

October 10, 2006

Mr. David Hinds, Manager, ESBWR
General Electric Company
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 71 RELATED TO
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

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 the Radioactive Waste Management, Chapter 11, Radiation Protection, Chapter 12, and Human Factors Engineering, Chapter 18, of Tier 2 of the ESBWR design control document (DCD), Revision 1. The RAI questions regarding Chapter 11 and 12 were sent to you via electronic mail on September 8, 2006, and you agreed to respond to these RAI questions by November 22, 2006.

The RAI questions regarding Chapter 18, were sent to you via electronic mail on August 28, 2006 with 18.7 question numbers and were resent on September 14, 2006 to renumber the questions from 18.7 to 18.8 and revise question 18.8-23. We discussed these questions with your staff on September 27, 2006 and you agreed to respond to these RAI questions by November 22, 2006.

Also contained in the enclosure to this letter are RAI followup questions on question 12.2-9 and 12.2-10 that were sent to you via electronic mail on September 8, 2006.

D. Hinds

- 2 -

If you have any questions or comments concerning this matter, you may contact me at (301) 415-207 or lnq@nrc.gov, or Amy Cabbage at (301) 415-42875 or aec@nrc.gov.

Sincerely,

/RA/

Lauren Quiñones, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-0010

Enclosure: As stated

cc: See next page

D. Hinds

- 2 -

If you have any questions or comments concerning this matter, you may contact me at (301) 415-207 or lnq@nrc.gov, or Amy Cubbage at (301) 415-42875 or aec@nrc.gov.

Sincerely,

/RA/

Lauren Quiñones, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-0010

Enclosure: As stated

cc: See next page

Distribution:

Hard Copy

PUBLIC
NESB R/F
ACubbage
LQuinones

E-Mail

JDanna
MGravilas
ACRS
OGC
ACubbage
LRossbach
LQuinones
MBarillas
JGaslevic
JBongarra
JCai
NSalgado
higgins@bnl.gov
ohara@bnl.gov
JCDehmel
TFrey

ACCESSION NO. ML062790403

OFFICE	NRBA/PM	NRBA/BC
NAME	LQuinones	JColaccino
DATE	10/10/2006	10/10/2006

OFFICIAL RECORD COPY

Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD) Chapters 11 and 12

RAI Number	Reviewer	Question Summary	Full Text
11.4-16	Dehmel JC	DCD Section 11.4.2.2 does not address the generation of mixed wastes and how mixed wastes will be handled for shipment and disposal.	A review of the types of radioactive wastes described in DCD Tier 2, Revision1, Section 11.4.2.2 indicates that there is no discussion on the generation of mixed wastes and how mixed wastes (with chemical and radiological hazards) will be processed. Provide a description of permanently installed or mobile treatment systems (processing equipment, tanks, pumps, etc.) that will be used to process, handle, and package and ship mixed wastes. Describe information and operational considerations that would be addressed by the COL applicant in the process control program. Update equipment descriptions in DCD Tier 2 Table 11.4-1 and revise DCD Tier 2 Table 11.4-2 to include an annual estimate of the projected amounts of mixed wastes.
11.4-17	Dehmel JC	The DCD does not address how large items, such as vessels, tanks, pumps, core components, etc. will be processed for disposal.	A review of the types of radioactive wastes described in DCD Tier 2, Revision 1, Section 11.4.2.2 indicates that there is no discussion on how large items, such as vessels, tanks, pumps, core components, etc. will be handled. Provide a description of equipment (cranes, decon equipment, etc.) and features of the radwaste building (shielding, staging areas, etc.) that will be used to process, handle, and package and ship large plant components. Describe information and operational considerations that would be addressed by the COL applicant in the process control program. Update equipment descriptions in DCD Tier 2, Table 11.4-1 and revise DCD Tier 2, Table 11.4-2 to describe the types and numbers, or projected amounts of such wastes.

RAI Number	Reviewer	Question Summary	Full Text
11.5-23	Dehmel JC	The DCD does not address plant design features to mitigate radiation exposures and doses to members of the public associated with the production of N-16 and sky-shine out of the turbine building.	<p>A review of DCD Tier 2, Revision 1, Sections 10.4.2, 11.3, 11.5, 12.3.1, and 12.3.2 indicates that there is no discussion addressing plant design features to mitigate radiation exposures and doses to members of the public associated with the production of N-16 and sky-shine out of the turbine building in the context of 10 CFR Parts 20.1302 and 20.1301(e) and 40 CFR 190. Provide:</p> <ul style="list-style-type: none"> (A) a description of turbine building features (placement of main steam pipes, shielding, construction materials used for the turbine building walls and roof, etc.) that are designed to mitigate radiation fields and sky-shine in plant environs; (B) an estimate of the dose to a postulated member of the public located at or beyond the EAB (800 m) in complying with 10 CFR Parts 20.1302 and 20.1301(e) and 40 CFR 190; and (C) describe how site-specific conditions will be considered in assessing radiation exposures and doses to members of the public, and how such information and operational considerations would be addressed by the COL applicant in the offsite dose calculation manual.

RAI Number	Reviewer	Question Summary	Full Text
11.5-24	Dehmel JC	The DCD does not address acceptance criteria and guidance of SRP Section 9.3.2.II (NUREG-0800) on the process sampling system and post-accident sampling system.	<p>A review of DCD Tier 2, Revision 1, Sections 11.5 and 9.3.2 indicates that there are no discussions on whether the acceptance criteria and guidance of SRP Section 9.3.2.II, Revision 2, July 1981, on the process sampling system and post-accident sampling system were considered in the design. The criteria include: General Design Criteria 1, 2, 13, 14, 26, 41, 60, 63, and 64; 10 CFR Part 20.1101(b); and 10 CFR Parts 50.34(f)(2)(viii) and 50.34(2)(xxvi). The guidance includes Regulatory Guides 1.21, 1.26, 1.29, 1.33, 1.56, 1.97, and 8.8; and ANSI/HPS 13.1-1999. Accordingly:</p> <ul style="list-style-type: none"> (A) provide discussions addressing how the applicable requirements of SRP Section 9.3.2.II were met in DCD Tier 2, Sections 11.5.5 and 9.3.2 for gaseous/liquid process and effluent streams; (B) update the text of DCD Tier 2, Sections 11.5.5 and 9.3.2 and Tables 11.5-1 and 9.3-1 to reflect the applicable criteria of SRP Section 9.3.2.II; (C) update the text in DCD Tier 2, Section 11.5.5 by adding internal cross-references to DCD Tier 2, Section 9.3.2; and (D) describe operational considerations that would be addressed by the COL applicant in DCD Tier 2, Sections 11.5.7 and 9.3.2.

RAI Number	Reviewer	Question Summary	Full Text
11.5-25	Dehmel JC	In the DCD, the types of filtration systems mitigating and controlling gaseous effluents (as prefilters, HEPA, and charcoal) are not consistently described.	<p>DCD Tier 2, Revision 1, Sections 9.4.2, 9.4.3, 9.4.4, and 9.4.6, and Tables 9.4-7 and 9.4-11 inconsistently describe the types of filtration systems (as prefilters, high energy particulate air (HEPA), or charcoal) used for mitigating and controlling gaseous effluents described in DCD Tier 2, Sections 11.5 and 11.3. Please address the following:</p> <p>(A) DCD Sections 9.4.2 and 9.4.6 and DCD Table 9.4-11 indicate that the exhaust flow out the reactor and fuel buildings may be diverted to the purge exhaust filter unit. The information does not describe the types of filters used in these subsystems. DCD Table 9.4-11 refers to “high efficiency and HEPA” and DCD Section 9.4.6 only refers to “filter units” or “filter unit.” Update descriptions to clearly specify the exact make up of each “filter unit” (i.e., equipped with prefilters, HEPA filters, and/or charcoal filters, or combination of these) for each subsystem.</p> <p>(B) DCD Section 9.4.4 states that HEPA filters are used for the turbine building exhaust subsystem, turbine building compartment exhaust subsystem, and turbine building decontamination room exhaust subsystem, but they are not listed in supporting DCD tables. Provide information and equipment descriptions in new tables for these subsystems - see details in DCD Table 9.4-7 as an example.</p> <p>(C) DCD Table 9.4-7 describes the filters for the radwaste building general area exhaust as “medium efficiency and HEPA” filtration units, while DCD Section 9.4.3 describes the system as “medium efficiency prefilter and HEPA filter.” The designation of “prefilter” should be used consistently throughout this and other sections when prefilters are specified by the design. Update DCD text and tables accordingly.</p>

RAI Number	Reviewer	Question Summary	Full Text
12.2-20	Dehmel JC	Address inconsistency on the method used to assess the radiological consequences of the postulated failure of the charcoal delay bed of the Offgas system.	A review of DCD Tier 2, Rev 1, Section 11.3.7 indicates that the radiological consequences of the postulated failure of the charcoal delay bed (Offgas system) were evaluated using the technical guidance of Branch Technical Position ESTB 11-5, as described in NUREG-0800, Standard Review Plan (SRP) Section 11.3.II [Draft Revision 3, dated June 1996]. The method described in ESTB 11.5 requires the use of the BWR-GALE code (NUREG-0016). However, GE's response to NRC RAI No. 12.2-9(b) (GE letter dated July 21, 2006, MFN 06-212) states that BWR-GALE code was not used in the analysis providing an estimate of annual airborne effluent releases. Accordingly, reconcile this inconsistency, update the methodology described in DCD Tier 2, Section 11.3.7, update the analytical parameters listed in DCD Tier 2, Tables 11.3-4 to 11.3-7, and revise doses if the analysis is updated. This clarification and updated information are needed for the staff to independently confirm the approach and dose results presented in DCD Tier 2, Section 11.3.7.

**Followup Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD) Chapters 12**

RAI Number	Reviewer	Question Summary	Full Text
12.2-9 followup	Dehmel JC	Estimates of gaseous effluent total annual radionuclide activity releases listed in Table 12.2-16 could not be confirmed using the updated information contained in GE responses to RAIs 12.2-9, 11.1-1 and 11.1-2.	<p>The estimates of total annual airborne effluent releases presented in DCD Tier 2, Revision 1, Table 12.2-16 could not be duplicated using the information contained GE responses to RAI No. 12.2-9 (MFN-06-212 dated July 21, 2006) and RAIs No. 11.1-1 and 11.1-2 (MFN-06-219 dated July 19, 2006) and the BWR-GALE Code (NUREG-0016). For example, the staff's analyses show results that are inconsistent even after making specific adjustments to results, such as for the assumed primary coolant radionuclide concentrations and plant capacity factor. Please address the following:</p> <ol style="list-style-type: none"> a. Since the BWR-GALE code was not used by GE in deriving total annual effluent releases, provide a description of the alternate method used, including adjustments made to address specific plant processes and/or radionuclides. b. Provide technical discussions describing differences between the method used by GE and NUREG-0016. Include sufficient details in the response to facilitate the staff's review in comparing sources of differences.

RAI Number	Reviewer	Question Summary	Full Text
12.2-10 followup	Dehmel JC	Estimates of liquid effluent total annual radionuclide activity releases listed in Table 12.2-19b could not be confirmed using the updated information contained in GE responses to RAI No. 12.2-10 (dated July 21, 2006) and RAIs No. 11.1-1 and 11.1-2 (dated July 19, 2006).	<p>The estimates of total annual liquid effluent releases presented in DCD Tier 2, Revision 1, Table 12.2-19b could not be duplicated using the information contained GE responses to RAI No. 12.2-10 (MFN-06-212 dated July 21, 2006) and RAIs No. 11.1-1 and 11.1-2 (MFN-06-219 dated July 19, 2006) and the BWR-GALE Code (NUREG-0016) and the BWR-GALE Code (NUREG-0016). For example, the staff's analyses show results that are inconsistent even after making specific adjustments to results, such as for the assumed primary coolant radionuclide concentrations and plant capacity factor. Please address the following:</p> <ul style="list-style-type: none"> a. Since the BWR-GALE code was not used by GE in deriving total annual effluent releases, provide a description of the alternate method used, including adjustments made to address specific plant processes and/or radionuclides. b. Provide technical discussions describing differences between the method used by GE and NUREG-0016. Include sufficient details in the response to facilitate the staff's review in comparing sources of differences.

Requests for Additional Information (RAIs)
Evaluation of NEDO-33268, Revision 0, ESBWR Human-system Interface (HSI) Design Implementation Plan

RAI Number	Reviewer	Question Summary	Full Text
18.8-1	Bongarra J	In NEDO-33268, clarify what tasks has been accomplished already and what will be done in the future.	<p>Use of present tense - Much of the document is written in present tense. For example, NEDO-33268 page (p.) 62 states: "The requirements for operator interaction with the Video Display Unit (VDU) or Flat Panel Display Graphical User Interface (GUI) are identified in the Style Guide for Graphical User Interfaces."</p> <p>Does the style guide currently exist and are the requirements currently in it? Please, clarify what tasks has been accomplished already and what will be done in the future.</p>
18.8-2	Bongarra J	Provide step-by-step, specific guidance on how to perform the HSI design.	<p>Presentation of the Methodology - An implementation plan should provide step-by-step, specific guidance on how to perform the HSI design. The current document stops short of providing step-by-step procedures. To illustrate, in NEDO-33268, Section 4.2.3, the plan advises its user to design the Man-Machine Interface Systems (MMIS) giving due consideration to the "centralized or local philosophy," but the philosophy for the ESBWR is not provided. Much of the plan identifies considerations for design without providing designers with the basis or procedures to make decisions based on the considerations. Another example is that the "Auditory environment of the HSI is designed considering a relevant database of human capabilities and characteristics" (p. 24). Absence of these type of specific procedural steps will make this document difficult for users and the intended methodology may be incorrectly and inconsistently applied.</p> <p>Special attention should be made to ensuring that the methodology used to address the General Human Factors Engineering (HFE) Requirements described in NEDO-33268, Section 3.3.3 is presented. Section 3.3.3 follows closely the staff's review criteria for HSI Design. However, the high-level discussion in 3.3.3 does not provided the methodological details</p>

RAI Number	Reviewer	Question Summary	Full Text
18.8-2 (cont.)			as to how these commitments are achieved. While some the considerations are addressed in later sections of the NEDO, others are not. For example, Section 3.3.2 discusses General Electric's commitment to develop a concept of operations. However, none of the subsequent plan material or documentation descriptions address concept of operations. Please, provide step-by-step, specific guidance on how to perform the HSI design.
18.8-3	Bongarra J	Clarify why the methodology is described as a recommendation only.	Commitment to the Methodology - The methodology is presented in this document (NEDO-33268) as a recommended practice rather than a commitment. The purpose of an Implementation Plan review is to certify the methodology that will be used, rather than what might be used. Please clarify why the methodology is described as a recommendation only and not the actual plan that will be used to conduct that analysis.
18.8-4	Bongarra J	Clarify why a background color was not specified?	Level of detail for guidance provided - NEDO-33268 Sections 4, 5, and 6 provide high-level HSI guidance. As an example, Section 4.2.6.2, Item 1.c.v states (p. 26) that "For VDU display, the background color should be pure and free from noise patterning." Clarify why a background color was not specified and how is the guidance in Sections 4, 5, and 6 to be used by designers following the plan?
18.8-5	Bongarra J	Clarify statement on NEDO-33268, p. 10, regarding ABWR and predecessor control rooms	Role of the ABWR and predecessor control rooms - NEDO-33268, page 10, states "The ESBWR HSI design implementation starts with the results of the operations analysis (system functional requirements analysis, allocation of functions, and task analysis) and with the existing design bases included in the Advanced Boiling Water Reactor (ABWR) Standard Safety Analysis Report (SSAR)." At the time of ABWR design certification, these analyses had not been completed and were a part of a certified process. Please clarify this statement.

RAI Number	Reviewer	Question Summary	Full Text
18.8-6	Bongarra J	Please clarify commitment to RG 1.97, Revision 4 and IEEE Std 497-2002.	Use of Regulatory Guide (RG) 1.97, draft Revision 4 and IEEE Standard (Std) 497-2002 - The introduction to NEDO-33268 and Table 1 both refer to RG 1.97, draft Revision 4 and IEEE Std 497-2002, but don't clearly state they will be followed. RG 1.97 Revision 4, which endorses IEEE 497 (with a few exceptions) has been issued as a final document and is being used for evaluating the ESBWR. Please clarify the commitment to these documents in NEDO-33268.
18.8-7	Bongarra J	Clarify NEDO-33268 scope and purpose.	<p>Purpose and Scope - The purpose of NEDO-33268 limits HSI design program to the main control room (MCR) and remote shutdown system (RSS), and the scope only addresses the MCR. Both the purpose and scope should include, the MCR, RSS, local control stations, the Technical Support Center (TSC) and the Emergency Offsite Facility (EOF). It is noted that the TSC and EOF are mentioned in Section 4.</p> <p>NEDO-33268, Section 1.2, Scope, Item 3 States "Methods for comparing the consistency of the HSI human performance, equipment design and associated workplace factors with that modeled and evaluated through the task analysis." Please clarify scope and purpose.</p>
18.8-8	Bongarra J	Clarify the use of old document versions.	NEDO-33268, Section 2 has many references to old documents - many to the 1980s. What role do these documents play in the plan. Many of the versions of the documents referenced have been replaced by newer, updated material. For example, MIL-STD-1472D is referenced, while that document has been revised and is now in Revision F. Some of the old documents may contain outdated and potentially incorrect guidance. For example, EPRI-NP3701 on Computer-Generated Display System Guidelines was published in 1984. Technology and display development approaches have advanced so much since 1984 that the guidance is not fully applicable to today's systems. These documents have been replaced by a new generation of guidance documents. Clarify the use of old document versions.

RAI Number	Reviewer	Question Summary	Full Text
18.8-9	Bongarra J	Clarify why more modern control rooms are not included in the OER.	NEDO-33268, Section 4.1 discusses the use of operating experience. Section 4.1.1 identifies existing plants for which Detailed Control Room Design Reviews (DCRDRs) were performed and who's Human Engineering Discrepancies (HEDs) will be evaluated for lessons learned. The plants listed do not include ABWRs (although operating experience of the ABWR is listed in the first sentence of Section 4.2), whose control rooms are like to be more similar to ESBWR than the plants listed. Also, no other "computer-based" control rooms are identified where similar technology may be used. Please clarify why more modern control rooms are not included in the Operational Experience Review (OER).
18.8-10	Bongarra J	Does NEDE-33217 list of human factors principles going to be used for portions of the ESBWR design?	Status of NEDE-33217 and its application to ESBWR - NEDO-33268, Section 4.1.1 references NEDE-33217 as a source of information on operating experience of previous designs. What document is this and is it available for staff review. NEDE-33217 led to a fairly extensive list of human factors principles identified in Appendix A. However, many of the principles would not seem to apply to a computer-based control room. Are these principles still to be used for portions of the ESBWR design?
18.8-11	Bongarra J	Provide status of control building general arrangement drawing	Status of the Control Building General Arrangement Drawing - NEDO-33268, Section 4.2.1 lists standard features. Reference is made to the Control Building General Arrangement Drawing after item 18. What is the status of this drawing and how does it relate to Figure 18D-1 of the Tier 2 Design Control Document (DCD)?
18.8-12	Bongarra J	Clarify statement on NEDO-33268, p. 29.	NEDO-33268, p. 29 states that the information processing functions should support "Expanding availability information to cover implicit data." Please clarify this statement.

RAI Number	Reviewer	Question Summary	Full Text
18.8-13	Bongarra J	Please clarify discussion on critical parameters	Specific critical parameters - NEDO-33268, p. 33 discusses critical parameters and references Section 18F. However, this section only identified the need for a Combined Operating License (COL) minimum inventory analysis and not the parameters. Please, clarify.
18.8-14	Bongarra J	How are plant parameters determined and status of arrangement drawings?	Wide Display Panel (WDP) Arrangement drawings - NEDO-33268, p. 34 states that plant parameters that are to be displayed on the over mimic are defined on the WDP Arrangement drawings. How are these parameters determined and what is the status of the arrangement drawings?
18.8-15	Bongarra J	Provide status of GUI Style Guide and how does it relate to NEDO-33268.	Status of GUI Style Guide - NEDO-33268, p. 35 and Section 4.6.4.2, p. 62 reference this document. The language suggests this document already exists, e.g. "The requirements for operator interaction with the VDU or Flat Panel Display GUI are identified in the Style Guide for Graphical User Interfaces" (p. 61). What is its status of this document and how does it relate to the guidance presented in the NEDO?
18.8-16	Bongarra J	Will ESBWR have computer-based ARPs?	Alarm Response Procedures (ARPs) - NEDO-33268, p. 38 discusses ARP and computer-based aids. Will ESBWR have computer-based ARPs? Alarms and corrective actions - NEDO-33268, p. 38 states that the display of alarms meets the following criteria. Criterion a. states "An alarm is annunciated where the operator has the necessary means for initiating corrective actions." Please clarify this statement, particularly as it applies to VDUs.
18.8-17	Bongarra J	What database is referred to in NEDO-33268, p. 39?	Anthropometric database - NEDO-33268, p. 39 states "Mechanical characteristics of control elements, such as size, operating pressure of force, tactile feedback, etc., meet capabilities and characteristics specified in the anthropometric database." What database is referred to here?

RAI Number	Reviewer	Question Summary	Full Text
18.8-18	Bongarra J	Clarify statements on controls, NEDO-33268, p. 39 and 40.	<p>Placement of controls - NEDO-33268, p. 39, Item 2 - iii states "Placement of controls in keeping with their conformance to safety functions." Please clarify what this statement means.</p> <p>Form of controls - NEDO-33268, p. 40 states "The form of control adopted is consistent with HSI requirements." Please clarify what this statement means.</p>
18.8-19	Bongarra J	Is it feasible for a dedicated control to be located at the MCC while the associated display is at the WDP?	Control-display relationships - NEDO-33268, p. 44, states "The Motor Control Center (MCC) design does not contain fixed-position displays because the standard ESBWR design does not require them at the MCC. All fixed-position displays (FPD) are located at the WDP based, in part, on the rationale for fixed-position displays (such as diversity) and the relatively compact configuration of the MCC. ... The minimum set of controls, displays and alarms, based upon a review of the ESBWR Emergency Procedure Guidelines (EPGs), have been allocated to the MCC and WDP." In Section 4.2.1, standard feature 4 states "The use of dedicated function switches on the control console." Is it feasible for a dedicated control to be located at the MCC while the associated display is at the WDP? What is the status of the minimum set of controls, displays and alarms?
18.8-20	Bongarra J	Provide status of MCC Panel Arrangement drawings	Status of MCC Panel Arrangement drawings - NEDO-33268, p. 45 references these drawings. What is their status?
18.8-21	Bongarra J	How was the list of critical parameters determined?	Critical parameters – NEDO-33268, p. 49 lists critical parameters to be displayed on the WDP. How was this list determined and why are the pool levels (suppression pool, gravity-driven cooling system, isolation condenser, and passive containment cooling) not included?
18.8-22	Bongarra J	Are suppressed alarms available to operators should they want them?	Alarm suppression - NEDO-33268, p. 50-51 discusses approaches to alarm suppression. Are suppressed alarms available to operators should they want them?

RAI Number	Reviewer	Question Summary	Full Text
18.8-23	Bongarra J	Explain how the analysis to define the minimum inventory was conducted and what the results were.	Definition of Minimum Inventory - NEDO-33268, p. 53 notes that an analysis was performed that defined a minimum inventory of alarms, displays, and controls using the EPGs, Probabilistic Risk Assessment (PRA), and "other studies." Please explain how this analysis was conducted and provide the minimum inventory of displays, controls and alarms derived from the analysis for both the MCR and RSS. And, in accordance with SRP 14.3.9, Draft Rev. 0, April 1996, the minimum inventory list should be included in DCD Tier 1. Also this section states that the analysis used important operator actions identified in the PRA. Please provide this list of operator actions and explain how they were derived.
18.8-24	Bongarra J	Explain statement in NEDO-33268, p. 55 regarding MCC profiles	MCC profiles - NEDO-33268, p. 55 notes that "MCC profiles that are compatible with task requirements have been defined in DCD Chapter 18." Explain how is this possible if the task analysis has not been completed yet?
18.8-25	Bongarra J	Explain what is the ESBWR Standard Plant Design Program.	Explain what is the ESBWR Standard Plant Design Program referenced in NEDO-33268, p. 56.
18.8-26	Bongarra J	Explain where in the DCD is the annunciator philosophy articulated.	Annunciation philosophy - NEDO-33268, p. 59 notes that "The annunciator philosophy for the ESBWR design, and the annunciator warning system, is based on the concepts presented in the ESBWR DCD." Explain where in the DCD is this philosophy articulated.
18.8-27	Bongarra J	Explain relation between conceptual design allocation of function in NEDO-33268 and NEDO-33210.	Conceptual design allocation of function - NEDO-33268, p. 60 states "Perform Preliminary allocation of primary and backup mode operation to operator or machine for the following functions" How does this relate to the allocation of function process described in that implementation plan (NEDO-33220)?
18.8-28	Bongarra J	Explain factors and considered constraints in the context of a new plant design.	Display system constraints - NEDO-33268, p. 61 identifies plant-specific display design constraints. The list includes: demands of operator and industry standards and guidelines. Explain why these factors are considered constraints in the context of a new plant design.

RAI Number	Reviewer	Question Summary	Full Text
18.8-29	Bongarra J	Provide status of the Display Primitives Design Specification	Status of the Display Primitives Design Specification - NEDO-33268, Section 4.6.4.2, p. 62, references a Display Primitives Design Specification. What is the status of this document?
18.8-30	Bongarra J	Clarify criteria for selecting HFE techniques	Criteria for selecting HFE techniques - NEDO-33268, p. 65, identifies "Demonstrated by use of dynamic displays, simulator, etc." as a criterion for selecting HFE techniques. How is this used as a criterion?
18.8-31	Bongarra J	Clarify the terms used and provide a consistent discussion regarding tools, techniques, methods and procedures for the HSI Design.	Clarification of tools, techniques, methods, and procedures - NEDO-33268, p. 64 contains a section 4.7.1, "Criteria Used in Selecting HFE/HSI Design and Evaluation Tools." The section discusses tools and techniques and presents a list of seven procedures appropriate to HSI evaluation in item 1. Item 2 goes on to provide criteria for selecting techniques. Section 4.7.2 is entitled "Definition of the Design/Evaluation Tools for the HSI Design Analysis." The introductory paragraph in this section addresses techniques. The section goes on to define four "techniques," including: checklists, drawings, mock-ups, and questionnaires/interviews. Two of these are the same as those identified in the listing of procedures in the previous section. Section 4.7.1 references Figures 4 & 5. Figure 4 identifies methods of data collection that are the same as the seven procedures listed on p. 64. Figure 5 identifies five methods of design evaluation, that include things like full-scope simulator. Please clarify the terms used and provide a consistent discussion in these sections of the NEDO.
18.8-32	Bongarra J	Clarify use of the criteria listed in Section 3.	Selecting HFE tools - NEDO-33268, p. 65, states "Considering the criteria listed in Section 3, Criteria to be used in selecting HFE/HSI Design and Evaluation Tools, the following techniques are used in the conduct of the HSI design analyses." How is the Section 3 material used for this purpose? Why are the criteria provided in Section 4.7.1 (including Figs 4 and 5) not used?

RAI Number	Reviewer	Question Summary	Full Text
18.8-33	Bongarra J	Clarify list of HFE activities provided in Figure 4, NEDO-33268, p. 95.	Figure 4 clarification - NEDO-33268, p. 95, Figure 4 lists HFE activities across the top of the matrix. Why were these activities chosen? What is meant by performance models? How are MMI Evaluation and Evaluation of Alternative Designs different? How were the ratings in the cells of the table determined?
18.8-34	Bongarra J	Clarify information provided in NEDO-33268, p. 96, Figure 5.	Figure 5 clarification - NEDO-33268, p. 96, Figure 5 - What is the basis for the evaluations? Full-scope simulators and in-plant evaluations are always identified as "inefficient." How is efficiency defined. What is the meaning of the underline for some cell entries?
18.8-35	Bongarra J	Provide description of methods of evaluation listed in NEDO-33268, Section 4.7.2.5.2.	Evaluation methods - NEDO-33268, Section 4.7.2.5.2, Methods of Evaluation, lists three such methods. However, the actual methods are not described. For example, the first item listed is "Electronic Evaluation." The section does not describe how a user of the document conducts this evaluation. Also, why have several of the methods (listed in Figure 5 and shown on Fig 7) been omitted from this section, e.g., full-scope simulator?
18.8-36	Bongarra J	Provide relationship between guidelines and descriptions provided in NEDO-33268, sections 5 and 6.	Relationship between guidelines and descriptions - NEDO-33268, Section 5 provides a HSI description and Section 6 provides software guidelines. How do these descriptions and guidelines relate to those provided in earlier section and those in the documents referenced in this NEDO, such as the HSI style guide?
18.8-37	Bongarra J	Clarify report reference in NEDO-33268, p. 74.	Report clarification - NEDO-33268, Section 6, p. 74, identified the "HSI report.". What report is being identified here?
18.8-38	Bongarra J	Clarify statement in NEDO-33268, p. 74 regarding NUREG-0700.	NUREG requirements - NEDO-33268, Section 6, p. 74, states "The look and feel of each display is governed by the requirements of NUREG-0700R2 ..." This should be modified since NUREG-0700 does not contain "requirements."

RAI Number	Reviewer	Question Summary	Full Text
18.8-39	Bongarra J	Will the guidance in the style guide be more specific to how general guidance is tailored and made more specific for the ESBWR application?	Style guide contents - NEDO-33268, p. 86, indicates that the ESBWR style guide will be based on "applicable excerpts from NUREG-0700R2." Much of the guidance in NUREG-0700 is fairly general due to its application (review of different HSI designs). Will the guidance in the style guide be more specific to how general guidance is tailored and made more specific for the ESBWR application?
18.8-40	Bongarra J	Clarify statements in NEDO-33268, Figure 1.	<p>NEDO-33268, Figure 1 states "All HSIs conform to HFE Guidelines" under HSI Task Support Verification. The same statement appears under HFE Design Verification. This statement appears to accurately characterize the latter, but not the former. Please clarify.</p> <p>NEDO-33268, Figure 1 states "Dynamic Display" under HFE Design Verification, yet the types of mockups listed would not seem to support an evaluation of dynamic displays. Please explain.</p>
18.8-41	Bongarra J	Clarify design inputs listed in NEDO-33268, Figure 2.	<p>NEDO-33268, Figure 2 lists a number of design inputs. Questions related to some of them are:</p> <ul style="list-style-type: none"> • Where are the general human factors requirements listed? • What does HSI technology refer to? • Describe how is the minimum displays, controls and alarms list an input. • What does operating crew refer to?
18.8-42	Bongarra J	Explain "Information and Control Requirements Definition Synthesis" as used on Figure 3 NEDO-33268, p. 94.	NEDO-33268, p. 94. Please explain "Information and Control Requirements Definition Synthesis" as used on Figure 3.

RAI Number	Reviewer	Question Summary	Full Text
18.8-43	Bongarra J	Describe the ESBWR-specific implementation of HSI.	<p>NUREG-0711 Section 8.5 references several other regulatory documents that specify HSI-related systems in the control room or other control facilities for the power plant. Please describe the ESBWR-specific implementation of HSI for the following six key aspects of the plant HSI:</p> <ol style="list-style-type: none"> 1. Provision for periodic testing of protection systems actuation functions, as described in Regulatory Guide 1.22. 2. Bypassed and inoperable status indication for NPP safety systems, as described in Regulatory Guide 1.47. 3. Manual initiation of protective actions, as described in Regulatory Guide 1.62. 4. Instrumentation for light-water-cooled nuclear power plants to access plant and environmental conditions during and following an accident, as described in Regulatory Guide 1.97. 5. Instrumentation setpoints, as described in Regulatory Guide 1.105. 6. HSIs for the emergency response facilities (TSC & EOF), as described in NUREG-0696.
18.8-44	Bongarra J	Provide information on how the proposed implementation of SPDS for ESBWR compares to the criteria of NUREG-0700, Revision 2, Section 5.	<p>NEDO-33268 discusses the Safety Parameter Display System (SPDS) for ESBWR and compares it to NUREG-0737, not the more recent set of criteria in NUREG-1342, 1989 and NUREG-0700, Revision 2, Section 5, 2002. Please provide information on how the proposed implementation of SPDS for ESBWR compares to the criteria of NUREG-0700, Revision 2, Section 5.</p>
18.8-45	Bongarra J	Update the document to address NUREG-0696, Section 8 or provide justification as to why your proposal is acceptable.	<p>NEDO-33268 states that the SPDS "may" be provided in the TSC and "optionally" in the EOF. However, NUREG-0696, Section 8, Emergency Response Facility Integration, specifies that the variables displayed by SPDS and the RG 1.97 Type A, B, C, D, & E variables shall be available for use in the TSC and the EOF. Please update the document to address this or provide justification as to why your proposal is acceptable.</p>

RAI Number	Reviewer	Question Summary	Full Text
18.8-46	Bongarra J	Clarify power supplies for SPDS.	IEEE Std 497 in Section 6.6 calls for the Type A, B, and C variables to be powered by Class 1E power. The SPDS parameters are typically a complete subset of these variables, yet Section 4.3.5.1 (2) of NEDO-33268 appears to state that SPDS will receive non-1E power. Please clarify.
18.8-47	Bongarra J	Provide information relative to the selection criteria and selection process for minimum inventory for ESBWR as it is described in SRP 14.3.9.	As part of the general resolution of the issue pertaining to lack of control room detail, the staff has requested that applicants for design certification identify a minimum group of fixed-position controls, displays, and alarms (CDAs) that are required for transient and accident mitigation. Also, the minimum inventory for safe shutdown from the remote shutdown panel should be specified (but not necessarily be fixed-position at the remote panel). The NRC review criteria for the minimum inventory are given in Standard Review Plan (SRP) Chapter 14.3.9. Sections 4.3.3, 4.3.5.1, and 4.3.6 of NEDO-33268 briefly discuss fixed-position dedicated CDAs, but do not specify the CDAs or provide the criteria used to select all of them. Many of the criteria given in SRP 14.3.9, such as risk, are not mentioned. Also Section 4.4.3 addresses minimum controls, displays and alarms but does not mention fixed-position. Further, it is not clear if the intent is to use criteria in IEEE Std 497 discussed elsewhere in NEDO-33268 for fixed displays. Please provide information relative to the selection criteria and selection process for minimum inventory for ESBWR as it is described in SRP 14.3.9.
18.8-48	Bongarra J	Item 9.b relates to the implementation of the HSI Design Plan and is appropriate, but should be modified to follow the guidance on SRP section 14.3.	Item 9.a. states "HSI Design Implementation Plan is developed which establishes the methods and criteria for Human System Interface (HSI) equipment ..." This plan has already been completed and is being reviewed as part of design certification of the ESBWR. Therefore 9.a does not belong in the ITAAC. Item 9.b relates to the implementation of the HSI Design Plan and is appropriate, but should be modified to follow the guidance on SRP section 14.3.
18.8-49	Bongarra J	Reconcile inconsistencies regarding standard features.	The description of the standard features is not exactly the same when comparing the Tier 2 DCD and the HSI Design Implementation Plan. Please reconcile inconsistencies.

ESBWR Mailing List

cc:

Mr. David H. Hinds, Manager
ESBWR
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

Mr. George B. Stramback
Manager, Regulatory Services
GE Nuclear Energy
1989 Little Orchard Street, M/C 747
San Jose, CA 95125

Mr. David Lochbaum, Nuclear Safety
Engineer
Union of Concerned Scientists
1707 H Street, NW., Suite 600
Washington, DC 20006-3919

Mr. Paul Gunter
Nuclear Information & Resource Service
1424 16th Street, NW, Suite 404
Washington, DC 20036

Mr. James Riccio
Greenpeace
702 H Street, Suite 300
Washington, DC 20001

Mr. Adrian Heymer
Nuclear Energy Institute
Suite 400
1776 I Street, NW
Washington, DC 20006-3708

Mr. Paul Leventhal
Nuclear Control Institute
1000 Connecticut Avenue, NW
Suite 410
Washington, DC 20036

Mr. Ron Simard
6170 Masters Club Drive
Suwanne, GA 30024

Mr. Brendan Hoffman
Research Associate on Nuclear Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

Mr. Jay M. Gutierrez
Morgan, Lewis & Bockius, LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Mr. Glenn H. Archinoff
AECL Technologies
481 North Frederick Avenue
Suite 405
Gaithersburg, MD 20877

Mr. Gary Wright, Director
Division of Nuclear Facility Safety
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Mr. Charles Brinkman
Westinghouse Electric Co.
Washington Operations
12300 Twinbrook Pkwy., Suite 330
Rockville, MD 20852

Mr. Ronald P. Vijuk
Manager of Passive Plant Engineering
AP1000 Project
Westinghouse Electric Company
P. O. Box 355
Pittsburgh, PA 15230-0355

Mr. Ed Wallace, General Manager
Projects
PBMR Pty LTD
PO Box 9396
Centurion 0046
Republic of South Africa

Mr. Russell Bell
Nuclear Energy Institute
Suite 400
1776 I Street, NW
Washington, DC 20006-3708

Ms. Sandra Sloan
Areva NP, Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

Mr. Robert E. Sweeney
IBEX ESI
4641 Montgomery Avenue
Suite 350
Bethesda, MD 20814

Mr. Eugene S. Grecheck
Vice President, Nuclear Support Services
Dominion Energy, Inc.
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. George A. Zinke
Manager, Project Management
Nuclear Business Development
Entergy Nuclear, M-ECH-683
1340 Echelon Parkway
Jackson, MS 39213

E-Mail:
tom.miller@hq.doe.gov or
tom.miller@nuclear.energy.gov
sfrantz@morganlewis.com
ksutton@morganlewis.com
jgutierrez@morganlewis.com
mwetterhahn@winston.com
whorin@winston.com
gcesare@enercon.com
gerald.holm@framatome-anp.com
erg-xl@cox.net
joseph_hegner@dom.com
mark.beaumont@wsms.com
steven.hucik@ge.com
patriciaL.campbell@ge.com
bob.brown@ge.com
david.hinds@ge.com
chris.maslak@ge.com
James1.Beard@ge.com
kathy.sedney@ge.com
mgiles@entergy.com
tansel.selekler@nuclear.energy.gov or
tansel.selekler@hq.doe.gov
Frostie.white@ge.com
David.piepmeyer@ge.com
george.stramback@gene.ge.com