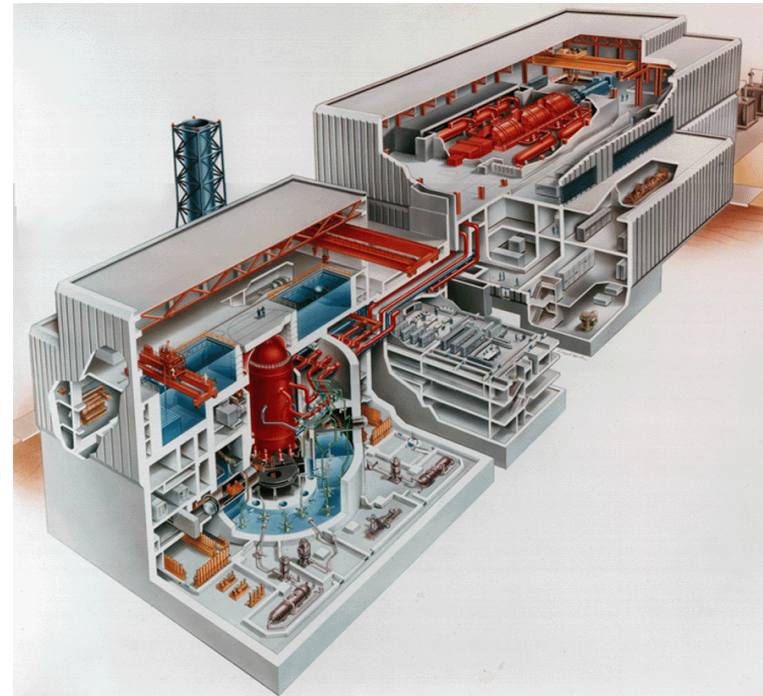


ABWR Certification Renewal NRC Public Meeting Status of Responses to Requests for Additional Information

May 7, 2015



HITACHI

Meeting Objectives

- Purpose of meeting is to:
 - 1) Discuss GEH responses to Requests for Additional Information (RAIs) for ABWR design certification renewal application. GEH will present an overview of each RAI and response.
 - 2) Discuss GEH proposed resolution of design changes (28 items) supporting renewal application.



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Meeting Objectives (cont.)

- GEH will seek concurrence with RAI and design change item resolution approach from NRC throughout meeting.
- GEH and NRC will identify further actions based on presentation and discussion.



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Submitted RAI Responses

The following slides provide a brief summary of the RAI responses submitted to the NRC to-date



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6

RAI summary

- 1) Update Chapter 12 of the GEH ABWR DCD to provide source term information (including source geometry) and shielding information for the CST.

RAI response summary (MFN 15-003)

A COL item will be added in ABWR DCD Chapter 12 for the COL applicant to provide the CST source term and shielding information. The COL item is used to maintain flexibility in the liquid waste management system design for the COL application.

The COL applicant will ensure there is sufficient shielding provided for the CST to ensure a dose rate of $\leq 6 \mu\text{Sv/hr}$ in the area surrounding the CST. Therefore, the area around the CST will be designated as radiation zone designation, A, “uncontrolled, unlimited access.”



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6 (cont.)

RAI summary (cont.)

- 2) Update Chapters 11 and 12 of the GEH ABWR DCD, as appropriate, to describe any procedures or engineering controls used to control radioactive effluents and radiation exposure from the CST, such as provisions to prevent CST overflow or design features to contain radioactive material if a leak or overflow were to occur.

RAI response summary (cont.)

The COL item being added to the DCD in response to Item 1 constitutes an additional engineered control which will allow uncontrolled and unlimited access to the area around the CST.

Additional procedures and engineering controls already used to control radioactive effluents and radiation exposure from the CST are stated in Chapter 11, Subsection 11.2.1.2 of the GEH ABWR DCD.



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6 (cont.)

RAI response summary (cont.)

Additional wording is added to DCD Chapter 11, Subsection 11.2.1.2: “The structure for the transfer pumps will be integrated in the dike, as well as the interfaces with any pipe chases or guard pipes. The buried portion of the condensate storage tank piping will be enclosed within a pipe chase or a guard pipe and monitored for leakage.”

From a procedures perspective, as stated in Table 11.5-4 (Item 4) of the DCD, samples are taken weekly of the CST to evaluate water radioactivity and control the radioactive effluents and radiation exposure from the CST.



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6 (cont.)

RAI summary (cont.)

- 3) Update Chapters 11 and 12 of the GEH ABWR DCD, as appropriate, to describe the locations, functions, and design features of piping routed to and from the CST in order to ensure that radioactive effluents and radiation exposure is being adequately controlled. Include any design features to detect or prevent leakage from outdoor pipes in order to ensure control of effluent releases from the site.

RAI response summary (cont.)

The piping associated with the CST is designed to preclude inadvertent or unidentified leakage to the environment. Per DCD Section 12.1.2.2.3, “The piping, where possible, was constructed of seamless pipe as a means to reduce radiation accumulation on the seam.”



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6 (cont.)

RAI response summary (cont.)

In addition, the buried portion of the CST piping will be enclosed within a pipe chase or a guard pipe and monitored for leakage.

These features substantially reduce the potential for unmonitored and uncontrolled releases to the environment.

The description of the pipe chase/guard pipe will be implemented in Chapter 11, Subsection 11.2.1.2 of the next revision of the GEH ABWR DCD.



HITACHI

RAI 12.02-2 (RAI 7583) – Item #6 (cont.)

RAI summary (cont.)

- 4) Update the Chapter 12 radiation zone drawings of the GEH ABWR DCD, to include the location of the CST, including radiation zoning for the CST.

RAI response summary (cont.)

The CST will be radiation zone designation, A, “uncontrolled, unlimited access;” therefore, Figure 12.3-50 will be updated to designate radiation zone “A.”

Figures 1.2-25 and 12.3-70 in the GEH ABWR DCD will be updated in the next revision of the ABWR DCD to show the CST position consistent with Figure 12.3-50.



HITACHI

RAI 12.02-3 (RAI 7583) – Item #6

RAI summary

In reviewing Tier 1, Table 3.2, all of the items in Table 3.2 are designated as "Acceptance Criteria", including Table 3.2a, item 4, instead of "Design Acceptance Criteria". Other DAC in the GEH ABWR DCD specifically include the designation, "Design Acceptance Criteria" in order to differentiate DAC from other types of ITAAC. Please change the designation of Table 3.2a Item 4 to correct this discrepancy.

RAI response summary (MFN 15-003)

GEH agrees. The designation of Table 3.2a Item 4 has been updated to "Design Acceptance Criteria."



HITACHI

RAI 12.02-1 (RAI 7583) – Item #7

RAI summary

- 1) Correct the core source term data in Tables 12.2-3b and 12.2-3c and provide calculations or other documentation demonstrating the accuracy of the revised source terms.

RAI response summary (MFN 14-079)

GEH has confirmed the gamma source values reported in ABWR DCD, Tier 2, Table 12.2-3b are one million times lower than the supporting analysis results indicate.

Similarly, GEH has also confirmed the gamma source values reported in ABWR DCD, Tier 2, Table 12.2-3c are one million times lower than the supporting analysis results indicate.



HITACHI

RAI 12.02-1 (RAI 7583) – Item #7 (cont.)

RAI summary (cont.)

- 2) Update the text in Chapter 12, as appropriate, to ensure that units used in referencing Tables 12.2-3b and 12.2-3c are accurate.

RAI response summary (cont.)

The next revision of the GEH ABWR DCD, Tier 2, Sections 12.2.1.2.1.1.4 and 12.2.1.2.8 will be corrected to report the units shown in DCD Tables 12.2-3b and 12.2-3c.



HITACHI

RAI 12.02-1 (RAI 7583) – Item #7 (cont.)

RAI summary (cont.)

- 3) Ensure that the errors in the aforementioned tables did not result in any other errors or inaccuracies in any other areas of the DCD, including but not limited to, facility design, shielding design (including the shielding design of the fuel transfer tube), radiation zoning, dose assessment, and equipment qualification. If any additional errors are identified, correct them. Please provide justification for your response.



HITACHI

RAI 12.02-1 (RAI 7583) – Item #7 (cont.)

RAI response summary (cont.)

GEH reviewed the following areas and confirmed that the errors in the tables did not result in any other errors or inaccuracies:

- Plant shield design
- Area dose rates that could result in workers receiving doses in excess of the worker dose limits
- Radiation areas not being properly identified
- Equipment qualification
- ABWR ALARA design



HITACHI

RAI 11.04-1 (RAI 7781) – Item #8

RAI summary

- 1) Please update the DCD, as appropriate, to provide information ensuring that the solid waste management system will meet the design, testing, and quality assurance criteria in Regulatory Guide 1.143, Revision 1, or provide an alternative approach that satisfies NRC regulations.

RAI response summary (MFN 15-023)

The following new sentence will be added to the end of Subsection 11.4.1.2:
“This includes compliance with Regulatory Guide 1.143.”



HITACHI

RAI 11.04-1 (RAI 7781) – Item #8 (cont.)

RAI summary (cont.)

- 2) Please update DCD Tier 2, Table 3.2-1, as appropriate, to correct the apparent errors associated with notes p, q, and v.

RAI response summary (cont.)

The following will be added to Table 3.2-1 for “N22 Offgas System” in the “Notes” Column: “(p), (q), (v)”



HITACHI

RAI 11.04-1 (RAI 7781) – Item #8 (cont.)

RAI response summary (cont.)

Additionally, during the preparation of the RAI response the following typographical errors were found in the DCD and are being corrected:

- DCD Subsection 11.2.1.2.2 references Regulatory Guide “1.43”. It should be Regulatory Guide “1.143” and has been corrected accordingly.
- DCD Table 3.2-1, Note “q” references Subsection “11.3.4.8”. There is no such subsection, it should be Subsection “11.3.8” and it has been changed accordingly.



HITACHI

RAI 09.05.01-1 (RAI 7665) – Item #11

RAI summary (ML15118A725 dated April 29, 2015)

The applicant is requested to perform an evaluation for the effects of multiple spurious actuations due to a fire that is consistent with NEI 00-01, Revision 2, as modified in RG 1.89, Revision 2, or if an alternative approach is used, justify how the alternative approach complies with NRC regulations.

RAI proposed response summary

- GEH will add a COL Action item for the COL applicant to perform an MSO review of the design.
- A recent MSO expert panel was performed by GEH for an ABWR project and did not identify any sequences that would result in the ABWR being unable to achieve a Safe Shutdown condition.



HITACHI

RAI 09.05.01-1 (RAI 7665) – Item #11 (cont.)

RAI proposed response summary (cont.)

- The key elements of the design for this ABWR project were consistent with the Certified ABWR design.
- Based on this effort, GEH does not anticipate any significant design issues to be identified by the MSO COLA review.



HITACHI

RAI 14.03-1 (RAI 7787) – Item #24

RAI summary

In finalizing the ESBWR design certification, GEH made two revisions to enhance the clarity of ASME Code requirements in the ITAAC. These revisions may be applicable to the ABWR DCD. Please consider whether it would be appropriate to make these revisions to the Tier 1 content of the ABWR DCD.

RAI response summary (MFN 15-022)

GEH agrees to add a clarification that it would be acceptable to allow NRC-approved code alternatives pursuant to 10 CFR 50.55a(a)(3) as acceptable for ITAAC closure.



HITACHI

RAI 08.02-1 (RAI 7435)

RAI summary

- 1) Describe the protection scheme design for important to safety buses to detect, alarm, and automatically respond to the following open circuit conditions on credited offsite power circuits:

(1) Loss of one of the three phases of the offsite power circuit on the high voltage side of a transformer connecting a GDC-17 offsite power circuit to the transmission system under all operating electrical system configurations and loading conditions with a high impedance ground fault condition under all loading and operating configurations.



HITACHI

RAI 08.02-1 (RAI 7435) (cont.)

RAI summary (cont.)

- 1) Describe the protection scheme design for important to safety buses to detect, alarm, and automatically respond to the following open circuit conditions on credited offsite power circuits:

(2) Loss of one of the three phases of the offsite power circuit on the high voltage side of a transformer connecting a GDC-17 offsite power circuit to the transmission system under all operating electrical system configurations and loading conditions without a high impedance ground fault condition under all loading and operating configurations.



HITACHI

RAI 08.02-1 (RAI 7435) (cont.)

RAI summary (cont.)

- 1) Describe the protection scheme design for important to safety buses to detect, alarm, and automatically respond to the following open circuit conditions on credited offsite power circuits:

(3) Loss of two of the three phases of the offsite power circuit on the high voltage side of a transformer connecting a GDC-17 offsite power circuit to the transmission system under all operating electrical system configurations and loading conditions under all loading and operating configurations.

RAI response summary (MFN 14-056)

Loss of one or more phases is discussed in the markups to DCD Tier 2 Subsection 8.3.1.1.6.3 Items (1) and (6). The wording was added to state:



HITACHI

RAI 08.02-1 (RAI 7435) (cont.)

RAI response summary (cont.)

Item (1):

“The undervoltage monitoring is responsive to all three phases. The monitoring is effective for both load shedding and emergency diesel start and protection of the safety-related bus loads for grounds and loss of one or more phases.”

Item (6):

“Nonsafety-related buses A4, B4, C4, and the new H bus are monitored by their own protective relays and will trip power to the safety-related buses on detection of abnormal voltages and frequency, including loss of one or more phases and ground conditions.”



HITACHI

RAI 08.02-1 (RAI 7435) (cont.)

RAI summary (cont.)

- 2) If the important to safety buses are not powered by offsite power sources during at power condition, explain how surveillance tests (e.g., SR 3.8.1.1) are performed to verify that any of the open circuit conditions described above is detected.

RAI response summary (cont.)

The three divisional buses (safety-related) are normally powered from either the normal or alternate preferred (offsite) power source. Therefore, a response to this question is not required.



HITACHI

RAI 08.02-1 (RAI 7435) (cont.)

RAI summary (cont.)

- 3) Describe the plant operating procedures including off-normal operating procedures, specifically call for verification of the voltages on all three phases of the ESF buses.

RAI response summary (cont.)

Plant operating procedures will be developed prior to plant startup and operation according to provisions of DCD Tier 2 Section 13.5 and Chapter 18 and will include how the operators respond to a loss of phase event.



HITACHI

RAI 06.03-1 (RAI 7795) – Item #9

RAI summary

In accordance with 10 CFR 52.59(a) (2014), provide information showing that the ECCS suction strainer design complies with 10 CFR 50.46(b)(5) (1997). Regulatory Guide (RG) 1.82, Revision 4, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," provides an acceptable method of ensuring compliance with 10 CFR 50.46(b)(5).

RAI response summary (MFN 15-024)

The ABWR DCD will be updated to make necessary clarifications to reflect updates in the design, and debris loading methodology. The DCD also will be updated to comply with the guidance of RG 1.82 Revision 3, and to reference the guidance of Utility Resolution Guidance for ECCS Suction Strainer Blockage (NEDO-32686-A).



HITACHI

RAI 06.03-1 (RAI 7795) – Item #9 (cont.)

RAI response summary (cont.)

A test program related to chemical effects (precipitates, corrosion products, etc.) and downstream effects (debris obstructing piping, equipment, and core flow) is currently being performed by the BWR Owner's Group in collaboration with the NRC.

To ensure test results can be included in the strainer design, a COL Information Item will be added to the DCD for the COL Applicant to complete an evaluation of the ECCS strainer for chemical and downstream effects to successfully demonstrate their ability to provide long term cooling in accordance with 10 CFR 50.46(b)(5).

GEH acknowledges that RG 1.1 has been recently withdrawn and will review submitted RAI response in MFN 15-024 and issue a revision as required to reflect the withdrawal of RG 1.1 and remove it from DCD Table 1.8-20.



HITACHI

RAI 06.03-1 (RAI 7795) – Item #9 (cont.)

RAI response summary (cont.)

GEH agrees that RG 1.82 includes necessary information from RG 1.1 and it is already referenced in Table 1.8-20. [Reference 80 Federal Register 24293 dated April 30, 2015]



HITACHI

RAI 02-1 (RAI 7668) – Item #2

RAI summary

- 1) Add hurricane wind speed (e.g., 3-second gust at 10 m above ground in open terrain) and hurricane missile spectra (including missile dimensions, mass, and velocity) to the list of site parameter values presented in Tier 1, Section 5.0, and Tier 2, Section 2.0 of the GE-Hitachi ABWR Design Control Document.

RAI response summary (MFN 14-075)

The hurricane wind speed and hurricane missile spectra (including missile dimensions, mass, and velocity) are added to the list of site parameter values presented in ABWR DCD Tier 1, Section 5.0, and Tier 2, Section 2.0.



HITACHI

RAI 02-1 (RAI 7668) – Item #2 (cont.)

RAI summary (cont.)

- 2) Revise and provide markups of affected sections of the GE-Hitachi ABWR Design Control Document to show how structures, systems, and components important to safety are protected from the effects of hurricane winds and missiles.

RAI response summary (cont.)

Related sections of the GE-Hitachi ABWR Design Control Document Tier 2 are revised to show how structures, systems, and components important to safety are protected from the effects of hurricane winds and missiles.



HITACHI

RAI 19-1 (RAI 7125)

RAI summary

The staff requests that the applicant consider using NEI 07-13 “Methodology for Performing Aircraft Impact Assessments for New Plant Designs,” revision (Revision 8), and reference RG 1.217, “Guidance for the Assessment of Beyond-Design-Basis Aircraft Impact.”

RAI response summary (MFN 14-063)

The Aircraft Impact Assessment has been revised to meet guidance in Regulatory Guide 1.217 and NEI 07-13, Revision 8.

DCD, Tier 2, Section 19.G, is revised accordingly.



HITACHI

RAI 19-2 (RAI 7125)

RAI summary

In order for these four ECCS to be available (Reactor Core Isolation Cooling, High Pressure Core Flooder, Low Pressure Flooder, and Automatic Depressurization System), all the “key design features” should be included in DCD Section 19.G. The staff requests that the applicant address the following as key design support systems. Also, shock and induced vibrations shall be assessed for other support systems.

RAI response summary (MFN 14-063)

GEH reviewed the list of ECCS support systems against the guidance of NEI 07-13, Revision 8 and determined that several of these systems should be identified as key design features. Some were already identified in DCD Tier 2, Section 19.G. Several key design features were added to Section 19.G accordingly.



HITACHI

RAI 19-3 (RAI 7125)

RAI summary

The staff requests that the applicant clarify the Loss of Large Areas of the Plant due to Explosions and Fires (LOLA) strategy, and provide alternate key design features for alternate spent fuel pool makeup in the event that RHR is out of service.

RAI response summary (MFN 14-063)

During shutdown conditions, core cooling is maintained by injecting water into the Reactor Vessel using the available RHR or HPCF train. For some strike locations only one division of RHR/HPCF equipment is available.



HITACHI

RAI 19-3 (RAI 7125) (cont.)

RAI response summary (cont.)

Administrative controls will be established by the COL applicant to ensure that RHR Train A and either RHR or HPCF for Trains B and C are not out of service for maintenance until the cavity is flooded and the SFP gates are opened.

This will ensure an adequate water reservoir to provide cooling of the fuel in the vessel for at least 24 hours.

DCD Tier 2, Section 19.G.4.4 is revised to include the administrative control and to eliminate reference to the standpipes installed to meet 10 CFR 50.54(hh) as they are no longer required to maintain core cooling.



HITACHI

RAI 19-4 (RAI 7125)

RAI summary

The staff requests that the applicant address shock and vibration damage potential to the HCUs thus possibly preventing a reactor scram while at power.

RAI response summary (MFN 14-063)

Physical damage, fire damage and shock damage have been evaluated for the HCUs and CRD mechanisms.

The assessment determined that there are no physical or shock damage impacts to the HCUs because of their location at the lowest below grade level. Therefore, the ability to scram the reactor is maintained.

DCD Tier 2, Section 19.G is revised to clearly state that shock and vibration effects on the HCUs and CRD mechanisms were assessed.



HITACHI

RAI 19-5 (RAI 7125)

RAI summary

The NRC staff requests that the applicant provide, in DCD Section 19.G, a description related to fire dampers and their ratings in any 5 psid barrier credited as a key design feature.

RAI response summary (MFN 14-063)

The detailed HVAC design is not yet available. In the detailed design and procurement, all doors, dampers and other penetrations at the perimeter of a fire barrier will meet the rating of the designated fire barrier (3-hour or 3-hour, 5-psid).

DCD Tier 2, Section 19.G and Figures in Section 9A were revised accordingly.



HITACHI

RAI 19-6 (RAI 7826)

RAI summary (MFN 15-029 dated April 20, 2015)

In Section 19G.2 of the GEH ABWR DCD Tier 2, revision 5, the applicant indicates that the spent fuel pool is not perforated. The applicant is requested to state that an assessment was performed to ensure no leakage through the spent fuel liner below the required minimum water level of the pool.

RAI proposed response summary

GEH will expand on the write-up in Appendix 19G to address the spent fuel pool leakage concerns.



HITACHI

RAI 19-7 (RAI 7826)

RAI summary (MFN 15-029 dated April 20, 2015)

In Section 19G.4.1 of the GEH ABWR DCD Tier 2, revision 5, the applicant concludes in the assessment that a strike upon the primary containment would not result in the perforation of the primary containment, and would not cause direct damage to the systems within the primary containment or expose them to jet fuel. The applicant is requested to address whether the primary containment can also maintain the ultimate pressure capability.

RAI proposed response summary

The GEH evaluation concluded that at least one division of core cooling remains available post-strike demonstrating compliance with the first option of 50.150(a)(i); therefore, demonstration of maintaining ultimate pressure capability is not required.



HITACHI

RAI 19-8 (RAI 7826)

RAI summary (MFN 15-029 dated April 20, 2015)

In Section 19G4.2 of the GEH ABWR DCD Tier 2, revision 5, the applicant describes in Item (3) that the key design features for the reactor well shield plugs for protecting the drywell head from secondary impacts are identified in Section 3H.1.4, "Structural Design Criteria." Please provide the correct section addressing the key design features for the reactor well shield plugs for protecting the drywell head from secondary impacts.

RAI proposed response summary

GEH will add the missing key design features for the reactor well shield plugs to Section 3H.



HITACHI

RAI 19-9 (RAI 7826)

RAI summary (MFN 15-029 dated April 20, 2015)

In Section 19G.4.2 of the GEH ABWR DCD Tier 2, revision 5, the applicant describes in Items (6) and (7) that the key design features that protect the east and west walls of the Control Buildings by the location and design of the Service Building and Control Building Annex structures from the impact of a large commercial aircraft were described in Section 3H.6 and figures 1.2-20 through 1.2-22. However, the applicant did not provide any discussions of the design features in Section 3H.6 that the east and west walls of the Control Buildings are protected from the impact of a large commercial aircraft.

RAI proposed response summary

GEH will add discussions of the design features in Section 3H.



HITACHI

RAI 07-1 (RAI 7658) – Item #22

RAI summary (MFN 15-029 dated April 20, 2015)

In accordance with 10 CFR 52.59 (2014), 10 CFR 52.47(a)(1)(i) (1997), and 10 CFR Part 50, Appendix A, GDC 28 (1997):

Correct the ganged withdrawal sequence description in Section 7.7.1.2.1(5)(b)(iii) or provide a technical basis and further explanation as to why this section, as currently written, is correct and accurate.

RAI proposed response summary

GEH has reviewed the wording used in Section 7.7.1.2.1(5)(b)(iii) and is considering to change the text as follows:

“Groups 1-4 must be fully withdrawn before groups 5-10 can be withdrawn from the full-in position.”



HITACHI

RAI 01.05-1 (RAI 7653) – Item #27

RAI summary

Consistent with SECY-12-0025 ("Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami" dated February 17, 2012) and the Commission's basis for issuing Order EA-12-051, the staff requests GEH to address the design-related aspects of Fukushima Recommendation 7.1 regarding enhanced spent fuel instrumentation as outlined in Attachment 2 of the Order.

RAI response summary (MFN 14-071)

GEH will include two safety-related wide range spent fuel pool level instruments in the ABWR DCD.



HITACHI

RAI 01.05-1 (RAI 7653) – Item #27 (cont.)

RAI response summary (cont.)

GEH will comply with applicable guidance in JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, and NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'," Revision 1.

The GEH ABWR design departs from the guidance of NEI 12-02 (Rev. 1) in the choice of water level nomenclature. In accordance with Human Factors Engineering principles, the ABWR spent fuel pool and RPV water level nomenclature have been made as consistent as possible.

Thus, the ABWR DCD will implement spent fuel pool Level 3 at slightly below normal water level, and Level 1 above the top of active fuel.

DCD Tier 1 and Tier 2 is revised in the applicable text, tables and figures.



HITACHI