13260 (ML13329A956, ML13330A285 – non-public)	Confirmatory Action These RAI questions are confirmatory actions due to required DCD changes. MHI will revise the DCD as described in the responses.
09.01.02-45			
09.01.02-49	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Issued/Waiting for Response MHI responded on December 2, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
09.01.02-50	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Confirmatory Action This RAI question is a confirmatory action due to required DCD and technical report changes. MHI will revise the DCD and Technical Report MUAP-13011 as described in the response.
09.01.02-51	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Issued/Waiting for Response MHI responded on December 2, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
09.01.02-52			
09.01.02-53	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Confirmatory Action This RAI question is a confirmatory action due to required DCD changes. MHI will revise the DCD as described in the response.
09.01.02-54	1055-7184 (ML13280A656)	UAP-HF-13260 (ML13329A956, ML13330A285 – non-public)	Confirmatory Action This RAI question is a confirmatory action due to required DCD changes. MHI will revise the DCD as described in the response.
09.01.02-59	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Issued/Waiting for Response MHI responded on December 2, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
09.01.02-61			
09.01.02-62			
09.01.02-63			
09.01.02-64			
09.01.02-65			
09.01.02-66			
09.01.02-67			
09.01.02-68			
09.01.02-69			
09.01.02-70			
09.01.02-71			
09.01.02-72			
09.01.02-73			
09.01.02-74	1055-7184 (ML13280A656)	UAP-HF-13260 (ML13329A956, ML13330A285 – non-public)	Issued/Waiting for Response MHI responded on November 14, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
09.01.02-75	1055-7184 (ML13280A656)	UAP-HF-13273 (ML13339A836)	Issued/Waiting for Response MHI responded on December 2, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
09.01.02-76			
09.01.02-77			
09.01.03-7	735-5723 (ML111110290)	UAP-HF-12234 (ML12307A244)	Confirmatory Action This was OI 9.1.3-7 in the Phase 2 SE. This RAI question is a confirmatory action due to required DCD changes. The changes were made in DCD Revision 4. An inconsistency in DCD Revision 4 related to this RAI prevents this confirmatory action from being closed at this time. MHI will revise the DCD to correct the inconsistency.
09.05.04-49	468-3360 (ML092810548)	UAP-HF-13171 (ML13182A536)	Confirmatory Action This was OI 9.5.4-1 in the Phase 2 SE. This RAI question is a confirmatory action due to required DCD and technical report changes. The NRC can close this confirmatory action based on DCD Revision 4 and Technical Report MUAP-10023 Revision 6.
09.05.04-52	1070-7386 (ML14014A250)	N/A	Issued/Waiting for Response The RAI was issued on January 14, 2014. MHI has not yet responded.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 9 is one of the review areas that will be pursued sequentially during the slowdown period. Specifically, the slowdown plan includes the activity for the fuel rack evaluations provided in several technical reports associated with DCD Chapter 9. This was identified with a goal of MHI and the NRC reaching agreement on the fuel rack evaluations. However, the remainder of DCD Chapter 9 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There are three outstanding MHI commitments at this time. The first is that MHI committed to an additional revision (i.e. subsequent to the March 2014 revision) to the Technical Report

"Mechanical Analysis for US-APWR New and Spent Fuel Racks," MUAP-07033. This commitment was made in the response to RAI 1054-7235 Question 09.01.02-41. The second is that MHI committed to revising two of the three Technical Reports for the containment racks ("Criticality Analysis for US-APWR Containment Racks," MUAP-13011 and "Mechanical Analysis for US-APWR Containment Racks," MUAP-13012). This commitment was made in the response to several questions of RAI 1055-7184. The third is that MHI committed to revising specific parts of DCD Chapter 9 based on the results of the safety reanalysis effort. This commitment was made in MHI letter UAP-HF-13170 dated July 1, 2013 (ML13189A283). Although the dates provided in that letter are no longer valid, the scope of Chapter 9 items to be affected by the safety reanalysis remains valid.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 9.

3.4 KEY REVIEW TOPICS

As of March 24, 2014, almost all of the OIs and CIs from the Phase 2 DCD Chapter 9 SE have been closed. However, there are still two technical areas where review is needed. A brief summary of each technical topic is provided below. Refer to the discussion in Table 2.3.2-1 above for details of the specific open RAIs associated with these topics.

- New and Spent Fuel Racks – DCD Section 9.1 references three Technical Reports that provide analyses of the new and spent fuel racks. The criticality, mechanical, and thermal-hydraulic analyses are provided in Technical Reports MUAP-07032, MUAP-07033, and MUAP-09014, respectively. MHI submitted revisions to these three Technical Reports on March 25, 2014 (MHI letter UAP-HF-14027, ML not yet available). As discussed previously in Section 3.2 of this report, MHI has a commitment for an additional revision to the mechanical analysis Technical Report, MUAP-07033. MHI will submit the necessary revision to address the remaining issues. The Technical Reports have been the subject of several DCD Chapter 9 RAIs, including some which were still under review by the NRC when the review was put on hold due to the slowdown. The NRC review of the Technical Report revisions, including the associated RAI responses, is necessary in order to ensure that the new and spent fuel racks are acceptable and that all issues are resolved.
- Containment Racks – DCD Section 9.1 references three Technical Reports that provide analyses of the containment racks. The criticality, mechanical, and thermal-hydraulic analyses are provided in Technical Reports MUAP-13011, MUAP-13012, and MUAP-13013, respectively. MHI submitted these three Technical Reports (all Revision 0) on May 23, 2013 (ML131540293). As discussed previously in Section 3.2 of this report, MHI has a commitment to revise two of these three Technical Reports as described in DCD Chapter 9 RAI responses. MHI will submit all the necessary revisions to address the remaining issues. The Technical Reports have been the subject of several DCD Chapter 9 RAIs, including some which were still under review by the NRC when the review was put on hold due to the slowdown. Some of the DCD Chapter 9 RAI responses have also resulted in follow-up RAIs in DCD Chapter 12. MHI has not yet responded to those DCD Chapter 12 RAIs (see US-APWR Chapter Status Report – Chapter 12). MHI will submit responses to all of these DCD Chapter 12 RAIs. The NRC review of the Technical Report revisions, including the associated RAI responses, is necessary in order to ensure that the containment racks are acceptable and that all issues are resolved.

1.0 INTRODUCTION

This report summarizes the status of Chapter 10, "Steam and Power Conversion System," of the US-APWR Design Certification Document (DCD), MUAP-DC010. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 10 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 10 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	08/09/2011	ML111990458
3	09/22/2011	ML11256A206
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 10 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 21 February, 2014). Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation Report (SER) with Open Items (OI) to MHI on August 9, 2011 (ML111990458). Phase 3 commenced with the presentation of DCD Chapter 10 to the ACRS Subcommittee (SC) on August 17, 2011 (ML11245A157) by MHI and the NRC. The meeting resulted in three questions requiring follow-up; MHI responded on June 8, 2012 (ML12164A171). DCD Chapter 10 was presented to the Full Committee (FC) on September 9, 2011 (ML11279A032). The ACRS FC issued the letter for Chapter 10 of the SER with OIs for US-APWR steam and power conversion system on September 22, 2011 (ML11256A206). The letter expressed concern that if active room cooling were to be lost to the rooms which house turbine driven emergency feedwater (TDEFW) pumps, control failures would occur. The NRC subsequently issued RAIs in DCD Chapter 8 to which MHI responded satisfactorily. The DCD Chapter 8 RAIs are now closed. Phase 4 of the NRC review is ongoing.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 10

Meeting Date	Topic	Transcript	MHI Follow-Up
08/17/2011	Steam and Power Conversion System SC Meeting	ML11245A157	ML12164A171 (UAP-HF-12161)
09/09/2011	Steam and Power Conversion System FC Meeting	ML11279A032	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of the interactions related to DCD Chapter 10 have been clarification calls to ensure that MHI fully understood an NRC RAI before submitting an official response. A summary of recent interactions between MHI and the NRC regarding DCD Chapter 10 is presented in Table 2.2-1 below.

Table 2.2-1 Summary of NRC-MHI Interactions for Chapter 10

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
05/21/2013	Clarification Call	N/A	Steam Generator Blowdown System Equipment Classification RAI 862-6165: MHI modified Table 1.9.2-10 of the DCD to clarify the system equipment classification for portions outside the first containment isolation valve are class 3 or 6.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 10, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 100 questions in 30 RAIs against DCD Chapter 10. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for two are considered closed at this time.

Table 2.3.1-1 Overall Chapter 10 RAI Question Status Summary

Status Description	No. of Questions
Issued/Waiting for Response	0
In Evaluation	0
Confirmatory Action	2
Closed*	98
TOTAL	100

*Includes both Resolved – Closed and Unresolved – Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the two questions in DCD Chapter 10 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 10 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
10.04.08-8	251-2146 (ML090630208)	UAP-HF-13182 (ML13199A027)	Confirmatory Action Response officially submitted 7/16/2013. Commitments to change the DCD have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
10.04.08-11	862-6165 (ML113130052)	UAP-HF-13181 (ML13199A028)	Confirmatory Action Response officially submitted 7/16/2013. Commitments to change the DCD have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 10 is one of the review areas that will be pursued during the slowdown period with a goal of completing the Chapter 10 Advanced SER without OIs.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 10 at this time.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 10.

3.4 KEY REVIEW TOPICS

There are no outstanding technical topics related to DCD Chapter 10. Once DCD Chapter 10 assumes review priority, MHI anticipates closure of the Confirmatory Actions in Section 2.3.2 of this report and closure of Phase 4 with issuance of the Advanced SER (ASER) without OIs.

1.0 INTRODUCTION

This report summarizes the status of Chapter 11 "Radioactive Waste Management" of the US-APWR Design Control Document (DCD), MUAP-DC011. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 11 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 11 Phase Status

Phase	Completion Date	Reference(s)
1	06/19/2009	N/A*
2	03/15/2011	ML110660127
3	10/25/2011	ML112840392
4	Ongoing	N/A
5	TBD	N/A
6	TBD	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 11 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on March 15, 2011 (Package: ML110660360; Memo to ACRS: ML110660501; Letter to MHI: ML110660364, SE: ML110660127). The Phase 2 SE contained 5 OIs and 21 Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD revision at the time of the SE.

For Phase 3, MHI and NRC presented DCD Chapter 11 to the ACRS Subcommittee (SC) on April 22, 2011 and the Full Committee (FC) on September 9, 2011. The FC issued the interim letter for Chapters 2, 5, 8, 10, 11, 12, 13 and 16 of the Safety Evaluation Report with Open Items for Certification of the US-APWR Design on September 22, 2011 (ML11256A206). The NRC staff response to the ACRS letter was issued on October 25, 2011 (ML112840392). Phase 4 is currently ongoing.

A summary of the relevant documents associated with the ACRS meetings related to DCD Chapter 11 is provided in Table 2.1-1 below.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 11

Meeting Date	Topic	Transcript	MHI Follow-Up
04/22/2011	Chapter 11 SC Meeting	ML111240424	UAP-HF-11216 (ML11200A330)
09/09/2011	Chapter 11 FC Meeting	ML11279A032	N/A

2.2 NRC INTERFACES

There have been no public meetings, audits, or inspections, since the 2011 ACRS meeting for DCD Chapter 11.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all issued RAIs issued against DCD Chapter 11, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 96 questions in 29 RAIs against DCD Chapter 11. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1, all of the questions are considered closed at this time.

Table 2.3.1-1 Overall Chapter 11 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	0
In Evaluation*	0
Confirmatory Action	0
Closed**	96
TOTAL	96

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).
** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

There are no open RAI questions in DCD Chapter 11.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation

(ML14079A396), DCD Chapter 11 is not one of the review areas that will be pursued during the slowdown period. The review of DCD Chapter 11 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There are two outstanding commitments for DCD Chapter 11 at this time.

- MHI's response to RAI 534-4256 Question 11.04-19 (ML11266A132) commits to updating the ANSI/ANS-40.37 version date from the 1993 version to the 2009 version. The reason for updating is that even though the 1993 version of the standard is the version currently endorsed in Regulatory Guide (RG) 1.143, it has since been withdrawn. These DCD changes were not included in DCD Revision 4, but were included in the March 14, 2014 DCD Revision 4 Tracking Report Revision 0 (ML14080A147) and thus will be captured in the next revision of the DCD.
- MHI has committed to updating DCD Chapter 11 for impacts of the safety reanalysis effort. This commitment was made in MHI letter UAP-HF-13170 dated July 1, 2013 (ML13189A283).

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 11.

3.4 KEY REVIEW TOPICS

The incorporation of the impacts of the safety reanalysis into DCD Chapter 11 is the only remaining technical issue at this time. As described in US-APWR Chapter Status Report – Chapter 15, the safety reanalysis effort will be placed on hold during the slowdown period. The scheduling of the reanalysis, DCD changes, and subsequent NRC staff review will be determined following the temporary slowdown period.

1.0 INTRODUCTION

This report summarizes the status of Chapter 12 "Radiation Protection" of the US-APWR Design Control Document (DCD), MUAP-DC012. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 12 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 12 Phase Status

Phase	Completion Date	Reference(s)
1	06/19/2009	N/A*
2	03/21/2011	ML110770408
3	10/25/2011	ML112840392
4	Ongoing	N/A
5	TBD	N/A
6	TBD	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 12 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OI) to both the ACRS and MHI on March 21, 2011 (Package: ML110740681, Memo to ACRS: ML110740656; Letter to MHI: ML110740662; SE: ML110770408). The Phase 2 SE contained 6 OIs and 17 Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD or revision at the time of the SE. MHI and NRC presented DCD Chapter 12 to the ACRS Subcommittee (SC) on April 22, 2011 and the Full Committee (FC) on September 9, 2011. The FC issued the interim letter, for Chapters 2, 5, 8, 10, 11, 12, 13 and 16 of the Safety Evaluation Report with Open Items for Certification of the US-APWR Design on September 22, 2011 (ML11256A206). The NRC staff response to the ACRS letter was issued on October 25, 2011 (ML112840392). Phase 4 is currently ongoing.

A summary of the relevant documents associated with the ACRS meetings related to DCD

Chapter 12 is provided in Table 2.1-1 below.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 12

Meeting Date	Topic	Transcript	MHI Follow-Up
04/22/2011	Chapter 12 SC Meeting	ML111240424	UAP-HF-11216 (ML11200A330)
09/09/2011	Chapter 12 FC Meeting	ML11279A032	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. However, there have not been any audits or inspections since the Phase 2 SE with open items for DCD Chapter 12 was issued. Table 2.2-1 provides a summary of the conference calls related to defining the closure path for several long-standing issues that remain open.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 12

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
07/06/2011	Public and Closed Teleconference	*Meeting Notice:* ML111730247 *Meeting Summary:* ML14084A430	This meeting discussed the open items in the Phase 2 SE for DCD Chapter 12.
08/10/2011	Clarification Call	N/A	MHI and the NRC to review the materials provided by MHI in response to NRC staff feedback on RAI 589-4536 Questions 3.11-36, 3.11-37, and 3.11-38.
08/25/2011	Clarification Call	N/A	This meeting discussed closure path options for three of the open items in the Phase 2 SE: • OI 12.02-2 (RAI 532-4019 Question 12.02-29) for Leak Prevention and Drainage Collection Features of the RWSAT/PWMT Tank Enclosure Facility • OI 12.03-12.04-1 (RAI 429-3178 Question 12.03-12.04-27) for Mission Routes, Discharge Flow Area A & B Dose Rates, and Equipment Dose • OI 12.02-1 (RAI 532-4019 Question 12.02-27) for CVCS Purification Flow Rates MHI actions from the meeting were to provide revised RAI responses and corresponding DCD markups. The NRC staff action was to issue a follow-up RAI related to refueling cavity rapid drain down open item 12.03-12.04-2 (became RAI 895-6172).

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
12/13/2011	Clarification Call	N/A	This call was focused on MHI requests for clarification of follow-up RAI 895-6172 related to the refueling cavity rapid drain down. MHI provided an outline of their intended response and the NRC noted places where additional information needed to be added to the DCD. MHI action was to provide a draft of the proposed changes to address the NRC feedback from the 12/13/2011 call. The RAI response was officially submitted on 04/25/2012.
03/12/2012	Clarification Call	N/A	In this call the NRC staff asked a series of questions about perceived inconsistencies between the Microshield source file provided by MHI and the related gamma Excel spreadsheets. The NRC staff also had a question about the 4 month post-accident operating time described in DCD Table 3D-1. MHI provided a written response to these clarification questions on 03/23/2012.
05/07/2012	Clarification Call	N/A	The NRC had an additional question on the selection of the gamma library in the Microshield calculation for determining Environmental Qualification (EQ) dose. A written response to this request was provided on 05/18/2012.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all issued RAIs issued against DCD Chapter 12, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 113 questions in 37 RAIs against DCD Chapter 12. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for thirty-one are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this report.

Table 2.3.1-1 Overall Chapter 12 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	31
In Evaluation*	0
Confirmatory Action	0

Status Description	No. Questions
Closed**	82
TOTAL	113

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).
** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the thirty-one questions in Chapter 12 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 12 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
12.03-50	1026-7095 (ML13120A038)	UAP-HF-13291 (ML13343A384)	Issued/Waiting for Response* These questions are related to Regulatory Guide (RG) 4.21 compliance and were issued as follow-up to MHI's prior response to RAI 578-4483 Question 12.03-12.04-37 and Question 12.03-12.04-38. (Phase 2 SE open items 12.03-12.04-3 and 12.03-12.04-4.) MHI's response to the follow-up questions was officially submitted on 12/6/2013. The NRC review of MHI's response is on hold due to the slowdown.
12.03-51			
12.03-52			
12.03-53			
12.03-54			
12.03-55			
12.03-56	1027-7093 (ML13120A553)	UAP-HF-13292 (ML13343A364)	Issued/Waiting for Response* These questions are related to the tank house enclosure and were issued as follow-up to MHI's prior responses to RAI 427-2902 Question 12.02-21 and RAI 532-4019 Question 12.02-29. (Phase 2 SE open item 12.02-2.) MHI's response to the follow-up questions was officially submitted on 12/6/2013. The NRC review of MHI's response is on hold due to the slowdown.
12.03-57			
12.03-58			
12.03-59			
12.03-60			
12.03-61			
12.03-62			
12.03-63	1028-7094 (ML13120A566)	UAP-HF-13293 (ML13343A363)	Issued/Waiting for Response* These questions are related to the tank house enclosure and were issued as follow-up to MHI's prior responses to RAI 427-2902 Question 12.02-21 and RAI 532-4019 Question 12.02-29. (Phase 2 SE open item 12.02-2.) MHI's response to the follow-up questions was officially submitted on 12/6/2013. The NRC review of MHI's response is on hold due to the slowdown.
12.03-64			
12.03-65			
12.03-66			
12.03-67			
12.03-68			

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
12.03-69	1028-7094 (ML13120A566)	UAP-HF-13293 (ML13343A363)	Issued/Waiting for Response* Follow-up to RAI 980-7094 Question 12.03-49. MHI's response was officially submitted on 12/6/2013. The NRC review of MHI's response is on hold due to the slowdown.
12.03-70	1065-7299 (ML13338A237)	UAP-HF-13310 (ML13361A190)	Issued/Waiting for Response* This RAI was issued as a follow-up to the Seismic Closure Plan (SCP) DCD markup submittal in UAP-HF-13020 (ML13044A715). MHI's response was officially submitted on 12/24/2013. The NRC review of MHI's response is on hold due to the slowdown.
12.03-71	1075-7308 (ML14035A515)	N/A	Issued/Waiting for Response The RAI has been issued and the NRC staff is waiting for MHI's response. This is a follow-up to Chapter 9 RAI 1055-7184 on the containment racks. MHI intends to submit the response to this RAI when the normal review resumes after the temporary slowdown period.
12.03-72			
12.03-73			
12.03-74			
12.03-75			
12.03-76			
12.03-77			
12.03-78			
12.03-79			
12.03-80			

* Reflects status communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), Chapter 12 is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 12 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There are two outstanding commitments for DCD Chapter 12 at this time.

- As described in Section 3.1 of this report, following the temporary slowdown MHI will respond to any issued RAIs listed in Section 2.3.2 of this report for which a prior response has not been officially submitted.
- MHI has committed to updating DCD Chapter 12 for impacts of the safety reanalysis effort. This commitment was made in MHI letter UAP-HF-13170 dated July 1, 2013 (ML13189A283).

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 12.

3.4 KEY REVIEW TOPICS

As of December 31, 2013, there are four open technical areas remaining in the Chapter 12 SE. A brief summary of each technical topic is provided below. Refer to the discussion in Table 2.3.2-1 for details of the specific open RAIs associated with these topics.

Rapid Drain Down/Containment Racks – The Chapter 12 Phase 2 SE with open items lists this technical area as OI 12.03-12.04-2 and ties it to MHI's response to RAI 524-4020 Question 12.03-12.04-35. The NRC staff revised the status of Question 12.03-12.04-35 to unresolved and closed to follow-up RAI 895-6172 Questions 12.03-12.04-40 through 12.03-12.04-47, which were issued on January 27, 2012. MHI responded to RAI 895-6172 on April 25, 2012. The NRC then changed the status of Questions 12.03-13.04-40 through 12.03-12.05-47 to unresolved and closed to follow-up RAI 1055-7184 Questions 09.01.02-44 through 09.01.02-77, which were issued on October 7, 2013. MHI responses to the additional follow-up questions in RAI 1055-7184 were submitted on November 14, 2013 and December 2, 2013. The NRC staff had additional follow-up items, which were issued as RAI 1075-7308 Questions 12.03-71 through 12.03-80 on February 4, 2014. MHI intends to respond to the latest round of follow-up questions following the slowdown period.

Mission Dose – The Chapter 12 Phase 2 SE with open items lists this technical area as OI 12.03-12.04-1 and CI 12.03-12.04-4 and ties it to MHI's response to RAI 429-3178 Question 12.03-12.04-27-SQ2 and RAI 358-2462 Question 03.11-2. MHI provided their original closure strategy for the open item in an informal memo dated July 7, 2011. The closure strategy was then discussed during the August 10, 2011 conference call (see Table 12-3 of this report). MHI provided a proposed draft response to RAI 589-4536 Question 03.11-36 and corresponding markups to MUAP-08015 to address the OI on September 16, 2011. There was no additional action on this topic until the NRC staff requested a clarification call which was held on March 12, 2012 (see Table 12-3 for details). MHI responded to the NRC staff requests received during the March 12, 2012 conference call on March 23, 2012. An additional conference call for the Microshield calculation associated with the Chapter 3 RAI was held on May 7, 2012 and MHI provided written clarification of the questions on May 18, 2012. Other activities in Chapter 3 ultimately drove the official revision of RAI 589-4536 Question 03.11-36 which was officially submitted on April 12, 2013. Around that same time, the NRC staff determined that it was prudent to ensure that the post-accident monitoring (PAM) instrumentation list was finalized (RAI 568-4588 Question 07.05-18 latest response dated September 11, 2013) before completing review of the Chapter 12 mission dose open item. As of December 31, 2013, the NRC staff has not yet completed their review of the officially submitted responses in Chapter 3 or Chapter 7 and therefore the Chapter 12 issue remains open.

Tank Enclosure – The Chapter 12 Phase 2 SE with open items lists this technical area as OI 12.02-2 and ties it to MHI's response to RAI 532-4019 Question 12.0-2-29 and RAI 427-2909 Question 12.02-21. MHI provided their original closure strategy in an informal memo dated July 7, 2011. The closure strategy was then discussed during the August 25, 2011 conference call (see Table 12-3). MHI provided a proposed draft response to address the OI on September 16, 2011. The NRC staff provided written feedback on October 20, 2011. MHI revised their proposed draft to address the NRC staff's feedback and provided an

updated draft response on December 21, 2011. Additional NRC feedback was received on January 10, 2012. MHI responded to this additional feedback on February 10, 2012. The NRC notified MHI on May 14, 2012 that the proposed draft was acceptable for official submittal. MHI then officially submitted the revised response on July 14, 2012. There was no additional activity on this open item until the NRC staff provided additional feedback / proposed draft follow-up RAI questions on March 18, 2013. These draft follow-up questions were officially issued to MHI as RAI 1027-7093 Questions 12.03-56 through 12.03-62 and RAI 1028-7094 Questions 12.03-63 through 12.03-69 on April 30, 2013. At the NRC staff's request, MHI provided a proposed draft response to the questions on June 26, 2013. The NRC staff reviewed the draft document and provided additional feedback on October 21, 2013. MHI addressed the October 2013 NRC staff feedback and officially submitted responses to RAI 1027-7093 and 1028-7094 on December 6, 2013. As of December 31, 2013, the NRC staff has not yet completed their review of the officially submitted responses to RAI 1027-7093 and RAI 1028-7094.

RG 4.21 Compliance - The Chapter 12 Phase 2 SE with open items lists this technical area as OI 12.03-12.04-3 and 12.03-12.04-4 and ties the OI to MHI's response to RAI 578-4483 Questions 12.03-12.04-37 and 12.03-12.04-38, respectively. MHI provided their original open item closure strategy in an informal memo dated May 8, 2011 and draft revised RAI response on July 6, 2011. The NRC staff provided written feedback on the proposed draft on September 7, 2011. MHI provided an updated proposed response to address the NRC staff's September 2011 feedback on February 10, 2012. The NRC staff reviewed the February 2012 draft and provided additional feedback and clarification requests on April 3, 2012. MHI addressed this additional NRC staff feedback as part of their official amended RAI response on August 29, 2012. There was no additional activity on this open item until the NRC provided additional feedback / proposed draft follow-up RAI questions on March 18, 2013. These draft follow-up questions were officially issued to MHI as RAI 1026-7095 Questions 12.03-50 through 12.03-55. MHI officially responded to RAI 1026-7095 on December 6, 2013. As of December 31, 2013, the NRC staff has not yet completed their review of the officially submitted responses to RAI 1026-7095.

The incorporation of the impacts of the Safety Reanalysis into DCD Chapter 12 is another remaining technical issue at this time. As described in US-APWR Chapter Status Report – Chapter 15, the safety reanalysis effort will be placed on hold during the slowdown period. The scheduling of the reanalysis, DCD changes, and subsequent NRC staff review will be determined following the temporary slowdown period.

1.0 INTRODUCTION

This report summarizes the status of Chapter 13 "Conduct of Operations" of the US-APWR Design Control Document (DCD), MUAP-DC013. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 13 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 13 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	09/17/2010	ML101550468
3	10/25/2011	ML112840392
4	08/29/2011	ML112290858
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420). US-APWR DCD Chapter 13 is currently in Review Phase 5.

US-APWR DCD Chapter 13 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on September 1, 2010 (Package: ML102080487 – non-public, Letter to ACRS: ML101550468, Letter to MHI: ML101550463, SE: ML102310356).

For Phase 3, MHI and the NRC presented DCD Chapter 13 to the ACRS Subcommittee (SC) on November 29, 2010 and the ACRS Full Committee (FC) on September 09, 2011. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. The ACRS FC issued their letter for DCD Chapter 13 (and also Chapters 2, 5, 8, 10, 11, 12, and 16) of the Safety Evaluation Report (SER) with OI for certification of the US-APWR design on September 22, 2011 (ML11256A206). The ACRS letter stated that there were no issues in DCD Chapter 13 that would preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 13. The NRC responded to the

ACRS letter on October 25, 2011 (ML112840392).

Phase 4 was completed with the issuance of the Phase 4 SE with No OIs to both the ACRS and MHI on August 29, 2011 (Package: ML112290261 – non-public, Letter to ACRS: ML112290858, Letter to MHI: ML112290725, SE: ML112290270).

Table 2.1-1 ACRS Meetings Related to DCD Chapter 13

Meeting Date	Topic	Transcript	MHI Follow-Up
11/29/2010	SC meeting on DCD Chapter 13	ML103430613	N/A
09/09/2011	FC Meeting on DCD Chapter13	ML11279A032	N/A

2.2 NRC INTERFACES

Some interactions between MHI and the NRC staff, including short conference calls, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 13. A summary of the major recent interactions between MHI and the NRC staff is provided in Table 2.2-1 below.

Table 2.2-1 Summary of Major NRC-MHI Interactions for Chapter 13

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
12/04/2013	Clarification Call	N/A	Clarification of the issues regarding MHI Technical Report UAP-SGI-08002, "High Assurance Evaluation Assessment", which were later documented as RAI 1077-7402, Question 13.06.02-27.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 13, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 31, 2014, the NRC staff issued a total of 134 questions in 8 RAIs against DCD Chapter 13. MHI has officially submitted responses to all of the issued questions except for one. As shown in Table 2.3.1-1 below, all of the questions except for one are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.4.2 of this report.

Table 2.3.1-1 Overall Chapter 13 RAI Question Status Summary

Status Description	Number of Questions
Issued/Waiting for Response	1
In Evaluation	0
Confirmatory Action	0
Closed*	133
TOTAL	134

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 1 question in DCD Chapter 13 that is not closed as of March 31, 2014.

Table 2.3.2-1 Status of Chapter 13 Questions Not Closed as of March 31, 2014

NRC RAI No. (Accession)	Question No.	MHI Letter No. (Accession)	Status
RAI 1077-7402 (ML14038A204)	13.06.02-27	N/A	Issued/Waiting for Response Submittal of a response will be scheduled following the temporary slowdown

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 13 is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 13 will resume in Phase 5 following the temporary slowdown.

3.2 COMMITMENTS

Submitting a response to RAI1077-7402, Question 13.06.02-27 is the only commitment at this time.

3.3 NRC INTERFACES

There are no additional interfaces currently planned for DCD Chapter 13.

3.4 KEY REVIEW TOPICS

There are no remaining outstanding review topics for DCD Chapter 13.

1.0 INTRODUCTION

This report summarizes the status of Chapter 14 "Verification Programs" of the US-APWR Design Control Document (DCD), MUAP-DC014. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 14 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 14 Phase Status

Phase	Completion Date	Reference(s)
1	06/19/2009	N/A**
2	01/31/2014*	ML14002A116
3	Ongoing	TBD
4	TBD	N/A
5	TBD	N/A
6	TBD	N/A

* Some sections of Chapter 14 are still in Phase 2. See Section 2.1 for more details.
** http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 14 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on January 31, 2014 (Package: ML13354B800; Memo to ACRS: ML13354B794; Letter to MHI: ML13354B799; SE: ML14002A116). The Phase 2 SE contained 1 OI and 98 Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD or technical report revision at the time of the SE. Note that two sections of DCD Chapter 14, Sections 14.3.2 (Inspections, Tests, Analyses, and Acceptance criteria (ITAAC) for Structural and Systems Engineering) and 14.3.9 (ITAAC for Human Factors Engineering), were not included in the Phase 2 SE since the NRC's review of these technical areas is still ongoing. Therefore, Phase 2 is ongoing for these DCD sections.

MHI and NRC presented DCD Chapter 14 to the ACRS Subcommittee (SC) on March 4, 2014 and the Full Committee (FC) on March 6, 2014. The FC issued the interim letter for Chapters 3 (Partial) and 14 of the Safety Evaluation Report with Open Items for Certification of the US-APWR Design on March 13, 2014 (ML14071A255). The NRC staff response to the ACRS letter will officially close Phase 3 of DCD Chapter 14, except for Sections 14.3.2 and 14.3.9.

A summary of the relevant documents associated with the ACRS meetings related to DCD Chapter 14 is provided in Table 2.1-1 below.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 14

Meeting Date	Topic	Transcript	MHI Follow-Up
03/04/2014	Chapter 14 SC Meeting (except 14.3.2 and 14.3.9)	ML14084A494	UAP-HF-14035 submitted 3/28/2014
03/06/2014	Chapter 14 FC Meeting (except 14.3.2 and 14.3.9)	ML14077A287	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, or audits have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 14. A summary of the major interactions between the NRC and MHI is provided in Table 2.2-1.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 14

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
11/3/2010	Public Meeting	*Meeting Notice:* ML102940011 *Meeting Summary:* ML103420566 *Presentations:* ML103070446 ML103070447 ML103070448 ML103070449 ML103230358 ML103230359 ML103230360	DCWG meeting identified areas for ITAAC Improvement, identification of Conceptual Design Information (CDI) in the DCD, and application of Risk Informed Technical Specifications (RITS). NRC provided a handout titled "ITAAC Quality & Inspectability Lessons Learned."
1/20/2011	Public Meeting	*Meeting Notice:* ML110060180 *Meeting Summary:* *ML110620352* *Presentation:* ML110380293	MHI discussed proposed ITAAC enhancements to Tier 1 Sections 2.6.1 through 2.6.8 intended for inclusion in DCD Rev. 3. MHI provided a written response to staff questions from this meeting in ML110600339.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
2/16/2011	Public Teleconference	*Meeting Notice:* ML110340312 *Meeting Summary:* ML110610531 *Presentation:* ML110490561	MHI discussed proposed ITAAC enhancements Tier 1 Sections 1.0, 2.1, 2.7, 2.8, 2.10, and 2.12 for inclusion into DCD Rev. 3.
2/17/2011	Public Meeting	*Meeting Notice:* ML110350183 *Meeting Summary:* ML110670361 *Presentation:* ML110490566 ML110490567 ML110490568 ML110490569	MHI discussed proposed ITAAC enhancements Tier 1 Sections 2.4 and 2.7 intended for inclusion in DCD Rev. 3.
3/15/2011	Public Meeting	*Meeting Notice:* ML110620189 *Meeting Summary:* ML110820434 *Presentation:* ML110691241 ML110691275 ML110691286 ML110691289 ML110691291 ML110691293 ML110691299	MHI discussed proposed ITAAC enhancements Tier 1 Sections 2.2, 2.3, 2.7, 2.11, and 3.0 intended for inclusion in DCD Rev. 3.
11/29/2011	Clarification Call	N/A	NRC voiced concerns regarding MHI's response to RAI 782-5910. Specifically, the NRC has requested that MHI add wording to Tier 1 Table 2.7.1.1.2 to commit to a turbine missile generation probability of < 10^{-5} per year. The NRC noted that this had been part of the ITAAC in DCD Rev 2 and had been removed from the ITAAC in DCD Rev 3. MHI maintained the position that no ITAAC revision is necessary.
01/12/2012	Clarification Call	N/A	Follow-up discussion of the DCD changes needed for the NRC staff to be able to close out the overall technical aspects of the turbine missile generation topic.
03/09/2012	Drop In	N/A	Reviewed status of Turbine Missile ITAAC proposals and received feedback from NRC on Tier 2, Tier 1, ITAAC and COL Item changes.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
10/23/2012	Clarification Call	N/A	Discussion of NRC staff feedback on the April 2012 proposed draft revised response to RAI 782-5910. This call identified the closure path and schedule for official submittal of the revised RAI.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all issued RAIs issued against DCD Chapter 14, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 529 questions in 90 RAIs against DCD Chapter 14. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for ten are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this report.

Table 2.3.1-1 Overall Chapter 14 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	0
In Evaluation*	0
Confirmatory Action	10
Closed**	519
TOTAL	529

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).
** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the ten questions in Chapter 14 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 14 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
14.03.05-36	936-6466 (ML12150A225)	UAP-HF-13015 (ML13028A405)	Confirmatory Action SE CI 14.03.05-4. The RAI response is reflected in DCD Rev. 4 for NRC confirmation, but the staff has indicated that additional discussion is needed to fully close the issue.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
14.03.05-37			Confirmatory Action This response was superseded by a Fukushima-response related design change to the PSMS power supply configuration. The design change should be reviewed as part of the Chapter 20 SE during the slowdown period. This item will remain open until that review is complete.
14.03.05-47			Confirmatory Action SE CI 14.03.05-5. The RAI response is reflected in DCD Rev. 4; however, the NRC requested clarifying editorial wording changes. These additional changes will need to be reflected in a future revision of the DCD; therefore, this item will remain open as a confirmatory item. See Section 3.2 of this report for the DCD changes.
14.03.06-23	754-5617 (ML111310580)	UAP-HF-11222 (ML11199A207)	Confirmatory Action These RAI responses are reflected in DCD Rev. 4; however, NRC staff review of these responses was suspended on 2/25/14. Therefore, these items will remain confirmatory actions. All four of these items are discussed in the Phase 2 SE for DCD Chapter 9.
14.03.06-24			
14.03.06-26			
14.03.06-28			
14.03.07-94	1052-7205 (ML13248A658)	UAP-HF-13237 (ML13269A015)	Confirmatory Action The RAI response is reflected in DCD Rev. 4 for NRC confirmation. This item is discussed in the Phase 2 SE for DCD Chapter 3.
14.03.09-9	838-6095 (ML112850905)	UAP-HF-14002 (ML14035A279)	Confirmatory Action This response was submitted after DCD Rev. 4 and was included in the March 2014 DCD Rev. 4 Tracking Report (ML14080A147). Remains a confirmatory item pending the next official revision of the DCD.
14.03.11-41	488-3745 (ML093340594)	UAP-HF-13155 (ML13176A058)	Confirmatory Action DCD mark-ups were provided as part of MHI's response to RAI 871-6121 (UAP-HF-13103) and RAI 1022-7082 (UAP-HF-13143) and were included in DCD Rev. 4. This item will remain a confirmatory action pending the closure of RAI 1022-7082, Question 19-590.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made

by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 14 is one of the review areas that will be pursued sequentially during the slowdown period with a goal of completing the Chapter 14 Phase 2 SE and subsequent ACRS meetings. Although this activity was originally planned for the slowdown period, the NRC has already completed the Phase 2 SE and the ACRS meetings for all of DCD Chapter 14 except for Sections 14.3.2 and 14.3.9. Section 14.3.9 is planned to be completed as part of the corresponding technical review of Chapter 18, which is planned during the slowdown period (See Section 3.1 of the US-APWR Chapter Status Report – Chapter 18). Section 14.3.2 is planned for completion with the corresponding SE for DCD Section 3.7/3.8 and the remainder of Chapter 14 will resume in Phase 4 following the temporary slowdown period.

3.2 COMMITMENTS

MHI has committed to updating the ASME code definition in Tier 1 in accordance with a NRC staff requested definition change. The revised definition is to be included in the first DCD Rev. 4 tracking report.

MHI has also committed to include the following Tier 1 ITAAC changes to improve the clarity of the Tier 1 document. The items in the list below are to be included in a future revision of the DCD.

- Tier 1 Table 2.4.1-2 ITAAC 14.i DC: Change "attached to the core barrel **to** hold capsules" => "attached to the core barrel **and** hold capsules" [Related to RAI 941-6465, Question 14.03.04-43]
- Tier 1 Table 2.5.3-4, ITAAC 1.c DC: Revise so that the final wording reads, "DAS can manually actuate each item of equipment identified in Table 2.5.3-2 via the PSMS from the MCR and manually provide each DAS function identified in Table 2.5.3-3 via the PSMS from the MCR." [Related to RAI 936-6466, Question 14.03.05-47]
- Tier 1 Table 2.5.3-4, ITAAC 1.d DC: revise so that the final wording reads, "When the monitored variables identified in Table 2.5.3-1 exceed predetermined limits, the DAS provides automatic actuation of the equipment identified in Table 2.5.3-2 and the functions identified in Tables 2.5.3-3, respectively. [Related to RAI 936-6466, Question 14.03.05-47]

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 14.

3.4 KEY REVIEW TOPICS

The two open technical areas remaining in Chapter 14 are related to DCD Section 14.3.2 and 14.3.9. The Phase 2 SE for Section 14.3.2 will be completed in conjunction with the corresponding Phase 2 SE for DCD Sections 3.7 and 3.8. No Chapter 14 RAIs or other actions specific to Chapter 14 have been identified for Section 14.3.2 at this time. With respect to DCD Section 14.3.9, the NRC staff needs to review the revised response to RAI 838-6095 Q 14.3.9-9 once they have completed their review of the revised HFE implementation plan reports. MHI is

also planning some additional changes to the DCD, as part of the sequential review effort activities, to ensure consistency with the revised HFE implementation plans. All of the revised information will be reviewed and evaluated in the HFE ITAAC (Section 14.3.9) Phase 2 SE which will be completed in conjunction with the DCD Chapter 18 Phase 2 SE.

There are three confirmatory actions in the Phase 2 SE that are not tied to any of the RAIs captured in Table 2.3.2-1 of this report. SE CI 14.03.05-20 requires that the staff verify that the changes to DCD Tier 1 Section 2.5.6 and Table 2.5.6-1 ITAAC 3 associated with ML13280A485 are appropriately incorporated into the DCD. MHI included these changes in the March 2014 DCD Revision 4 Tracking Report (ML14080A147), so there is no additional MHI action for this item at this time. SE CI 14.03.06-01 requires staff verification that changes included in the US-APWR DCD Revision 3 Tracking Report MUAP-11021, Revision 3 dated January 2013 (ML13037A074) are incorporated into the DCD. The information from MUAP-11021 was incorporated into DCD Revision 4, so there is no additional MHI action for this item. SE CI 14.03.11-1 requires that the staff verify the changes to DCD Tier 1 Sections 2.4 and 2.11 to reflect the GSI-191 recirculation flow path changes submitted in UAP-HF-12239, "Transmittal of US-APWR DCD GSI-191 Tracking Report," dated August 30, 2012 (ML122490125) are appropriately reflected in DCD Revision 4. Since these changes have already been reflected into DCD Revision 4, there is no additional MHI action for this item.

1.0 INTRODUCTION

This report summarizes the status of Chapter 15 "Transient and Accident Analysis" of the US-APWR Design Control Document (DCD), MUAP-DC015. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

A summary of the current status of the NRC staff's review of the following Topical Reports are included as part of this report on the status of DCD Chapter 15.

- Large Break Loss of Coolant Accident (LB LOCA) Code Applicability Report for the US-APWR, MUAP-07011
- Small Break Loss of Coolant Accident (SB LOCA) Methodology for US-APWR, MUAP-07013
- Non-LOCA Methodology, MUAP-07010

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 15 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 15 Phase Status

Phase	Completion Date	Reference(s)
1	06/19/2009	N/A*
2	05/18/2012	ML120830026 ML12167A444**
3	05/24/2013	ML13127A299
4	Ongoing	N/A
5	TBD	N/A
6	TBD	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.
** An asterisk denotes an ADAMS accession number that is not publically available.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 15 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to MHI on May 18, 2012 (Package: MI121350394; Memo to ACRS: ML121350457;

Letter to MHI: ML121350413; SE: ML120830026). The Phase 2 SE contained 32 OIs and 11 Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD, technical, or topical report revision at the time of the SE. MHI and NRC presented DCD Chapter 15, MUAP-07011 (LB LOCA Topical Report), and MUAP-07013 (SB LOCA Topical Report) to the ACRS Subcommittee (SC) on July 9-10, 2012. MHI and the NRC returned to present MUAP-07010 (Non-LOCA Topical Report) on October 19, 2012. All four of the Chapter 15-related topics were then presented to the ACRS Full Committee (FC) on April 11, 2013. The FC issued the interim letter for Chapters 4, 15, 17, and 19 of the Safety Evaluation Report with Open Items for US-APWR design on April 29, 2013 (ML13105A219). The NRC staff response to the ACRS letter was issued on May 24, 2013 (ML13127A299). Phase 4 is currently ongoing.

Table 2.1-1 provides a summary of the relevant milestones for the NRC review of the three topical reports associated with DCD Chapter 15. Both MUAP-07011 and MUAP-07013 were revised in late 2013 to address the final Advanced Accumulator (ACC) scaling bias values from the NRC staff's final Topical Report Safety Evaluation (TRSE) report for MUAP-07011, Revision 5, "The Advanced Accumulator" Topical Report. As described in US-APWR Chapter Status Report – Chapter 6, the NRC completed the review of MUAP-07011, Revision 5, "The Advanced Accumulator" Topical Report with the issuance of the final TRSE on February 11, 2014 (ML14030A381-LTR, ML14030A407-Public TRSE, ML14030A412-Non-Public TRSE). The NRC staff then issued a supplemental TRSE approving the corresponding changes to MUAP-07011, Revision 4 and MUAP-07013, Revision 3 on February 24, 2014 (ML14050A053).

Table 2.1-1 Chapter 15 Topical Report Milestones

Report Number	**MUAP-07010**	**MUAP-07011**	**MUAP-07013**
Advanced TRSE	09/05/2012 ML12248A309 (PKG) ML1248A322 (LTR) ML12284A283 (SE)	04/30/2012 ML120870653 (PKG) ML120870646 (LTR) ML120810191 (SE)	12/09/2011 ML113190785 (PKG) ML113190785 (LTR) ML113191069 (SE)
Final TRSE	05/13/2013 ML13123A189 (PKG) ML13123A22 (LTR) ML13123A279 (SE)	05/14/2013 ML13123A323 (PKG) ML13123A342 (LTR) ML13123A363 (SE)	05/14/2013 ML13123A285 (PKG) ML13123A299 (LTR) ML12123A311 (SE)
Supplemental TRSE	N/A	02/24/2014 ML14050A360 (PKG) ML14050A053 (LTR)	
Approved Topical Report	ML13198A032 (LTR) ML13198A045	UAP-HF-14032 submitted 3/25/2104	UAP-HF-14033 submitted 3/31/2014

A summary of the relevant documents associated with the ACRS meetings related to DCD Chapter 15 is provided in Table 2.1-2 below.

Table 2.1-2 ACRS Meetings Related to DCD Chapter 15

Meeting Date	Topic	Transcript	MHI Follow-Up
07/09/2012	SB LOCA and LB LOCA Topical Report SC Meeting	ML12236A296 ML12236A265*	UAP-HF-12320 (ML12346A049) UAP-HF-13021 (ML13036A352) UAP-HF-13050 (ML13064A013)
07/10/2012	Chapter 15 SC Meeting	ML12236A296 ML12236A265*	
10/19/2012	Non-LOCA Topical Report SC Meeting	ML12325A614 ML12312A242*	UAP-HF-12321 (ML12346A051)
04/11/2013	Chapter 15 and Corresponding Topical Reports FC Meeting	ML13112A25	N/A

* An asterisk denotes an ADAMS accession number that is not publically available.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, or audits, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 15.

Table 2.2-1 Summary of NRC-MHI Interactions for DCD Chapter 15

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
08/04-05/2011	Audit	*Audit Plan:* ML112030187	The NRC staff reviewed MHI internal documentation describing the methods and technical basis used in the analysis of the rod ejection accident (REA) for the US-APWR. The audit was focused on the acceptability of the REA methodology for at-power conditions, specifically the method used to calculate the number of fuel rod failures due to exceeding the DNB limits under certain accident conditions. MHI revised the response to MUAP-07010 Topical Report RAI REA-12 as a result of discussion during the audit.
10/13/2011	Clarification Call	N/A	MHI requested clarification of the draft follow-up to Question 15.06.05-91 related to post-LOCA boron dilution and precipitation. This draft was issued as RAI 861-6062 Q 15.06.05-98.
10/26/2011	Clarification Call	N/A	Follow-up to 10/13/2011 call on RAI 861-6062 Question 15.06.05-98 to discuss how MHI planned to use the 1/7 scale mixing test data to support the boron dilution mixing assumption.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
11/21/2011	Clarification Call	N/A	Follow-up to 10/26/2011 call. MHI described the updated approach for evaluating the GSI-185 issue based on NRC staff feedback received during the 10/26/2011 call.
12/21/2011	Clarification Call	N/A	Follow-up to the 11/21/2011 call. MHI described the applicability of other vendor's data to the US-APWR design and described plan for evaluating the potential for local recriticality.
01/30/2012	Clarification Call	N/A	MHI requested this call to inform the NRC of the revised closure plan for the GSI-185 issue described in Q 15.06.05-98 and to respond to the 12/21/2011 NRC request for additional information regarding the core recriticality evaluation. MHI agreed to perform additional testing to support the GSI-185 mixing assumption and provided a schedule for providing the NRC staff a draft of the proposed test plan.
02/15/2012	Closed Teleconference	*Meeting Notice:* ML120310544	Follow-up to the prior series of calls on GSI-185. MHI described the additional detail added to the GSI-185 closure as a result of NRC staff feedback in January. MHI also responded to the additional information request regarding the core recriticality evaluation from the December 2011 call.
03/15/2012	Closed Teleconference	*Meeting Notice:* ML120580406	Meeting postponed to March 21, 2012.
03/21/2012	Closed Teleconference	*Meeting Notice:* MI120750175	The NRC requested this meeting to facilitate understanding of the MHI boron precipitation calculation supporting MHI's response to RAI 861-6062 Question 15.06.05-100 related to the switchover time.
05/16/2012	Audit	*Audit Plan:* N/A (Proprietary)	The NRC reviewed MHI internal documentation related to the BACCHUS test data used to support the mixing assumptions in the boron precipitation calculation in RAI 861-6062.
05/22/2012	Clarification Call	N/A	The NRC requested this conference call to follow-up regarding MHI's position on the closure path for RAI 861-6062 Question 15.06.05-93. No MHI actions resulted from this call.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
05/31/2012	Closed Teleconference	*Meeting Notice:* ML12138A326	Follow-up to the prior series of calls on GSI-185. The purpose of this call was to provide the NRC staff an opportunity to provide feedback on the revised vessel mixing test report and the local criticality evaluation before official submittal as part of the response to RAI 861-6062 Question 16.06.05-98.
11/08/2012	Clarification Call	N/A	The NRC provided feedback on the draft GSI-185 technical report and MHI's proposed response to RAI 969-6763 Question 15.06.05-101.
05/08/2013	Clarification Call	N/A	NRC staff provided feedback on MHI's proposed revision to RAI 861-6062 Question 15.6.5-100.
5/23/2013	Public Meeting	*Meeting Notice:* ML13127A434 *Meeting Summary:* ML14073A732	MHI described the plan for the safety analysis cleanup effort and potential impacts on the DCD, topical and technical reports, and RAI responses.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all issued RAIs issued against DCD Chapter 15, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 283 questions in 61 RAIs against DCD Chapter 15. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for two are considered closed at this time. Additional details of the remaining activities for each of the questions that are not closed are described in Section 2.3.2 of this report.

Table 2.3.1-1 Overall Chapter 15 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response**	1
In Evaluation**	0
Confirmatory Action	1
Closed*	281
TOTAL	283

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI.
** Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the two questions in Chapter 15 that are not closed as of

March 24, 2014.

Table 2.3.2-1 Status of Chapter 15 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
15.06.05-15	352-2369 (ML091270192)	UAP-HF-09384 (ML092040060)	Confirmatory Action SE OI 15.6.5-2. This question is being held open until the LOCA analyses in DCD Chapter 15 are updated to incorporate the final ACC scaling bias values. This effort is planned as part of the safety reanalysis effort described in Section 3 of this report.
15.06.05-102	1042-7143 (ML13184A029)*	UAP-HF-13199 (ML13218A009)	Issued/Waiting for Response** Related to SE OIs 15.6.5-8 (tied to RAI 719-5352 Question 15.6.5-90) and 15.6.5-9 (tied to RAI 861-6062 Question 15.6.5-98). MHI's response to RAI 1042-7143 Question 15.6.5-102 was officially submitted on 8/1/2013. The NRC review of MHI's response is on hold due to the slowdown.

* Denotes an ADAMS accession number that is not publically available.
** Reflects status communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728), and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 15 is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 15 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

The incorporation of the impacts of the safety reanalysis into DCD Chapter 15 is the only remaining technical issue at this time. This commitment was made in MHI letter UAP-HF-13170 dated July 1, 2013 (ML13189A283). Changes to the Chapter 15 analysis also have the potential to impact the corresponding analyses in MUAP-07014, "Defense-in-Depth Coping Analysis." As a result, Phase 2 SE OI 15.08-1 will remain open to track the impact of the safety reanalysis effort on MUAP-07014. MHI will also incorporate the update for the ACC scaling bias into the LB and SB LOCA analyses as part of the safety reanalysis effort. This activity is also being tracked under Phase 2 SE OI 15.6.5-2.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 15.

3.4 KEY REVIEW TOPICS

The incorporation of the impacts of the ACC scaling bias and the safety reanalysis effort into DCD Chapter 15 are the only remaining technical issues for Chapter 15. As described in US-APWR Chapter Status Report – Chapter 6, the NRC has completed the review of MUAP-07001, Rev. 5, "The Advanced Accumulator" Topical Report. MHI subsequently updated the corresponding descriptions in the two LOCA Topical Reports, MUAP-07011 and MUAP-07013. MHI intends to incorporate the final ACC scaling bias values into the Chapter 15 LOCA analyses as part of the safety reanalysis effort. The safety reanalysis effort was placed on hold as part of the approach to the slowdown period. The scheduling of the reanalysis, DCD changes, and subsequent NRC staff review will be determined following the temporary slowdown period.

1.0 INTRODUCTION

This report summarizes the status of Chapter 16, "Technical Specifications," of the US-APWR Design Certification Document (DCD), MUAP-DC016. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 16 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 16 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	03/25/2010	ML090900107
3	09/09/2011	ML11279A032
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 16 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 21 February, 2014). Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation Report (SER) with Open Items (OI) to MHI on March 25, 2010 (ML090900107). Phase 3 commenced with the presentation of DCD Chapter 16 to the ACRS Subcommittee (SC) on June 7, 2010 (ML101750054) by MHI and the NRC. The meeting resulted in 2 questions requiring follow-up; MHI responded on August 27, 2010 (ML102430181). DCD Chapter 16 was presented to the ACRS Full Committee (FC) on September 9, 2011 (ML11279A032). The FC issued their letter for Chapter 16 of the SER with OIs for US-APWR technical specifications on September 22, 2011 (ML11256A206). Phase 4 of the NRC review is ongoing. There are no items which need follow-up with the ACRS.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 16

Meeting Date	Topic	Transcript	MHI Follow-Up
06/07/2010	Technical Specifications SC Meeting	ML101750054	ML102430181 (UAP-HF-10235)
09/09/2011	Technical Specifications FC Meeting	ML11279A032	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of Chapter 16 interactions have been prompted by changes in the US-APWR design which result in a need to change the Technical Specifications. A summary of recent interactions between MHI and the NRC regarding Chapter 16 is presented in Table 2.2-1 Below.

Table 2.2-1 Summary of NRC-MHI Interactions for Chapter 16

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
12/09/2013	Clarification Call	N/A	Low Power Shutdown RAI 161-1812 Question 16-117 and related Chapter 19 RAI 669-5219 Question 19-494. The NRC staff had reviewed MHI's draft revised responses and provided a few final comments. MHI submitted revised/supplemental RAI responses based on the feedback from this call.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 16, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 310 questions in 22 RAIs against DCD Chapter 16. MHI has officially submitted responses to all of the issued questions. As shown in Table 2.3.1-1 below, all of the questions except for 23 are considered closed at this time.

Table 2.3.1-1 Overall Chapter 16 RAI Question Status Summary

Status Description	No. of Questions
Issued/Waiting for Response	0
In Evaluation	0
Confirmatory Action	23
Closed*	287
TOTAL	310

*Includes both Resolved – Closed and Unresolved – Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 23 questions in Chapter 16 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 16 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
16-160	166-1784 (ML090360299)	UAP-HF-12015 (ML12041A034	Confirmatory Action Response officially submitted 1/30/2012. NRC stated these questions are confirmatory actions awaiting acceptance of MUAP-07030, "US-APWR Probabilistic Risk Assessment."
16-161			
16-162			
16-163			
16-164			
16-166			
16-167			
16-168			
16-177			
16-178			
16-179			
16-180			
16-181			
16-184			
16-189			
16-190			
16-191			
16-194			

16-299	463-3746 (ML092810160)	UAP-HF-09501 (ML093070292)	Confirmatory Action Response officially submitted 10/28/2009. Response makes no commitments to change US-APWR documentation. Staff to close item upon closure of Chapter 7 RAI 568-4588, Question 07.05-18.
16-306	1059-7275 (ML13316B124)	UAP-HF-13315 (ML13361A195)	Confirmatory Action Response officially submitted 12/26/2013. Commitments to change the DCD have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
16-307			
16-308			
16-306	1071-7376 (ML14028A140)	UAP-HF-14019 (ML14063A524)	Confirmatory Action Response officially submitted 2/27/2014. Commitments to change the DCD have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), Chapter 16 is not one of the review areas that will be pursued during the slowdown period. Review of Chapter 16 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There are no outstanding commitments for DCD Chapter 16 at this time.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 16.

3.4 KEY REVIEW TOPICS

At the completion of the slowdown period, MHI anticipates the NRC's review of RAI 1071-7376 will result in moving Question 16-306 to confirmatory status. After MHI submits DCD Rev. 5, it is expected all confirmatory actions will be closed and Phase 4 of the DCD Chapter 16 review will be completed with the issuance of the Advanced SER (ASER) without OIs.

1.0 INTRODUCTION

This report summarizes the status of Chapter 17 "Quality Assurance and Reliability Assurance" of the US-APWR Design Control Document (DCD), MUAP-DC017. The status of the applicant, Mitsubishi Heavy Industries, Ltd (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 17 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1 below.

Table 2.0-1 DCD Chapter 17 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	12/19/2012	ML12342A037
3	05/24/2013	ML13127A299
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 17 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to both the ACRS and MHI on December 19, 2012 (Package: ML12342A175 – non-public, Letter to ACRS: ML12342A097, Letter to MHI: ML12342A108, SE: ML12342A037). The Phase 2 SE contained no OIs (the SE identified one OI which was described as already being closed). The Phase 2 SE also contained five Confirmatory Items (CIs) related to DCD changes that MHI had committed to make which had not been included in an official DCD revision at the time of the SE.

For Phase 3, MHI and the NRC presented DCD Chapter 17 to the ACRS Subcommittee (SC) on February 21, 2013 and the ACRS Full Committee (FC) on April 11, 2013. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. Following the meetings, the ACRS FC issued the letter documenting the ACRS evaluation of the

SE with OIs for DCD Chapter 17 (and also DCD Chapters 4, 15, and 19) on April 29, 2013 (ML13105A219). The ACRS letter stated that there were no issues in DCD Chapter 17 that would preclude certification of the US-APWR design and did not identify any specific actions for MHI or the NRC regarding DCD Chapter 17. Although nothing specific was identified for DCD Chapter 17, the NRC responded to the ACRS letter on May 24, 2013 (ML13127A299).

Phase 4 is currently ongoing. Note that there are no OIs from Phase 2 to resolve during Phase 4 and the five CIs from Phase 2 have now been closed. For a discussion of current and future activities in Phase 4, see Section 3 of this report.

Table 2.1-1 ACRS Meetings Related to DCD Chapter 17

Meeting Date	Topic	Transcript	MHI Follow-Up
02/21/2013	Ch. 17 SC Meeting	ML13079A309	N/A
04/11/2013	Ch. 17 FC Meeting	ML13112A254	N/A

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 17. A summary of the major interactions between MHI and the NRC staff is provided in Table 2.2-1 below. In addition to these interactions, a few clarification calls were held to discuss RAI questions and discuss the plans for an audit.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 17

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
12/06/2010 to 12/10/2010	Inspection	*Inspection Report & NOV:* ML110210624 *MHI Response to NOV:* ML110670353 *NRC Acceptance of NOV Response:* ML110730661	An inspection was held on the US-APWR Quality Assurance (QA) program. The inspection resulted in a Notice of Violation (NOV) for three items. MHI responded to the NOV with the proposed resolution for each item. The NRC accepted the MHI responses to the NOVs.
03/28/2013	Public and Closed Meeting	*Meeting Notice:* ML13073A560 *Meeting Materials & Summary:* ML13114A113	A public and closed meeting was held to discuss DCD Section 17.4 and the potential for an audit in the fall of 2013 related to that area. The proposed purpose and scope of the audit was discussed. (The meeting also covered topics related to DCD Chapter 19.)

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
10/02/2013	Audit	*Audit Plan:* ML13246A071 *Audit Report:* ML13361A042	An audit was held on the US-APWR design reliability assurance program (D-RAP) to review the process used to generate the list of risk-significant structures, systems, and components (SSCs) in DCD Table 17.4-1. The findings from the audit resulted in the issuance of RAI 1069-7354. For more details on this RAI, see Section 2.3.2 of this report.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 17, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 71 questions in 9 RAIs against DCD Chapter 17. MHI has officially submitted responses to all of the issued questions except for two. As shown in Table 2.3.1-1 below, all of the questions except for two are considered closed at this time.

Table 2.3.1-1 Overall Chapter 17 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response	2
In Evaluation	0
Confirmatory Action	0
Closed*	69
TOTAL	71

* Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 below provides a summary of the two questions in DCD Chapter 17 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 17 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
17.04-69	1069-7354 (ML14008A264)	N/A	Issued/Waiting for Response The RAI was issued on January 6, 2014. MHI has not yet responded.
17.04-70			

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made

by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 17 is one of the review areas that will be pursued sequentially during the slowdown period. Specifically, the slowdown plan includes only the activity related to the Topical Report PQD-HD-19005. This was identified with a goal of the NRC updating the SE for Topical Report PQD-HD-19005. Although this activity was originally planned for the slowdown period, the NRC has already completed the review of the Topical Report revision and has issued the supplemental SE, see Section 3.4 of this report for additional details. However, the remainder of DCD Chapter 17 will resume in Phase 4 following the temporary slowdown.

3.2 COMMITMENTS

There is one outstanding MHI commitment at this time. MHI committed to performing an internal audit on the D-RAP and convening an additional expert panel meeting for D-RAP following the next revision of the probabilistic risk assessment (PRA). This commitment is also described in Section 3.4 of this report.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 17.

3.4 KEY REVIEW TOPICS

As of March 24, 2014, all of the OIs and CIs from the Phase 2 DCD Chapter 17 SE have been closed. However, there are still two technical areas where review is needed. A brief summary of each technical topic is provided below. Refer to the discussion in Table 2.3.2-1 above for details of the specific open RAIs associated with these topics.

- Quality Assurance Program Description (QAPD) – DCD Chapter 17 references the MHI Topical Report PQD-HD-19005, "Quality Assurance Program (QAP) Description For Design Certification of the US-APWR." The NRC approved Topical Report PQD-HD-19005 in the SE dated January 24, 2008 (ML073610579). Subsequently, MHI has submitted revisions to the Topical Report and the NRC has issued supplemental SEs approving those revisions. PQD-HD-19005 Revision 5 was submitted by MHI on May 20, 2013 (ML13154A309 and ML13154A311) and the supplemental SE was issued by the NRC on August 15, 2013 (ML13213A068). MHI updated DCD Revision 4 to refer to PQD-HD-19005 Revision 5 and the NRC has indicated that the DCD Chapter 17 SE has been updated to refer to PQD-HD-19005 Revision 5 as well. However, due to subsequent organizational changes at MHI, MHI has submitted PQD-HD-19005 Revision 6 on December 6, 2013 (ML13350A510 and ML13350A511) and PQD-HD-19005 Revision 7 on February 20, 2014 (ML14065A060 and ML14065A074). The NRC has completed reviewing PQD-HD-19005 Revision 7 and the supplemental SE approving Revision 7 has been issued by the NRC on March 20, 2014 (ML14073A741). MHI will update the DCD to refer to the latest revision of PQD-HD-19005. The NRC will need to update the DCD Chapter 17 SE to refer to the latest supplemental SE.
- Design Reliability Assurance Program (D-RAP) – As indicated in Table 2.2-1 above, an audit related to D-RAP was held in October 2013. The audit resulted in new RAI

1069-7354 which MHI has not yet responded to as shown in Table 2.3.2-1 above. MHI will respond to this RAI following the temporary slowdown. Following the MHI response to this RAI, the NRC review will be a key review area in the future. In addition, during the audit MHI discussed how the list of risk-significant SSCs (the D-RAP list) in DCD Table 17.4-1 may need to be revised following the next revision of the PRA documented in DCD Chapter 19. MHI's commitment to revise the PRA is discussed in the US-APWR Chapter Status Report – Chapter 19. MHI will update the D-RAP list as necessary following the PRA revision. Then, the NRC review of the updated D-RAP list in DCD Table 17.4-1 will need to be performed.

1.0 INTRODUCTION

This report summarizes the status of Chapter 18, "Human Factors Engineering," of the US-APWR Design Certification Document (DCD), MUAP-DC018. The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI) submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 18 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Chapter 18 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	Ongoing	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 18 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 21 February, 2014). Phase 2 of the NRC review is ongoing. There have been no meetings with the ACRS regarding US-APWR Chapter 18. Phase 2 of the NRC review is to conclude with issuance of the Phase 2 Safety Evaluation Report (SER) with Open Items (OI) to both the ACRS and MHI.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of the interactions related to Chapter 18 have been clarification calls to ensure that MHI fully understood an NRC RAI before submitting an official response. However, a number of public meetings and calls were held in order to facilitate a common understanding of ongoing review topics and closure approaches. A summary of recent interactions between MHI and the NRC regarding Chapter 18 is presented in Table 2.2-1. Interactions which have resulted in actions currently not completed

are discussed below.

On March 28, 2013 the NRC and MHI participated in a clarification call to discuss the reorganization and submission of Human Factors Engineering (HFE) Implementation Plans (IP) and changes to affected documentation. MHI stated Technical Reports (TeR) and templates of Results Summary Reports (contained within the IPs) would be produced to correspond to applicable HFE elements in NUREG-0711, Revision 2 and demonstrate fulfillment of acceptance criteria therein. MHI also committed to reconcile the DCD and HFE Topical Report (ToR) MUAP-07007, "HSI System Description and HFE Process" in order to facilitate the Staff's review of the US-APWR Human System Interface System. Subsequent to the meeting, MHI submitted the HFE closure plan (ML13093A412) which officially communicated MHI's intentions to the NRC.

To date, MHI has submitted the nine TeRs committed to in the HFE closure plan. In addition, MHI has withdrawn MUAP-08014, "US-APWR Human System Interface Verification and Validation (Phase 1a)," MUAP-10010, "US-APWR Procedure Development Implementation Plan," and MUAP-10011, "US-APWR Training Program Development Implementation Plan" (UAP-HF-14023) due to contents of MUAP-08014 being included in other HFE documentation and the subjects of MUAP-10010 and MUAP-10011 being addressed within DCD Chapter 13, "Conduct of Operations." Work to reconcile the DCD and ToR is ongoing as described in Section 3.2 of this report. RAIs which have been issued posing questions against current HFE documentation are presented in Section 2.3.2 below.

Table 2.2-1 Summary of NRC-MHI Interactions for Chapter 18

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
01/31/2013	Public Meeting	*Meeting Notice:* ML13017A209	Human Factors Engineering (HFE) Implementation Plans (IP) and MHI's responses to RAIs 999-6982, 1000-6964, 1001-6939, 1002-6994, 1003-6911
02/14/2013	Clarification Call	N/A	HFE IP reorganization and submission schedule
03/28/2013	Clarification Call	N/A	HFE IP reorganization and submission schedule
05/22/2013	Clarification Call	N/A	HFE IP Tier 2* content, placement of Computer Based Procedures (CBP) discussion in HFE documentation, inclusion of Risk Important Human Actions (RIHA) in HFE documentation

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 18, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 266 questions in 56 RAIs against DCD Chapter 18. As shown in Table 2.3.1-1 below, all of the questions except for 13 are considered closed at this time.

Table 2.3.1-1 Overall Chapter 18 RAI Question Status Summary

Status Description	No. of Questions
Issued/Waiting for Response	1
In Evaluation	0
Confirmatory Action	12
Closed*	252
TOTAL	265

*Includes Resolved – Closed and Unresolved – Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 13 questions in Chapter 18 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 18 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
18-252	1008-7008 (ML13063A175)	UAP-HF-13296 (ML13350A026)	Confirmatory Action Response officially submitted 12/11/2013. Commitments to change DCD Rev. 4 are to be included in the Chapter 18 reconciliation document, to be submitted 5/16/2014, and are to be officially submitted in DCD Rev. 5.
18-253			
18-254			
18-264	1073-7383 (ML14035A507)	N/A	Issued/Waiting for Response MHI to respond.
18-245	1006-6998 (ML13063A171)	UAP-HF-13295 (ML13350A027)	Confirmatory Action Response officially submitted 12/10/2013. Commitments to change DCD Rev. 4 are to be included in the Chapter 18 reconciliation document, to be submitted 5/16/2014, and are to be officially submitted in DCD Rev. 5.
18-246			
18-247	1006-6998 (ML13063A171)	UAP-HF-13295 (ML13350A027)	Confirmatory Action Response officially submitted 12/10/2013. Commitment to change MUAP-07007, Rev. 5, "HSI System Description and HFE Process" are to be included in the Topical Report reconciliation (i.e. submittal of MUAP-07007, Rev. 6), to be submitted 4/18/2014.
18-189	999-6982 (ML13063A145)	N/A	Confirmatory Action No response has been submitted. NRC to evaluate closure to ToR and DCD reconciliation.
18-190			
18-191			
18-192			

18-126	777-5776 (ML111870408)	UAP-HF-11275 (ML11238A047)	Confirmatory Action Response officially submitted 8/24/2011. Commitments to change the DCD are incorporated in DCD Rev. 4, submitted 8/30/2013 (ML13262A471).
18-128			

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), Chapter 18 is one of the review areas that will be pursued sequentially during the slowdown period. Chapter 18 is the first sequential activity to occur during the US-APWR review slowdown period with a goal of all open items brought to confirmatory action status pending issuance of DCD Revision 5.

3.2 COMMITMENTS

As discussed in Section 2.2, MHI has committed to reconcile the DCD and ToR MUAP-07007, "HSI System Description and HFE Process" with HFE TeRs as committed to in MHI's HFE closure plan (ML13093A412). MHI intends to submit the revised ToR no later than April 18, 2014, and a markup of the revised DCD sections no later than May 16, 2014.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Chapter 18.

3.4 KEY REVIEW TOPICS

DCD Chapter 18 is the first sequential activity to occur during the US-APWR review slowdown period. MHI intends to continue performing activities in support or the NRC's review through completion of review Phase 3. In order for MHI and the NRC to progress to the end of Phase 3, some key review topics will need to be addressed.

RAIs to which MHI has not yet produced a response are to be responded to officially, with the exception of those questions contained in RAI 999-6982. Revisions to the DCD, TeRs, and the ToR are to take place as committed. MHI is to submit the reconciled ToR and DCD Chapter 18 after removing contents which are not pertinent to the NRC's review, aligning references to current IP contents, and adjusting descriptions to improve consistency with US-APWR HFE nomenclature. RAIs which result from the NRC's review of the reconciled report and DCD Chapter 18 are to be answered by MHI in support of the NRC's review.

MHI anticipates performing the aforementioned activities, along with preparation of meeting materials and meeting execution, will be sufficient to complete Phase 3 of the DCD Chapter 18 review and obtain an SER for the ToR.

1.0 INTRODUCTION

This report summarizes the status of Chapter 19 "Probabilistic Risk Assessment and Severe Accident Evaluation" of the US-APWR Design Control Document (DCD), MUAP-DC019. The status of the applicant, Mitsubishi Heavy Industries, Ltd (MHI), submittals and the Nuclear Regulatory Commission (NRC) review is included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Chapter 19 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1 below.

Table 2.0-1 DCD Chapter 19 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	01/17/2013**	ML13014A643
3	05/24/2013	ML13127A299
4	Ongoing	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014.
** Some sections of DCD Chapter 19 are still in Phase 2. See Section 2.1 of this report for more details.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Chapter 19 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, February 19, 2014).

Phase 2 was completed with the issuance of the Phase 2 Safety Evaluation (SE) with Open Items (OIs) to the ACRS on January 22, 2013 and to MHI on January 17, 2013 (Package: ML13014A617 – non-public, Letter to ACRS: ML13014A669, Letter to MHI: ML13014A627, SE: ML13014A643). The Phase 2 SE contained 20 OIs. The Phase 2 SE also contained 24 Confirmatory Items (CIs) related to DCD or technical report changes that MHI had committed to make which had not been included in an official DCD or technical report revision at the time of the SE. Note that some sections of DCD Chapter 19 were not included in the Phase 2 SE. Sections 19.1.4.5.1, 19.1.4.6.2.3, and 19.2.4.2.4 of the Phase 2 SE described that the seismic risk evaluation, seismic margins assessment, and containment performance capability, respectively, were not yet evaluated by the NRC staff. These sections of the SE correspond to DCD Sections 19.1.5.1 and 19.2.4. Therefore, Phase 2 is ongoing for these DCD sections.

For Phase 3, MHI and the NRC presented DCD Chapter 19 to the ACRS Subcommittee (SC) on February 21-22, 2013 and the ACRS Full Committee (FC) on April 11, 2013. A summary of the relevant documents associated with the ACRS meetings is provided in Table 2.1-1 below. Following the meetings, the ACRS FC issued the letter documenting the ACRS evaluation of the SE with OIs for DCD Chapter 19 (and also DCD Chapters 4, 15, and 17) on April 29, 2013 (ML13105A219). The ACRS letter stated that, other than the OIs identified in the SE, there were no issues in DCD Chapter 19 that would preclude certification of the US-APWR design. The ACRS letter did indicate two items where additional attention from the NRC staff was needed. The NRC responded to the ACRS letter on May 24, 2013 (ML13127A299) and indicated the staff would work with MHI to resolve the OIs as well as the additional ACRS requests. One of the items was related to the use of the probabilistic risk assessment (PRA) to support risk-informed applications; this item applies to the licensee and is outside of the scope of the design certification, so no further action was required by MHI. The other item became an RAI in Phase 4.

Phase 4 is currently ongoing. Note that 7 of the 20 OIs and 17 of the 24 CIs from Phase 2 have now been closed. For a discussion of current and future activities in Phase 4, see Section 3 of this report.

DCD Chapter 19 also includes Appendix A, "Beyond Design Basis Aircraft Impact Assessment." The Aircraft Impact Assessment (AIA) review does not include all six phases. Phases 2 and 3 are skipped and the staff moves directly to Phase 4 with the preparation of the Advanced SE with no OIs. The NRC has prepared a draft Phase 4 SE. The SE has not yet been issued officially and Phase 4 for AIA is currently ongoing. The AIA review also includes an NRC inspection. The AIA inspection for the US-APWR was held in January 2014 (see Table 2.2-1 below).

Table 2.1-1 ACRS Meetings Related to DCD Chapter 19

Meeting Date	Topic	Transcript	MHI Follow-Up
02/21/2013 to 02/22/2013	Ch. 19 SC Meeting*	ML13079A309 ML13079A315	N/A
04/11/2013	Ch. 19 FC Meeting*	ML13112A254	N/A

* DCD Sections 19.1.5.1 and 19.2.4 were not included in the Phase 2 SE and were therefore not included in the ACRS meetings.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the review of US-APWR DCD Chapter 19. A summary of the major interactions between MHI and the NRC staff is provided in Table 2.2-1 below. In addition to these interactions, numerous clarification calls were held to discuss RAI questions.

Table 2.2-1 Summary of Major NRC-MHI Interactions for DCD Chapter 19

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
06/07/2011 to 06/09/2011	Public and Closed Meeting	*Meeting Notice:* ML111400118	A public and closed meeting was held to discuss a general overview of the DCD Chapter 19 review as well as discuss several specific DCD Chapter 19 RAIs. For each of the RAIs discussed, resolution was reached or else additional NRC-MHI interactions were held.
01/09/2012	Public Tele-conference	*Meeting Notice:* ML113560231 *Meeting Summary:* ML120340250	A public tele-conference was held to discuss the methodology used in identifying the structures, systems, and components included in the US-APWR Technical Specifications (DCD Chapter 16). This topic is related to RAI 669-5219 Question 19-494 and related Chapter 16 RAI 161-1812 Question 16-117, which are follow-ups to older RAIs. The NRC's specific concern is how MHI applies Criterion 4 of 10 Code of Federal Regulation (CFR) 50.36(c)(2)(ii). This topic was discussed in several other MHI-NRC interactions (see below). This RAI is also discussed in detail in Section 2.3.2 of this report.
01/30/2012	Public Tele-conference	*Meeting Notice:* ML120120178	A public tele-conference was held to discuss RAI 871-6121 Question 19-560 (and related Chapter 6 RAI 873-6168 Question 06.02.05-46) concerning the hydrogen igniters and the severe accident analysis. The call was held to discuss draft responses which MHI had provided to the NRC. Following this call, MHI revised the draft RAI response. This topic was discussed in several other MHI-NRC interactions (see below). This RAI is also discussed in detail in Section 2.3.2 of this report.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
04/05/2012	Public Tele-conference	*Meeting Notice:* ML120890494 *Meeting Summary:* ML12128A131	A public tele-conference was held to discuss several DCD Chapter 19 RAIs. The first RAI discussed was RAI 669-5219 Question 19-494 concerning low power shutdown technical specifications and the application of Criterion 4 of 10 CFR 50.36(c)(2)(ii). The second RAI discussed was RAI 668-5180 Question 19.01-10 concerning hydrogen peroxide. The third RAI discussed was RAI 749-5651 Question 19-506 concerning MAAP analysis. As a result of this call, MHI revised the RAI responses for some of these RAI questions. Some of these RAIs are discussed in detail in Section 2.3.2 of this report while the rest have already been closed.
04/19/2012	Public Tele-conference	*Meeting Notice:* ML12089A390 *Meeting Summary:* ML12146A260	A public tele-conference was held to discuss two DCD Chapter 19 RAIs. The first RAI discussed was RAI 750-5675 Questions 19-507, 19-509, 19-511, 19-514, and 19-518 concerning various topics. The second RAI discussed was RAI 834-6035 Question 19-559 concerning combined license applicant items. As a result of this call, MHI revised the RAI responses for some of these RAI questions. Some of these RAIs are discussed in detail in Section 2.3.2 of this report while the rest have already been closed.
05/16/2012	Public Tele-conference	*Meeting Notice:* ML12110A095 *Meeting Summary:* ML12192A477	A public tele-conference was held to discuss several DCD Chapter 19 RAIs. This call was a follow-up to the April 19, 2012 call. All the RAIs discussed concerned combined license applicant items and were RAI 750-5675 Questions 19-507, 19-508, 19-509, and 19-518; RAI 834-6035 Question 19-559; and RAI 898-6275 Question 19-564. As a result of this call, MHI revised the RAI responses for some of these RAI questions. Some of these RAIs are discussed in detail in Section 2.3.2 of this report while the rest have already been closed.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
06/07/2012	Public Tele-conference	*Meeting Notice:* ML12143A400	A public tele-conference was held to discuss RAI 871-6121 Question 19-560 (and related Chapter 6 RAI 873-6168 Question 06.02.05-46) concerning the hydrogen igniters and the severe accident analysis. This was a follow-up to the call on January 30, 2012. Following this call, MHI submitted the RAI response.
09/19/2012	Closed Tele-conference	*Meeting Notice:* ML12243A406	A closed tele-conference was held to discuss RAI 871-6121 Question 19-560 concerning the hydrogen igniters and the severe accident analysis. This call was a follow-up to the call on June 7, 2012 and was held after the NRC had reviewed MHI's response. The NRC provided feedback on MHI's response. As a result of this call, MHI revised the RAI response.
02/28/2013	Letter	ML13008A124	The NRC provided an official letter to MHI to document the staff's position on the need for certain Technical Specifications during low power shutdown conditions. This issue was the subject of RAI 669-5219 Question 19-494, and related Chapter 16 RAI 161-1812 Question 16-117, and had been discussed in several previous meetings and calls with the NRC. The purpose of this letter was to provide written documentation of the details of the NRC's position.
03/28/2013	Public and Closed Meeting	*Meeting Notice:* ML13073A560 *Meeting Materials & Summary:* ML13114A113	A public and closed meeting was held to discuss several DCD Chapter 19 topics: RAIs that were SE OIs, follow-up actions from the ACRS meeting, updating the PRA, and revision of the Technical Report MUAP-07030. (The meeting also covered topics related to DCD Chapter 17.)
07/11/2013	Public and Closed Tele-conference	*Meeting Notice:* ML13172A389	A public and closed tele-conference was held to discuss two DCD Chapter 19 RAIs. The first RAI discussed was RAI 967-6790 Question 19-575 concerning the technical adequacy of the PRA and compliance with PRA standards. The second RAI discussed was RAI 983-6953 Question 19-578 concerning Generic Letter 88-17. As a result of this call, MHI revised the RAI responses for both of these RAIs. These RAIs are also discussed in detail in Section 2.3.2 of this report.

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
08/08/2013	Clarification Call	N/A	A clarification call was held to discuss RAI 669-5219 Question 19-494 and related Chapter 16 RAI 161-1812 Question 16-117. The NRC staff had reviewed MHI's draft revised responses and provided clarification of the staff concerns.
12/09/2013	Clarification Call	N/A	This clarification call was a follow-up to the August 8, 2013 call and was held to discuss RAI 669-5219 Question 19-494 and related Chapter 16 RAI 161-1812 Question 16-117. The NRC staff had reviewed MHI's draft revised responses and provided a few final comments. MHI submitted revised/supplemental RAI responses based on the feedback from this call.
11/06/2013 and 01/27/2014 to 01/31/2014	Inspection	*Inspection Notice:* ML13262A147 *Inspection Report & NOV:* ML14064A271	An inspection was held on the US-APWR AIA. An onsite visit was held on November 6, 2013 to review documents and information to prepare for the inspection. The inspection itself was held at the end of January 2014. The inspection resulted in a Notice of Violation (NOV) for two items and a minor violation for one item.

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Chapter 19, as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 610 questions in 89 RAIs against DCD Chapter 19. MHI has officially submitted responses to all of the issued questions except for one. As shown in Table 2.3.1-1 below, all of the questions except for 23 are considered closed at this time.

Table 2.3.1-1 Overall Chapter 19 RAI Question Status Summary

Status Description	No. Questions
Issued/Waiting for Response*	13
In Evaluation*	0
Confirmatory Action	10
Closed**	587
TOTAL	610

* Reflects the status from the eRAI provided by the NRC on March 24, 2014 or as communicated by the NRC during the meeting on March 20, 2014 (ML14041A131).

** Includes both Resolved-Closed and Unresolved-Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 below provides a summary of the 23 questions in DCD Chapter 19 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Chapter 19 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
19.01-5	621-4947 (ML102440817)	UAP-HF-11229 (ML11206B294)	Confirmatory Action This was CI 19.1-LPSD-5 in the Phase 2 SE. This RAI question is a confirmatory action due to required DCD changes. Some of the changes were incorporated in DCD Revision 3 and the rest were incorporated in DCD Revision 4. The NRC provided feedback that this could not be closed due to information in the RAI response that was missing from DCD Revision 4. MHI believes that DCD Revision 4 contains all of the required changes. Additional NRC review of DCD Revision 4 is necessary for closure of this confirmatory action.
19-493	669-5219 (ML103330524)	UAP-HF-11229 (ML11206B294)	Confirmatory Action This was CI 19.1-LPSD-493 in the Phase 2 SE. This RAI question is a confirmatory action due to required PRA changes. MHI will revise the PRA (and associated Technical Report MUAP-07030) as described in the response.
19-494	669-5219 (ML103330524)	UAP-HF-13280 (ML13350A316)	Issued/Waiting for Response This was OI 19.1-LPSD-494 in the Phase 2 SE and is also related to OIs 19.1-LPSD-566 and 19.1-LPSD-570. MHI responded on December 12, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.
19-503	744-5668 (ML111180403)	UAP-HF-11302 (ML11255A017, ML112550040 – non-public)	Confirmatory Action Question 19-503 was CI 19.1-LEVEL1-503 in the Phase 2 SE. These RAI questions are confirmatory actions due to required PRA changes. MHI will revise the PRA (and associated Technical Report MUAP-07030) as described in the responses.
19-504			

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
19-513	750-5675 (ML111220055)	UAP-HF-13297 (ML13354B742)	Issued/Waiting for Response These were OIs 19.1-LEVEL1-513 and 19.1-LEVEL1-514 in the Phase 2 SE. MHI responded on December 12, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
19-514			
19-515	750-5675 (ML111220055)	UAP-HF-13270 (ML13325B104)	Issued/Waiting for Response This was OI 19.1-LEVEL1-515 in the Phase 2 SE. MHI responded on November 14, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.
19-516	750-5675 (ML111220055)	UAP-HF-13274 (ML13333A170)	Issued/Waiting for Response This was OI 19.1-LEVEL1-516 in the Phase 2 SE. MHI responded on November 25, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.
19-521	752-5614 (ML111230603)	UAP-HF-11213 (ML11196A055)	Confirmatory Action This was CI 19.1-LEVEL2-521 in the Phase 2 SE. This is a confirmatory action because the NRC has requested an audit. The audit is required in order to close this confirmatory action (see Section 3.3 of this report).
19-524	761-5804 (ML111450288)	UAP-HF-13298 (ML13345A732)	Issued/Waiting for Response MHI responded on December 9, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
19-549	823-5933 (ML112500191)	UAP-HF-11342 (ML11284A037)	Confirmatory Action This was CI 19.1-LPSD-549 in the Phase 2 SE. This RAI question is a confirmatory action due to required PRA changes. MHI will revise the PRA (and associated Technical Report MUAP-07030) as described in the response.
19-560	871-6121 (ML113320339)	UAP-HF-13103 (ML13119A168, ML131190156 – non-public)	Confirmatory Action This was OI 19.1-LEVEL2-560 in the Phase 2 SE. This RAI question is a confirmatory action due to required PRA changes. MHI will revise the PRA (and associated Technical Report MUAP-07030) as described in the response.
19-561	872-6144 (ML113320347)	UAP-HF-11437 (ML11361A087)	Confirmatory Action These were CIs 19.1-LEVEL2-561 and 19.1-LEVEL2-562 in the Phase 2 SE. These are confirmatory actions due to required PRA changes. MHI will revise the PRA (and associated Technical Report MUAP-07030) as described in the responses.
19-562			
19-575	967-6790 (ML12283A066)	UAP-HF-13269 (ML13317B695)	Issued/Waiting for Response This was OI 19.1-LEVEL1-575 in the Phase 2 SE. MHI responded on November 12, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.
19-578	983-6953 (ML12354A389)	UAP-HF-13299 (ML13345A731)	Issued/Waiting for Response This is related to OI 19.1-LPSD-506 in the Phase 2 SE. MHI responded on December 9, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's response is on hold due to the slowdown.
19-593	1049-7187 (ML13242A195)	UAP-HF-13242 (ML13273A012)	Confirmatory Action This RAI question is a confirmatory action due to required DCD changes. MHI will revise the DCD as described in the response.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
19-594	1061-7266 (ML13324A084)	UAP-HF-13305 (ML13350A315)	Issued/Waiting for Response These questions are related to OIs 19.1-LPSD-568, 19.1-LPSD-565, and 19.1-LPSD-506, respectively. MHI responded on December 12, 2013. Although MHI has responded, the NRC communicated the intent that the status be Issued/Waiting for Response to reflect that the NRC review of MHI's responses is on hold due to the slowdown.
19-595			
19-596			
19-597	1068-7342 (ML13347B111)	N/A	Issued/Waiting for Response This is related to OI 19.1-LEVEL1-516 in the Phase 2 SE. The RAI was issued on December 13, 2013. MHI has not yet responded.
19-599	1082-7419 (ML14051A802)	UAP-HF-14028 (ML not yet available)	Issued/Waiting for Response The RAI was issued on February 20, 2014. MHI responded on March 14, 2014. The NRC communicated that the response was acceptable and the status would be changed to Confirmatory Action due to required DCD changes. The status has not yet been changed. MHI will revise the DCD as described in the response.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Chapter 19 is not one of the review areas that will be pursued during the slowdown period. The review of DCD Chapter 19 will resume in Phase 4 (Phase 2 for DCD Sections 19.1.5.1 and 19.2.4) following the temporary slowdown.

3.2 COMMITMENTS

There is one outstanding MHI commitment at this time. MHI committed to updating the PRA and submitting the revised Technical Report MUAP-07030, "US-APWR Probabilistic Risk Assessment." MHI previously described this commitment as part of the PRA closure plan in letter UAP-HF-13101 dated April 26, 2013 (ML13120A019). Although the dates provided in that closure plan are no longer valid, the scope of items to be included in the PRA update remains valid. This commitment is also described in Section 3.4 of this report.

3.3 NRC INTERFACES

There are two additional interfaces planned for DCD Chapter 19. The first is that the NRC requested an audit to close the confirmatory action associated with RAI 752-5614 Question 19-521, as described in Table 2.3.2-1 above. The purpose of the audit would be for the NRC to review the finite-element structural analyses referred to in the RAI response. This audit was not held prior to the slowdown and is therefore a future required interface with the NRC. The second additional interface planned is related to the PRA update. As described in Section 3.2 of this report, MHI has committed to updating the PRA and submitting the revised Technical Report MUAP-07030. The NRC has requested an audit to verify that the PRA reflects the latest design (i.e. the design changes in the DCD were included in the PRA update). This audit would be held after MHI has submitted the revised Technical Report MUAP-07030.

3.4 KEY REVIEW TOPICS

As of March 24, 2014, many of the OIs and CIs from the Phase 2 DCD Chapter 19 SE have been closed. However, there are still several technical areas where review is needed. A brief summary of each technical topic is provided below. Refer to the discussion in Table 2.3.2-1 above for details of the specific open RAIs associated with these topics.

- Low Power Shutdown (LPSD) Technical Specifications (TS) – The NRC staff has indicated a need for increased use of TS to control equipment during LPSD operation. This NRC position is based on Criterion 4 of 10 CFR 50.36(c)(2)(ii). This issue was documented in RAI 669-5219 Question 19-494, which was OI 19.1-LPSD-494 in the Phase 2 SE, and related RAIs (Chapter 19 RAI 1020-7081 Question 19-584, Chapter 16 RAI 161-1812 Question 16-117, and other older RAIs). As indicated in Table 2.2-1 above, this issue has been discussed in several meetings and calls. The NRC staff position was also documented in a February 28, 2013 letter (ML13008A124). MHI has submitted multiple revisions and supplements to the RAI responses, the most recent set being December 12, 2013 (ML13350A316 and ML13350A089) and December 13, 2013 (ML13351A047). The most recent MHI responses have not yet been evaluated in detail by the NRC and the NRC review is now on hold due to the slowdown. MHI's position is that the December 12th and 13th responses fully meet the intent of the NRC request and address all NRC feedback received to date. Therefore, MHI believes this topic will be resolved once the NRC has reviewed the most recent MHI responses.
- Digital Instrumentation and Controls (I&C) in the PRA – The US-APWR has a digital I&C system which is modeled in the PRA. The NRC has asked several RAIs about how the PRA models of the I&C, including RAI 750-5675 Question 19-515, which was OI 19.1-LEVEL1-515 in the Phase 2 SE. The ACRS also made several comments about this in the SC meetings for DCD Chapter 19 as well as for DCD Chapter 7. MHI discussed the topic with the NRC in the March 28, 2013 meeting (see Table 2.2-1 above), as well as several meetings with the NRC in DCD Chapter 7 (see US-APWR Chapter Status Report – Chapter 7). Based on the NRC feedback, MHI provided a revised response to RAI 750-5675 Question 19-515 on November 14, 2013 (ML13325B104). MHI's position is that the November 14th response fully meets the intent of the NRC requests. The most recent MHI response has been evaluated only briefly by the NRC at this time and the NRC review is now on hold due to the slowdown; preliminary feedback from the NRC was that there were still several issues to address in this area. The NRC planned to provide a list of the remaining specific issues for MHI to address. This list was not completed before the slowdown and is now on hold. Therefore, MHI is waiting for the NRC to document the remaining issues in this area.

- Seismic Margin Analysis (SMA) – As discussed in Section 2.1 of this report, the Phase 2 SE did not include all of DCD Chapter 19. One of the areas that was not addressed in the Phase 2 SE was the SMA in DCD Section 19.1.5.1. This topic was the subject of RAI 761-5804 Question 19-524. Based on MHI's latest seismic design, MHI provided a revised response to RAI 761-5804 Question 19-524 on December 9, 2013 (ML13345A732). The most recent MHI response has not been evaluated in detail by the NRC and the NRC review is now on hold due to the slowdown. MHI is waiting for the NRC to review the most recent response and complete the Phase 2 SE for this section of the DCD.
- Technical Adequacy and Compliance with PRA Standards – DCD Section 19.1.2.3 discusses the technical adequacy of the PRA. The NRC has asked several RAIs about this topic, including RAI 967-6790 Question 19-575, which was OI 19.1-LEVEL1-575 in the Phase 2 SE. MHI discussed the topic with the NRC in the July 11, 2013 tele-conference (see Table 2.2-1 above). Based on the NRC feedback, MHI provided a revised response to RAI 967-6790 Question 19-575 on November 12, 2013 (ML13317B695). The November 12th response provided a new DCD table showing the compliance with the PRA standard endorsed by Regulatory Guide 1.200. The most recent MHI response has been evaluated only briefly by the NRC at this time and the NRC review is now on hold due to the slowdown; preliminary feedback from the NRC was that the DCD table did not include the evaluation of internal fire against the PRA standard. MHI will revise the DCD table to include the additional evaluation for internal fire and address any other NRC feedback to resolve this topic.
- Drain-down Events and Containment Racks – The US-APWR includes temporary storage racks (referred to as containment racks) in the refueling cavity that can be used to store a limited number of fuel assemblies. The NRC has asked several RAIs in DCD Chapters 9, 12, and 19 about the potential for a rapid drain-down of the refueling cavity while fuel is in the containment racks. The focus of the DCD Chapter 19 RAIs, and corresponding OI 19.1-LPSD-565 in the Phase 2 SE, is on why these drain-down event scenarios are not modeled in the PRA. MHI provided a response to RAI 1061-7266 Question 19-595 on this topic on December 12, 2013 (ML13350A315). The most recent MHI response has not been evaluated in detail by the NRC at this time and the NRC review is now on hold due to the slowdown. In addition, the NRC issued a related Chapter 12 RAI 1075-7308, which refers to Chapter 19 RAI 1061-7266 Question 19-595. Therefore, the resolution of this topic requires action by MHI to respond to the new RAI questions on this topic as well as action by the NRC to finish the review of previously submitted RAI responses on this topic. (The general topic of containment racks is also a key review topic in the US-APWR Chapter Status Report – Chapter 12.)
- Generic Letter (GL) 88-17 – NRC GL 88-17 addresses rapid loss of reactor coolant system (RCS) inventory during shutdown conditions. The NRC has asked several RAIs pertaining to GL 88-17 which resulted in OI 19.1-LPSD-506 in the Phase 2 SE. The most recent Chapter 19 RAI is RAI 1061-7266 Question 19-596, although there have been related RAIs in Chapters 9 and 12 related to the applicability to containment racks (see key review topic above). MHI provided a response to RAI 1061-7266 Question 19-596 on this topic on December 12, 2013 (ML13350A315) and a revised response to RAI 983-6953 Question 19-578 on December 9, 2013 (ML13345A731). The most recent MHI responses have not been evaluated in detail by the NRC at this time and the NRC review is now on hold due to the slowdown. In addition, the related Chapter 12 RAI 1075-7308, which refers to Chapter 19 RAI 1061-7266 Question 19-596, has been issued and will need to be responded to by MHI. Furthermore, Chapter 19 RAI 621-4947 Question 19.01-5, and corresponding CI 19.1-LPSD-5 in the Phase 2 SE, is

related to GL 88-17. As indicated in Table 2.3.2-1 above, the NRC did not close the confirmatory action associated with this RAI even though MHI believes that this RAI can be closed due to required DCD changes being included in DCD Revision 4. Therefore, the resolution of this topic requires action by MHI to respond to the new RAIs on this topic, action by the NRC to finish the review of previously submitted RAI responses on this topic, and discussion between the NRC and MHI to ensure closure of older RAIs related to this topic.

- Technical Report MUAP-07030 Revision – As described in Section 3.2 of this report, MHI is planning a future update to the PRA and revision to the Technical Report MUAP-07030, "US-APWR Probabilistic Risk Assessment." This PRA update will include changes discussed in RAI responses (see Table 2.3.2-1 above) and also any required design changes based on the current DCD revision at that time. The PRA update will also require changes to the DCD, since the PRA results are reported in DCD Chapter 19. MHI action is required to complete these commitments. The NRC previously indicated a need to perform an audit after the PRA update and MUAP-07030 revision. The need for this future interface is captured in Section 3.3 of this report.
- Aircraft Impact Assessment (AIA) – The NRC had prepared the draft Phase 4 SE for AIA in late December 2013. Then the AIA inspection was held in January 2014 (see Table 2.2-1 above). Following the inspection, the NRC issued RAI 1082-7419 Question 19-599 regarding AIA. MHI provided a response on March 14, 2014. The NRC communicated that the response was acceptable and would be confirmatory pending the DCD changes described in the response. The change in status has not yet been processed by the NRC in eRAI. MHI will revise the DCD as discussed in the response. After the NRC has updated the status to reflect the review of the response, the NRC will also need to update the draft Phase 4 SE for AIA to discuss the RAI and response. Then the Phase 4 SE will need to be officially issued. In addition, the inspection report dated March 19, 2014 (ML14064A271) resulted in two NOVs and one minor violation. MHI is required to submit responses to the NOVs.

1.0 INTRODUCTION

This report summarizes the status of Sections 3.7 & 3.8 of the US-APWR Design Certification Document (DCD). The status of the applicant, Mitsubishi Heavy Industries, LTD (MHI), submittals and the Nuclear Regulatory Commission (NRC) review are included. The identification of NRC review items is only to identify the review status and not to presuppose any review effort by the NRC staff, the ultimate authority and responsibility lies with the NRC.

2.0 CHAPTER REVIEW PROGRESS

Section 2 of this report discusses the history of the DCD Sections 3.7 & 3.8 review to date including the status of the NRC Review Phase, Advisory Committee on Reactor Safeguards (ACRS) meeting(s), significant historical NRC interfaces, and Requests for Additional Information (RAI). A summary of the DCD chapter review progress by phase is given in Table 2.0-1.

Table 2.0-1 DCD Section 3.7 & 3.8 Phase Status

Phase	Completion Date	Reference
1	06/19/2009	N/A*
2	Ongoing	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A

* http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 2/19/2014.

2.1 REVIEW PHASE

The design certification (DC) application for the US-APWR was submitted by MHI on December 31, 2007 (ML080140503). The NRC performed an acceptance review in early 2008, resulting in the docketing of the application on February 29, 2008 (ML080420261). Then the NRC began the safety review of the DCD, which consists of six phases (ML080840420).

US-APWR DCD Sections 3.7 & 3.8 completed Phase 1 in June 2009 (http://www.nrc.gov/reactors/new-reactors/design-cert/apwr/review-schedule.html, 21 February, 2014). Phase 2 of the NRC review is ongoing. There have been no meetings with the ACRS regarding US-APWR DCD Sections 3.7 & 3.8. Phase 2 of the NRC review is to be concluded with issuance of the Phase 2 Safety Evaluation Report (SER) with Open Items (OI) to both the ACRS and MHI following the temporary slowdown.

2.2 NRC INTERFACES

A number of interactions between MHI and the NRC staff, such as clarification calls, public meetings, audits, or inspections, have occurred in order to effectively and efficiently communicate various aspects of the US-APWR review. The majority of the interactions related to DCD Sections 3.7 & 3.8 have been to facilitate a common understanding of ongoing review topics and closure approaches. A summary of recent interactions between MHI and the NRC regarding DCD Sections 3.7 & 3.8 is presented in Table 2.2-1. Interactions which have resulted in actions currently not completed are discussed below.

From September 23 through 27, 2013 the NRC conducted an audit to review the seismic analysis and design of the nuclear island structures in support of the safety evaluation of the US-APWR DCD Tier 2, Sections 3.7.1, 3.7.2, and 3.7.3. Documentation supporting the development of design time histories, soil profiles, structural models, and soil-structure interaction (SSI) models were reviewed. Throughout the audit, numerous discussions took place resulting in MHI performing various evaluations and hand calculations to accommodate the NRC staff's questions and concerns. At the end of the audit, MHI had committed to revise various RAI responses to incorporate discussions, evaluations, and calculations which had been shared with the NRC staff. The NRC committed to produce new RAIs regarding some discussions for which a previous RAI had not been issued. Issues outstanding at the end of the audit included; out-of-plane motion of walls, response characteristics of the ANSYS dynamic model as compared to the SASSI structural model, adequacy of the modified subtraction method, SASSI results when using a Poisson's ratio greater than 0.42, mesh irregularities in the SASSI model, overturning stability, and others. RAIs for which the NRC is currently awaiting responses from MHI can be found in Section 2.3.2 of this report.

On October 31, 2013 a meeting was held between MHI and the NRC to discuss the design and analysis of the US-APWR basemat. MHI presented the design inputs, methodology, and load cases which had been used to determine settlement values and approaches for responding to RAIs posed against the basemat design. The NRC indicated any approach using superposition would need to be validated through the use of alternate analyses in order for the NRC staff to complete its safety determination, and that quality assurance documentation regarding the basemat design should be present at the audit of DCD Section 3.8. A list of other questions regarding the basemat was provided to MHI in preparation for the DCD Section 3.8 audit.

From November 4 through 8, 2013 the NRC conducted an audit of DCD Section 3.8 to review the design reports for the Reactor Building (R/B) Complex, the common basemat of the nuclear island, and the related documentation and supporting calculations to address outstanding issues with the structures, verify design methodologies are consistent with those presented in the DCD, and confirm calculations were conducted in accordance with applicable codes and regulations. At the end of the audit, MHI had committed to revise various RAI responses to incorporate discussions, evaluations, and calculations which had been shared with the NRC staff. The NRC committed to produce new RAIs regarding some discussions for which a previous RAI had not been issued. Issues outstanding at the end of the audit included; justification of using two times wall thickness to distribute localized forces, exclusion of in-plane membrane forces from overall bending and vertical seismic forces, Steel Concrete (SC) wall fabrication, construction, and inspection, thermal protection of hot penetrations through SC walls, use of straight line theory of stress and strain for factored load design, and others. RAIs for which the NRC is currently awaiting responses from MHI can be found in Section 2.3.2 of this report.

A clarification call between MHI and the NRC took place on November 19, 2013 to discuss the creation of the draft SER for DCD Sections 3.7 & 3.8. The NRC stated the staff would produce RAIs communicating 3.8 audit actions and then focus on producing the draft SER for DCD Sections 3.7 & 3.8. Responses to RAIs which were officially submitted after the time of the call were not to be reviewed by the NRC staff or included in the draft SER. MHI subsequently provided multiple RAI responses to which the NRC staff provided feedback.

The draft SER was subsequently discussed during a clarification call between MHI and the NRC on March 12, 2014. During the call the staff stated much progress had been made in the review of DCD Sections 3.7 & 3.8, but some issues still remain. The NRC identified the following topics

in DCD Section 3.7 as needing further review and possible interaction with MHI; treatment of walls shared by Seismic Category I and Seismic Category II structures, collapse of the Auxiliary Building and Access Building affecting Seismic Category I structures, COL Item consistency and redundancy, identification of Tier 2* information in the DCD, and augmentation of the DCD with TeR contents in order to avoid unnecessary incorporation of TeRs by reference. The NRC identified the following topics in DCD Section 3.8 as needing further review and possible interaction with MHI; the gap between the PCCV and the Reactor Building, the ultimate pressure capacity of the PCCV, use of linear and non-linear analyses, settlement analysis which account for construction sequencing, and use of ASME code. The NRC identified the following topics regarding Containment Internal Structures as needing further review and possible interaction with MHI; issues of constructability of SC walls including training, mock-ups, and non-destructive examination, stiffness values of SC walls (particularly walls classified as Category 6), and the consideration of thermal loads experienced by walls in close proximity to the RCS hotleg. MHI acknowledged the NRC staff's concerns and asked the NRC if RAIs had been produced for issues raised during the call. The NRC responded in the affirmative and acknowledged that some RAI responses concerning the aforementioned issues had been received since the November 19, 2013 call but had not been reviewed. At the end of the call, it was understood that multiple licensing and technical issues were ongoing in the NRC staff's review of DCD Sections 3.7 & 3.8, and that further interaction between MHI and the NRC would be needed in order for the NRC staff to complete the Phase 2 SER with OIs.

Table 2.2-1 Summary of NRC-MHI Interactions for Sections 3.7 & 3.8

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
11/07/2012	Audit	ML14002A301	NRC audit to review the confirmatory test plan, related documentation, and observation of confirmatory test of SC module
05/15/2013	Public Meeting	ML13120A179	MHI methodology for identification of critical sections for structures of the US-APWR
06/13/2013	Public Meeting	ML13154A148	Structure-Soil-Structure Interaction, evaluation of the Turbine Building, calculation of story shear values, selection of critical sections, identification of Tier 2* information
07/17/2013	Public Meeting	ML13183A247	Identification of Tier 2* information, DCD Rev. 4 mark-ups indicating Tier 2* information, Containment Internal Structure design status
08/14/2013	Clarification Call	N/A	September 2013 audit plans for DCD Section 3.7, status and approaches of ongoing RAIs, identification of Tier 2* information, phase schedule
08/28/2013	Clarification Call	N/A	September 2013 audit scope clarification (SASSI run capabilities of MHI), scheduling of basemat differential settlement calculation
09/11/2013	Clarification Call	N/A	Agenda of basemat design and settlement meeting, scope clarification and schedule of DCD Section 3.8 audit

Date Held	Interface Type	Related Reference(s)	Discussion Topic(s)
09/23/2013	Audit	ML13322B231	NRC audit to review nuclear island design documentation regarding design time histories, soil profiles, structural models, and soil-structure interaction models (DCD Section 3.7)
10/31/2013	Public Meeting	ML13290A418	Design Input, methodology, and load cases of the US-APWR basemat, basemat RAI response outlines
11/04/2013	Audit	ML13357A173	NRC audit to review the design of the Reactor Building Complex, Prestressed Concrete Containment Vessel, Power Source Buildings, Auxiliary Building, and Essential Service Water Pipe Chase and related documentation (DCD Section 3.8)
11/19/2013	Clarification Call	N/A	Drafting of the dSER for DCD Sections 3.7 & 3.8
3/12/2014	Clarification Call	N/A	Contents of dSER for DCD Sections 3.7 & 3.8

2.3 RAI RESPONSES

Section 2.3 of this report summarizes the overall status of all RAIs issued against DCD Sections 3.7 & 3.8 as well as providing specific discussion of RAI responses that have not been closed during the NRC review of the US-APWR DCD.

2.3.1 OVERALL STATUS

As of March 24, 2014, the NRC staff issued a total of 582 questions in 81 RAIs against DCD Sections 3.7 & 3.8. As shown in Table 2.3.1-1 below, all of the questions except for 78 are considered closed at this time.

Table 2.3.1-1 Overall Sections 3.7 & 3.8 RAI Question Status Summary

Status Description	No. of Questions
Issued/Waiting for Response	54
In Evaluation	0
Confirmatory Action	24
Closed*	504
TOTAL	582

*Includes Resolved – Closed and Unresolved – Closed items in eRAI.

2.3.2 RAI RESPONSE DISCUSSION

Table 2.3.2-1 provides a summary of the 78 questions in DCD Sections 3.7 & 3.8 that are not closed as of March 24, 2014.

Table 2.3.2-1 Status of Section 3.7 & 3.8 Questions Not Closed as of March 24, 2014

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.07.01-44	1047-7217 (ML13226A488)	UAP-HF-13265 (ML13316B649)	Confirmatory Action Response officially submitted 11/8/2013. Commitments to change the DCD have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.07.02-113	852-6003 (ML112991610)	UAP-HF-14005 (ML14024A074)	Issued/Waiting for Response Response officially submitted 1/10/2014. Commitments to change MUAP-10006, Rev. 3, "Soil Structure Interaction Analyses and Results for the US-APWR Standard Plant" are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined.
03.07.02-212	960-6709 (ML12268A283)	N/A	Issued/Waiting for response MHI committed to revise this response during the 3.7 audit (ML13322B231). MHI is to respond.
03.07.02-216	960-6709 (ML12268A283)	UAP-HF-13307 (ML13351A048)	Issued/Waiting for Response Response officially submitted 12/13/2013. Response makes no commitments to revise documentation.
03.07.02-217	960-6709 (ML12268A283)	N/A	Issued/Waiting for response MHI committed to revise this response during the 3.7 audit (ML13322B231). To date, no response has been produced.
03.07.02-224	1018-7083 (ML13106A111)	UAP-HF-13289 (ML13350A466)	Issued/Waiting for Response Response officially submitted 12/9/2013. The NRC review of MHI's response is on hold due to the slowdown.
03.07.02-225	1025-7092 (ML13119A212)	UAP-HF-13193 (ML13228A271)	Issued/Waiting for Response Response officially submitted 8/2/2013. Response makes no commitments to revise documentation. The NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.07.02-226	1025-7092 (ML13119A212)	N/A	Issued/Waiting for response MHI committed to revise this response during the 3.7 audit (ML13322B231). MHI is to respond.
03.07.02-227	1050-7218 (ML13242A302)	UAP-HF-14005 (ML14024A120)	Issued/Waiting for Response Response officially submitted 1/10/2014. Response makes no commitments to revise documentation. The NRC review of MHI's response is on hold due to the slowdown.
03.07.02-228	1050-7218 (ML13242A302)	N/A	Issued/Waiting for Response MHI to respond.
03.07.02-229	1050-7218 (ML13242A302)	N/A	Issued/Waiting for Response MHI to respond.
03.07.02-230	1050-7218 (ML13242A302)	UAP-HF-14005 (ML14024A122)	Issued/Waiting for Response Response officially submitted 1/10/2014. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-10006, Rev. 3, are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined. The NRC review of MHI's response is on hold due to the slowdown.
03.07.02-231	1060-7285 (ML13319B188)	UAP-HF-14009	Issued/Waiting for Response Response officially submitted 3/27/2014. Response makes no commitments to revise documentation.
03.07.02-234			
03.07.02-235			
03.07.02-237			
03.07.02-241			
03.07.02-232	1060-7285 (ML13319B188)	UAP-HF-14009	Issued/Waiting for Response Response officially submitted 3/27/2014. Response commits to revise DCD Rev. 4; however, no Living DCD markup has been created. Commitments to change MUAP-10006, Rev. 3, are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined.
03.07.02-233			

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.07.02-236	1060-7285 (ML13319B188)	UAP-HF-14009	Issued/Waiting for Response Response officially submitted 3/27/2014. Commitments to change MUAP-10006, Rev. 3, are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined.
03.07.02-238			
03.07.02-239			
03.07.02-240			
03.08.01-15	1040-7139 (ML13182A151)	UAP-HF-13193 (ML13228A271)	Confirmatory Action Response officially submitted 8/2/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.01-18			
03.08.01-19			
03.08.01-20			
03.08.01-17	1040-7139 (ML13182A151)	UAP-HF-14005 (ML14024A078)	Confirmatory Action Response officially submitted 1/10/2014. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.01-21	1040-7139 (ML13182A151)	UAP-HF-14005 (ML14024A078)	Confirmatory Action Response officially submitted 1/10/2014. Response makes no commitments to revise documentation.
03.08.01-22	1040-7139 (ML13182A151)	UAP-HF-13217 (ML13260A414)	Confirmatory Action Response officially submitted 9/3/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.01-23	1066-7306 (ML13346A548)	N/A	Issued/Waiting for Response MHI to respond.
03.08.01-24	1066-7306 (ML13346A548)	N/A	Issued/Waiting for Response MHI to respond.
03.08.01-25	1085-7421 (ML14063A488)	N/A	Issued/Waiting for Response MHI is to responded.
03.08.03-74	905-6311 (ML120600468)	UAP-HF-13064 (ML13109A206)	Issued/Waiting for Response MHI committed to revise this response during the 3.8 audit (ML13357A173). To date, no response has been produced.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.08.03-77	905-6311 (ML120600468)	UAP-HF-14005 (ML14024A078)	Confirmatory Action Response officially submitted 1/10/2014. Commitments to change MUAP-11019, Rev. 1, "Containment Internal Structure: Design Criteria for SC Walls" are to be included in MUAP-11019, Rev. 2, to be submitted on a date to be determined.
03.08.03-94	958-6608 (ML12249A288)	UAP-HF-13249 (ML13301A446)	Issued/Waiting for Response Response officially submitted 10/11/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-10006, Rev. 3, are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined. Commitments to change MUAP-11018, Rev. 1, "Containment Internal Structure: Stiffness and Damping for Analysis" are to be included in MUAP-11018, Rev. 2, to be submitted on a date to be determined. The NRC review of MHI's response is on hold due to the slowdown.
03.08.03-97	977-6899 (ML12325A925)	UAP-HF-13249 (ML13301A287)	Issued/Waiting for Response Response officially submitted 10/11/2013. Response makes no commitments to revise documentation. The NRC review of MHI's response is on hold due to the slowdown.
03.08.03-98			
03.08.03-99			
03.08.03-100	977-6899 (ML12325A925)	UAP-HF-13064 (ML13107B428)	Issued/Waiting for Response Response officially submitted 3/29/2013. Response makes no commitments to revise documentation. The NRC review of MHI's response is on hold due to the slowdown.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.08.03-104	985-6948 (ML13008A475)	UAP-HF-14005 (ML14024A076)	Confirmatory Action Response officially submitted 1/10/2014. Commitments to change MUAP-11019, Rev. 1, are to be included in MUAP-11019, Rev. 2, to be submitted on a date to be determined.
03.08.03-111	1024-7053 (ML13116A190)	UAP-HF-14005 (ML14024A067)	Confirmatory Action Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-11020, Rev. 1, "Containment Internal Structure: Anchorage and Connection Design and Detailing" are to be included in MUAP-11020, Rev. 2, to be submitted on a date to be determined.
03.08.03-112	1024-7053 (ML13116A190)	UAP-HF-13249 (ML13301A460)	Confirmatory Action Response officially submitted 10/16/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.03-113	1024-7053 (ML13116A190)	UAP-HF-13154 (ML13199A066)	Confirmatory Action Response officially submitted 7/8/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-11019, Rev. 1, are to be included in MUAP-11019, Rev. 2, to be submitted on a date to be determined.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.08.03-115	1051-7176 (ML13242A303)	UAP-HF-14005 (ML14024A123)	Issued/Waiting for Response Response officially submitted 1/10/2014. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-11013, Rev. 2, "Containment Internal Structure Design and Validation Methodology" are to be included in MUAP-11013, Rev.3, to be submitted on a date to be determined. The NRC review of MHI's response is on hold due to the slowdown.
03.08.03-116	1062-7296 (ML13329A537)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-43	497-3734 (ML093430029)	UAP-HF-10047 (ML100550204)	Confirmatory Action Response officially submitted 2/19/2010. Complete listing of anchorage systems is to be included in the DCD, as committed to in MHI's response to RAI 498-3782, Question 03.09.02-59 and confirmed by the staff.
03.08.04-53	1044-7140 (ML13189A012)	UAP-HF-13193 (ML13228A271)	Confirmatory Action Response officially submitted 8/2/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.04-54			
03.08.04-57			
03.08.04-59	1067-7307 (ML13346A560)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-60	1067-7307 (ML13346A560)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-61	1079-7361 (ML14038A362)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-62	1079-7361 (ML14038A362)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-63	1084-7422 (ML14063A493)	N/A	Issued/Waiting for Response MHI to respond.
03.08.04-64	1084-7422 (ML14063A493)	N/A	Issued/Waiting for Response MHI to respond.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.08.05-12	340-2004 (ML091130096	UAP-HF-13064 (ML13107A664)	Issued/Waiting for Response Response officially submitted 3/29/2013. Response commits to produce shear forces and bending moments in the basemat due to construction settlements in a future basemat design calculation.
03.08.05-13	340-2004 (ML091130096)	UAP-HF-14005 (ML14024A070)	Issued/Waiting for Response Response officially submitted 12/27/2013. . Response makes no commitments to revise documentation.
03.08.05-14	340-2004 (ML091130096)	UAP-HF-14005 (ML14024A071)	Issued/Waiting for Response Response officially submitted 3/29/2013. Response commits to revise DCD to reflect contents of construction settlements in a future basemat design calculation.
03.08.05-47	1045-7141 (ML13189A011)	UAP-HF-13193 (ML13228A271)	Confirmatory Action Response officially submitted 8/2/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.05-49			
03.08.05-52			
03.08.05-58			
03.08.05-63			
03.08.05-67			
03.08.05-46	1045-7141 (ML13189A011)	UAP-HF-13207 (ML13252A197)	Confirmatory Action Response officially submitted 8/26/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5. Commitments to change MUAP-10006, Rev. 3, are to be included in MUAP-10006, Rev. 4, to be submitted on a date to be determined.
03.08.05-48	1045-7141 (ML13189A011)	UAP-HF-13207 (ML13252A198)	Confirmatory Action Response officially submitted 8/26/2013. Commitments to change DCD Rev. 4 have been included in the Living DCD and are to be officially submitted in DCD Rev. 5.
03.08.05-59	1045-7141 (ML13189A011)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-60	1045-7141 (ML13189A011)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-68	1078-7242 (ML14038A360)	N/A	Issued/Waiting for Response MHI to respond.

Question No.	NRC RAI No. (Accession)	MHI Letter No. (Accession)	Status
03.08.05-69	1078-7242 (ML14038A360)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-70	1078-7242 (ML14038A360)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-71	1078-7242 (ML14038A360)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-72	1080-7362 (ML14038A365)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-73	1080-7362 (ML14038A365)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-74	1080-7362 (ML14038A365)	N/A	Issued/Waiting for Response MHI to respond.
03.08.05-75	1080-7362 (ML14038A365)	N/A	Issued/Waiting for Response MHI to respond.

3.0 CHAPTER REVIEW

Section 3 of this report discusses the near-future activities planned by MHI, commitments made by MHI, identified needs for future NRC interfaces, and remaining key review topics.

3.1 SLOWDOWN PLAN

As described in MHI's November 14, 2013 DC Slowdown Plan presentation (ML13322A728) and also in MHI's March 20, 2014 US-APWR DCD Chapter Status Reports presentation (ML14079A396), DCD Sections 3.7 & 3.8 are not review areas that will be pursued during the slowdown period. Review of DCD Sections 3.7 & 3.8 will resume in Phase 2 following the temporary slowdown.

3.2 COMMITMENTS

In various RAIs submitted to date, MHI has committed to revise technical reports regarding the seismic design of the US-APWR and portions of Sections 3.7 & 3.8 of DCD Rev. 4. RAIs which commit to such changes are presented in Section 2.3.2 of this report. Documents which MHI committed to make changes to during the DCD Section 3.7 & 3.8 audits are to be revised to accommodate discussions held with the NRC staff. Work to incorporate the committed changes into official documentation will resume after the project slowdown.

The US-APWR DCD Revision 4 Tracking Report Revision 0 (ML14080A147) was submitted on March 14, 2014. The report contains numerous changes to DCD Section 3.8 and Appendix 3L. Changes contained in the report are to be included in DCD Revision 5.

3.3 NRC INTERFACES

There are no additional interfaces planned for DCD Sections 3.7 & 3.8.

3.4 KEY REVIEW TOPICS

After the project slowdown, MHI anticipates the NRC will review RAIs with statuses of "Issued/Waiting for Response" and "In Evaluation" resulting in the need for the NRC to adjust

the draft SER to indicate the changed status of various RAIs which will be reviewed. Remaining issues within DCD Sections 3.7 & 3.8 for which MHI believes further interaction with the NRC will be required are:

- treatment of walls shared by Seismic Category I and Seismic Category II structures
- collapse of the Auxiliary Building and Access Building affecting Seismic Category I structures
- COL Item consistency and redundancy
- identification of Tier 2* information in the DCD
- augmentation of the DCD with TeR contents in order to avoid unnecessary incorporation of TeRs by reference
- gap between the PCCV and the Reactor Building
- PCCV ultimate pressure capacity
- use of linear and non-linear analyses
- settlement analysis which account for construction sequencing
- use of ASME code
- SC mockup program
- rain accumulation in the gap between the Reactor Building and the PCCV
- CIS stiffness values
- CIS wall category 6
- effects of RCS thermal loads on SC walls

MHI will work with the NRC staff to resolve these issues through use of the RAI process, revisions of applicable US-APWR documentation, and interactions with the NRC staff. It is expected that several months of review will be required before the NRC is capable of producing a Phase 2 SER with OIs which can be communicated with MHI and the ACRS.