

  
**MITSUBISHI HEAVY INDUSTRIES, LTD.**  
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TOKYO, JAPAN

October 7, 2009

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

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021  
MHI Ref: UAP-HF-09483

**Subject: Amended MHI's Response to US-APWR DCD RAI No. 354-2585  
Revision 0**

**Reference:** [1] "Request for Additional Information No. 354-2585 Revision 0, SRP  
Section: 06.02.02 – Containment Heat Removal System – Design  
Certification and New License Applicants, Application Section: 6.2.2 and  
6.3," dated May 7, 2009.  
[2] "MHI's Responses to US-APWR DCD RAI No. 354-2585 Revision 0"  
dated July 7, 2009

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "MHI's Responses to US-APWR DCD RAI No. 354-2585 Revision 0". This amended response is submitted to address the programmatic control inside the containment in DCD.

Enclosure 1 is the amended responses to Question No. 06.02.02-31 through 06.02.02-36 of the RAI contained within Reference 1. The initial responses were provided in Reference 2. MHI replaces the previous letters (Reference 2) with this amended response letter.

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,



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

DO81  
NRC

**Enclosure:**

1. Amended Response to Request for Additional Information No. 354-2858 Revision 0

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

Contact Information

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Docket No. 52-021  
MHI Ref: UAP-HF-09483

Enclosure 1

UAP-HF-09483  
Docket No. 52-021

Amended Response to Request for Additional Information  
No. 354-2858 Revision 0

October 2009

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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10/06/2009

**US-APWR Design Certification  
Mitsubishi Heavy Industries, Ltd.  
Docket No. 52-021**

**RAI NO.: NO. 354-2585 REVISION 0**  
**SRP SECTION: 06.02.02 – Containment Heat Removal System**  
**APPLICATION SECTION: 6.2.2 & 6.3**  
**DATE OF RAI ISSUE: 05/07/2009**

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**QUESTION NO.: 06.02.02-31**

Consistent with guidance listed in RG 1.82 and GL 2004-02, provide a description of how permanent and temporary modifications to structures, systems, and components inside containment are programmatically controlled so changes to the analytical inputs and assumptions of the licensee analyses ensures ECCS remains in compliance with 10 CFR 50.46 and related regulatory requirements.

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**ANSWER:**

Design change control procedures, procedures for conduct of maintenance activities, and administrative procedures for implementation of a cleanliness, housekeeping and foreign materials exclusion program will be established consistent with guidance provided in Regulatory Guide (RG) 1.82, Revision 3 and Generic Letter (GL) 2004-02 to ensure that potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support Emergency Core Cooling (ECC) and Containment Spray (CS) recirculation functions and ensure the long term core cooling requirements of 10 CFR 50.46 will be accomplished.

Procedures will be implemented to ensure administrative controls and regulatory/quality requirements for plant modifications and temporary changes that include consideration of materials introduced into the containment that could contribute to sump strainer blockage. Included will be requirements for controlling temporary modifications to systems, structures and components (SSCs) in a manner which ensures compliance with 10 CFR 50.46. Future plant modifications will be evaluated in accordance with the requirements of 10 CFR 50.59 and 10 CFR 52.63.

The administrative controls will consider as a minimum, the introduction of additional sources of debris or modifications that could impact sump strainer performance including insulation, coatings, inactive volumes and structural changes (i.e., choke points).

The conduct of maintenance activities including associated temporary alterations is addressed in response to Question No. 06.02.02-32.

The cleanliness, housekeeping and foreign materials exclusion program for inside containment is addressed in response to Question No. 06.02.02-33.

In addition, ITAAC have been provided in DCD Tier 1 Table 2.4.4-5, *Emergency Core Cooling System Inspections, Tests, Analyses, and Acceptance Criteria*, to address the debris source term associated with insulation and coatings in containment. These ITAAC will verify consistency between the as-built insulation and coatings, and the evaluations described in MUAP-08001, US-APWR Sump Strainer Performance. (Refer to RAI 348-2587, Question No. 14.03.11-39).

DCD Subsections 6.2.2.3 will be revised to include administrative controls of potential sources of post-accident debris inside containment. The DCD Subsection 6.2.2.3 has been expanded to include the following:

- Control of permanent plant modifications to structures, systems, and components inside containment to include consideration of materials introduced inside containment.
- Conduct of maintenance activities, including associated temporary changes, subject to the provisions of 10 CFR 50.65(a)(4) that could contribute to sump strainer blockage (Refer to Question No. 06.02.02-32).
- Control on the amount of latent and miscellaneous debris introduced into containment as part of the cleanliness, housekeeping and foreign materials exclusion program (Refer to Question Nos. 06.02.02-35 and 06.02.02-36).
- Implementation of a containment coating monitoring program in accordance with the requirements of Regulatory Guide 1.54, Revision 1 (Refer to Question No. 06.02.02-34).

These additional programmatic controls will ensure that quantities of debris inside containment are maintained within the bounds of the analyses and design bases that support Emergency Core Cooling (ECC) and Containment Spray (CS) recirculation functions

#### Impact on DCD

DCD Tier 2 subsections 6.2.2.3 and Table 1.9.1-1 (Sheet 4 of 15) will be revised as follows:

Revise the 10<sup>th</sup> paragraph in DCD Subsection 6.2.2.3 to state:

~~Preparation of a cleanliness, housekeeping and foreign materials exclusion program is the responsibility of the COL Applicant. This program addresses other debris sources such as latent debris inside containment. This program minimizes foreign materials in the containment.~~  
**“Programmatic controls will be established to ensure potential sources of debris introduced into containment (e.g., insulation, coatings, foreign material), and plant modifications will not adversely impact the ECC/CS recirculation function. Programmatic control will be established consistent with guidance provided in RG 1.82, Rev. 3 to ensure that potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support Emergency Core Cooling (ECC) and Containment Spray (CS) recirculation functions and ensure the long term core cooling requirements of 10 CFR 50.46 are met. The following is a summary of the programmatic controls that will be implemented to ensure that activities are conducted in a manner that ensures ECC/CS strainer operation, and limits the quantity of latent (unintended dirt, dust, paint chips, and fibers) and miscellaneous (tape, tags, stickers) debris inside containment:**

- **Preparation of a cleanliness, housekeeping and foreign materials exclusion program. This program addresses latent and miscellaneous debris inside containment. An acceptance criterion below the conservative assumption**

of 200 lb for latent debris inside containment will be established consistent with MUAP-08001-P, Sump Strainer Performance Evaluation (Ref. 6.2-34). The program will also ensure that the quantity of miscellaneous debris will be limited such that the 200 ft<sup>2</sup> strainer surface area per sump uncertainty per MUAP-08001-P will be met to ensure ECC/CS strainer operation. A cleanliness, housekeeping and foreign materials exclusion program will be established by the COL Applicant.

- Procedures will be implemented to ensure administrative controls and regulatory/quality requirements for plant modifications and temporary changes that include consideration of materials introduced into the containment that could contribute to sump strainer blockage. Included will be requirements for controlling temporary modifications to systems, structures and components (SSCs) in a manner which ensures compliance with 10 CFR 50.46. Future plant modifications will be evaluated in accordance with the requirements of 10 CFR 50.59 and 10 CFR 52.63.
- Maintenance activities, including associated temporary changes, will be subject to the provisions of 10 CFR 50.65(a)(4), which requires a licensee to assess and manage the increase in risk that may result from the proposed maintenance activities, prior to performing the activities. These activities may be shown to be acceptable with respect to the ECC/CS strainers by any of the following means:
  1. performing the activities when the ECC/CS strainers are not required to be operable and restoring conditions consistent with the design bases prior to re-establishing operability;
  2. deterministic evaluation that concludes the specific activities do not create a condition that adversely affects strainer performance;
  3. control of maintenance activities within the bounds established by approved programs that assure no adverse impact (e.g., activities do not result in exceeding limits established for temporary use of material inside containment);
  4. risk assessment for a specific activity.

Combined License Applicant Item COL 17.6(1) addresses development and implementation of the maintenance rule program in accordance with 10 CFR 50.65.

- Containment coating monitoring program will be implemented in accordance with the requirements of Regulatory Guide 1.54, Revision 1. Coatings program is described in Subsection 6.1.2.”

Revise Table 1.9.1-1 (Sheet 4 of 15) to add corresponding subsection 6.2.2.3 as a reference for RG 1.54.

#### **Impact on COLA**

The COLA shall be updated to address changes to the DCD for COL item 6.2(5).

#### **Impact on PRA**

There is no impact on the PRA.

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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10/06/2009

**US-APWR Design Certification  
Mitsubishi Heavy Industries, Ltd.  
Docket No. 52-021**

**RAI NO.:** NO. 354-2585 REVISION 0  
**SRP SECTION:** 06.02.02 – Containment Heat Removal System  
**APPLICATION SECTION:** 6.2.2 & 6.3  
**DATE OF RAI ISSUE:** 05/07/2009

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**QUESTION NO.:** 06.02.02-32

Regarding programmatic controls taken to limit debris sources in containment, provide a description of how maintenance activities including associated temporary changes are assessed and managed in accordance with the Maintenance Rule, 10 CFR 50.65.

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**ANSWER:**

Combined License Applicant Item COL 17.6(1) addresses development and implementation of the maintenance rule program in accordance with 10 CFR 50.65. Maintenance activities, including associated temporary changes, will be subject to the provisions of 10 CFR 50.65(a)(4), which requires a licensee to assess and manage the increase in risk that may result from the proposed maintenance activities, prior to performing the activities. These activities may be shown to be acceptable with respect to the ECC/CS strainers by any of the following means:

1. performing the activities when the ECC/CS strainers are not required to be operable and restoring conditions consistent with the design bases prior to re-establishing operability;
2. deterministic evaluation that concludes the specific activities do not create a condition that adversely affects strainer performance;
3. control of maintenance activities within the bounds established by approved programs that assure no adverse impact (e.g., activities do not result in exceeding limits established for temporary use of material inside containment);
4. risk assessment for a specific activity.

As discussed in response to RAI 06.02.02-31, design change control procedures, procedures for conduct of maintenance activities, and administrative procedures for implementation of a cleanliness, housekeeping and foreign materials exclusion program for inside containment will be established consistent with guidance provided in RG 1.82 and GL 2004-02. These processes will ensure that potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support Emergency Core Cooling (ECC) and Containment Spray (CS) recirculation functions and ensure the long term core cooling requirements of 10 CFR 50.46 will be accomplished.

**Impact on DCD**

DCD Tier 2 subsections 6.2.2.3 will be revised to add a description for the conduct of maintenance activities including temporary changes to limit debris sources inside containment. Refer to the response to Question 06.02.02-31.

**Impact on COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**DATE OF RAI ISSUE: 05/07/2009**

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**QUESTION NO.: 06.02.02-33**

Regarding programmatic controls taken to limit debris sources in containment provide a summary of the foreign material exclusion programmatic controls in place to control the introduction of foreign material into the containment.

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**ANSWER:**

As discussed in DCD Subsections 6.2.2.3 and 6.2.8, COL Item 6.2(5), the COL applicant is responsible for implementation of a cleanliness, housekeeping and foreign materials exclusion program for inside containment. Procedures to remove foreign materials and minimize the amount of debris that might be left in containment following refueling and maintenance outages will address the following:

- Frequency of cleanliness control and inspection activities for operation and maintenance
- Restriction of materials introduced into the containment
- Accounting for materials introduced into and out of the containment (e.g., scaffold, tape, labels, plastic film, paper, cloth, keys, and pens)
- Cleaning of maintenance outage areas, including areas associated with removal or replacement of insulation
- Cleanliness inspections and removal of debris/foreign material, including operation and maintenance areas, RWSP, debris interceptors, RWSP vent and drain lines, and strainer debris
- Preparation and review of entry/exit logs and inspection records

The cleanliness, housekeeping and foreign materials exclusion program will be established consistent with guidance provided in RG 1.82 and GL 2004-02 to ensure that potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support Emergency Core Cooling (ECC) and Containment Spray (CS) recirculation functions and ensure the long term core cooling requirements of 10 CFR 50.46 will be accomplished.

The cleanliness, housekeeping and foreign materials exclusion program also addresses other debris sources such as latent and miscellaneous debris inside containment. Consistent with MUAP-08001(R2), Sump Strainer Performance Evaluation (Ref. 6.2-34), the program will ensure that the quantity of miscellaneous debris inside containment will be limited such that the 200 ft<sup>2</sup>

strainer surface area per sump uncertainty per MUAP-08001(R2) will be met. The cleanliness, housekeeping and foreign materials exclusion program to be implemented by the COL Applicant will also ensure that the quantity of latent debris will be limited to less than 200 lbm per MUAP-08001(R2). Refer to the responses to Question Nos. 06.02.02-35 and 06.02.02-36.

**Impact on DCD**

DCD Tier 2 subsections 6.2.2.3 will be revised to require the COL Applicant to establish programmatic controls as part of the cleanliness, housekeeping and foreign materials exclusion program to limit the quantity of miscellaneous and latent debris inside containment per MUAP-08001(R2). These subsections will be revised as shown in response to Question 06.02.02-31.

**Impact on COLA**

See the response to Question RAI 06.02.02-31 for the impact on COLA.

**Impact on PRA**

There is no impact on the PRA.

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**APPLICATION SECTION:** 6.2.2 & 6.3  
**DATE OF RAI ISSUE:** 05/07/2009

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**QUESTION NO.: 06.02.02-34**

Regarding programmatic controls taken to limit debris sources in containment provide a summary of the protective coating programmatic controls in place to control the introduction and use of coating material in containment and address coating deficiencies.

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**ANSWER:**

Protective coatings to be utilized inside containment will be DBA qualified. In accordance with the requirements of Regulatory Guide 1.54, Revision 1 (July, 2000), a coating condition monitoring program that incorporates the guidance of ASTM D5163 will be established to conduct assessments of the conditions of the containment coatings during refueling outages. Coating monitoring program is included in coatings program described in DCD Subsection 6.1.2.

**Impact on DCD**

DCD Tier 2 subsections 6.2.2.3 will be revised to add a description of coating monitoring program. This subsection will be revised as shown in response to Question 06.02.02-31.

**Impact on COLA**

There is no impact on the COLA.

**Impact on PRA**

There is no impact on the PRA.

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**QUESTION NO.: 06.02.02-35**

On page 6.2-49 of the DCD (Revision 1), the applicant discusses how preparation of a cleanliness program is the responsibility of the COL applicant and that this program addresses debris sources such as latent debris inside containment. What specific latent debris limits or controls does the DCD establish to enable the COL applicant to remain within the containment cleanliness design basis limit? Explain why this design basis limit is not contained within the COL item?

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**ANSWER:**

MUAP-08001-P, Sump Strainer Performance Evaluation, Section 3.2 (Ref. 6.2-34) conservatively established an upper bound for the quantity of latent debris (unintended dirt, dust, paint chips, and fibers) inside containment at 200 lbm. The cleanliness, housekeeping and foreign materials exclusion program will ensure that the quantity of latent debris will be limited to less than 200 lbm to ensure ECC/CS strainer operation. DCD Tier 2 Subsections 6.2.2.3 and 6.2.8, COL Item 6.2(5) will be revised to establish a limit of 200 lbm for latent debris inside containment.

**Impact on DCD**

DCD Tier 2 subsections 6.2.2.3 was revised to indicate that the quantity of latent debris inside containment will be limited to less than 200 lbm to ensure ECC/CS strainer operation. The cleanliness, housekeeping and foreign materials exclusion program to be implemented by the COL Applicant will ensure that the quantity of latent debris will be limited to less than 200 lbm. These subsections will be revised as shown in response to Question 06.02.02-31.

**Impact on COLA**

See the response to Question RAI 06.02.02-31 for the impact on COLA.

**Impact on PRA**

There is no impact on the PRA.

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**QUESTION NO.: 06.02.02-36**

The standard design for US-APWR does not define the specific type of materials for miscellaneous debris, such as tapes, tags or stickers, because these are controlled by the foreign material control program established by the plant owner. To deal with this uncertainty, a 200 ft<sup>2</sup> penalty of sacrificial strainer surface area per sump is applied as a margin for future detail design and installation of the US-APWR (page 10, MUAP 08001). What specific miscellaneous debris limits or controls does the DCD establish to enable the COL applicant to remain within the foreign material 'uncertainty' (200 ft<sup>2</sup>) design basis limit or performance criteria? Explain why this design basis limit is not contained within the COL item?

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**ANSWER:**

DCD Tier 2 Subsections 6.2.2.3 and 6.2.8, COL Item 6.2(5) have been revised to specify the 200 ft<sup>2</sup> penalty for strainer surface area per sump that was applied as uncertainty to account for miscellaneous debris in accordance with MUAP-08001-P, Sump Strainer Performance Evaluation (Ref. 6.2-34). The cleanliness, housekeeping and foreign materials exclusion program will ensure that the quantity of miscellaneous debris will be limited such that the 200 ft<sup>2</sup> strainer surface area per sump uncertainty will be met to ensure ECC/CS strainer operation.

**Impact on DCD**

DCD Tier 2 Subsections 6.2.2.3 will be revised to indicate the cleanliness, housekeeping and foreign materials exclusion program to be implemented by the COL Applicant will ensure that the quantity of miscellaneous debris will be limited such that the 200 ft<sup>2</sup> strainer surface area per sump uncertainty is met. The DCD will be revised as shown in response to Question 06.02.02-31.

**Impact on COLA**

See the response to Question RAI 06.02.02-31 for the impact on COLA.

**Impact on PRA**

There is no impact on the PRA.