


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

December 13, 2011

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

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11431

Subject: Amended MHI's Responses to US-APWR DCD RAI No. 296-2254 Revision 0 (SRP 03.09.01)

- Reference:** 1) "Request for Additional Information No.296-2254 Revision 0, SRP Section: 03.09.01 – Special Topics for Mechanical Components, Application Section: 03.09.01", dated April 1, 2009.
2) "MHI's Response to US-APWR DCD RAI No.296-2254 Revision 0", UAP-HF-09237, dated May 14, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Amended Responses to Request for Additional Information No. 296-2254 Revision 0".

Enclosed is the response to two (2) RAIs, Question 03.09.01-4 and 03.09.01-5, contained within Reference 1. These responses amend the previously transmitted responses submitted under Letter UAP-HF-09237 on May 14, 2009 (Reference 2) in order to correct description of responses to US-APWR DCD RAI No. 296-2254 Revision 0 (Reference 1). And these responses include the contents of confirmation that MHI was audited by NRC in August 2011.

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

Sincerely,

Y. Ogata

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

DOB1
NRO

Enclosures:

1. Amended Responses to Request for Additional Information No.296-2254 Revision 0

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

Contact Information

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

Docket No. 52-021
MHI Ref: UAP-HF-11431

Enclosure 1

UAP-HF-11431
Docket Number 52-021

Amended Responses to Request for Additional Information
No. 296-2254 Revision 0

December, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/13/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 296-2254 REVISION 0
SRP SECTION: 03.09.01 – Special Topics for Mechanical Components
APPLICATION SECTION: 03.09.01
DATE OF RAI ISSUE: 4/1/2009

QUESTION NO.: 03.09.01-4

1. DCD section 3.9.3.4.5, "Special Engineered Pipe Supports" addresses the application of Appendix F of ASME Code, Section III, Division 1 to ASME Code, Section III piping supports and those supports or components not built to ASME Code Section III. To meet the requirements of GDC 1, 14 and 15 when Service Level D limits are specified the methods of analysis should conform to the methods outlined in Appendix F to ASME Code Section III, Division I. The second bullet of DCD section 3.9.3.4.5 indicates that when the effects of Level D service conditions are evaluated for supports or components not built to ASME Code Section III that the allowable stress levels are based on tests or accepted industry standards "comparable" to those in Appendix F of ASME Code Section III. Provide additional information and details on the methods and allowable stress levels that will be applied for these Level D analyses to allow the staff to confirm that the methods satisfy Appendix F requirements.

2. In DCD Tier 2, Section 3.9.3, the applicant stated that all Seismic Category I equipment are evaluated for the faulted (ASME Section III Service Level D) loading conditions identified in Tables 3.9-3 and 3.9.4. The staff requested that for each of the components, supports, core support structures and RPV vessel listed in Section 3.9.3, MHI identify the computer programs that were used to evaluate the stresses for determining that the ASME Section III, Appendix F, limits were met.

3. In Section 3.9.3, the applicant indicated that calculation methods were used to evaluate RCS components and their supports for faulted loading as detailed in Table 3.9-6 and Section 3.12. The applicant is requested to identify the components evaluated in Section 3.9.3 where the inelastic Service Level D limits were met under the faulted condition loads and load combinations in Tables 3.9-3 and 3.9-4.

ANSWER:

1. MHI has determined that special engineered pipe supports will not be used in the US-APWR design and DCD Subsection 3.9.3.4.5 has been revised to delete the related information. See the response to RAI 209-1803, question 18 (a)-(d).

2. Seismic category I equipment are identified as such in US-APWR DCD Section 3.2, Table 3.2-2. Computer programs are used for “elastic” analysis for stress evaluation of the components, supports and core support structures, and stress limit applied from ASME Code, Section III, Appendix F requirements on Service Level D. These computer programs were listed in the revised DCD mark-up of the amended RAI response of RAI 3.9.1-6 in UAP-HF-11420, dated on December 2, and these computer programs have already been audited by staff on August, 2011. MHI provided an example of the application of Appendix F of ASME Code, Section III and this example shows the hand-calculation and evaluation for SG columns in UAP-HF-11209, dated on July 5, 2011 (ML11188A199).
3. MHI will not perform plastic (inelastic) analysis in accordance with the requirements of Appendix F of ASME Code, Section III. Load combinations in DCD Table 3.9-3 and Table 3.9-4 do not have special consideration for Service Level D limits. MHI will perform the evaluation for the set of design load combinations shown in DCD Table 3.9-3 and 3.9-4.

Impact on DCD

There is no impact on the DCD

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Topical/Technical Report

There is no impact on a Topical/Technical Report.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

12/13/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 296-2254 REVISION 0
SRP SECTION: 03.09.01 – Special Topics for Mechanical Components
APPLICATION SECTION: 03.09.01
DATE OF RAI ISSUE: 4/1/2009

QUESTION NO.: 03.09.01-5

(1) The staff reviewed MHI technical reports MUAP-09001-P (R0) "Summary of Design Transient" and MUAP-09002-P (R0) "Summary of Seismic and Accident Load Conditions for Primary Components and Piping," that provide a list of new computer codes (MARVEL-M, M-RELAP-5, WCOBRA/RTRAC, TWINKLE-M, VIPRE-01M and GOTHIC) that are not included in DCD section 3.9.1.2.1 OR 3.12.4.1.1. Mitsubishi is requested to provide additional information regarding how the computer codes were used, and discuss computer test problem methods, solution sets, and summary of the results in compliance with requirements of Appendix B to 10CFR50 and ASME NQA-1. Confirm that the documentation of these computer programs is available for staff review. The information should include the author, source code, dated version, and facility; the program users manual and theoretical description, the extent and limitation of the program application; and the benchmarking problems, the QA control and maintenance of the program.

(2) In Table 3.9-1 of DCD revision 1, the number of design cycles for refueling is listed at 120 cycles. Document MUAP-09001-P (R0) "Summary of Design Transient" in Table 2.2-1 lists the number of design cycles for refueling at 60 cycles. The staff request that the applicant clarify which table has the correct number of design cycles for refueling and correct the inconsistency between the two documents.

ANSWER:

- (1) MHI uses several computer programs for both design transients for primary components and safety analyses. The specific computer codes mentioned in this RAI (MARVEL-M, M-RELAP-5, WCOBRA/TRAC, TWINKLE-M, VIPRE-01M) are all examples of safety analysis codes that are also used for design transients. A significant amount of information regarding these codes has already been submitted to the NRC in support of the Chapter 15 (accident analysis) review. This information is presented in Table 03.09.01-5.1 below.

The asymmetric pressurization analysis for the accident load evaluation is performed by the GOTHIC code that is also used for containment pressure and temperature analysis in Chapter 6 (Containment Functional Design).

The NRC review guidance for accident analysis codes (SRP 15.0.2) is very similar to the documentation requested in this RAI for codes used to support Chapter 3. This review guidance includes acceptance criteria for documentation and quality assurance. The MHI Quality Assurance Manual, Quality Assurance Program Description (QAPD, PQD-HD-19005 Revision 3), includes requirements for the development, QA control and maintenance of these computer codes.

It should be noted that the Technical Report, MUAP-09001-P (R0), "Summary of Design Transient," in Section 2.4 provides a cross reference to DCD Section 15.0.2.2 for additional details concerning all of these codes except for GOTHIC. It should also be noted, in certain cases, that MHI has provided the executable file and input data as requested by the NRC.

The input deck for the GOTHIC code, used for containment integrity analysis, was also submitted to the NRC in support of Topical Report, MUAP-07012-P (R2), "LOCA Mass and Energy Release Analysis Code Applicability Report for US-APWR," review.

Table 03.09.01-5.1 Summary of Chapter 15 Code Documentation Submittals

Accident Analysis	Computer Code	MHI Response		
		Input Manual	Executable	Input Deck
Transient and Non-LOCA Non-LOCA Topical Report (MUAP-07010, July 2007)	MARVEL-M	UAP-HF-09099, March 2009	UAP-HF-09099, March 2009	UAP-HF-09099, March 2009
	VIPRE-01M	UAP-HF-08092, May 2008	UAP-HF-08092, May 2008	UAP-HF-08092, May 2008
	TWINKLE-M	UAP-HF-08138, August 2008	UAP-HF-08138, August 2008 (same as the UAP-HF-07189, December 2007)	UAP-HF-08138, August 2008
LBLOCA LBLOCA Topical Report (MUAP-07011, July 2007)	WCOBRA/TRAC	UAP-HF-08140, August 2008	UAP-HF-07189, December 2007	-
SBLOCA SBLOCA Topical Report (MUAP-07013, July 2007)	M-RELAP5	UAP-HF-08162, August 2008	UAP-HF-09100, March 2009	UAP-HF-08081, April 2008
CV Integrity (DCD 6.2.1)	GOTHIC	-	-	UAP-HF-08048, February 2008

(2) The number of design cycles for US-APWR refueling is 60 times. MHI will change the DCD as noted below.

Impact on DCD

There is no impact on the DCD.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on the PRA.

Impact on Technical / Topical Report

There is no impact on a Technical / Topical Report.

This completes MHI's responses to the NRC's questions.