July 23, 2007

Mr. Robert E. Brown
Senior Vice President, Regulatory Affairs
GE-Hitachi Nuclear Energy Americas LLC
3901 Castle Hayne Rd MC A-45
Wilmington NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 103 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, General Electric Company (GE) submitted an application for final design approval and standard design certification of the economic simplified boiling water reactor (ESBWR) standard plant design pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed design.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter. This RAI concerns Tier 1 and Chapters 6 and 9 of Tier 2, Revision 3, of the ESBWR Design Control Document:

Chapter 6: 6.2-178 and 6.4-5 through 6.4-17
Chapter 9: 9.4-29 through 9.4-50
Chapter 14: 14.3-152 and 14.3-153

To support the review schedule, you are requested to respond to this RAI by October 1, 2007.

If you have any questions or comments concerning this matter, please contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov or me at (301) 415-3207 or saw8@nrc.gov.

Sincerely,

/RA/

Shawn Williams, Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
As stated

cc w/encl: See next page

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ACCESSION NO. ML071830286

OFFICE	NGE1	NGE1/PM	NGE1/BC
NAME	SWilliams	ACubbage	MShuaibi
DATE	07/20/2007	07/20/2007	07/23/2007

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RAI Number	Reviewer	Question Summary	Full Text
6.2-178	Goel R	Provide in the DCD a description of which “special events” were considered in the analysis.	DCD, Revision 3, Tier 2, subsection 6.2.5.4.1, makes these two statements addressing containment structural integrity: – The pressure capability of the ESBWR containment vessel is such that it will not be exceeded by any design basis or special event. – The pressure capability of the containment’s limiting component is higher than the pressure that results from assuming 100% fuel clad-coolant reaction. There is sufficient margin to the containment pressure capability such that there is no need for an automatic containment overpressure protection system. These statements are not specific enough for the staff to be able to determine whether the structural integrity of the containment design is acceptable. First, it is unclear as to what is meant by a “special event.” Second, the DCD does not provide the actual pressure that results from assuming 100% fuel clad-coolant reaction, and most especially does not indicate whether the assumption of 100% fuel clad-coolant reaction includes hydrogen burning, as required by 10 CFR 50.44(c)(5). It may be that the inerted condition of the containment would preclude burning for many or most accidents, but there may be beyond design-basis accident sequences in which sufficient oxygen is generated by radiolysis of water to support combustion. Provide in the DCD a description of which “special events” were considered in the analysis. Provide the actual pressure that results from assuming 100% fuel clad-coolant reaction, and whether the assumption of 100% fuel clad-coolant reaction includes hydrogen burning. If no hydrogen burning was assumed for any accident, justify this assumption, with consideration of beyond design-basis accident information from DCD, Tier 2, Chapter 19.

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6.4-5	Forrest E	Has the main control room bottled system been completely removed from the design?	DCD, Tier 2, Revision 3, Section 12.3.3.2.1, Control Room Ventilation, references bottled air as being supplied during the first 72 hours and that the Control Building is maintained at 0.5 inches Hg. Staff's understanding is that main control room bottled system has been completely removed from the design. Please reconcile this discrepancy in the DCD. Also, confirm the 0.5 inches Hg value.
6.4-6	Forrest E	Revise Table 3.2-1, U77, item number 4 accordingly.	DCD, Tier 2, Revision 3, Chapter 3, Table 3.2-1, U77, item number 4 states, "Main control room bottled air system." Staff's understanding is that main control room bottled system has been completely removed from the design. Please reconcile this discrepancy in the DCD.
6.4-7	Forrest E	Discuss in the DCD how temperature in the control room is to be maintained for the entire 30 day design basis accident period.	DCD, Tier 2, Revision 3, Section 6.4.3, states that the heat sink "consists of the thermal mass of concrete that makes up the ceilings and walls of these rooms" in the control room habitability area (CRHA). This RAI requests additional information on the role of the heat sink after 72 hours into the design basis accident. A. Thoroughly discuss in the DCD how the temperature in the control room is to be maintained for the entire 30 day design basis accident period. Include the initial temperature assumptions and CRHA heat loads that are assumed in the heat sink calculation. Identify the equipment and their power sources necessary to maintain the temperature (heat sink, recirculation air handling units (AHUs), chillers, cooling water pumps, etc) for the full 30 day period. B. After 72 hours into the design basis accident, will the operation of the chillers, cooling water pumps, and recirculation AHUs be needed so that the heat sink is not needed? Are these items powered from the same portable non-safety diesel generator units used to power the EFU's after 72 hours? Are connections established to allow rapid hook up of the portable diesel generators? C. Identify in the DCD the non-safety-related components included in the regulatory treatment of non-safety systems (RTNSS) program that are needed to maintain CRHA temperature.

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			D. Change number 125 to Section 8 for Rev. 3 of the DCD states "The transportable AC generator referenced has been deleted from the ESBWR design." Are the portable generators part of the ESBWR design? Are these the same portable non-safety diesel generator units used to power the EFU's after 72 hours as described in Section 6.4.4, Emergency Mode? If these portable diesel generators have been removed from the ESBWR design, what have they been replaced with?
6.4-8	Forrest E	Discuss the surveillance requirements that will ensure that the initial temperature assumptions on the heat sink are below acceptable limits?	What surveillance requirements will ensure that the initial temperature assumptions on the heat sink are below acceptable limits? How often will these surveillances be performed? How are the effects of the following items accounted for in the surveillances: (1) external temperatures such as 95 degree Fahrenheit day and (2) heat loads in adjoining rooms and passageways? The temperature of the CRHA is not necessarily the temperature of the heat sink because of the temperatures on the outside surface of the heat sink (concrete wall, ceilings, and floors) may be higher than the temperature in the control room.
6.4-9	Forrest E	Provide the analysis that ensures the feasibility of maintaining the tested differential pressure with the design makeup airflow rate.	DCD, Tier 2, Revision 3, Section 6.4.4 under Emergency Mode states that a constant air flow, sufficient to pressurize the CRHA boundary, is maintained. Standard Review Plan (SRP) Section 6.4, Revision 3, March 2007*, in Acceptance Criteria Item 3 for Pressurization Systems, paragraph B states: "Systems having pressurization rates of less than 0.5 and equal to or greater than 0.25 volume changes per hour should have identical testing requirements as indicated in acceptance criteria [A] above. In addition, at the construction permit (CP), combined license, or standard design certification stage, an analysis should be provided (based on the planned leaktight design features) that ensures the feasibility of maintaining the tested differential pressure with the design makeup airflow rate." Provide the analysis underlined above so that the staff can evaluate the adequacy of make up flow rate. Include the results of the analysis in the DCD. *Note: Same criteria same as 1981 and 1996 versions of SRP Section 6.4

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6.4-10	Forrest E	Refer to the addenda AG-1a-92 in the DCD.	DCD, Tier 2, Revision 3, Section 6.4.3 under Component Descriptions, states that the emergency filter units (EFUs) are designed to ASME AG-1 but addenda AG-1a-92 is not mentioned. Addenda AG-1a-92 is part of acceptance criterion no. 4 in Standard Review Plan (SRP) Section 6.4, Revision 3, March 2007, and was also included in SRP Section 6.4, Draft Revision 3, June 1996. Refer to the addenda in the DCD or provide a reason why it is not applicable.
6.4-11	Forrest E	Provide information on the HVAC supply louvers.	Refer to DCD, Tier 2, Revision 3, Figures 1.2-4 and 1.2-11 that show the location of the heating, ventilation and air conditioning (HVAC) supply louvers: A. Identify which of these louvers services the emergency filter unit (EFU) system and which services the normal HVAC supply to the control room habitability area (CRHA). B. Are these control room ventilation inlets consistent with the values suggested in acceptance criterion no. 5A in Standard Review Plan (SRP) Section 6.4, Revision 3, March 2007?*: (1) Are they separated from potential release points by 100 feet laterally and 50 feet vertically, and; (2) Are the actual minimum distances based on the dose analyses? Include the information requested above in the DCD. *Note: Same criteria as the 1981 and 1996 versions of SRP Section 6.4

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6.4-12	Forrest E	Provide information in the DCD on the ability of the CRHA systems to protect during a toxic gas event.	DCD, Tier 2, Revision 3, Section 6.4.1.1 states that control room habitability area (CRHA) requirements are satisfied without the need for individual breathing apparatus. A. Concerning acceptance criterion no. 5B in Standard Review Plan (SRP) Section 6.4, Revision 3, March 2007*, provide information in the DCD on the ability of the CRHA systems to protect during a toxic gas event without individual breathing apparatus. Specifically, if the CRHA is isolated in a toxic gas event, would the emergency filter unit (EFU) be operational and effective for all potential toxic gasses? Is there any event where self contained breathing apparatus would be required? If this is the case, how many are provided and where are they stored? B. SRP 6.4, Section III, Item 2*, “Control Room Personnel Capacity” states that for a control room designed with complete isolation capability from the outside air, a 100,000 cubic foot CRHA would be satisfactory for 5 operators for 6 days from the build up of carbon dioxide. If the ESBWR CRHA had to be totally isolated, how long would the anticipated number of operators be protected in an 88,000 cubic foot control room from the build up of carbon dioxide? *Note: Same criteria as the 1981 and 1996 versions of SRP Section 6.4
6.4-13	Forrest E	Provide information on the tornado dampers as they relate to the CRHAVS.	DCD, Tier 2, Revision 3, Section 6.4.3 under “Component Descriptions” lists tornado dampers. The staff requests additional information to assure that appropriate protection is provided to the various intakes or discharge paths of the control room habitability area heating, ventilation and air conditioning (CRHAVS). A. Identify in the DCD the location and quantity of the tornado dampers. B. Identify in the DCD the supply louvers are considered safety-related and protected by tornado dampers. C. Discuss the potential for the control building or control room habitability area to experience a sudden drop in pressure due to a tornado event as a result of an unprotected louver?

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6.4-14	Forrest E	Is there any ductwork external to the CRHA associated with EFU supply, normal outside air supply, and smoke purge paths.	DCD, Tier 2, Revision 3, Section 6.4.3 under "Leak Tightness" states that the control room habitability area (CRHA) utilizes internal air handling units (AHUs) that preclude any AHU ductwork external to the CRHA envelope. Include a discussion in the DCD of any ductwork external to the CRHA associated with emergency filter unit (EFU) supply, normal outside air supply, and smoke purge paths. Please be specific in referencing components such as AHU's and use the same terminology on figures, tables and in the text.
6.4-15	Forrest E	Is the emergency habitability portion also automatically initiated and an EFU started by a toxic gas event?	DCD, Tier 2, Revision 3, Section 6.4.4 states that operation of the emergency habitability portion of the control room habitability area heating, ventilation and air conditioning (CRHAVS) system is automatically initiated by either of the following conditions – High radioactivity in the main control room supply air duct – Extended loss of AC power Is the emergency habitability portion also automatically initiated and an EFU started by a toxic gas event? Please explain the duration that qualifies as an extended loss of AC power.
6.4-16	Forrest E.	Provide additional information why credit is needed for main control room cooling in the first two hours or state clearly in the DCD that no credit is being taken.	DCD, Tier 2, Revision 3, Section 6.4.4 states that during the first two hours of a station blackout (SBO). Most of the equipment in the main control room (MCR) remains powered by the non-1E battery supply. A. For a design basis accident with loss of power is any of the equipment in the MCR powered from the non-1E battery supply. What credit is taken for cooling and the operation of an AHU during this two hour period with respect to temperature rise in the MCR for the first 72 hours and ultimately for the duration of the accident period (30 days). If credit is taken for cooling, please justify the use of non-safety batteries during the design basis accident mitigation and recovery period.

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			B. What manual actions are required during a LOCA with a LOOP to isolate non-safety heat loads due to the potential unavailability of non-1E battery supply? This would be of particular concern during the early stages (first two hours) of the accident. Have these manual actions been identified and evaluated in the analysis?
6.4-17	Forrest E	State in the DCD that the testing frequency will be consistent with the guidance of Regulatory Guide 1.197.	DCD, Tier 2, Revision 3, Section 6.4.9 states that the COL applicant will provide the testing frequency for main control room (CRHA) inleakage testing. Please state in the DCD (1) that the test requirements and the testing frequency will be consistent with the guidance of Regulatory Guide 1.197 which establishes an in service test program and (2) that the test requirements are presented in Chapter 16, Technical Specifications, Section 5.5.12, Control Room Habitability Area (CRHA) Boundary Program.

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9.4-29	Forrest E	Show how the control room compares to the type of facility selected from the ASHRAE Standard 62 tables in terms of use, equipment, and air circulation features.	In DCD, Tier 2, Revision 3, Section 9.4.1, the Emergency Filter Unit (EFU) flow rate was established at 424 cfm. This was stated to be the minimum outdoor supply air required to maintain breathable air quality in the control room based on American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62. Please provide the assumptions used in this determination. Show how the control room compares to the type of facility selected from the ASHRAE 62 tables in terms of use, equipment, and air circulation features. Are there monitors that would warn operators of oxygen or carbon dioxide levels? Is there a capability to increase filtered outdoor air flow if more fresh air is needed? Considering the control room as an isolated facility with very minimal air circulation, what is the maximum carbon dioxide level and how does it compare with the toxic limits for carbon dioxide in the 72 hours after an accident?
9.4-30	Forrest E	Discuss the features which provide assurance that the air in the operator breathable zone would be adequately refreshed in the first 72 hours.	In DCD, Tier 2, Revision 3, Section 9.4.1, Figure 9.4-1 the EFU discharges its flow into the plenum above the false ceiling in the control room. For the first two hours an air handling unit (AHU) operates off the non-safety battery power to facilitate removal of non-safety heat loads. The inference is that after two hours the recirculation AHU would be shut down. As such, there would be no recirculation from the plenum above the false ceiling to the plenum below the false floor for distribution through the control room. Breathable air, especially if it is warm air from the outside, may not dissipate to the operator breathable zone and the operator could experience reduced oxygen. Please discuss the features which provide assurance that the air in the operator breathable zone would be adequately refreshed in the first 72 hours.

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9.4-31	Forrest E	Provide information on power sources for EFU operation after 72 hours.	A. In DCD, Tier 2, Revision 3, Section 9.4.1 the applicant stated that the emergency filter unit (EFU) was operated from the safety-related battery supply for a 72 hour duration. In Section 19A.3.1.3, it is stated that "for longer term operation, the system can be powered by a small, portable AC power generator that is kept on the plant site." Is this portable generator dedicated to the EFU system as a power source? Please clearly state how many portable generators are provided for this purpose. If there is only one, what actions would be needed to restore power to the EFU. What are the testing requirements and reliability goals for the portable generator system under the RTNSS program? Are there conveniently located isolation busses provided where the portable generator can be hooked up to provide power to the EFU? Does this portable generator also power the chiller and recirculation AHU that is necessary to restore temperature control in the control room habitability area (CRHA)? B. In DCD, Tier 2 Revision 3, Section 19A.8.4.12, it is stated that the portable AC generator that recharges the batteries that power the Control Room Habitability Area ventilation is not risk significant...." The EFU is operated from one of the four safety-related battery trains. Would this portable AC generator be hooked up to recharge one or more of these trains after 72 hours? Explain how GDC19 is met if the loss of the portable AC generator results in the loss of the EFU.

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9.4-32	Forrest E	Justify use of non safety cooling in the first 2 hrs and identify manual operator actions required.	DCD, Tier 2, Revision 3, Section 9.4.1 states that the CRHAVS maintains a habitable control room under accident conditions by providing adequate radiation protection and breathing air. When power is available, the Air Handling Units (AHU) maintains the space temperature. Upon loss of power the remaining non safety-related heat loads are dissipated for 2 hours using battery power, and the remaining safety related heat loads are passively dissipated by the walls, floor ceiling, and interior walls . A. Please provide additional information justifying the use of a non-safety power source to provide cooling to non-safety heat loads in the first two hours of accident mitigation. Please include in the information the source and magnitude of these heat loads and the impact on control room temperatures and accident mitigation if cooling is not available and/or these non-safety heat loads are isolated. B. Please identify any operator actions that may be required to isolate these heat loads during the first two hours of an accident.
9.4-33	Forrest E	Provide additional information on how the temperature in the Control room changes with time during the 72 hour period following accident initiation.	In DCD, Tier 2, Revision 3, Section 9.4.1 it is stated that after the first two hours up to 72 hours, the temperature is controlled by the absorption of heat by the control room habitability area (CRHA) heat sink which is essentially the building walls, floors, ceilings and other structural components. The staff understands that a recirculation AHU would not be operating and that movement of air in the control room would be by natural convection with a small contribution of the EFU outside air flow being delivered to the space above the false ceiling. Provide additional information on how the temperature in the control room changes with time during the 72-hour period following accident initiation. The information should be based on a detailed thermal heat transfer study that considers the temperature of outside air entering

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			the control room, the heat loads in the control room, the rate of heat transfer from the heat producing equipment to control room air, the rate of heat transfer from the control room air to building structures and components that make up the heat sink, the impact of other barriers to heat transfer such as carpets, vinyl layers, false ceilings and floors, and the impact of heat sources on exterior CRHA surfaces, outside air conditions and other environmental factors on the building heat sink. The staff is concerned that although there is some potential to remove the heat through the heat sink, the rate of removal would be much slower than the heat released to the room and the temperatures might exceed limits for personnel and equipment operation.
9.4-34	Forrest E	Control room temperature questions during a design base accident.	In DCD, Tier 2, Revision 3,Section 9.4.1, it is stated that the temperature rise in the control room would be limited to 15 degrees Fahrenheit. Is the temperature rise based on the highest temperature that could exist in the room at the time of the accident? Although room air temperature is important, the temperature of the air inside electrical cabinets is also important because it affects the proper functioning and potential failure of components important to safety. Is the air flow through electrical cabinets reduced during the 72-hour post accident period? Are temperatures inside the cabinets higher since the room air used to cool the cabinets is higher? Is there any potential for component design temperatures to be exceeded with adverse effects on component performance or failure? Is there any adverse impact on control room temperatures or component operating temperatures if the winter design temperatures exist at the time of the accident?

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9.4-35	Forrest E	Explain the inconsistency between the DCD Section 5.5.13 test criteria and the regulatory guide 1.52.	In DCD, Tier 2, Revision 3, Section 9.4.1, the applicant states that the emergency filter unit (EFU) filter units will be tested in accordance with Regulatory Guide 1.52. The staff noted that in Section 5.5.13 of DCD, Tier 2, Revision 3 that the criteria for the in place and by pass leakage test was specified as 1.0 percent. Regulatory Guide 1.52 criteria for the in place and by pass leakage test is 0.05 percent. Please explain the inconsistency between the DCD Section 5.5.13 test criteria and the regulatory guide and either justify the use of 1.0 percent or make appropriate changes to the DCD.
9.4-36	Forrest E	Explain the basis for the laboratory test criteria used to support the 99% credited efficiency.	The staff noted that in DCD, Tier 2, Revision 3, Section 5.5.13.c that the laboratory test of the charcoal absorber shows a penetration value of less than 1 percent. In Section 9.4.1, the credit given the carbon adsorption filter in the emergency filter unit (EFU) is 99 percent credited efficiency (equivalent to 1 peercent penetration). Regulatory Guide (RG) 1.52 requires a safety factor of 2 for the laboratory test criteria with respect to the efficiency credited for filter operation. This would lead to a laboratory test criteria of less than 0.5 percent penetration. Explain the basis for the laboratory test criteria used to support the 99 percent credited efficiency and provide the thickness of the charcoal bed in the DCD.
9.4-37	Forrest E	Clarify the classification of the portions of the CRHAVS which penetrate the CRHA envelope.	In DCD, Tier 2, Revision 3, Section 9.4.1, it was stated in the control room habitability HVAC system (CRHAVS) description that "The portions of the CRHAVS which penetrate the control room habitability area (CRHA) envelope are <u>non-safety-related</u> and designed as Seismic Category I to provide isolation of the CRHA envelope from the outside and surrounding areas in the event of a design basis accident (DBA)."

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			Please clarify if the items should be classified as safety-related since they provide isolation of the CRHA envelope from the outside and surrounding areas in the event of a DBA and make the appropriate change to the DCD.
9.4-38	Forrest E	Is there any impact on the fuel building ventilation system as a result of pool boiling?	Spent fuel pool cooling relies on pool boiling as an emergency cooling method. Is there any impact on the fuel building ventilation system as a result of pool boiling? Would releases during pool boiling mandate routing the fuel building ventilation system to the Reactor Building HVAC Purge Exhaust Filter Unit for clean up?
9.4-39	Forrest E	Clarify which parts of the RBVS, EBVS, FBVS, CBVS, and TBVS are considered RTNSS and which components require cooling in the post 72 hour period.	DCD Section 19A.8.4.10, Tier 2, states that component cooling will be performed by the HVAC systems in the Reactor Building, Electrical Building, Fuel Building, Control Building, and parts of the Turbine Building. A. Please identify which components in the Reactor Building HVAC System (RBVS) are RTNSS qualified. Please discuss how the RBVS or its sub-system would be used in the post 72-hour period and identify areas of the Reactor Building or equipment which require ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the RBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS). B. Please identify which components in the Electrical Building HVAC System (EBVS) are RTNSS qualified. Please discuss how the EBVS or its sub-system would be used in the post 72-hour period and identify areas of the Electrical Building or equipment which require ventilation or cooling. C. Please identify which components in the Fuel Building HVAC System (FBVS) are RTNSS qualified. Please discuss how the FBVS or its sub-system would be used in the post 72-hour period and identify areas of the Fuel Building or equipment which require

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			ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the FBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS). D. Please identify which components in the Control Building HVAC System (CBVS) are RTNSS qualified. Please discuss how the CBVS or its sub-system would be used in the post 72-hour period and identify areas of the Control Building or equipment which require ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the CBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS). E. Please identify which components in the Turbine Building HVAC System (TBVS) are RTNSS qualified. Please discuss how the TBVS or its sub-system would be used in the post 72-hour period and identify areas of the Turbine Building or equipment which require ventilation or cooling.
9.4-40	Forrest E	Show all five filter units on Figure 9.4-8 or show one filter unit with a note saying that it is typical of 5 units.	DCD, Tier 2, Revision 3, Figure 9.4-8 shows two (2) filter units for the Turbine Building Exhaust (TBE) system whereas Table 9.4-15 states there are five (5) filter units. Please show all five filter units on the figure or show one filter unit with a note saying that it is typical of 5 units. Please verify that the nomenclature between the figure, table, and text are consistent.

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9.4-41	Forrest E	Show all four of the safety-related dampers on Figure 9.4-11 and mark them as safety-related.	DCD Tier 2, Revision 3, Table 9.4-10 states there are four (4) safety-related isolation dampers for the Reactor Building Refueling and Pool Area HVAC Subsystem (REPAVS). Figure 9.4-11 (a simplified diagram) only shows two (2) building isolation dampers. Please show all four of the safety-related dampers on the figure and mark them as safety-related.
9.4-42	Forrest E	Identify the isolation dampers that are safety-related on Figure 9.4-9 and coordinate with Table 9.4-9.	DCD, Tier 2, Revision 3, Table 9.4-9 does not list safety-related isolation dampers. Please add this item to the table with appropriate information. Figure 9.4-9 has a variety of dampers. Please identify the isolation dampers that are safety-related and coordinate with Table 9.4-9.
9.4-43	Forrest E	Provide additional information from Table 9.4-9.	DCD, Tier 2, Revision 3, Table 9.4-9 shows two battery room exhaust fans. How many battery rooms are exhausted by these fans? Are there both safety-related and non-safety-related battery rooms exhausted by these fans. Are there monitors in each of the battery rooms that indicate that the rooms are being properly exhausted and that there is no build up of hydrogen? Is the operation of these fans required to keep the battery rooms cool during periods of battery discharge? Are there recirculation fans in each of the rooms to prevent thermal gradients?
9.4-44	Forrest E	Show all four of the safety-related dampers on Figure 9.4-10 and mark them as safety-related.	DCD, Tier 2, Revision 3, Table 9.4-11 states there are four (4) safety-related isolation dampers for the Reactor Building Contaminated Area HVAC Subsystem (CONAVS). Figure 9.4-10 (a simplified diagram) only shows two (2) building isolation dampers. Please show all four of the safety-related dampers on the figure and mark them as safety-related.
9.4-45	Forrest E	Include the Main Steam Tunnel AHU's and CONAVS AHU's on the appropriate diagrams and equipment lists.	DCD, Tier 2, Revision 3, Table 9.4-11 lists a Main Steam Tunnel AHU, Recirculation AHU and a Refueling Machine Control Room Recirculation AHU as part of the CONAVS equipment.

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			A. Please identify these items on the Figure 9.4-10 with respect to other CONAVS equipment. B. The Main Steam Tunnel AHU's are located in the Turbine Building. Are there safety-related dampers for isolation at the Reactor Building interface? Include them on the appropriate diagrams and equipment list. C. The CONAVS AHU's are located in the Fuel Handling Building. Are there safety-related dampers at the building interface? Include them on the appropriate diagrams and equipment list.
9.4-46	Forrest E	Include the building isolation dampers and note if they are safety-related in Figure 9.4-9.	DCD, Tier 2, Revision 3, Figure 9.4-9 indicates that the smoke purge is exhausted directly to the environment. Include the building isolation dampers and note if they are safety-related in Figure 8.4-9. Since the smoke exhaust could be from contaminated areas, is there any provision to monitor for radioactive release?
9.4-47	Forrest E	How the reactor building clean air sub system exhaust air monitored for radiation?	DCD, Tier 2, Revision 3, Figure 9.4-9 shows that the reactor building clean air sub system exhaust air directly outdoors. How is the release monitored for radiation? What assurance is there that this release is clean and does not have to be monitored? Are there barriers that separate the clean area from the contaminated areas of the reactor building other than air pressure differential?
9.4-48	Forrest E	Provide in Section 9.4.7 the major components of the EBVS including sub systems and basic design features including flow rates.	DCD, Tier 2, Revision 3, Section 9.4.7.1 states that the Electrical Building Electric and Electronic Rooms (EER) sub system provides fresh filtered air. Identify the outside air intake and flow rate on Figure 9.4-12 for the EER or the Electrical Building Technical Support Center HVAC Subsystem (TSCVS) systems and discuss its adequacy in the DCD

RAI Number	Reviewer	Question Summary	Full Text
			Tier 2 text. Has the potential effect of hot air being introduced from the outside been taken into consideration with the sizing of cooling coil capacity? Provide a table that shows the major components of the electrical building HVAC System (EBVS) including sub systems and basic design features including flow rates.
9.4-49	Forrest E	Provide additional information on the applicability of the ASHRAE Standard 62 on a tightly closed facility such as the control room and determine if there are long term indoor air quality effects on habitability that need to be addressed.	In DCD, Revision 3, Tier 2, Section 9.4.1 and as shown on Figure 9.4.1, the normal outdoor air supply for the control room habitability area HVAC system (CRHAVS) is 424 cfm. With the leak tight structure, the CR is essentially a confined entry vessel and is significantly different from the structures evaluated in ASHRAE 62. The CR operates at a positive pressure and depends on cracks, crevices, and door seals leakage to remove most of the surplus air that develops as a result of the normal outside air supply. The staff is concerned that the air which leaves the ESBWR control room might not carry with it the contaminants, odors, fumes, etc., that would be carried out by a direct exhaust equivalent to the outside air being added. Provide additional information on the applicability of the ASHRAE Standard 62 on a tightly closed facility such as the ESBWR control room and determine if there are long term indoor air quality effects on habitability that need to be addressed.
9.4-50	Forrest E	The AHU's listed in Table 9.4.2 should be labeled Recirculation AHU's to avoid confusion and the terminology should be consistent in the text, tables and figures of the DCD.	The AHU's listed in DCD, Tier 2, Revision 3, Table 9.4.2 should be labeled Recirculation AHU's to avoid confusion and the terminology should be consistent in the text, tables and figures of the DCD.

RAI Number	Reviewer	Question Summary	Full Text
14.3-152	Forrest E	Provide an ITAAC to verify that the leaktightness of the CRHA has been achieved by testing in accordance with the guidance in Regulatory Guide 1.197.	DCD, Tier 2, Revision 3, Section 6.4.3 discusses the features of the design that provide leak tightness of the control room habitability area (CRHA). Section 6.4.7 discusses preoperational test requirements. Provide an ITAAC in the DCD, Tier 1 to verify that the leak tightness of the CRHA has been achieved by testing in accordance with the guidance in Regulatory Guide 1.197. This testing is important in that it serves as the basis for unfiltered in-leakage assumed in the design basis analyses of Chapter 15.
14.3-153	Forrest E	Confirm the unfiltered in leakage value that will be used in the design basis analyses and be maintained by control room pressurization in the accident mode.	In DCD, Tier 2, Revision 3, Section 9.4.1, the applicant stated that the Control Room Habitability Area HVAC Subsystem (CRHAVS) would maintain the control room at a positive pressure of 1/8 inches e.g., to minimize air in leakage. DCD, Tier 2, Revision 3, Chapter 15, Table 15.4-5 states that the assumption on control room unfiltered in leakage is 1.13E-02 cubic meters per minute (0.3 cfm). Typically, a value of 10 cfm as a minimum is assumed for access and egress. In addition, results of tracer gas testing on positive pressure control rooms have shown additional leakage in many cases. Inefficiency of the emergency filter unit (EFU) filters and bypass penetration could add to unfiltered in leakage. A. Please confirm the unfiltered in leakage value that will be used in the design basis analyses and be maintained by control room pressurization in the accident mode. B. Provide an ITAAC to verify that the unfiltered inleakage is no greater than the value in A.

cc:

Ms. Michele Boyd
Legislative Director
Energy Program
Public Citizens Critical Mass Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

Mr. Marvin Fertel
Senior Vice President
and Chief Nuclear Officer
Nuclear Energy Institute
1776 I Street, NW
Suite 400
Washington, DC 20006-3708

Mr. Ray Ganthner
AREVA, Framatome ANP, Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

Dr. Gail H. Marcus
U.S. Department of Energy
Room 5A-143
1000 Independence Avenue, SW
Washington, DC 20585

Email

APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
bob.brown@ge.com (Robert E. Brown)
BrinkmCB@westinghouse.com (Charles Brinkman)
chris.maslak@ge.com (Chris Maslak)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
dan1.williamson@ge.com (Dan Williamson)
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
David.piepmeyer@ge.com (David Piepmeyer)
dlochbaum@UCSUSA.org (David Lochbaum)
don.lewis@ge.com (Don Lewis)
erg-xl@cox.net (Eddie R. Grant)
frankq@hursttech.com (Frank Quinn)
Frostie.white@ge.com (Frostie White)
gcesare@enercon.com (Guy Cesare)
george.honma@ge.com (George Honma)
george.stramback@gene.ge.com (George Stramback)
george.wadkins@ge.com (George Wadkins)
GovePA@BV.com (Patrick Gove)
greshaja@westinghouse.com (James Gresham)
gzinke@entergy.com (George Alan Zinke)
hickste@earthlink.net (Thomas Hicks)
james.beard@gene.ge.com (James Beard)
jcurtiss@winston.com (Jim Curtiss)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
jim.kinsey@ge.com (James Kinsey)
jim.riccio@wdc.greenpeace.org (James Riccio)
JJNesrsta@cpsenergy.com (James J. Nesrsta)
joel.Friday@ge.com (Joel Friday)
john.leatherman@ge.com (John Leatherman)
john.o'neil@pillsburylaw.com (John O'Neil)
john.sorensen@ge.com (John Sorensen)
Joseph.savage@ge.com (Joseph Savage)
Joseph_Hegner@dom.com (Joseph Hegner)
junichi_uchiyama@mhi.co.jp (Junichi Uchiyama)
kathy.sedney@ge.com (Kathy Sedney)
KSutton@morganlewis.com (Kathryn M. Sutton)
kurt.schaefer@ge.com (Kurt Schaefer)
kwaugh@impact-net.org (Kenneth O. Waugh)
lou.lanese@ge.com (Lou Lanese)
lynchs@gao.gov (Sarah Lynch - Meeting Notices Only)
MaddenG@BV.com (George Madden)
maria.webb@pillsburylaw.com (Maria Webb)
mark.beaumont@wsms.com (Mark Beaumont)
Marvin_Smith@dom.com (Marvin L. Smith)
matias.travieso-diaz@pillsburylaw.com (Matias Travieso-Diaz)
edia@nei.org (Scott Peterson)

mgiles@entergy.com (M. Giles)
mike_moran@fpl.com (Mike Moran)
mwetterhahn@winston.com (M. Wetterhahn)
mwl@nei.org (Melanie Lyons)
pareez.golub@ge.com (Pareez Golub)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
peter.jordan@ge.com (Peter Jordan)
Petrovb@westinghouse.com (Bojan Petrovic)
PGunter@NIRS.org (Paul Gunter)
phinnen@entergy.com (Paul Hinnenkamp)
pshastings@duke-energy.com (Peter Hastings)
RJB@NEI.org (Russell Bell)
RKTemple@cpsenergy.com (R.K. Temple)
roberta.swain@ge.com (Roberta Swain)
ronald.hagen@eia.doe.gov (Ronald Hagen)
sandra.sloan@areva.com (Sandra Sloan)
SauerB@BV.com (Robert C. Sauer)
sfrantz@morganlewis.com (Stephen P. Frantz)
steven.hucik@ge.com (Steven Hucik)
steven.stark@ge.com (Steven Stark)
tom.miller@hq.doe.gov (Tom Miller)
tom.miller@nuclear.energy.gov (Thomas P. Miller)
trsmith@winston.com (Tyson Smith)
waraksre@westinghouse.com (Rosemarie E. Waraks)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)
kenneth.ainger@exeloncorp.com (K. Ainger)