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U.S. Nuclear Regulatory Commission
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Subject: **Submittal of Response to Portion of NRC Request for Additional Information Letter No. 343 Related to ESBWR Design Certification - RAI Number 14.3-453**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter No. 343, dated May 19, 2009 (Reference 1).

Enclosure 1 provides the GEH response to the subject RAI as requested in Reference 1. Enclosure 2 contains the DCD changes to Tier 1 and Tier 2 as a result of GEH's response to this RAI. Enclosure 3 contains the changes to GEH LTR NEDO-33274 as a result of the response to this RAI. Verified LTR and DCD changes associated with this RAI response are identified in the enclosed markups by enclosing the text within a black box.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. MFN 09-347 - Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request For Additional Information Letter No. 343 Related To ESBWR Design Certification Application*, dated May 19, 2009

Enclosures:

1. MFN 09-412 – Response to Portion of NRC Request for Additional Information Letter No. 343 Related to ESBWR Design Certification Application - RAI Number 14.3-453
2. MFN 09-412 – Response to Portion of NRC Request for Additional Information Letter No. 343 Related to ESBWR Design Certification Application - RAI Number 14.3-453 – DCD Markups
3. MFN 09-412 – Response to Portion of NRC Request for Additional Information Letter No. 343 Related to ESBWR Design Certification Application - RAI Number 14.3-453 – NEDO-33274 Markups

cc:

	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	eDRF Section	0000-0103-2062 (RAI 14.3-453)

Enclosure 1

MFN 09-412

Response to Portion of NRC Request for

Additional Information Letter No. 343

Related to ESBWR Design Certification Application

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NRC RAI 14.3-453

The staff requests that GEH revise the third bullet in Tier 2 Section 14.3.3 to address severe accident management procedures and the fourth bullet in the acceptance criteria for ITAAC 7ii in Tier 1 Table 3.3-1 to read as follows:

"A description of the plant procedures derived from the ESBWR Severe Accident Guidelines (SAGs), including technical basis for severe Accident management."

Also, GEH should update NEDO-33274, Section, 5.1 to be consistent with the changes that the staff requested above.

GEH Response

GEH will revise the third bullet of Tier 2 Section 14.3.3.3 to include a statement that describes the commitment for standard design feature support of severe accident management procedures. This implementation of the requested change was discussed with the staff during a teleconference held on April 21, 2009. GEH will also revise the fourth bullet in the acceptance criteria for Design Commitment 7ii of the Tier 1 ITAAC for Human Factors Engineering to read as follows: “A description of the plant procedures derived from the ESBWR Severe Accident Guidelines, including the technical basis for severe accident management.” Additionally, GEH will update NEDO-33274, Section 5.1 to be consistent with the changes made to the fourth bullet in the acceptance criteria for Design Commitment 7ii.

DCD Impact

DCD Tier 2, Section 14.3.3.3 will be revised as noted in the attached markup.

DCD Tier 1, Table 3.3-2 will be revised as noted in the attached markup.

LTR NEDO-33274, Section 5.1 will be revised as noted in the attached markup.

Enclosure 2

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Response to Portion of NRC Request for

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DCD Markups

14.3.3.3 Human Factors Engineering

The human factors engineering (HFE) entry defines the processes by which the details of the human-system interface (HSI) is developed, designed and evaluated. The processes defined in this entry require the use of analyses based on human factors principles and apply to the main control room (MCR), including areas which provide the displays, controls and alarms required for normal, abnormal and emergency plant conditions. They also apply to the Remote Shutdown System (RSS), Technical Support Center (TSC), Emergency Operations Facility (EOF), and Local Control Stations (LCSs) with safety-related functions or as defined by HFE task analysis. For detailed HSI design implementation, the certification of processes (rather than specific design features) is necessitated and justified by the following:

- The technology of equipment associated with HSI implementation is rapidly evolving (and improving) and certification of implementation processes permits future licensees to take advantage of beneficial technological advances available at the time of application. An example is the rapid advances that have taken (and are taking) place in flat panel display technology.
- Detailed implementation of the HSI is dependent upon the details of the as procured, as-installed equipment. For example, different manufacturers use different techniques to monitor equipment performance. Because this equipment is not available at the time of design certification, it is not possible to develop HSI implementation details. This can be only be accomplished by a licensee when specific equipment characteristics are known.
- The fundamental design work for the ESBWR HSI has been completed and is described in Tier 2. This includes commitments to a set of standard design features necessary for the operators to implement the emergency operating procedures, severe accident management procedures, and to carry out those human actions shown to be important by the plant Probabilistic Risk Assessment (PRA). ~~as well as a~~ In addition, the minimum inventory of fixed alarms, displays and controls necessary for the operators to implement the emergency operating procedures and to carry out those human actions shown to be important by the plant Probabilistic Risk Assessment (PRA) is defined. This design information, coupled with the comprehensive commitments to HSI implementation processes based on currently accepted HFE practices, provides confidence that the execution of these processes result in acceptable MCR and RSS detail designs that implement the applicable requirements.

Selection of specific technical material for the HFE design descriptions and ITAAC entries in the Tier 1 utilized the same selection criteria and methodology as described above for Tier 1, Section 2 system entries.

14.3.3.4 Radiation Protection

The Tier 2 radiation protection chapter (Chapter 12) defines the design confirming that radiation protection features maintain exposures for both plant personnel and the general public below allowable limits. The material applies to the radiological shielding and ventilation design of buildings within the scope of the ESBWR certified design. ITAAC confirm that the building radiation zones are in accordance with site-specific radiation shielding calculations.

Table 3.3-~~1~~ 2

ITAAC For Human Factors Engineering

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. Procedure Development is performed in accordance with the ESBWR HFE Procedure Development Implementation Plan.	i. An inspection is performed on the Procedure Development results summary report(s). **{{Design Acceptance Criteria}}** .	i. A results summary report(s) exists that concludes that the Procedure Development design was conducted in accordance with the implementation plan and contains: • The scope of the procedures development process. • A list of writer's guides for procedure development. • A summary of design requirements and inputs to procedure development. **{{Design Acceptance Criteria}}** ~~The inspections, tests, analyses, and acceptance criteria for the Human Factors Engineering process address the ESBWR safety-related systems as defined in Table 2.2.10-1 and their associated safety-related functions.~~
	ii. An inspection is performed on the final Procedure Development results	ii. A final results summary report(s) exists that concludes that the Procedure

Table 3.3-~~1~~ 2

ITAAC For Human Factors Engineering

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	summary report(s).	Development process was conducted in accordance with the implementation plan and contains: • A description of the plant procedures derived from ESBWR EPGs. • A list of procedures and procedure support equipment developed. • A description of how procedures are utilized, including operator access and use of hard copy and computer based procedures. • A description of the plant procedures derived from the ESBWR Severe Accident Guidelines, including the t~~T~~echnical basis for severe accident management. • A description of procedure storage and laydown areas for hardcopy procedure use in the MCR, RSS, and risk significant local control stations. • A description of the framework utilized for procedure maintenance and control of updates. ~~The inspections, tests, analyses, and~~

Enclosure 3

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NEDO-33274 Markups

5. RESULTS

5.1 RESULTS SUMMARY REPORT

The results of the Procedure Development are summarized in a RSR. This report is the main source of information used to demonstrate that efforts conducted in accordance with the implementation plan satisfy the applicable review criteria of NUREG-0800.

The report contains the following:

- General approach, including the purpose and scope
- Plant procedures derived from ESBWR EPGs
- A description of the plant procedures derived from the ESBWR SAGs, including the ~~T~~technical basis for severe accident management
- A list of writer's guides, procedures, and procedure support equipment developed during implementation of this plan
- Outline of how procedures are utilized, including operator access and use of procedures for both hard copy and computer based procedures
- A description of procedure storage and laydown areas for hardcopy procedure use in the MCR, RSSs or risk significant LCSs
- A description of the framework utilized for procedure maintenance and control of updates