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MFN 09-538

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 344 Related to ESBWR Design Certification Application - Radiation Protection - RAI Number 12.4-19 S04**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) 12.4-19 S04 sent by NRC Letter 344, Reference 1. The response to RAI Number 12.4-19 S03 was previously submitted to the NRC via Reference 2 in response to Reference 3.

GEH response to RAI Number 12.4-19 S04 is addressed in Enclosure 1.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

References:

1. MFN 09-336, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 344 Related to ESBWR Design Certification Application*, May 18, 2009
2. MFN 06-499 Supplement 2, Response to Portion of NRC Request for Additional Information Letter Number No. 218 Related to ESBWR Design Certification Application – Radiation Protection - RAI Number 12.4-19 S03, January 27, 2009
3. MFN 08-561, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 218 Related to ESBWR Design Certification Application*, July 1, 2008

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 344 Related to ESBWR Design Certification Application - Radiation Protection - RAI Number 12.4-19 S04

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Enclosure 1

MFN 09-538

Response to Portion of NRC Request for Additional Information Letter No. 344 Related to ESBWR Design Certification Application

Radiation Protection

RAI Number 12.4-19 S04

NRC RAI 12.4-19 S04

In response to RAI 12.4-19 S03, GEH addresses staff concerns based on GEH's responses to supplements 1 and 2 of RAI 12.4-19. The staff has the following questions regarding portions of GEH's response:

a. GEH's response to item 1 states that Room 1702 and the trapezoidal room (the two rooms where the IFTT can be accessed) will be permanently closed except when maintenance is being carried out on the components (valves, seats) that service the IFTT. State the expected annual frequency that these rooms will need to be accessed to perform this maintenance.

b. GEH's response to item 8 a) lists several assumptions used in the shielding analysis of the IFTT in the response to supplements 1 and 2 of RAI 12.4-19 that were changed from the original assumptions used to respond to RAI 12.4-19. Provide your reasons for the following design changes: 1) changing the radius of the steel tube, 2) changing the radius of the guard tube, 3) not including the guard tube in the model when the transfer tube passes through the interior of a room, and 4) including the addition of 10 or 15 cm of lead in the model when the transfer tube passes through the interior of a room (that staff notes that the use of this lead shielding was not assumed in the original design of the IFTT).

c. GEH's response to item 10 states that the crane girder cantilever accounts for 75 cm of the 125 cm of concrete shielding assumed between the IFTT and room 2400 (at elevation 13570) in the Fuel Building. Provide a description of what is meant by the crane girder cantilever and describe its location on DCD Figure 9.1-2.

d. GEH's response to item 14 states that the DCD Rev. 5 Figure 12.3-9 did not include a depiction of the drywell head storage location because the drywell head is not normally stored in this position. If this position is known, describe where the drywell head will normally be stored.

During a phone conversation with GEH on June 12, 2008 to discuss GEH's responses to supplements 1 and 2 of RAI 12.4-19, the staff asked GEH why Figure 12.3-6 (elevation 13570 of the Reactor and Fuel Buildings) did not show where the IFTT passed through this elevation or any of the other elevations (elevation 17500 and 9060) between the inclined fuel transfer fuel tube (on elevation 27500) and the inclined fuel transfer tube pit (on elevation 4650). GEH responded that they will provide the staff with a set of layout figures in Chapter 12 showing where the IFTT passes through each of the floor elevations.

e. Provide a set of layout figures in Chapter 12 showing where the IFTT passes through each floor elevation (these drawings were not provided as part of GEH's response to RAI 12.4-19 S03).

GEH Response

Item a:

In general, the IFTT components will be inspected, cleaned, and any maintenance performed on them as part of refueling outage preparations, which is expected to occur every 24 months (an expected annual frequency of 0.5 times/year). However, it should be noted that both routine procedures (governing radiological precautions for maintenance in high radiation areas) and emergency plan implementing procedures will contain appropriate guidance for entry. COL items related to radiation protection are 12.1-3-A (for Operational Considerations) and 12.5-3-A (for the Radiation Protection Program).

Item b:

1) The ESBWR IFTS steel tube radius was changed for the purpose of the shielding evaluation, and was further assessed based on the potential cost of the tube, and the seismic requirements. The ESBWR IFTT wall thickness is expected to be the same or thicker than the BWR-6 because the ESBWR fuel bundle cross section is similar to the BWR-6. Because the ESBWR IFTS is longer and the initial seismic input from the ESBWR seismic analysis of Reactor/Fuel Building Complex is the same order of magnitude as the BWR-6 seismic input; the final configuration of the ESBWR IFTT is expected to be the same as or thicker than BWR-6.

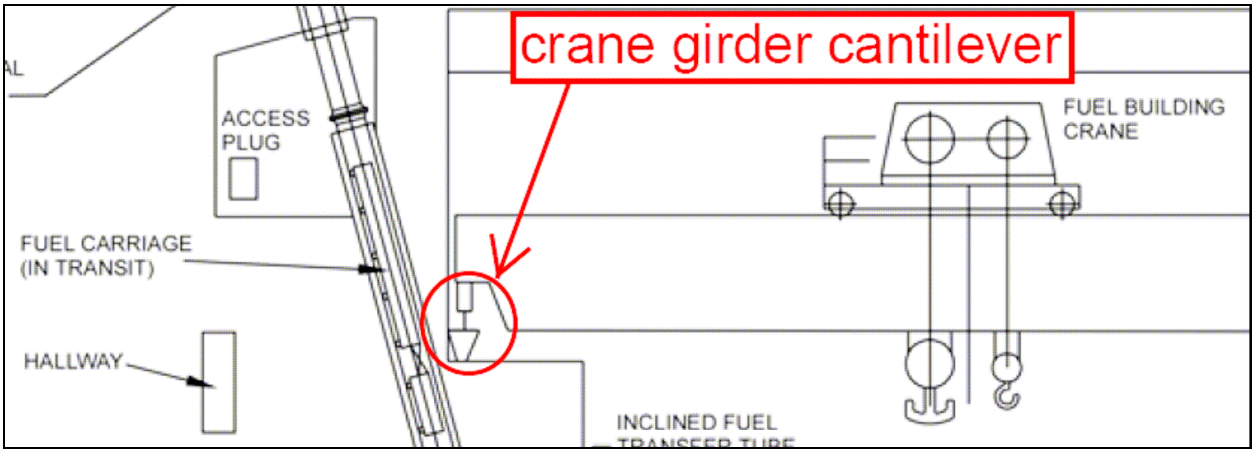
2) The radius of the guard tube was changed to accommodate the larger steel tube and was assessed using the same criteria as the stated for item b1 (above).

3) For the purpose of the shielding calculation, not including the guard tube in the model when the transfer tube passes through the interior of a room was assumed for conservatism.

4) The previously reported dose rates (transmitted via Letter MFN 06-499 Supplement 1, April 15, 2008) did not credit 10 or 15 cm of lead when the transfer tube passes through the interior of a room. Letter MFN 06-499 Supplement 2 (January 27, 2009) was misleading as it indicated lead shielding had been credited in the calculation of the dose rate around the IFTT. The 10 or 15 cm-thick layer of lead had been evaluated to study the effect of the concrete thickness at various points in the rooms due to the tilt of the transfer pipe, and was not a design change to the IFTT. As expected, the results showed that a 10 cm or 15 cm layer of lead reduces the dose rates (radiation area) in areas adjacent to the IFTT. However, the results reported in Letter MFN 06-499 Supplement 1 did not credit the 10 or 15 cm of lead around the tube, and were the most conservative results generated in the supporting evaluation.

Item c:

The term “crane girder cantilever” refers to the wall mount attached to the girder that supports the fuel-building crane. A depiction has been provided below. The concrete crane girder cantilever is approximately 75 cm thick.



Items d and e:

All of the Chapter 12 figures are included in the “Preliminary ESBWR Design Control Document, Revision 6, Chapter 12, Radiation Protection” transmitted to the NRC on June 19, 2009 via Letter MFN 09-410.

For item d, the GEH response (transmitted via Letter MFN 06-499 Supplement 2, January 17, 2009) to item 14 of RAI 12.4-19 S03 does not state that the drywell head is not normally stored in this position. It stated, “The DCD Rev. 5 Figure 12.3-9 did not include a depiction of this equipment item because it is not normally in this position.” Normally the drywell head is in its operational position above the drywell.

For item e, the layout drawings showing where the IFTT passes through each floor elevation are Figures 12.3-1 through 12.3-10 in the “Preliminary ESBWR Design Control Document, Revision 6, Chapter 12, Radiation Protection” transmitted to the NRC on June 19, 2009 via Letter MFN 09-410.

DCD/LTR Impact

No DCD changes will be made in response to this RAI.

No LTR changes will be made in response to this RAI.