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April 23, 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-09197

Subject: MHI's Responses to US-APWR DCD RAI No. 200-1983 Revision 1

Reference: [1] "Request for Additional Information No. 200-1983 Revision 1, SRP Section: 09.01.04 - Light Load Handling System (Related to Refueling) Application Section: 9.1.4," dated February 24, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 200-1983 Revision 1".

Enclosure 1 is the responses to the 15 questions contained within Reference [1].

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.

D081
NRO

Enclosures:

1. Responses to Request for Additional Information No. 200-1983 Revision 1

CC: J. A. Ciocco
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Docket No. 52-021
MHI Ref: UAP-HF-09197

Enclosure 1

UAP-HF-09197
Docket No. 52-021

Responses to Request for Additional Information No. 200-1983 Revision 1

April 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-01

DCD Section 9.1.4.1, "Design Basis," states that the light load handling system (LLHS) components involved in grappling, latching, translating, rotating, supporting, or hoisting fuel assemblies are designed to assure no structural failure of any part of the handling equipment would result in dropping or damaging a fuel assembly. These components are designated as seismic category I and designed in accordance with DCD Sections 3.7, "Seismic Design," and 3.9, "Mechanical Systems and Components." However, DCD Tier 1 Table 2.7.6.4-1, "Light Load Handling System Characteristics," lists the spent fuel cask handling crane suspension hoist, which handles new fuel assemblies, as seismic category II. The applicant needs to:

A) Explain the statement in DCD Section 9.1.4.1, which states that all components involved in fuel handling are seismic class I. [When the spent fuel cask handling crane suspension hoist is seismic category II].

B) Verify that the seismic category II components (spent fuel cask handling crane suspension hoist and other non seismic category I components) are designed to hold their maximum load during a safe shutdown earthquake (SSE) without dropping the load.

Revise the DCD to include these explanations as applicable.

ANSWER:

The principal components of the Light Load Handling System (LLHS) are the Refueling Machine, Fuel Handling Machine, Auxiliary Hoist and Suspension Hoist on the Spent Fuel Cask Handling Crane, New Fuel Elevator, Fuel Transfer System, and Fuel Transfer Tube. Tools associated with the utilization of the LLHS are the Spent Fuel Assembly Handling Tool, New Fuel Assembly Handling Tool, Rod Control Cluster (RCC) Handling Tool, Thimble Plug Handling Tool, Burnable Poison Rod Assembly Handling Tool, and Control Rod Drive Shaft Handling Tool. These LLHS components are involved in grappling, latching, translating, rotating, supporting, or hoisting fuel assemblies and are designed to assure no structural failure of any part of the handling equipment could occur, including from the stresses associated with a SSE, that would result in dropping or damaging a fuel assembly*.

All LLHS components and associated tools are designed / classified in accordance with the table below, which also includes interfacing structures. The DCD Tier 2 section 9.1.4.1 on "Design Bases", first bullet will be revised to eliminate discrepancies with other sections.

The seismic category of the components in DCD Tier 1 Table 2.7.6.4.1 on "Light Load Handling System Characteristics" will be updated to be consistent with Item # 28 on Fuel Handling and Refueling System in DCD Tier 2 Table 3.2-2 on "Classification of Mechanical and Fluid Systems, Components, and Equipment" as revised per the responses to NRC Requests for Additional Information numbers 287-2041, question number 03.02.01-06, and 200-1983, question number 09.01.04-02, and the Equipment Classes below.

Facilities	Seismic Category	Equipment Class
Refueling Machine	II	4
Fuel Handling Machine	II	4
Fuel transfer system (except the Fuel transfer tube)	II	4
Fuel transfer tube	I	2
New fuel elevator	II	4
Spent fuel storage rack	I	3
New fuel storage rack	I	3
Spent fuel assembly handling tool	NS	5
Suspension hoist and Auxiliary hoist on the spent fuel cask handling crane	II	4
New fuel pit	I	3
Spent fuel pit	I	3
Fuel transfer canal	I	3
Cask pit	I	3
Cask wash down pit (Decontamination pit)	I	3
Spent fuel pit gates	I	3
Fuel inspection pit	I	3
New fuel assembly handling tool	NS	5
Rod control cluster (RCC) handling tool	NS	5
Thimble plug handling tool	NS	5
Burnable poison rod assembly handling tool	NS	5
Control rod drive shaft handling tool	NS	5
Spent fuel cask handling crane	II	5

* DCD section 3.2.1.1.2 states "Seismic category II SSCs are designed so that the SSE could not cause unacceptable structural interaction or failure with seismic category I SSCs. Fluid systems requires an adequate level of pressure boundary integrity to prevent seismically-induced flooding that may cause adverse effects on safety-related SSCs" and "Seismic category II SSCs are analyzed and designed for the SSE using methods appropriate to demonstrate position retention with no adverse interaction effects as specified for seismic category I SSCs."

Impact on DCD

- The DCD Tier 2 Section 9.1.4.1 on "Design Bases", 1st bullet will be modified as follows:

"The LLHS is designed as seismic category I and meets the equipment class quality requirements of the US-APWR as specified in Section 3.2."

will be replaced with the following:

"The LLHS is designed to meet the seismic category and equipment class quality requirements of the US-APWR as specified in Section 3.2."

- The DCD Tier 2 Section 9.1.4.1 on "Design Bases", 4th bullet, 3rd point 2nd sentence will be modified as follows:

"These components are designated as seismic category I and designed in accordance with Section 3.7 and 3.9."

will be replaced with the following:

"These components are designed in accordance with Sections 3.2, 3.7 and 3.9."

- The DCD Tier 1 Table 2.7.6.4-1 on "Light Load Handling System Characteristics" will be replaced with the following:

Table 2.7.6.4-1 Light Load Handling System Characteristics

Name	Seismic Category
New Fuel Elevator	II
Suspension Hoist and Auxiliary Hoist on the Spent Fuel Cask Handling Crane	II
Refueling Machine	II
Fuel Handling Machine	II
Fuel Transfer Tube	I
Fuel Transfer Tube Blind Flange	I

Impact on COLA
There is no impact on the COLA.

Impact on PRA
There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-02

DCD Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," includes the classification of mechanical and fluid systems, components and equipment for the LLHS. However, the fuel inspection pit, new fuel elevator and various tools, including the new fuel assembly handling tool, rod control cluster handling tool, thimble plug handling tool, burnable poison rod assembly handling tool, and the control rod drive shaft handling tool are not shown in this DCD table, although they are described in DCD Section 9.1.4, "Light Load Handling System (Related to Refueling).

"The applicant needs to identify the classification information for the above listed components or provide justification as to why they are not included in DCD Table 3.2-2.

Revise the DCD to include this information as applicable.

ANSWER:

DCD Tier 2 Table 3.2-2 will be updated by adding the following systems, components, and equipment: the fuel inspection pit, fuel transfer system (excluding fuel transfer tube), and the new fuel elevator. Classification of these fuel handling system, structure and components (SSCs) is as shown below in the section "Impact on DCD".

The spent fuel assembly handling tool (subsection 9.1.4.2.1.7), new fuel assembly handling tool (subsection 9.1.4.2.1.8), rod control cluster handling tool (subsection 9.1.4.2.1.9), thimble plug handling tool (subsection 9.1.4.2.1.10), burnable poison rod assembly handling tool (subsection 9.1.4.2.1.11), and the control rod drive shaft handling tool (subsection 9.1.4.2.1.12) are only tools associated with the fuel handling system and are not considered as systems, components, and equipment. Hence, these tools will not be added in the DCD Table 3.2-2.

DCD section 9.1.4.2.1 title will be revised to "Components and Associated Tools Description"

Impact on DCD

- DCD Table 3.2-2, Item number 28. On "Fuel Handling and Refueling System" will be updated to add the following system, structure and components (SSCs).

System and Components	Equipment Class	Location	Quality Group	10 CFR 50 Appendix B (Reference 3.2-8)	Codes and Standards	Seismic Category	Notes
Fuel inspection pit	3	R/B	C	YES	5	I	
Fuel transfer system	4	R/B	D	YES	5	II	
Suspension hoist and Auxiliary hoist on spent fuel cask handling crane	4	R/B	D	YES	5	II	
New fuel elevator	4	R/B	D	YES	5	II	

- DCD section 9.1.4.2.1 title will be revised from "9.1.4.2.1 Component Description" to "9.1.4.2.1 Component and Associated Tool Description" for clarification.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-03

DCD Tier 1, Section 2.7.6.4.1, "Design Description," states that the light load handling system is non safety related. This classification conflicts with American National Standards Institute/American Nuclear Society (ANSI/ANS) 57.1-1992; R1998; R2005, "Design Requirements for Light Water Reactor Fuel Handling Systems," section 6.2 which states that the portion of the transfer tube that serves as part of the primary reactor containment should be designated Safety Class 2. The applicant needs to explain the apparent discrepancy between the classification of the LLHS in DCD Tier 1, Section 2.7.6.4.1 and ANSI/ANS 57.1.

The applicant has designated the LLHS as non-safety related as indicated in DCD Tier 1 Section 2.7.6.4.1. DCD Tier 2 Section 9.1.4 does not state the safety classification of the LLHS. The guidance provided in SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria," states that Tier 1 information is derived from Tier 2, and that any design information presented in Tier 1 also should be in the appropriate Tier 2 sections. The applicant needs to explain why the application differs from the guidance specified in SRP Section 14.3 in that information provided in Tier 1 is not in Tier 2. Additionally, DCD Tier 2 Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," lists the refueling machine, fuel handling machine and other equipment as safety-related, equipment class 2 or 3. Explain why the classification of the LLHS components in DCD Tier 2 Table 3.2-2 is apparently inconsistent with the classification of the LLHS stated in DCD Tier 1, Section 2.7.6.4.1, which states that the light load handling system is non safety related.

Revise the DCD to include these explanations as applicable.

ANSWER:

DCD Section 3.2.2 identifies ASME Code, Section III Class 1 as safety-related components. These components are designated in RG 1.26 as Quality Group A. In addition, RG 1.26 identifies, on a functional basis, water- and steam containing components of those safety-related systems designated as Quality Groups B and C. Quality Group D applies to non safety-related water- and steam containing components of systems.

Based on DCD Table 3.2-3, RG 1.26 NRC Quality Group A, B, C (safety related) corresponds to equipment class 1, 2, and 3 as Safety related. Quality Group D (non-safety related) corresponds to equipment class 4 and hence non-safety related.

All light load handling system components, except the fuel transfer tube and blind flange (designed as safety class 2), are non-safety related.

DCD Tier 1, section 2.7.6.4.1 will be revised to be consistent with the DCD Tier 2 Table 3.2-2. Also, section 9.1.4 will be revised for consistency.

Impact on DCD

The DCD Tier 1, subsection 2.7.6.4.1 on "Design Description" sub-part on "System Purpose and Function" last sentence will be revised as follows:

"The LLHS is non-safety related."

will be replaced with the following:

"All Light Load Handling System (LLHS), except fuel transfer tube and blind flange, are non-safety related."

Add the following sentence at the end of second paragraph in the DCD Tier 2 Section 9.1.4.2 on "System Description":

"All Light Load Handling System (LLHS), except fuel transfer tube and blind flange, are non-safety related."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-04

DCD Section 9.1.4.1, "Design Basis," states that the light load handling system (LLHS) is designed with the ability to isolate the equipment from shield waters. The staff does not know what the applicant means by this statement. Explain specifically the meaning of the ability to isolate equipment from shield waters and explain how that is performed.

Revise the DCD to include these explanations as applicable.

ANSWER:

All Light Load Handling System (LLHS) components, including those that are immersed in water for shielding, are designed to be removed from the water (following decontamination) for as necessary inspections and testing. The DCD will be revised to include this clarification.

Impact on DCD

The DCD Section 9.1.4.1 on "Design Bases", third bullet, first point, will be revised for clarification:

"Ability to perform periodic inspections and testing of components important to safety through appropriate configuration of the LLHS and, where necessary, the ability to isolate the equipment from shield waters;"

will be replaced with the following,

"Ability to perform periodic inspections and testing of components important to safety through appropriate configuration of the LLHS and, where necessary, the ability to isolate the equipment from shield waters (i.e. designed to be removed from the water following decontamination for as necessary inspections and testing);"

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-05

DCD Section 9.1.4.2.1.6, "Fuel Transfer Tube," describes the fuel transfer tube as having a gate valve on the refueling area end of the transfer tube and a blind flange on the pre stressed concrete containment vessel (PCCV) end. DCD Section 3.8.1.1.4, "Mechanical Penetrations," indicates the fuel transfer tube penetration is sealed with the PCCV wall similar to other mechanical penetrations. The containment boundary is a double-gasketed blind flange at the refueling canal end. DCD Tier 1, Section 2.7.6.4, "Light Load Handling System," provides classification of fuel transfer tube and fuel transfer tube blind flange as non-safety and seismic category I, because it states the LLHS is non safety related. Yet, DCD Tier 2 Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," lists the fuel transfer tube as safety related, equipment class 2. The applicant needs to clarify DCD Tier 1, regarding safety classification of the LLHS, and provide component classification information for the transfer tube gate valve and double-gasketed blind flange in DCD Tier 2 Table 3.2-2.

Revise the DCD to include this information as applicable.

ANSWER:

The transfer tube gate valve and double–gasketed blind flange will be designed to meet the seismic category I and equipment class 2 quality requirements of the US-APWR to be consistent with the DCD Tier 2 Table 3.2-2.

As stated in response to RAI 200-1983 question number 09.01.04-03, LLHS classification will be revised in DCD Tier 1 subsection 2.7.6.4.1 to state the following:

"All light load handling system, except fuel transfer tube and blind flange (designed as safety class 2), are non-safety related."

Impact on DCD

DCD Tier 1 subsection 2.7.6.4.1 will be revised as indicated in response to RAI 200-1983 question number 09.01.04-03.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-06

DCD Tier 2 Section 9.1.4.2.1.2, "Fuel Handling Machine," states that the fuel handling machine traverses the length of the refueling cavity. The refueling cavity is in containment while the fuel handling machine is in the reactor building refueling area. The auxiliary hoist has the load capacity to lift a fuel assembly, but is configured to preclude latching on to fuel assembly. The applicant did not state the purpose of the auxiliary hoist.

a) Explain the traversing range of the fuel handling machine and how it can traverse the refueling cavity. Revise the DCD accordingly.

b) The auxiliary hoist has the load capacity to lift a fuel assembly, but is configured to preclude latching on to fuel assembly. The applicant needs to explain the purpose and uses of the auxiliary hoist on the fuel handling machine.

Revise the DCD accordingly.

ANSWER:

a) The Fuel Handling Machine is located outside the containment (in the fuel handling area in the reactor building). It traverses the length of the spent fuel pit, the cask pit and the fuel inspection pit, but not the refueling cavity.

b) The auxiliary hoist of the fuel handling machine is provided to handle inserts for spent fuel assemblies using the appropriate handling tool. The auxiliary hoist also handles the gates separating the various pits (pools). When a spent fuel assembly is transferred, it is handled by the vertical mast tube of the fuel handling machine. The auxiliary hoist has the load capacity to lift a fuel assembly using a handling tool, but it cannot directly latch the fuel assembly.

Impact on DCD

a) The second sentence in first paragraph in the DCD section 9.1.4.2.1.2 on "Fuel Handling Machine" will be modified as follows:

"The fuel handling machine consists of a bridge with two motorized end trucks which traverse the length of the refueling cavity."

will be replaced with the following

"The fuel handling machine consists of a bridge with two motorized end trucks which traverse the length of the spent fuel pit, the cask pit and the fuel inspection pit."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-07

The guidelines of SRP Section 9.1.4.III.3.C specifies that the staff should review the fuel transfer system for the adequacy of provisions to prevent damage to fuel assemblies, especially during the time it receives or transfers them to other LLHS equipment. DCD Section 9.1.4.2.2.1, "New Fuel Receipt," describes the process of new fuel receipt from shipping container to new fuel pit. DCD Section 9.1.4.2.2.2, "Reactor Refueling Operations," (phase III) describes spent fuel handing from reactor to spent fuel pool.

DCD Section 9.1.4.2.2.2 further indicates that the new fuel loading operation is the reverse of the spent fuel unloading process described. These operation descriptions do not include description of what is involved in moving the new fuel from new fuel storage pit to spent fuel pit.

1) The applicant needs to clearly describe the integrated use of the new fuel storage pit, fuel inspection pit and the spent fuel pit in the processes that accept new fuel and for the refueling operation.

2) The applicant needs to clearly describe the purpose of the fuel inspection pit.

The DCD needs to be revised to include all the above listed information.

ANSWER:

1. Transfer of the new fuel assemblies from the new fuel storage pit to the reactor is called "new fuel transfer". A new fuel assembly stored in the new fuel pit is transferred to the refueling cavity in containment, via the spent fuel pit. The transfer process of new fuel loading into the reactor is as follows:

   a) A new fuel assembly stored in the new fuel racks is lifted using the suspension hoist of the spent fuel cask handling crane, and transferred to the new fuel elevator located in the fuel inspection pit. The new fuel assembly is then lowered using the new fuel elevator for access by the fuel handling machine.

   b) The new fuel assembly is latched by the spent fuel assembly handling tool on the fuel handling machine, and is lifted using the fuel handling machine auxiliary hoist and then transferred to the spent fuel pit for temporary storage in the spent fuel rack.

c) The new fuel assembly is then lifted and moved laterally using the vertical mast tube of the fuel handling machine, and then indexed over the vertical fuel transfer system (FTS) receiving basket ("fuel container"). The new fuel assembly is then lowered into the fuel container and unlatched.

d) The fuel container is pivoted to the horizontal position. The fuel transfer car is moved through the transfer tube to the refueling cavity inside containment. The fuel container is pivoted to the vertical position again.

e) The new fuel assembly is then grasped, lifted and moved laterally using the vertical mast tube of the refueling machine. The refueling machine is indexed over the reactor core, and then the vertical mast inserts the new fuel assembly into the designated position. This process is continued until the core is fully loaded.

2. The primary purpose of the fuel inspection pit is to allow as-needed underwater visual inspections of the irradiated fuel removed from the reactor core.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-08

GDC 62 requires the prevention of criticality in fuel handling systems. The applicant has stated that the LLHS has been designed to comply with ANS 57.1-1992, which states that fuel handling equipment be designed to ensure that subcriticality is maintained with the equipment fully loaded with fuel and the pool flooded with unborated water. Explain the design features of the following LLHS equipment that ensure that subcriticality is maintained when handling fuel: the refueling machine, fuel handling machine, new fuel elevator, fuel transfer system, and the spent fuel cask handling crane suspension hoist.

Update the DCD to include how the design objective is achieved.

ANSWER:

The Light Load Handling System (LLHS) equipment, including the refueling machine, fuel handling machine, new fuel elevator, fuel transfer system, and the suspension hoist on the spent fuel cask handling crane, is designed for handling only one fuel assembly at a time, and with sufficient space between the handled fuel assembly and adjacent stored fuel assembly(ies) to ensure subcriticality even under conditions of flooding with unborated water.

Impact on DCD

Add the following as sub-bullet to fourth bullet in the DCD Tier 2, Section 9.1.4.1 on "Design Bases":

"- The LLHS equipment involved in handling fuel is designed for handling only one fuel assembly at a time, and with sufficient space between the handled fuel assembly and adjacent stored fuel assembly(ies) to ensure subcriticality."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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4/23/2009

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Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-09

DCD Section 9.1.4.2.2.1, "New Fuel Receipt," specifies that during new fuel receipt, new fuel shipping container is raised through access hatch from the truck at 3ft - 7in elevation using the suspension hoist on the spent fuel cask handling crane and set on refueling area operating floor at 76ft – 5in elevation. DCD Table 9.1.5-1, "Specification of the Spent Fuel Cask Handling Crane," specifies a hoist lift value for suspension hoist is only 69'-3". Explain how new fuel is safely loaded onto the operating floor where the lift range of 69'-3" is only available. Also, Tables 9.1.5-1 and 9.1.5-2 reference a Figure 9.1.5-5 for hook coverage. However, Figure 9.1.5-5 can not be found in DCD.

Applicant is to provide figure and include this figure in DCD.

ANSWER:

The term "suspension hoist" mentioned in the DCD Section 9.1.4.2.2.1 is incorrect and needs to be changed to "auxiliary hook", which has 20 ton capacity and is designed for lifting the new fuel shipping container (weighing approximately 5 metric tons) from ground level (EL. 3'-7") to the operating floor (EL. 76'-5"). The reference to "Figure 9.1.5-5" in Tables 9.1.5-1 and 9.1.5-2 is incorrect and needs to be revised.

In addition, the Table 9.1.5-1 reference to "Figure 9.1.5-5" for hook coverage of the crane shall be replaced with "Figures 9.1.5-1 and 2", and the reference to "Figure 9.1.5-5" in Table 9.1.5-2 shall be replaced with "Figure 9.1.5-4".

Impact on DCD

- The DCD section 9.1.4.2.2.1 on "New Fuel Receipt" second paragraph first sentence will be modified as follows:

  "The new fuel shipping container is raised from the truck using the suspension hoist on the spent fuel cask handling crane through the access hatch in the refueling area floors at elevations 25 ft - 3 in and 76 ft - 5 in."

will be replaced with the following

"The new fuel shipping container is raised from the truck using the auxiliary hook on the spent fuel cask handling crane through the access hatch in the refueling area floors at elevations 25 ft - 3 in and 76 ft - 5 in."

- Figure 9.1.5-5 referenced in DCD Tables 9.1.5-1 and 9.1.5-2, Item number 9. on "Hook Coverage" will be changed to Figures 9.1.5-1 and 9.1.5-2.

- Figure 9.1.5-5 on "Hook Coverage" referenced in DCD Table 9.1.5-2 will be changed to Figure 9.1.5-4.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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4/23/2009

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RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-10

As described in DCD Section 9.1.4.2.2.1, "New Fuel Receipt," the new fuel container is set on the operating floor. Using the suspension hoist on the spent fuel cask handling crane, new fuel is removed from the shipping container and stored in the new fuel storage pit. During this operation, the new fuel assemblies are suspended using a short fuel handling tool to permit surface inspection prior to being placed into a new fuel storage rack. The guidelines of SRP 9.1.4.III.1 specify a review to verify whether the LLHS physical arrangement for stored fuel and fuel handling areas has been described sufficiently to establish that the various handling operations can be performed safely. The staff is unable to clearly determine the handling process of new fuel after it is received into new fuel storage pit. Additional information is needed to determine process of handling new fuel after being received into the new fuel storage rack. It is unclear whether new fuel is stored in new fuel pit or spent fuel pit prior to load.

Applicant is to provide more description in the DCD on how and when the fuel inspection pit and new fuel elevator are used during new fuel receipt operation.

ANSWER:

See the ANSWER for RAI 09.01.04-7 for the description of the process of handling new fuel after receipt, its placement into the new fuel storage rack, and its temporary storage in the spent fuel pit prior to reactor loading.

Regarding the handling of the new fuel container, upon its receipt into the Reactor Building refueling area truck access bay at Elevation 3 ft - 7 in, it is lifted using the auxiliary hook on the spent fuel cask handling crane through the access hatch in the refueling area floors to the Elevation 76 ft – 5 in operating level of the refueling area and set on the operating floor. Using the suspension hoist on the spent fuel cask handling crane, new fuel is removed from the shipping container and stored in the new fuel storage pit. During this operation, the new fuel assemblies are suspended using a short fuel handling tool to permit surface inspection prior to being placed into a new fuel storage rack.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-11

DCD Section 9.1.4.2.2.4, "Spent Fuel Shipment," describes the handling procedure for loading spent fuel into a spent fuel cask for transfer off-site. The fuel handling crane transports spent fuel from the spent fuel racks located in the spent fuel pit (SFP) to the cask pit and inserts fuel into the spent fuel cask. After the spent fuel cask is full, the lid is reinstalled for proper radiation shielding and cask is then moved to a decontamination pit. Neither the DCD arrangement drawings nor DCD Section 9.1.4, "Light Load Handling System," provide any location or description of a decontamination pit. The applicant needs to provide additional details on location and function of the decontamination pit. Revise the DCD accordingly.

ANSWER:

DCD Figure 9.1.5-1 indicates the traveling route of the spent fuel cask to the cask washdown pit. The decontamination pit mentioned in the ninth bullet of the DCD section 9.1.4.2.2.4 is incorrect and needs to be corrected.

Impact on DCD

The DCD Section 9.1.4.2.2.4, ninth bullet, second sentence will be modified as follows:

"It is then moved to the decontamination pit."

will be replaced with the following:

"It is then moved to the cask washdown pit."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-12

For the US-APWR, a "heavy load" is defined as a load greater than approximately 2450 pounds (defined in DCD Section 9.1.5 as a load weighing more than one fuel assembly and its handling device). DCD Section 9.1.4.2.2.1, "New Fuel Receipt," indicates the suspension hoist is used to lift new fuel shipping container from truck to refueling floor.
According to Table 9.1.5-1, "Specification of the Spent Fuel Cask Handling Crane," the capacity of the suspension hoist is 2 metric tons.

a) It is not specified whether the weight of new fuel shipping container with fuel weighs more than 2450 pounds. What is the weight of a new fuel shipping container and is it within the capacity of the suspension hoist?

The DCD should be revised accordingly.

ANSWER:

The shipping container containing new fuel assemblies will weigh approximately 5 metric tons. As stated in response to RAI 200-1983 question number 09.01.04-09, the use of the suspension hoist mentioned in DCD Section 9.1.4.2.2.1 is incorrect, as it has only a 2 metric tons capacity, and needs to be changed to "auxiliary hook", which has a 20 tons capacity, and is designed for lifting the new fuel shipping container from ground level (EL. 3'-7") to the operating floor (EL. 76'-5").

Impact on DCD

The DCD section 9.1.4.2.2.1 on "New Fuel Receipt", second paragraph, first sentence will be modified as follows:

"The new fuel shipping container is raised from the truck using the suspension hoist on the spent fuel cask handling crane through the access hatch in the refueling area floors at elevations 25 ft - 3 in and 76 ft - 5 in."

will be replaced with the following

"The new fuel shipping container is raised from the truck using the auxiliary hook on the spent fuel cask handling crane through the access hatch in the refueling area floors at elevations 25 ft - 3 in and 76 ft - 5 in."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-13

10 CFR 52.47(b) (1), which requires that a design certification (DC) application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC regulations.

DCD Tier 2 Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," lists the refueling machine, fuel handling machine and other equipment as safety-related, equipment class 2 or 3. The guidelines of SRP 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria," states that safety functions should be captures in the Design Description and ITAAC. Therefore, safety related functions should be described in the DCD Tier 1, Section 2.7.6.4, "Light Load Handling System" and Table 2.7.6.4-2, " Light Load Handling System Inspections, Test, and Analysis and Acceptance Criteria."

1) Explain why the application does not have ITAAC for all the safety related systems, structures, and components (SSC) and safety related functions, to include the fuel transfer tube that serves as a part of the primary reactor containment.

2) Explain why Table 2.7.6.4-2 lists ITAAC for the refueling machine but not the fuel handling machine.

The DCD should be revised accordingly.

ANSWER:

1) DCD Tier 1, Table 2.11.2-2, "Containment Isolation System Inspections, Tests, Analyses and Acceptance Criteria", Design Commitment numbers 1, 2b, 3b, and 4b describes the ITAAC for the fuel transfer tube as a part of the primary reactor containment. Hence, for the fuel transfer tube ITAAC, a note will be added in a revised DCD Tier 1 Table 2.7.6.4-2 to refer to Table 2.11.2-2.

2) DCD Tier 1 Table 2.7.6.4-2 will be revised to include the corresponding ITAAC for the fuel handling machine, similar to those for the refueling machine.

Also, see the ANSWER for RAI 14.03.07-31 in RAI No. 184-1912 Revision 0, for Item 2 ITAAC in Table 2.7.6.4-2 to be revised to include the three separate steps used for as-built Seismic Category I equipment, consistent with DCD Tier 2, Table 14.3-2, Example 5.

Impact on DCD

Add the following after the Design Commitment number 5 on new fuel elevator and fuel transfer tube in the DCD Tier 1 Table 2.7-6.4-2, "Light Load Handling System Inspections, Tests, Analyses, and Acceptance Criteria:

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The fuel handling machine utilizes electrical interlocks, limit switches, and mechanical stops to: 1) prevent damage to a fuel assembly, 2) assure appropriate radiation shielding depth below the water level in the reactor cavity, and 3) monitor the fuel assembly load for imparted loads greater than the nominal weight of the fuel assembly.	6. Tests of the as-built electrical interlocks, limit switches, and mechanical stops of the as-built fuel handling machine will be performed, including: a) Operating the open controls of the gripper while suspending a dummy fuel assembly. b) Attempting to raise a dummy fuel assembly above a preset height. c) Attempting to lift a dummy fuel assembly that is heavier than the nominal fuel assembly.	6.The as-built fuel handling machine utilizes electrical interlocks, limit switches, and mechanical stops to: 1) Prevent damage to a fuel assembly, 2) assure appropriate radiation shielding depth below the water level in the reactor cavity, and 3) monitor the fuel assembly load for imparted loads greater than the nominal weight of the fuel assembly.
7. ITAACs for fuel transfer tube: Refer to DCD Tier 1 Table 2.11.2-2, Design Commitment numbers 1, 2b, 3b, and 4b.		

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.
1)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-14

DCD Tier 2, Table 1.9.2-9, "US-APWR Conformance with Standard Review Plan Chapter 9 Auxiliary Systems," states that General Design Criterion 2 is not applicable for the conformance of the US-APWR with Standard Review Plan (SRP) Section 9.1.4, "Light Load Handling System (Related to Refueling)."

Explain in the DCD the technical basis for listing this exception to SRP Section 9.1.4.

ANSWER:

The statement in the DCD Tier 2 Table 1.9.2-9, "US-APWR Conformance with Standard Review Plan Chapter 9 Auxiliary Systems" Status column that Criterion 2 is not applicable for US-APWR design certification is a reference to the second numbered criterion in the preceding column (which in turn refers to General Design Criterion 5), and not to General Design Criterion 2. As each US-APWR is a single unit plant, with no sharing among nuclear plant units intended, General Design Criterion 5 regarding sharing of structures, systems, and components is not applicable.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

4/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries, Ltd.

Docket No. 52-021

RAI NO.: NO. 200-1983 REVISION 1

SRP SECTION: 9.1.4 – Light Load Handling System (Refueling)

APPLICATION SECTION: 9.1.4

DATE OF RAI ISSUE: 2/24/2009

QUESTION NO.: 09.01.04-15

DCD Tier 2, Section 9.1.4.2.2.4, "Spent Fuel Shipment," states "When the cask is being lifting down in the filled cask pit..." The staff is not sure what action is described in this statement.

Explain/clarify the action being performed in the above statement and modify the DCD accordingly.

ANSWER:

The action being described is the lowering of the cask inside its demineralizer-water filled "baggy" into the cask pit.

Impact on DCD

There is no impact on the DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.