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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-10235

Subject: MHI's Responses to the Questions at ACRS Subcommittee Meeting on June 7, 2010 regarding the US-APWR DCD Chapter 2 and 16

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") the responses to the questions that have been discussed during the ACRS Subcommittee meeting on June 7, 2010 regarding the US-APWR Design Control Document ("DCD") Chapter 2 and 16.

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

Sincerely,

Y. Ogata

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

Enclosures:

1. MHI's Responses to the Questions at ACRS Subcommittee Meeting regarding the US-APWR DCD Chapter 2
2. MHI's Responses to the Questions at ACRS Subcommittee Meeting regarding the US-APWR DCD Chapter 16

CC: J. A. Ciocco
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Enclosure 1

UAP-HF-10235
Docket Number 52-021

MHI's Responses to the Questions at ACRS Subcommittee Meeting
regarding the US-APWR DCD Chapter 2

August 2010

RESPONSE ON ACRS SUBCOMMITTEE MEETING

US-APWR Design Control Document

Mitsubishi Heavy Industries, Ltd.

CHAPTER: 2

CHAPTER TITLE: SITE CHARACTERISTICS

DATE OF MEETING: 06/07/10

QUESTION: on Section 2.4 Hydrologic Engineering, Slide 6

Groundwater elevation 1 foot below plant grade is a relatively high groundwater level. Do any of the buildings in the US-APWR design have safety related equipment located more than 1 foot below grade level? Does the certified design contain any safety related equipment that's located more than 1 foot below grade for the certified side of it? Is there any safety related equipment located more than 1 foot below grade level? Are there any cables routed through underground cable ducts? Does plant grade mean surface elevation?

ANSWER:

For convenience of review, the questions listed above are repeated and answered individually as follows.

Does plant grade mean surface elevation?

Yes. Plant grade is ground surface elevation. Figures 2.2-10 and 2.2-11 in DCD Tier 1 identify ground level (plant grade) as standard plant elevation 2'-7". Also, the highest water table elevation is at 1'-0" below the plant grade.

Groundwater elevation 1 foot below plant grade is a relatively high groundwater level. Do any of the buildings in the US-APWR design have safety-related equipment located more than 1 foot below grade level?

Yes, there are numerous safety-related SSCs below the stated water table. However, suitable protection systems have been devised for their protection from water infiltration and/or from postulated rupture of piping systems in designated areas or external flooding. For example:

1) The standard plant is designed to preclude interior flooding of buildings due to groundwater intrusion. Below grade, the US-APWR nuclear island and other seismic category I and II structures are primarily protected against exterior flooding and the intrusion of ground water by virtue of their thick reinforced concrete walls and base mats. As recommended by NUREG-0800, SRP 14.3.2, the external walls below flood level are equal to or greater than two feet thick to protect against water seepage, and penetrations in the external walls below flood level are provided with flood protection features. Design to protect against groundwater and external sources of flooding are described in Sections 3.4 and 3.8 of Tier 2 of the DCD.

2) Equipment qualification described in Section 3.11 of the DCD takes into account environmental conditions including humidity (spray or submergence) potentially caused by building interior flooding due to postulated pipe rupture or other internal flood-inducing events.

3) Construction joints in the exterior walls and base mats are provided with water stops to prevent seepage of ground water.

Does the certified design contain any safety-related equipment that's located more than 1 foot below grade for the certified side of it?

Yes. See response above.

Is there any safety-related equipment located more than 1 foot below grade level?

Yes. See response above.

Are there any cables routed through underground cable ducts?

There are no underground cable ducts utilized in the standard plant design. Below-grade exterior wall penetrations such as for piping and conduits have been minimized in the standard plant design to reduce the risk of in-leakage and flooding. Where below-grade piping penetrations are necessary (such as across building joints), they are designed to preclude water intrusion. This is addressed in the design criteria presented in Section 3.8 of the DCD Tier 2. Where below-grade electrical conduit penetrations are necessary, internal conduit seals are installed to preclude a fluid pathway through the conduit.

For site-specific SSCs located below the water table the COL applicant must provide the appropriate protections against potential flooding and/or other environmental conditions.

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Mitsubishi Heavy Industries, Ltd.

CHAPTER: **2**

CHAPTER TITLE: **SITE CHARACTERISTICS**

DATE OF MEETING: **06/07/10**

QUESTION: on Section 2.5 Geology, Seismology, and Geotechnical Engineering, Slide 6

Did MHI give any consideration to using Regulatory Guide 1.208 to define spectra and utilize a performance based approach rather than a uniform hazard approach?

ANSWER:

The standard plant input ground motion is based on traditional deterministic RG 1.60 spectra tied to 0.3 g peak ground acceleration. The performance based approach associated with RG 1.208 is used to confirm that the input ground motion used in the standard plant analyses envelopes the site-specific input ground motion to be considered in each COL application. Further explanation follows.

Regulatory Guide 1.60: The input ground motion representing the proposed standard plant certified seismic design response spectra (CSDRS) are derived by scaling the spectra contained in RG 1.60 from 1.0 g to 0.3 g zero period acceleration (ZPA) values, and by modifying the RG 1.60 spectra control points to broaden the spectra in the higher frequency range. This is described in further detail in Section 3.7 of Tier 2 of the DCD. The DCD requires the COL Applicant to develop site-specific input ground motion representing the site-specific safe shutdown earthquake (SSE) to ensure that it is enveloped by the standard plant CSDRS.

Regulatory Guide 1.208: The DCD (Revision 2) currently allows the COL Applicant to develop the site-specific SSE input motions using the reference-probabilistic seismic hazard approach of RG 1.165 or the performance based approach of RG 1.208. In response to a recent NRC correspondence to MHI indicating that RG 1.165 is being withdrawn from the Federal Resister, MHI has opted to remove the option for use of RG 1.165 from the next revision of the DCD.

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Mitsubishi Heavy Industries, Ltd.

CHAPTER: 2

CHAPTER TITLE: SITE CHARACTERISTICS

DATE OF MEETING: 06/07/10

QUESTION: on Section 2.3 Meteorology, Slide 6

Category IV hurricane has a sustained wind speed between 131 miles per hour and 155 miles per hour, a sustained wind speed. The gusts within a Category IV hurricane would probably exceed 155 miles an hour. How did MHI arrive at a 155 mile per hour 3 second gust as having a 100 year return period? The return period for several locations, especially in the south and southeast and eastern coastal portions of the United States might be considerably less than 100 years for that type of gust. What's MHI basis for that 100 year return period for that magnitude of a wind gust?

ANSWER:

As described in DCD Subsection 3.3.1.1, the basic wind speed applied in conjunction with an importance factor of 1.15 corresponds to an annual return period of 100 years. In DCD Table 2.0-1, the site parameter value for extreme wind speed, defined as 3-second gusts at 33 ft above ground level with a 100-year return period, is 155 mph with an importance factor of 1.15. The 100-year return period is therefore incorporated with the importance factor of 1.15 as described in Subsection 3.3.1.1.

DCD Subsection 3.3.1 recognizes design basis wind loadings are determined in accordance with American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI) 7-05. The NRC staff found that the US-APWR DCD extreme wind speed site parameter value bounds the ASCE/SEI 7-05 wind loading design criteria for the continental United States. The design wind speed has a basic wind speed of 155 mph, which corresponds to a 3-second gust at 33 ft above ground for exposure category C. The selection of 155 mph as the site parameter for basic wind speed envelopes the basic wind speeds for the continental US, including the southern and southeastern regions, as reflected in ASCE/SEI 7-05 Figure 6-1. ASCE/SEI 7-05 Figures 6-1A through 6-1C enlarge the coastlines from Texas to Maine for more exact representation of the basic wind speed along hurricane-prone regions. Basic wind speeds in Figures 6-1A through 6-1C are 150 mph or less.

ASCE/SEI commentary Section C6.5.4 includes a section titled "Correlation of Basic Wind Speed Map with the Saffir/Simpson Hurricane Scale. In this commentary, it is pointed out that the wind speeds used in the Saffir/Simpson Hurricane Scale are defined in terms of a sustained wind speed, with a 1 minute averaging time, at 33 ft over open water. In contrast, the ASCE/SEI 7-05 uses a 3 second gust speed at 33 ft above ground in Exposure C as defined in Figure 6-1 of the standard.

The ASCE/SEI commentary provides Table C6-1 through C6-5 to form the basis for the correlation of the wind speeds reported by the Saffir/Simpson Hurricane Scale and basic wind speed defined in ASCE/SEI 7-05, Figure 6-1. These tables are intended to help the users better understand design wind speeds used in ASCE/SEI 7-05 and the Saffir/Simpson Hurricane Scale. In general, the wind speeds in the Saffir/Simpson Hurricane Scale are equivalent wind speeds used in the determination of factored wind loads, while basic wind speeds are used in the determination of nominal (unfactored) wind loads. Table C6-2 also takes into consideration both the reduction in wind speed as the storm moves from over water to over land. Therefore, the derivations of basic wind speeds in ASCE/SEI Figure 6-1 utilize maximum wind speeds associated with the Saffir/Simpson Hurricane Scale.

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CHAPTER:	**2**
CHAPTER TITLE:	**SITE CHARACTERISTICS**
DATE OF MEETING:	**06/07/10**

QUESTION: on Section 2.5 Geology, Seismology, and Geotechnical Engineering, Slide 8

An item J, the maximum differential of settlement between buildings. Over time, the buildings settle some and that MHI can guarantee it's never going to be more than a half inch. How did MHI get up to that number? Can anyone actually ever build a facility at an actual site that will meet that specification?

ANSWER:

The difference between absolute actual settlement of a structure and the differential settlement of it with respect to an adjacent structure must be emphasized.

The ½ inch differential settlement between buildings is a value, which has been determined by MHI during the course of its standard design to be acceptable without further detailed evaluation. The value takes into account the potential for stresses induced on subsystems that cross between buildings, while allowing reasonable margin for differential settlement due to different foundation configurations and conditions. FSARs for existing plants throughout the US report differential settlement values for the power block that are typically less than or equal to ½ inch. COL applications for proposed new US-APWR units at the Comanche Peak site in Texas and North Anna site in Virginia report differential settlements less than ½".

On this basis, the limit of ½ inch differential settlement for purposes of standard plant design is reasonable and achievable.

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Mitsubishi Heavy Industries, Ltd.

CHAPTER: **2**

CHAPTER TITLE: **SITE CHARACTERISTICS**

DATE OF MEETING: **06/07/10**

QUESTION: on Section 2.3 Meteorology, χ/Q for TSC

For an RAI, one of the concerns was regarding a pipe break in the auxiliary building that caused a release inside the auxiliary building that could transfer to the technical support center. In the original analysis, a single door that separated the auxiliary building from the technical support center. The revised analysis says that all of the releases in the auxiliary building will be removed through the auxiliary building ventilation system, distributed out through the plant stack and the only pathway is then from the plant stack, diluted in the atmosphere into the ventilation intake for the technical support center. What is the basis for saying that all of the releases will be removed through the auxiliary building ventilation system and that no releases can go through that door? Why did MHI remove the door as a pathway?

ANSWER:

Sampling lines are located inside the piping area which is part of the radiological controlled area (RCA) on the EL15'-9" floor inside the auxiliary building (A/B), while the technical support center (TSC) is located in a non-RCA inside an access building (AC/B). There is no direct penetration line between the piping area containing the sampling lines and the non-RCA in front of the TSC. On a different elevation floor, the A/B ventilation duct is listed as the intersection point between the RCA and non-RCA in the A/B. Therefore, the most likely possible pathway to the TSC is dispersion of radioactive material inside the building which is leaked from the RCA to the non-RCA through the A/B ventilation ductwork. However, since the ventilation duct has check dampers, the released radioactivity due to a sampling line break does not transport to the non-RCA in front of TSC by way of dispersion inside of the building. Therefore, the only realistic pathway for radioactivity to leak to the TSC is through outside air.

In the original MHI analysis, it was not assumed that radioactivity resulting from a sampling line break reached the TSC by way of the building ventilation system. In the original analysis, the release pathway was assumed to be an atmospheric dispersion with conservatively assumed assumptions. That is, in order to make the distance shortest between source and receptor, the break point in the A/B piping area and the AC/B door were set as source and receptor, respectively. However, as discussed above, radioactivity due to a sampling line break does not reach the TSC by way of dispersion inside of the building due to dampers in the ductwork.

Therefore, in US-APWR design, the plant vent, which is the release point to atmosphere, is assumed to be the source, and the A/B shutter, which is the intake point from the atmosphere, is assumed to be the receptor.

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Mitsubishi Heavy Industries, Ltd.

CHAPTER: 2

CHAPTER TITLE: SITE CHARACTERISTICS

DATE OF MEETING: 06/07/10

QUESTION: in general

One observation this Committee has made in the past is that in many respects these kind of parameters come from past experience, limiting past experience and the question is if in fact we're going to have global warming and changes in the future, to what extent will these parameters be, in fact, acceptable or be a problem? Is there any attempt on the part of MHI to build in a little bit of margin or something that will call for this database to be in fact bounding in the future?

ANSWER:

The US-APWR is designed in accordance with General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," but it is not specifically designed to address global warming or climate change per se. Some parameters, such as those related to geology, seismology, and geotechnical engineering, are not influenced by global warming and climate change. US-APWR Structures, Systems, and Components (SSCs) are designed with margin based upon historical site data. Design parameters are conservatively established for use in accordance with NRC guidance and industry practice. The US-APWR is designed with consideration given to extreme environmental conditions. As an additional conservatism, administrative controls may be implemented during extreme environmental conditions to assure that plant SSCs and required functions are not adversely affected. These administrative controls are supplemental measures that are implemented on a temporary basis in accordance with plant procedures. For example, snow removal remedial action may be implemented to assure that roof loads are not exceeded. Other examples include reductions in plant power to compensate for elevated heat sink temperatures or earlier plant shutdown in response to anticipated hurricane conditions.

It is important to recognize that the plant Technical Specifications remain in effect. The Technical Specifications are not influenced by severe environmental extremes. If a Technical Specification limit is exceeded, the plant would follow the required technical specification action statements thereby assuring safe plant operation. In addition, if extreme environmental conditions due to global warming were to be experienced more frequently in the future, supplemental measures could be implemented to satisfy areas of regulatory concern as well as operational expectations.

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CHAPTER: 2

CHAPTER TITLE: SITE CHARACTERISTICS

DATE OF MEETING: 06/07/10

QUESTION: on Section 2.5 Geology, Seismology, and Geotechnical Engineering, item 5.a through 5.f of Slide 13 and 14

Were these language problems? Did you make a mistake, or was it a matter of English language interpretation? Can you, for this whole group, explain a little of that?

ANSWER:

The statements in Section 2.5 items 5a thru 5f of slides 13 and 14 are clarifications to terminology or changes made to provide additional information. Most of the changes in Section 2.5 were made in response to RAIs from the NRC. The change in the value for minimum allowable dynamic bearing capacity was made based on refinements in the standard plant seismic analyses.

Enclosure 2

UAP-HF-10235
Docket Number 52-021

MHI's Responses to the Questions at ACRS Subcommittee Meeting regarding the US-APWR DCD Chapter 16

August 2010

RESPONSE ON ACRS SUBCOMMITTEE MEETING

US-APWR Design Control Document

Mitsubishi Heavy Industries, Ltd.

CHAPTER:	**16**
CHAPTER TITLE:	**SITE CHARACTERISTICS**
DATE OF MEETING:	**06/07/10**

QUESTION: on Slide 5

Why is the 90 day limit not specified in the technical specifications? How is the 90 day limit controlled? The NEI document that MHI has referred is the guidance and has no legal bearing in terms of licensing. It's a guideline and not part of the licensing basis of the plant? The reality of PRA would support an indefinite period of time to allow flexibility in performing surveillances and maintenance. A question is on this slide it says "One train out of service is not allowed for more than 90 days in accordance with 10 CFR 50.59 and its guideline." 10 CFR 50.59 doesn't really specify a 90 day limit for anything. If one train cannot be out of service for more than 90 days, why 90 days it not actually specified in the technical specifications, which indeed governs the operation and licensing basis for the plant? If MHI intention is that no train of safety systems shall be removed for longer than 90 days, why would you not specify that in the technical specifications, that limit? Why does that maximizes the benefit of on-line maintenance? If MHI as the applicant agree that that was MHI actual backstop limitation, why is the 90 day a reluctance to put that into the technical specifications? Why MHI does not specifies that to actually just codify it and make it a formal limitation in the DCD?

ANSWER:

It is a requirement of technical specification that one train out of service is not deviation of the Limiting Condition for Operation.
We think that the 90 day-limit is a guideline to administrate the plant according with 10 CFR 50.59 and is not a requirement of technical specification. it is not assumed to be a part of licensing basis, and there is no intention to put it into specification.

The 90-day explained in the slide is quoted from the guideline of NEI 96-07 Rev.1 as not to cause the misunderstanding which the requirement of technical specification denies the administration of the plant according to 10 CFR 50.59.

RESPONSE ON ACRS SUBCOMMITTEE MEETING

US-APWR Design Control Document

Mitsubishi Heavy Industries, Ltd.

CHAPTER:	**16**
CHAPTER TITLE:	**SITE CHARACTERISTICS**
DATE OF MEETING:	**06/07/10**

QUESTION:

There is no technical specifications on the HVAC systems or the safety-related 4 train chilled water system. Although ACRS is aware that there is a screening process to identify risk-significant areas. What is the basis for screening out the chilled water system? In general, the ACRS is interested in reviewing the process used to identify which SSC should be in the technical specifications, and which should not.

ANSWER:

The basis for screening out the chilled water system is discussed in MHI's RAI response to US-APWR DCD RAI No. 584-4468, Question 09.02.02-75; MHI Ref: UAP-HF-10167; Dated June 10, 2009; ML101660066 as follows:

> "The ECWS provides chilled water at the required flowrate and temperature to support the room temperature control function of the safety-related HVAC systems. The safety-related HVAC systems, in turn, provide heat removal from equipment spaces and the control room in support of safety-related equipment operation and control room habitability. In this manner, the ECWS indirectly supports the function of safety-related equipment and the habitability of the control room. As such, the ECWS is a support system. The ECWS is not part of the primary success path to mitigate a design basis accident or transient that involves a challenge or failure of a fission product barrier. Therefore, Criterion 3 of 10CFR50.36(c)(2)(ii) is not applicable to the ECWS.
>
> As described in DCD Section 16.1.1.2, the US-APWR Technical Specifications content meets 10CFR50.36 requirements. In addition, NUREG-1431, Rev. 3.1, Standard Technical Specifications Westinghouse Plants, was used as guidance for developing the US-APWR Technical Specifications for consistency with the Technical Specification Improvement Program. The US-APWR Technical Specifications are consistent with NUREG-1431 in that the standard technical specifications do not explicitly include LCO or surveillance testing requirements for the chilled water system."