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TOKYO, JAPAN

March 14, 2014

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

Attention: Perry Buckberg

Docket No. 52-021
MHI Ref: UAP-HF-14028

Subject: MHI's Response to US-APWR DCD RAI No. 1082-7419 (SRP 19A)

References: 1) "Request for Additional Information No. 1082-7419, SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation Application Section: 19A," dated February 20, 2014.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "MHI's Response to US-APWR DCD RAI No. 1082-7419."

Enclosed is the response to the RAI contained within Reference 1.

Enclosure 1 includes certain information, designated pursuant to the Commission guidance as sensitive unclassified non-safeguards information, referred to as security-related information ("SRI"), that is to be withheld from public disclosure under 10 C.F.R. § 2.390. The information that is SRI is identified by brackets. Enclosure 2 omits the SRI and is suitable for public disclosure. In the public version of the DCD, the SRI is replaced by the designation "[Security-Related Information - Withheld Under 10 CFR 2.390]".

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

Sincerely,

Y. Ogata

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

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NRO

Enclosures:

1. MHI's Response to US-APWR DCD RAI No. 1082-7419 (Security-Related Information Included version)
2. MHI's Response to US-APWR DCD RAI No. 1082-7419 (Security-Related Information Excluded version)

CC: P. Buckberg
J. Tapia

Contact Information

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Enclosure 2

UAP-HF-14028
Docket No. 52-021

MHI's Response to US-APWR DCD RAI No. 1082-7419

March 2014

(Security-Related Information Excluded)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/14/2014

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No.52-021

RAI NO.:	**NO. 1082-7419**
SRP SECTION:	**19 – Probabilistic Risk Assessment and Severe Accident Evaluation**
APPLICATION SECTION:	**19A**
DATE OF RAI ISSUE:	**02/20/2014**

QUESTION NO. : 19-599
In accordance with 10 CFR 50.150, "Aircraft Impact Assessment," each applicant listed in paragraph (a)(3) shall perform a design-specific assessment of the effects on the facility of the impact of a large, commercial aircraft. Using realistic analyses, the applicant shall identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions:

(i) The reactor core remains cooled, or the containment remains intact; and
(ii) Spent fuel cooling or spent fuel pool integrity is maintained.

To ensure compliance with 10 CFR 50.150, the staff requests that the applicant address the following:

1. In US-APWR DCD Section 19A.4.4, "Core Cooling Features," the remote shutdown console (RSC) is discussed but does not include a specific reference the DCD Tier 2, Section 7.4.15 RSC description.

2. The physical separation location for shock was not specifically described in DCD Section 19A.4.4 for the two RSC transfer switch panels.

3. In DCD Section 19A.4.4, the non-essential chilled water system is credited as a key design feature to support the charging pumps. Clarify if the non-essential chilled water system needs to be credited since the fire protection system performs this function.

4. DCD Section 19A.4.4, "Core Cooling Feature," states that administrative controls require that no trains of residual heat removal (RHR) system are out of service when the reactor vessel head is removed and the reactor vessel water level is at or near the reactor vessel head flange. This statement conflicts with DCD Chapter 16, Technical Specifications, Section 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation – Low Water Level," which requires three RHR loops to be operable with two RHR loops in operation. The staff

requests that the applicant provide both a clarification to DCD Section 19A.4.4 and provide a related COL 13.x information item for this administrative control.

ANSWER:

MHI's response to each of the specific items cited in Question 19-599 are as follows:

1. MHI will revise the discussion of the remote shutdown console in DCD Section 19A.4.4 to add a specific reference to DCD Section 7.4.1.5.

2. MHI will revise DCD Section 19A.4.4 to describe the physical separation of the two RSC transfer switch panels.

3. MHI will revise DCD Section 19A.4.4 to delete the discussion of the non-essential chilled water system since the design feature credited to support the charging pumps in the assessment is the fire protection system.

4. DCD Section 19A.4.4 and the heat removal report of the AIA describe administrative controls to maintain all RHR trains operational. This administrative control was added to prevent the loss of the core cooling function during shutdown conditions in the case where one train is out of service and the remaining three trains are disabled by the impact of an aircraft. However, the US-APWR design has the capability to maintain core cooling via evaporative losses by filling the refueling cavity with one charging pump. This design feature is discussed in DCD Section 19A.4.4. Therefore, the administrative control described in DCD Section 19A.4.4 is not required to be credited in the assessment. MHI will revise DCD Section 19A.4.4, and Section 3.7.2 of the AIA heat removal report, to delete the discussion of the administrative control. There is no impact on the existing Technical Specification 3.9.6.

<u>Impact on DCD</u>

DCD Section 19A.4.4 will be revised as indicated in the attached markup.

<u>Impact on R-COLA</u>

There is no impact on R-COLA.

<u>Impact on PRA</u>

There is no impact on PRA.

<u>Impact on Topical/Technical Report</u>

Section 3.7.2 of the AIA report will be revised to be consistent with the change discussed in item 4 of the response above.

cooling following a reactor trip in response to an aircraft impact event. ~~The design and physical separation of the component cooling water system (CCWS) (described in Section 9.2.2), of those portions of the essential service water system located in the R/B and PS/ Bs (described in Section 9.2.1), of the Class 1E electrical power supply and distribution system (described in Section 8.3), and of the safety related instrumentation and control system (described in Chapter 7) including the physical separation between the MCR and the RSC and the ability to power the Class 1E MOV inverters from the AAC GTGs are key supporting system design features for assuring core cooling following a reactor trip in response to an aircraft impact event.~~ The action of tripping or shutting down the reactor ensures that the fuel in the reactor is kept subcritical. DCD_19-599

Replace with:
The key supporting system design features for assuring core cooling following a reactor trip in response to an aircraft impact event include: the design and physical separation of the component cooling water system (CCWS) (described in Section 9.2.2), the portions of the essential service water system located in the R/B and PS/Bs (described in Section 9.2.1), and the Class 1E electrical power supply and distribution system with the ability to power the Class 1E MOV inverters from the AAC GTG (described in Section 8.3). The key supporting system design features also include: the safety-related instrumentation and control system (described in Chapter 7), the physical separation between the MCR and the RSC (described in Section 7.4.1.5), and the physical separation of the two RSC transfer switch panels [
] (SRI) (described in Section 7.4.1.5).

In the event the CCWS is unavailable, the capability of the chemical volume and control system to provide seal-water flow to the reactor coolant pumps described in Section 9.3.4.1.2.4 and the capability of the fire protection water system ~~and the non-essential chilled service water system~~ to provide water to cool the charging pumps, described in Table 19.1-1 (Sheet 2 of 6) and shown on Figures 9.2.2-1 (Sheet 6 of 9) and 19.1-2 (~~Sheets~~ 33 of 42~~ and 34 of 42~~), are key design features. The emergency feedwater system is available to provide decay heat removal. DCD_19-599 DCD_19-599

Replace with:
Sheet

[...]mpact during plant shutdown with the reactor vessel head removed and [...]r near the reactor vessel head flange, the reactor core is cooled by the RHR system as described in Section 5.4.7. [

](SRI) ~~To ensure that one train of the RHR system is available following the impact of a large commercial aircraft on the R/B, administrative controls require that no trains of the RHR system are out of service when the reactor vessel head is removed and the reactor vessel water level is at or near the reactor vessel head flange.~~ DCD_19-599

If the RHR system is unavailable due to the loss of the ultimate heat sink, the capability of the charging pump to take suction from the refueling water storage pit to provide make-up water for the reactor coolant system, described in Sections 9.3.4.2.1 and 9.3.4.2.6.1 and shown on Figure 9.3.4-1 (Sheet 4 of 7), and the capability of the fire protection water system ~~and the non-essential chilled water system~~ to provide water to cool the charging pumps, described in DCD Table 19.1-1 (Sheet 2 of 6) and shown on DCD Figures 9.2.2-1 (Sheet 6 of 9) and 19.1-2 (~~Sheets~~ 33 of 42~~ and 34 of 42~~), and the capability to provide make-up water to the reactor coolant system by direct gravitational feed from the spent DCD_19-599 DCD_19-599 DCD_19-599

Replace with:
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Add:
or the aircraft impact