GE Energy

David H. Hinds
Manager, ESBWR

PO Box 780 M/C L60
Wilmington, NC 28402-0780
USA

T 910 675 6363
F 910 362 6363
david.hinds@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 06-265

Docket No. 52-010

August 17, 2006

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. 26 Related to ESBWR Design Certification Application – Isolation Condenser - RAI Numbers 5.4-22, 5.4-27, 5.4-31, 5.4-40, 5.4-43, 5.4-47, 5.4-49 and 5.4-51**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

Enclosure 1 contains GE proprietary information as defined by 10 CFR 2.390. GE customarily maintains this information in confidence and withholds it from public disclosure.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GE. GE 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. A non proprietary version is contained in Enclosure 2.

If you have any questions about the information provided here, please let me know.

D068

Sincerely,

Kathy Sedney for

David H. Hinds
Manager, ESBWR

Enclosure:

1. MFN 06-265 - Response to Portion of NRC Request for Additional Information Letter No. 26 Related to ESBWR Design Certification Application – Isolation Condenser - RAI Numbers 5.4-22, 5.4-27, 5.4-31, 5.4-40, 5.4-43, 5.4-47, 5.4-49 and 5.4-51 – GE Proprietary Information
2. MFN 06-265 - Response to Portion of NRC Request for Additional Information Letter No. 26 Related to ESBWR Design Certification Application – Isolation Condenser - RAI Numbers 5.4-22, 5.4-27, 5.4-31, 5.4-40, 5.4-43, 5.4-47, 5.4-49 and 5.4-51 – Non Proprietary Version
3. Affidavit – George B. Stramback – dated August 17, 2006

Reference:

1. MFN 06-141, Letter from U. S. Nuclear Regulatory Commission to Mr. David H. Hinds, *Request for Additional Information Letter No. 26 Related to ESBWR Design Certification Application,* May 3, 2006

cc: WD Beckner USNRC (w/o enclosures)
AE Cubbage USNRC (with enclosures)
LA Dudes USNRC (w/o enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRFs 0000-0057-1898 and 0000-0054-1545

ENCLOSURE 2

MFN 06-265

Response to Portion of NRC Request for

Additional Information Letter No. 26

Related to ESBWR Design Certification Application

Isolation Condenser

RAI Numbers 5.4-22, 27, 31, 40, 43, 47, 49 and 51

Non Proprietary Version

NRC RAI 5.4-22

The staff finds the system operation parameters given in Table 5.4-1 is not complete. Provide a diagram showing the ICS design and operating parameters: pressures, temperatures and flow rates. The diagram should be similar to a GE standard Process Flow Diagram (PFD) for the ICS.

GE Response

A simplified Isolation Condenser System (ICS) process flow diagram (PFD) is provided in the following figure. DCD Tier 2 Section 5.4 will be revised in the next update to incorporate this figure. The requested design data, associated with the figure, follows the figure.

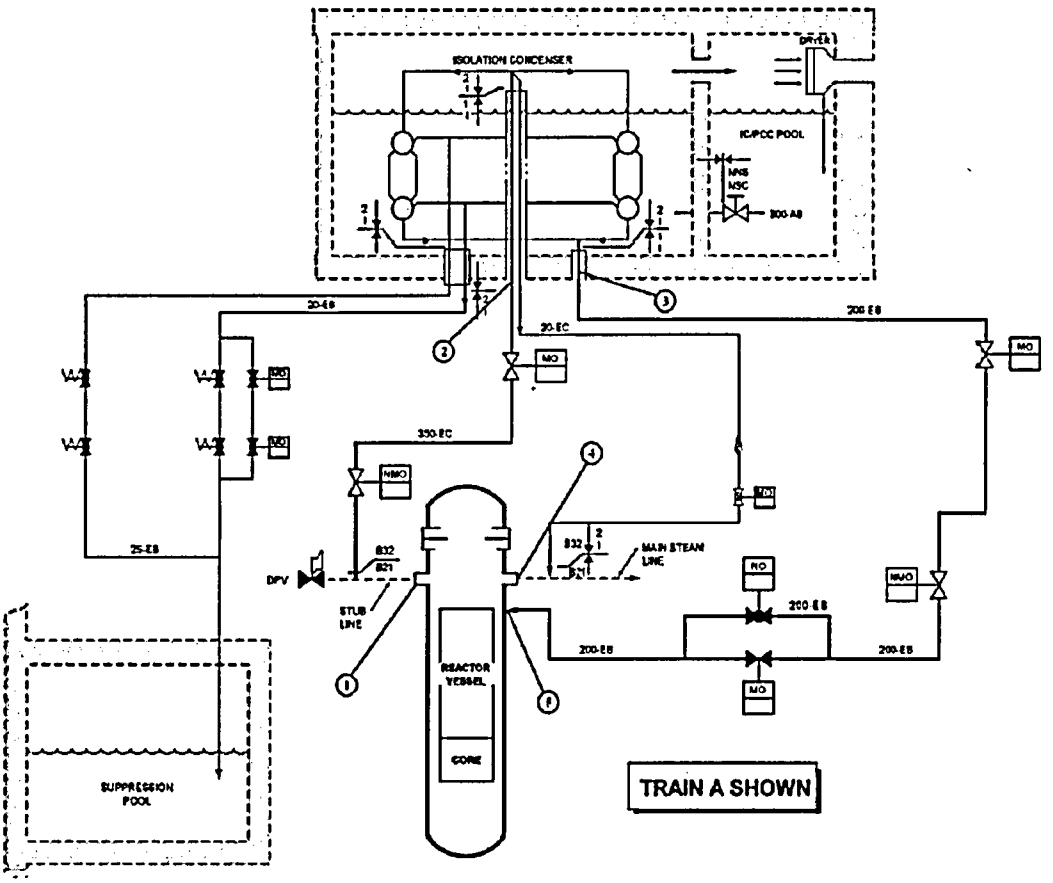

Figure 5.4-(to be assigned) Isolation Condenser System Simplified Process Diagram

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NRC RAI 5.4-27

In DCD Tier 2, Section 5.4.6 it is stated: "[t]he ESBWR passive decay heat removal systems (Isolation Condensers) are capable of achieving and maintaining safe stable conditions for at least 72 hours without operator action following non-LOCA events." After 72 hours, DCD Tier 2 states that the operator is credited for filling the ICS pools. Can the ICS operate longer than 72 hours without any make up from the fuel and auxiliary pools cooling system (FAPCS) make up line? How long can the FAPCS supply make up to the ICS pools?

GE Response

(A) *Can the ICS operate longer than 72 hours without any make up from the fuel and auxiliary pools cooling system (FAPCS) make up line?*

Additional margin is incorporated into the volumes of the ICS and expansion pool designs, therefore, the ICS will continue to operate past 72 hours without make up from a safety or nonsafety-related source. However, the safety-related flow paths of the FAPCS are designed to provide make up water past 72 hours to the ICS.

(B) *How long can the FAPCS supply make up to the ICS pools?*

The FAPCS has the ability to supply water to the ICS pools "nearly indefinitely" when connected to the Fire Protection System (FPS). Permanently installed piping is included in the FAPCS, which is connected directly with the site FPS and this can provide makeup water from 72 hours through 7 days. See DCD Tier 2 Section 9.1.3 and Figure 9.1-1.

No DCD change is required.

NRC RAI 5.4-31

Confirm that the ICS operation is independent of AC power. How long can the ICS be operated without AC power? What is the capacity of the ICS if the only source of power is the on-site DC power supply? Discuss ICS operation following a station blackout.

GE Response

(A) *Confirm that the ICS operation is independent of AC power*

DCD Tier 1 Section 2.4.1 states the ICS independence of AC power: "The ICs are sized to remove post-reactor isolation decay heat with 3 of 4 ICs operating and to reduce reactor pressure and temperature to safe shutdown conditions, with occasional venting of radiolytically generated noncondensable gases to the suppression pool. Because the heat exchangers (ICs) are independent of plant AC power, they function whenever normal heat removal systems are unavailable, to maintain reactor pressure and temperature below limits."

A clarification statement of the IC system's independence of AC power will be added in the next revision of the DCD Tier 2 in Subsection 5.4.6.1 as follows:

General System Requirements

"The ICs are sized to remove post-reactor isolation decay heat with three out of four ICs operating and to reduce reactor pressure and temperature to safe shutdown conditions, with occasional venting of radiolytically generated noncondensable gases to the suppression pool (see Table 5.4-1). The IC heat exchangers are independent of plant AC power, they function whenever normal heat removal systems are unavailable, to maintain reactor pressure and temperature below limits."

(B) *What is the capacity of the ICS if the only source of power is the on-site DC power supply?*

The ICS is only dependant on DC power; therefore, the ICS operates at full capacity with DC power.

(C) *Discuss ICS operation following station blackout.*

Subsequent to a Station Blackout (SBO), the IC system is initiated when water level 2 is reached following the trip of the feedwater pumps. The IC system initiates when the F006 valve opens using safety-related DC power. See DCD Tier 2 Subsections 15.5.5.2 & 15.5.5.3 and Sections 8B.3 & 8B.4 for plant performance.

NRC RAI 5.4-40

According to DCD Tier 1, Table 2.4.1-1, the accumulator for the pneumatic motor (PM) isolation valves in the ICS steam supply and condensate return valves have the capacity to close the valves three times with the drywell at the drywell design pressure. What is the basis for the three actuations?

GE Response

The basis for the accumulator capacity of 3 valve actuations is to cover the possibility that the isolation valve is incorrectly reopened after initial closure, therefore, requiring re-closure.

No DCD change is required.

NRC RAI 5.4-43

The ICS uses differential pressure transmitters to detect a possible pipe break and hence TMI-2 action item II.K.3.15 is applicable. Since there is a potential for inadvertent system isolation, the issue is applicable for ESBWR. Please address TMI-2 action item II.K.3.15 in the DCD.

GE Response

TMI item [II.K.3(15)] applies to high pressure systems with steam-driven pumps that use differential pressure sensors with taps in the steam supply line to isolate the steam supply in the event of a pipe break. The ESBWR Isolation Condenser System (ICS) replaces the traditional HPCI and RCIC Systems found in most BWRs. Although the ICS uses differential pressure transmitters to detect a possible pipe break, the system does not utilize steam-driven pumps. Therefore, this TMI item is not applicable to the ESBWR Standard Plant design. See DCD Table 1.9-7 which excludes this TMI item and Subsections 7.1.2.2 and 7.3.1.2.3.

No DCD change is required.

NRC RAI 5.4-47

Describe the provisions for repairing, replacing, or plugging the leaking tubes in the IC. Are any design features incorporated to reduce radiation exposure to personnel during IC tube plugging?

GE Response

Corrective maintenance for IC tube plugging following tube leak detection can be performed during refueling. After closing the isolation valves to/from the IC and after emptying its pool, personnel operating from the refueling floor can perform sub-compartment plugging/repair of the leaking tube. Maintenance will be performed from upper and lower end, after removal of the header covers. A remotely operated tool shall be used, to reduce radiation exposure to personnel.

If there is considerable damage to some component part of the IC, each module of the IC unit is designed to be easily removable, after cutting the feed, drain and vent lines. Also, the pool water in a specific isolation condenser sub-compartment is designed to be removable without emptying the remaining IC/PCC pools.

No DCD change is required.

NRC RAI 5.4-49

Once a radiation detector indicates ICS leakage, how are the specific leaking tube(s) identified?

GE Response

Once the radiation detector indicates ICS leakage, an alarm will sound and following gross leakage the complete IC train will shutdown with closure of isolation valves. At this point the IC will be declared inoperable and will require inspection to determine source of leak path.

During operation, after the leaking IC train has been isolated, a small amount of steam will be allowed to enter the IC unit and a remote camera will be used in the affected IC pool to determine the location of the leak. Corrective maintenance for IC tubes can be performed during refueling.

No DCD change is required.

NRC RAI 5.4-51

Because of the functional limitations of the passive plant designs, the Commission, in an SRM issued June 30, 1994, approved the position in SECY-94-084, " Policy and Technical Issues Associated with the Regulatory Treatment of Non-safety systems in Passive Plant Designs." This position accepts 420 EF or below, rather than the cold shutdown specified in RG 1.139, as the safe stable condition that the passive systems must be capable of achieving and maintaining following non-LOCA events. Describe in detail the use of ICS in combination with other systems to keep the plant in Safe Shutdown Condition (less than 420 EF) for 72 hours in both normal shutdown mode as well as post accident conditions. Describe the use of ICS in combination with other systems during and post LOCA conditions.

GE Response

(A) *Describe in detail the use of ICS in combination with other systems to keep the plant in Safe Shutdown Condition (less than 420 EF) for 72 hours in both normal shutdown mode as well as post accident condition.*

Normal Shutdown Mode:

DCD Tier 2 states in two sections, see below, the operation of the ICS in combination to other systems during normal shutdown.

DCD Tier 2 Section 5.1 states, "During normal shutdown and reactor servicing, the RWCU/SDC System removes residual and decay heat. The RWCU/SDC System in conjunction with the Isolation Condenser System (ICS) allows decay heat to be removed whenever the main heat sink (main condenser) is not available (e.g., hot standby). The ICS provides cooling of the reactor if the RCPB becomes isolated following a scram during power operations. The ICS automatically removes residual and decay heat to limit reactor pressure when reactor isolation occurs. Over a longer duration, the ICS provides a way to remove excess heat from the reactor with minimal loss of coolant inventory, if the normal heat removal path is unavailable."

DCD Tier 2 Subsection 5.4.6.3 Safety Evaluation states, "The Isolation Condenser System is used to transfer decay and residual heat from the reactor after it is shutdown and isolated. This function can also be performed by the RWCU/SDC system or other Engineered Safety Features (ESF) of ADS, PCCS, and GDCS which back up the ICS."

Post Accident Condition:

The ICS is designed to remove post-reactor isolation decay heat with 3 out of 4 IC heat exchangers operating and to reduce Nuclear Steam Supply System (NSSS) temperature to safe shutdown conditions of 204°C (400°F) in 36 hours (and NSSS pressure below containment design conditions of 0.31 MPaG in 72 hours) with occasional venting to the suppression pool of radiolytically generated noncondensable gases beginning four hours after isolation.

(B) *Describe the use of ICS in combination with other systems during and post LOCA conditions*

An ICS function is to avoid unnecessary use of other ESFs for residual heat removal and in the event of a Loss of Coolant Accident (LOCA) and the ICS provides additional liquid inventory upon opening of the condensate return valves to initiate the system. The ICS also provides reactor with initial depressurization of the reactor before ADS in event of loss of feed water, such that the ADS can take place from a lower water level.

No DCD change is required.

ENCLOSURE 3

MFN 06-265

Affidavit

General Electric Company

AFFIDAVIT

I, George B. Stramback, state as follows:

(1) I am Manager, Regulatory Services, General Electric Company ("GE"), 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 sought to be withheld is contained in Enclosure 1 of GE letter MFN 06-265, David H. Hinds to USNRC, *Response to Portion of NRC Request for Additional Information Letter No. 26 Related to ESBWR Design Certification Application – Isolation Condenser - RAI Numbers 5.4-22, 5.4-27, 5.4-31, 5.4-40, 5.4-43, 5.4-47, 5.4-49 and 5.4-51,* dated August 17, 2006. The proprietary information in Enclosure 1, *Response to Portion of NRC Request for Additional Information Letter No. 26 Related to ESBWR Design Certification Application – Isolation Condenser - RAI Numbers 5.4-22, 5.4-27, 5.4-31, 5.4-40, 5.4-43, 5.4-47, 5.4-49 and 5.4-51 – GE Proprietary Information,* is delineated by a double underline inside double square brackets. Figures and large equation 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, GE 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 2.790(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 General Electric's competitors without license from General Electric 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 General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

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 GE, 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 GE, 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. Access to such documents within GE 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, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE 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 the results of detailed ESBWR isolation condenser design and testing information developed by GE over a period of several years at a cost of over one million dollars. This information, 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.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE'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 GE.

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.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE 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 GE 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 GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing 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 17th day of August 2006.

George B. Stramback
General Electric Company