HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

P.O. Box 780
3901 Castle Hayne Road, M/C A-65
Wilmington, NC 28402 USA

T 910.819.6192
F 910.362.6192
rick.kingston@ge.com

Proprietary Notice
This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosure 1, the balance of this letter may be considered non-proprietary.

MFN 09-393

Docket No. 52-010

June 30, 2009

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119**

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) sent by NRC Letter 337, dated May 14, 2009, Reference 1. GEH response to RAI Number 9.1-119 is addressed in Enclosure 1, which contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. Enclosure 2 is a non-proprietary version that is suitable for public disclosure.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GEH. GEH hereby requests that the information of Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 09-331, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application*, dated May 14, 2009.

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119 - Proprietary Version
2. Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119 – Non-Proprietary Version
3. Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119 – DCD Markup
4. MFN 09-393– Affidavit – Larry J. Tucker – June 30, 2009

cc: AE Cubbage USNRC (with enclosures)
JG Head GEH/Wilmington (with enclosures)
DH Hinds GEH/Wilmington (with enclosures)
eDRF section 0000-0102-5603

Enclosure 2

MFN 09-393

Response to Portion of NRC Request for

Additional Information Letter No. 337

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.1-119

Public Version

NRC RAI 9.1-119

SRP 9.1.2 Section III.3.B directs the staff to review the potential for several events if the spent fuel pool liner is not Seismic Category I. This includes item iii related to the thermal hydraulic analysis, "Loss of ability to cool the fuel due to flow blockage caused by a complete section or portion of the liner plate falling on the fuel racks." The staff has identified the need for clarification of the DCD and the blockage assumptions used in NEDE-33373P.

The response to RAI 9.1-6 in MFN 06-309 identifies that the spent fuel pool liner is Seismic Category 1 and some descriptions of the design loads for the spent fuel pool liner were added to the DCD. However, the DCD still does not specifically state that the spent fuel pool liner is Seismic Category 1 in expected locations such as section 9.1.2.4, Table 3.2-1, or Table 9.1-4. Revise the DCD to specifically state that the spent fuel pool liner is Seismic Category 1.

In NEDE-33373P Section 5.3.6, the assumption of [[ ]] *blockage at the rack exit is used. Does this mean each channel in the rack is blocked off* [[ ]] *or does it mean that [[ ]] of the channels are blocked? Has the Computational Fluid Dynamics (CFD) code been used with the assumption of* [[ ]] *blockage on one of the racks?*

GEH Response

Table 3.2-1 (U71 and U97) implies that the pool liners in both the Reactor Building pools and Fuel Building pool are Seismic Category I by designating the buildings themselves as Seismic Category I. Section 3.8 of the DCD, "Seismic Category I Structures", specifically describes welding of the spent fuel pool liner in Subsection 3.8.4.2.5, which means it is a Seismic Category I component. Also, Section 9.1.2.4 of the DCD states, "Fuel storage racks and pool liner embedments are designed to meet Seismic Category I requirements" in specific reference to those components in both the spent fuel pool and buffer pool.

In order to provide further clarification, Table 3.2-1 will be revised to add both the Reactor Building pool liners and the Spent Fuel Pool liner as Seismic Category I components. In addition, the Section 9.1.2.4 sentence referenced above will be reworded to read, "Fuel storage racks and pool liners are designed to meet Seismic Category I requirements".

As the pool liners are Seismic Category I, the considerations of SRP 9.1.2, Section III.3.b, are not applicable. Flow blockage caused by any portion of the liner falling on fuel racks is not considered.

The [[ ]] blockage analysis is not required by NRC documents. [[ ]] blockage at the rack exit, as analyzed in Section 5.3.6 of LTR NEDC-33373P, considers that the flow area through the channel of each fuel assembly is reduced by [[ ]]. The Computational Fluid Dynamic (CFD) analysis does not take into account any blockage, but considers unrestricted flow through the fuel. Results of the CFD are used to perform analysis of the [[ ]] blockage case, which was performed to demonstrate that under such incredible circumstances, rack integrity remains intact.

DCD Impact

DCD Tier 2, Table 3.2-1 and Subsection 9.1.2.4 will be revised as noted in the attached markups.

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

Enclosure 3

MFN 09-393

Response to Portion of NRC Request for

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Auxiliary Systems

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DCD Markup

GDC 62

Criticality in the spent fuel storage pool is prevented by the presence of fixed neutron absorbing material to assure k_{eff} does not exceed 0.95 under all normal and abnormal conditions which include earthquake and load drop. The spent fuel storage system is designed to the applicable provisions of ANSI/ANS 57.1, which specify criteria for compliance with GDC 62. Individual fuel racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks. The spent fuel storage system conforms to the applicable provisions of RG 1.13 and ANSI/ANS 57.1 and complies with GDC 62 requirements.

GDC 63

The fuel storage monitoring section of GDC 63 applies to Sections 9.4.2 and 11.5. Instrumentation associated with spent fuel storage conforms to the guidance of RG 1.13 and complies with GDC 63 requirements.

9.1.2.2 Nuclear Design

A full array in the loaded spent fuel rack is designed to be subcritical by at least 5% $\Delta k/k$. Neutron-absorbing material (borated stainless steel in accordance with ASTM A887), as an integral part of the design, is employed to assure that the calculated k_{eff}, including biases and uncertainties, does not exceed 0.95 under all normal and abnormal conditions.

Monte Carlo techniques are employed in the calculations performed to assure that k_{eff} does not exceed 0.95 under all normal and abnormal conditions (see Reference 9.1-2).

~~The storage array is assumed to be infinite in all directions. No credit is taken for neutron leakage, therefore, the values reported as effective neutron multiplication factors are, in reality, infinite neutron multiplication factors.~~

The biases between the calculated results and experimental results, as well as the uncertainty involved in the calculations, are taken into account as part of the calculative procedure to assure that the specific k_{eff} limit is met.

9.1.2.3 Storage Design

The fuel storage racks provided in the Spent Fuel Pool in the Fuel Building provide for storage of 3504 ~~3600~~ irradiated fuel assemblies, which provides enough storage capacity for 10 calendar years of plant operation. ~~accommodates the spent fuel resulting from 10 calendar years of plant operation plus one full core off load.~~ The fuel storage racks in the Reactor Building buffer pool deep pit can hold a maximum of 154 spent fuel assemblies. Together, the spent fuel storage racks provided in the spent fuel pool and buffer pool deep pit, accommodate the spent fuel resulting from 10 calendar years of plant operation plus one full core off load.

9.1.2.4 Mechanical and Structural Design

The spent fuel storage racks in the Reactor Building buffer pool and in the Spent Fuel Pool in the Fuel Building contain storage space for fuel assemblies. A standard dynamic analysis using the appropriate response spectra is performed to demonstrate compliance to design requirements. They are designed to withstand all credible static and dynamic loadings. The racks are designed to protect the fuel assemblies from excessive physical damage which may cause the release of

radioactive materials in excess of Reg. Guide 1.183 requirements, under normal and abnormal conditions caused by impact from fuel assemblies, or other equipment.

The Spent Fuel Pool and buffer pool are reinforced concrete structures with a stainless steel liner. Fuel storage racks and pool liners ~~embedments~~ are designed to meet Seismic Category I requirements. Pool liner and anchorage are designed to the same loads and load combinations as the pool concrete structure in accordance with Table 3.8-15, except that load factors for all cases are equal to 1.0, and the acceptance criteria follow ASME Section III, Division 2, CC-3700. Pool liners are evaluated to ensure structural integrity under fuel handling accidents. The bottoms of the pool gates are higher than the minimum water level required over the spent fuel storage racks to provide adequate shielding and cooling. Pool fill and drain lines enter the pool above the safe shielding water level. Redundant anti-siphon vacuum breakers are located at the high point of the pool circulation lines to preclude a pipe break from siphoning the water from the pool and jeopardizing the safe water level.

The racks include individual solid tube storage compartments, which provide lateral restraints over the entire length of the fuel assembly or bundle. The weight of the fuel assembly or bundle is supported axially by the rack fuel support. Lead-in guides at the top of the storage spaces provide guidance of the fuel during insertion. There are no unanalyzed locations within a fuel rack or array of fuel racks. Individual racks are spaced less than one fuel assembly apart so that a fuel assembly cannot be inserted between racks. In the event that a fuel assembly is lowered adjacent to an exterior rack, this configuration is analyzed.

Materials used for construction are specified in accordance with the latest issue of applicable ASTM specifications at the time of equipment order. The racks are constructed in accordance with the quality assurance requirements of 10 CFR 50, Appendix B.

The structural integrity of the rack is demonstrated for the loads and load combinations described below using linear elastic design methods.

The applied loads to the rack are as follows:

- Dead loads-weight of rack and fuel assemblies plus the hydrostatic loads;
- Live loads—effect of lifting an empty rack during installation;
- Thermal loads—effects caused by pool temperature changes occurring as a result of normal operating or abnormal conditions, as applicable;
- Dynamic loads (SRSS combination of Seismic, LOCA, SRV loads);
- Fuel drop load-effect of an accidental drop of the heaviest fuel assembly or bundle from the maximum possible height; and
- Stuck fuel load-upward force on the rack caused by a postulated stuck fuel assembly.

The load combinations considered in the rack design are as follows:

- Dead plus live loads;
- Dead plus live plus thermal loads;
- Dead plus live plus thermal plus stuck fuel loads;

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	Quality ~~Req.~~ Class[5]	Seismic Category[6]	Notes
U68 Ancillary Diesel Building Structure	N	ADB	—	S	II	(5) c, (5) h
U69 Ancillary Diesel Building HVAC System	N	ADB	—	S	II	(5) c, (5) h
U71 Reactor Building Structure						
1. Main building	3	RB	—	~~Q~~B	I	
2. Stair towers and elevator shafts	N	RB	—	S~~E~~	II	(5) c
3. Equipment, reactor, and buffer pool liners	3	RB	—	Q	I	
U72 Turbine Building Structure	N	TB	—	S~~E~~	~~NS~~II	(5) c ~~NS structure with special seismic and tornado design considerations. See Subsections 3.3.2.3, 3.5.3.3 and 3.7.2.8.~~
U73 Control Building Structure						
1. Main building	3	CB	—	~~Q~~B	I	
2. Stair towers and elevator shaft	N	CB	—	S~~E~~	II	(5) c
U74 Radwaste Building Structure	N	RW	—	S~~E~~	NS	(5) d~~Radwaste Management Systems—A quality assurance program meeting the guidance of NRC Regulatory Guide 1.143, Category RW-IIa is applied to radioactive waste management systems.~~
U75 Service Building Structure	N	SB	—	S~~E~~	II	(5) c
U77 Control Building HVAC						
1. Ducts, valves, and dampers (including supports) supporting safety-related areas	3	CB	—	~~Q~~B	I	
2. Other ducts, valves and dampers (including supports)	N	CB	—	N~~E~~	NS	
3. Electrical modules and cable with	3	CB	—	~~Q~~B	I	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	Quality ~~Req.~~ Class[5]	Seismic Category[6]	Notes
U78 Cold Machine Shop	N	OO		NE	NS	
U80 Electrical Building Structure	N	EB	—	NE	NS	
U81 Seismic Monitoring System	N	ALL	—	NE	NS	
U84 Service Water Building Structure	N	SF	—	NE	NS	
U85 Service Water Building HVAC	N	SF	—	NE	NS	
U91 Administration Building Structure	N	OL	—	NE	NS	
U93 Training Center	N	OL	—	NE	NS	
U95 Hot Machine Shop	N	OO	—	NE	NS	
U97 Fuel Building Structure						
1. Main building	3	FB	—	~~B~~Q	I	
2. HVAC penthouse, stair towers and elevator shaft	N	FB	—	SE	II	(5) c
3. Spent fuel pool liner	3	FB	—	Q	I	
U98 Fuel Building HVAC						
1. Building isolation dampers	3	FB	—	Q~~B~~	I	
2. Ducting penetrating fuel building boundary	3	FB	—	Q~~B~~	I	
3. Controls associated with the isolation dampers	3	FB	—	Q~~B~~	I	
4. Other system components	N	FB	—	SE	II	(5) c, (5) i – for RTNSS equipment
W INTAKE STRUCTURE AND SERVICING EQUIPMENT						
W12 Intake and Discharge Structures	N	OO	—	NE	NS	
W24 Cooling Tower	N	OO	—	NE	NS	
W32 Screen Cleaning Facility	N	OO	—	NE	NS	
W33 Screens, Racks, and Rakes	N	OO	—	NE	NS	

Enclosure 4

MFN 09-393

Affidavit

Larry J. Tucker

June 30, 2009

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Larry J. Tucker, state as follows:

(1) I am Manager, ESBWR Engineering, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information to be discussed and sought to be withheld is delineated in the letter from Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled "*MFN 09-393 Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119*", dated June 30, 2009. The information in Enclosure 1, which is entitled "*Response to Portion of NRC Request for Additional Information Letter No. 337 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.1-119 - Proprietary Version*" contains proprietary information, and is identified by [[dotted underline inside double square brackets$^{\{3\}}$]]. Figures and other large objects are identified with double square brackets before and after the object. In each case, the superscript notation $^{\{3\}}$ refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

   a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it contains computer code analysis inputs and assumptions used by GEH for analyzed transients using the TRACG computer model. Development of these inputs and assumptions and the TRACG computer code was achieved at a significant cost to GEH, and is considered a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the

availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 30th day of June 2009.

Larry J. Tucker
GE-Hitachi Nuclear Energy Americas LLC