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July 17, 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-09383

Subject: MHI's Response to US-APWR DCD RAI No. 384-2862 REVISION 0

Reference: 1) "Request for Additional Information 384-2862 Revision 0, SRP Section: 09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System), Application Section: 9" dates June 8, 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. 384-2862 Revision 0."

Enclosed is the response to the RAI 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.

Enclosure:

1. Response to Request for Additional Information No. 384-2862 Revision 0

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

D081
NRO

Contact Information

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Enclosure 1

UAP-HF-09383
Docket Number 52-021

Response to Request for Additional Information
No. 384-2862 Revision 0

July 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

07/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 384-2862 REVISION 0**
SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-9

Table 9.3.4-3 of Section 9.3.4 of the DCD indicates that boric acid containing components of the CVCS are maintained at 200°F. However, in the response to RAI No. 280-2060 Revision 1, in the answer to Question 9.3.4-1, subpart e) states that, "The boric acid solution in the tanks is heated to a temperature above the low temperature alarm setpoint and maintained within the temperature ranges of approximately 70°F to 105°F." This statement is regarding the boric acid storage tanks and is conflicting with temperature information in Table 9.3.4-3 of Section 9.3.4 of the DCD for the corresponding tanks. Please provide clarification of the actual temperature range for all boric acid containing components.

ANSWER:

Table 9.3.4-3 shows design conditions and not operating conditions. The temperature of 200°F shown in the table is the design temperature of boric acid containing components. The temperature ranges of 70°F to 105°F described in the response to RAI No. 280-2060 Revision 1 indicate normal operating conditions. Thus there is no inconsistency.

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.

This completes MHI's response to the NRC's question.

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RAI NO.:	**NO. 384-2862 REVISION 0**
SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-10

1. How is the use of the boron recycle system and the potential recycling of depleted boron (depleted in 10B atom percent) back into the accumulator and refueling water storage pit addressed?
2. What measures are taken to ensure that the product of boron concentration (in ppm) and 10B atom percentage yield the expected negative reactivity assumed by the Chapter 15 accidents?
3. Provide the methodology for the determination of the 10B concentration (atom %) in the recycled boric acid and provide the frequency of that determination.

ANSWER:

1. The 10B of the reactor coolant in the RCS is depleted with reactor operation. By recycling the boric acid solution containing depleted 10B, the 10B atom percent of the boric acid solution gradually decreases. The RCS reactor coolant is mixed with refueling water stored in the refueling water storage pit (RWSP) during the refueling outage. With repeated mixing of each cycle, the 10B atom percent of refueling water in the RWSP and accumulators that are filled from RWSP gradually decreases over a long duration. However, the volume of RWSP water is so large that the degree of depletion is small. In addition, since the boron recycle system does not collect all of the boric acid solution, new boric acid is supplied to the plant, and this contributes to the recovery of the 10B atom percent. Thus, 10B depletion does not cause a significant effect.

2. The boron concentration (in ppm) limit of refueling water is specified by the Technical Specifications (LCO 3.5.4). The 10B depletion of the refueling water in the RWSP and accumulators is so small that the effect on the expected negative reactivity of the refueling water assumed in the Chapter 15 accidents is well covered with the margins considered in the assumptions of the analysis and fuel design.

3. The 10B concentration (atom %) can be determined by using mass spectrometry method. Since the 10B depletion of the boric acid solution is small and progresses only moderately, routine measurements of the 10B atom percent are not required. The 10B atom percent in the boric acid solution will be measured, as necessary.

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.

This completes MHI's response to the NRC's question.

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RAI NO.:	**NO. 384-2862 REVISION 0**
SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-11

In Sections 9.3.4.2.3.2 and 9.3.4.2.7.2, it is stated that the pH will be maintained at 7.3 ± 0.1.

1. Please provide justification as to why such a large pH range of 4.2-10.5 is given in Table 9.3.4-1. Why is such a precise range given in the text, but such a large range given in the table?
2. Under what conditions is the coolant allowed to have a pH in the range of 4.2-6.8? How long is the reactor coolant in an acidic state for these conditions?
3. What is the maximum lithium concentration (ppm) allowed? Is this consistent with the EPRI guidelines?
4. What is the maximum integrated Li-days (ppm-days) the fuel is allowed? How does this compare with MHI's operating experience base?

ANSWER:

1. The pH range of 4.2 -10.5 given in Table 9.3.4-1 is the band of pH values at 25°C, which changes with the combination of Li and Boron concentrations. The value of pH 7.3±0.1 given in Section 9.3.4.2.3.2 and Section 9.3.4.2.7.2 is an optimum pH value at 285°C. Detail discussions were provided to the NRC in the response to RAI No. 350-2675, Revision 1, Question No 05.02.03-17. The description of pH 7.3±0.1 in Section 9.3.4.2.3.2 and Section 9.3.4.2.7.2 will be modified to refer to Figure 5.2.3-1 for clarification. In the description "Conductivity: 0.1 - 4.0 at 25°F, pH: 4.2 - 10.5 at 25°F" in Table 9.3.4-1, "at 25°C" is mistaken for "at 25°F" and will be corrected.

2. At shut-down, refueling and start up conditions, lithium concentration is reduced to make the coolant pH low (about 0.5ppm, which corresponds to a pH of about 5 at 25°C) in order to remove corrosion products. Detailed discussions were provided to the NRC in the response to RAI No. 350-2675, Revision 1, Question No 05.02.03-17.

3. Maximum lithium concentration is set at 3.5 ppm, which is consistent with the EPRI guidelines.

4. The maximum integrated Li-days (ppm-days) of the fuel depend on the vendor. MHI's fuel basically adopts the specified upper limit of the Li concentration of a maximum of 3.5ppm at a boron concentration of 1100ppm and above, and a maximum of 2.2ppm when the boron concentration is below 1100ppm on the basis of operating experience.

Impact on DCD

The following changes will be made to the Tier 2 DCD, Section 9.3.4.2.3.2, 3rd paragraph:

"The chemical solution is added into the chemical mixing tank and is then flushed to the suction side of the charging pumps with the primary makeup water. To maintain the reactor coolant pH ~~to 7.3±0.1~~ **as shown in Chapter 5, Figure 5.2.3-1**, the Li-7 concentration in the reactor coolant is controlled by feed of the LiOH from the chemical mixing tank and bleed of the reactor coolant to the cation bed demineralizer."

The following changes will be made to the Standard Value of the Conductivity and pH in Table 9.3.4-1.

Conductivity: "0.1 - 4.0 at ~~25°F~~ **25°C**"
pH: "4.2 - 10.5 at ~~25°F~~ **25°C**"

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

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Docket No. 52-021

RAI NO.:	**NO. 384-2862 REVISION 0**
SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-12

In Section 9.3.4.3, the sixth paragraph states the following:
"The CVCS does not provide an ECCS function. Therefore, the provision for a leakage detection and control program in accordance with 10 CFR 50.34 (f) (xxvi) does not apply."

Although the CVCS does not provide an ECCS function, that does not imply that 10 CFR 50.34(f)(2)(xxvi) is not applicable to the CVCS. Compliance with 10 CFR 50.34(f)(2)(xxvi) is required.

What kind of containment leakage control program is implemented that address leaks in the CVCS? Both inside and outside containment leaks should be addressed. Please explain how leaks are to be identified and what action will be taken to mitigate the leaks.

ANSWER:

The sentence that reads, "The CVCS does not provide an ECCS function. Therefore, the provision for a leakage detection and control program in accordance with 10 CFR 50.34 (f) (xxvi) does not apply." will be deleted. This change was previously described to the NRC in the response to RAI No. 91-1496, Revision 1, Question 12.03-12.04-2, which was submitted by MHI letter UAP-HF-09003, dated January 9, 2009.

The design includes detection of CVCS leaks. The design provisions for minimization and detection of leakage for systems are described to the NRC in the response to RAI No. 346-2641, Revision 1, Question 09.03.02-10, which was submitted by MHI letter UAP-HF-09296, dated June 8, 2009.

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.

This completes MHI's response to the NRC's question.

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RAI NO.:	**NO. 384-2862 REVISION 0**
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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-13

In Section 9.3.4.1.2.4 it is stated that during a SBO, "reactor coolant pump seal integrity is maintained until the charging pumps are powered from an alternate power source and seal water injection restarts." Section 8.4.2.1.2 explains how seal integrity can be maintained for up to 60 minutes after a SBO without damage and that after this amount of time, an alternate alternating current power gas turbine generator re-establishes power to the charging pumps so that seal injection and RCS makeup can be resumed by the CVCS.
Please address the following items:

1. Provide justification showing that seal integrity can be maintained for a 60 minute period after a SBO.
2. What system provides RCS makeup and volume control during a SBO before the charging pumps become powered again?
3. How is seal leakage during a SBO mitigated?

ANSWER:

1 Integrity of the RCP shaft seal during a SBO was previously described to the NRC in the response to RAI No. 148-1700, Revision 1, Attachment to answer to question 19-273, which was submitted by MHI letter UAP-HF-09043, dated February 6, 2009.

2. During a SBO, before the charging pumps become powered again, no significant inventory loss will occur because CVCS letdown and RCP No.1 seal leakage paths are terminated by closure of isolation valves, and RCS makeup is not required.

3. As mentioned above, the seal leakage is mitigated by terminating the RCP No.1 seal leakage path by closing isolation valves automatically.

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.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-14

Please make corrections as appropriate to the following items:

1. The Section 9.3.4.5.4.1 title is entitled "Volume Co Volume." Please provide correction to this title.
2. Section 9.3.4.5.2.10, "Seal Water Exchanger Inlet Temperature," states the following: "Instrumentation is provided to indicate the seal water heat exchanger outlet temperature, and provide the indication in the MCR."
   The word *outlet* should be changed to *inlet* to be consistent with the section title.

ANSWER:

1. MHI will revise the Section 9.3.4.5.4.1 title to correct the typographical error.
2. MHI will revise the Section 9.3.4.5.2.10 to correct the typographical error.

Impact on DCD

The Section 9.3.4.5.4.1 title "Volume Co Volume" will be revised to "Volume Control Tank Level."

The Section 9.3.4.5.2.10 will be revised as follows:
"Instrumentation is provided to indicate the seal water heat exchanger ~~outlet~~ **inlet** temperature and provide local indication."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

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SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-15

Table 9.3.4-2 states that the temperature of charging water at full power is 464°F. Table 9.3.4-3 has the charging pump design temperature at 200°F. Please provide clarification to why these numbers differ.

ANSWER:

The temperature of 464°F stated i Table 9.3.4-2 is the temperature of charging water which is injected into the RCS after heating by the Regenerative Heat Exchanger. The charging water at the charging pumps is not heated and the Chemical and Volume Control System Equipment design temperature of 200°F covers the operating conditions.

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.

This completes MHI's response to the NRC's question.

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SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-16

During plant shutdown, Section 9.3.4.2.7.3 states that "When the purification flow is increased, two charging pumps can be in operation." An increase in flow seems to imply that only one charging pump might be needed. Do you mean to say that an increased purification flow is needed, therefore two charging pumps are used? If not, when does *increased* flow occur such that two pumps are needed? Or, do you mean to say that the second charging pump is always running for plant shutdown situations?

ANSWER:

At plant shutdown conditions, one charging pump can be used for RCS fluid purification. Two pumps are not needed. As an operational mater, purification flow may be increased to facilitate the RCS cleanup. The charging pumps can be run in parallel operation to accommodate the increased flow as desired

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.

This completes MHI's response to the NRC's question.

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Docket No. 52-021

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-17

Please give more detail regarding the containment isolation system signal types. In DCD Tier 1 Section 2.4.6.1 under the subsection titled "Logic", the following is stated:

"The containment isolation valves in the CVCS letdown line and charging line close on a containment isolation signal; where as the seal water return line close on a containment isolation signal with the under voltage signal present."

Three containment isolation valves (CIVs) are mentioned, however, in DCD Tier 2 Section 9.3.4.2.6.27, there are four CIVs listed.

1. Please explicitly discuss when the *seal water injection line CIV* is closed and add this discussion to the appropriate section of the DCD.
2. Explain what is meant by the "under voltage signal" and what causes it.
3. Is the seal water injection line CIV supposed to be closed in conjunction with the seal water return line CIV?

ANSWER:

1. The seal water injection line CIV is not closed by automatic isolation signal since it is desirable to keep the seal water injection line available. The CIV is closed manually when the plant condition does not require the seal water injection. The statement of the seal water injection line CIV will be added to DCD Tier 1 Section 2.4.6.1 "Logic".

2. The term "under voltage signal" is the same as "undervoltage signal" stated in Tier 2 Section 8.3.1.1.2.4. Detail of the signal is described in Tier 2 Chapter 8. In summary, an undervoltage condition on the bus initiates an undervoltage signal, and the signal controls interconnections between electrical buses, load shedding and load sequencing and operation of the on-site gas turbine generator.

3. No. The seal water injection line CIV does not need to be closed in conjunction with the seal water return line CIV. Normally, the seal water flows along the pump shaft downward into the RCS, and the remainder of the seal water runs along the pump shaft upward through the No.1

seal and exits to the No. 1 seal water return line. The seal water flows into the RCS when the seal water return line is isolated.

Impact on DCD

The following changes will be made to the Tier 1 Section 2.4.6.1 "Logic":

"The containment isolation valves in the CVCS letdown line and charging line close on a containment isolation signal. ~~; where as the~~ **The** seal water return line close on a containment isolation signal with the ~~under voltage~~ **undervoltage** signal present**; where as the containment isolation valves in the seal water injection line is closed manually**."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-18

How does US-APWR handle the processing of the gaseous fission products? Where are the storage tanks that hold these fission products kept? How does the GWMS design provide suitable radiation shielding in order to maintain low exposure for areas where personnel might come in contact with any associated fission gas storage tanks or associated piping? Are periodic inspections and maintenance possible based on the design layout?

ANSWER:

The gaseous fission products are stripped out of the coolant in the VCT and the HTs into the cover gas and form the input to the GWMS. The charcoal bed adsorbers are used to control and minimize the release of radionuclides into the environment by delaying the release of the radioactive noble gases. The processing of the gaseous fission products is described in Section 11.3.2 System Description. Also, Section 11.3.2.2 provides descriptions of the design features of the GWMS that are accessible for maintenance.

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.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-19

With regard to Section 9.3.4.5.3.3, "Demineralizer and Filter Differential Pressure," what measures are taken once a high differential pressure alarm is received for each of the listed components in the section?

ANSWER:

Upon receipt of a high differential pressure alarm, operators will replace the media from demineralizers and filters with new media.

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.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-20

The latest edition of the EPRI PWR Primary Water Chemistry Guidelines is an acceptable standard for determining whether a primary water chemistry control program is adequate to comply with GDC 14 with respect to minimizing corrosion-induced degradation of the reactor coolant pressure boundary. DCD Tier 2 Section 5.2.3.2.1 reference 1 identifies the EPRI PWR Water Chemistry Guidelines Revision 4 (2003).The guidelines have been updated since that time and have significant changes.

1. Confirm that the reference will be updated to the latest edition, Revision 6 (2007), of the EPRI Guidelines.
2. Alternatively, provide a detailed explanation of meeting and presenting the changes to the guidelines.
3. The EPRI Primary Water Chemistry Guidelines provide specific Action Level 1, 2 and 3 limits for many primary water chemistry control parameters. Specific actions including reduced power and/or shutdown are required if these limits are exceeded. Describe the implementation of these action levels.

ANSWER:

1. MHI will update the reference to Revision 6 of EPRI PWR Primary Water Chemistry Guidelines. Changes were described to the NRC in the response to RAI No. 224-2067, Revision 1, Question No 05.02.03-1.

2. Please see the response to No.1 above.

3. DCD Chapter 5 specifies the standard value and the limiting value analysis items in Table 5.2.3-2 Recommended Reactor Coolant Water Chemistry Specification. The standard value is close to the EPRI action level 1 and defined as an easily achievable value. The EPRI Guideline does not define some values, for example, chloride ion which is to be kept below 0.05ppm. The limiting value shown in the Table is close to EPRI action level 2. If the value is exceeded during operation, the water chemistry is required to be recovered. Similar to action level 3, not stated in Chapter 5, a 24-hour limiting value is defined such that the limiting value for the chloride ion and the fluoride ion is 1.5ppm(1500ppb) and the limiting value for the

dissolved oxygen is 1.0ppm (1000ppb). If these parameters are not restored within 24 hours, the nuclear reactor is to be shut down.

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.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-21

It is stated in Section 9.3.4.2.4 that hydrazine is injected into the RCS at plant startup via the chemical mixing tank. It is stated in Section 9.3.4.2.3.2 that LiOH is also added to the RCS via the chemical mixing tank and is continuously fed to the RCS throughout the cycle. Furthermore, it is stated that hydrazine is only used at startup from cold shutdown.

At what point is the LiOH introduced into the RCS if hydrazine is initially used in the chemical mixing tank during startup?

ANSWER:

The supply of chemicals to the RCS from the chemical mixing tank is a batch operation. During startup, since the chemical mixing tank is not always used for injection of hydrazine, LiOH can be added from the tank as required.

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.

This completes MHI's response to the NRC's question.

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APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-22

In Section 9.3.4.2.6.14, "Mixed Bed Demineralizers," the following is stated in the first paragraph:

"Each demineralizer is sized to accept the full purification flow during normal plant operation and to have a minimum design life of one core cycle."

1. What is the maximum design life of each mixed bed demineralizer?
2. What is the maximum design life of all of the other demineralizers, including the cation bed, deborating, and boric acid evaporator feed demineralizers?
3. Are all of the demineralizer resins refilled at end of cycle? If so, please update the DCD to state this in each demineralizer sub-section.

ANSWER:

The demineralizers do not have a specified maximum design life. The demineralizer resins will be replaced with new resins as required due to limitations such as bed exhaustion, high pressure differential and high radiation dose.

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.

This completes MHI's response to the NRC's question.

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Docket No. 52-021

RAI NO.:	**NO. 384-2862 REVISION 0**
SRP SECTION:	**09.03.04 – Chemical and Volume Control System (PWR) (Including Boron Recovery System)**
APPLICATION SECTION:	**9.3.4**
DATE OF RAI ISSUE:	**6/8/2009**

QUESTION NO. : 09.03.04-23

Section 9.3.4.2.5 discusses the boron recycle subsystem. Typical boron recycle systems use evaporative techniques to separate pure water from concentrated boric acid solution. The evaporator feed is purified through a demineralizer and then sent to an evaporator where the water is distilled through a series of trays to purify the distillate removing additional boric acid. Concentration of contaminants in the boric acid phase, such as chlorides, silica, sulfate and sodium, and difficulty in maintaining flow continuity at higher boron concentrations and temperatures due to boric acid insolubility at high concentrations, have caused some plants to abandon operations of these systems for recycle purposes.

1. Provide additional details regarding the trays in the boron evaporator and their physical functionality (e.g., percent boron removed for each tray).
2. Provide the mechanism for removing anionic contaminants from the boric acid concentrate so that it may be reused and still meet the EPRI PWR Primary Water Chemistry Guideline requirements for boric acid solution.

ANSWER:

1. An absorption tower is provided in the boron recycle system to remove boric acid from the evaporated steam from the evaporator to improve the purity of the evaporated steam. The steam separated in the evaporator enters in the absorption tower where the steam passes through stages comprised of porous plates and demisters (Typically typically 5 stages). On the stages (porous plate trays), reflux flow (distilled water) that flows down from the top of the tower is in the form of laminae. In passing through the stages, the steam contacts the flux laminar flow, and is subject to a repetetive cycle of condensation and evaporation such that the boric acid steam and impurities are removed from the steam to reduce volatile boron carryover. The boron concentration in the passed distilled water through the absorption tower can finally be reduced below at least 10ppm B. The operational experience has shown that the boron concentration in the passed distilled water through the absorption tower can be reduced below 1ppm B.

2. The coolant supplied to the boron recycle system is pure water from the mixed bed demineralizer and boric acid evaporator feed demineralizers. The recycled boric acid solution

dissolved oxygen is 1.0ppm (1000ppb). If these parameters are not restored within 24 hours, the nuclear reactor is to be shut down.

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.

This completes MHI's response to the NRC's question.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

07/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

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QUESTION NO. : 09.03.04-24

In DCD Tier 1 Section 2.4.6 Figure 2.4.6-1 (Sheet 2 of 2), there are two CVS seal water return lines shown. The one that is connected to the purification loop should be shown as the letdown line and not the CVS seal water return line. Please make the necessary change to the figure.

ANSWER:

MHI will revise DCD Tier 1 Section 2.4.6, Figure 2.4.6-1 (Sheet 2 of 2) as shown in the "Impact on DCD" section below.

Impact on DCD

In DCD Tier 1 Section 2.4.6 Figure 2.4.6-1 (Sheet 2 of 2), the line labeled "CVS SEAL WATER RETURN" that is connected to the purification loop will be replaced with "CVS LETDOWN Hx."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's response to the NRC's question.