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MFN 08-086, Supplement 58

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 199 Related to ESBWR Design Certification Application ESBWR RAI Number 14.3-250, Supplement 1**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) Response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter 199 and dated May 5, 2008 (Reference 1).

Enclosure 1 contains the GEH response to RAI Number 14.3-250, Supplement 1.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 08-482, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 199 Related To ESBWR Design Certification Application*, dated May 15, 2008

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 199 Related to ESBWR Design Certification Application DCD Tier 1 RAI Number 14.3-250, Supplement 1

cc:	AE Cubbage	USNRC (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	eDRF	0000-0080-2212

MFN 08-086, Supplement 58

Enclosure 1

Response to Portion of NRC Request for Additional Information Letter No. 199 Related to ESBWR Design Certification Application

DCD Tier 1

RAI Number 14.3-250, Supplement 1

RAI 14.3-250, Supplement 1

NRC Summary:
Figure to display instrumentation

NRC Full Text:
In RAI 14.3-250 the staff requested that GEH display controls on DCD Tier 1 Figure 2.2.2-1, Control Rod Drive System. In response GEH stated that "Tier 1 functional arrangement information can be provided in tabular or graphical form. The form selected is based on the nature of the information. When instruments are shown on the figure, the placement on the figure implies spatial or relational aspects of the configuration (e.g. the instrument is mounted on the accumulator, or the instrument is mounted on the pipe upstream of the check valve) that may not be required. In this case, the tabular form is appropriate because the location of the controls are not critical to the performance of the system during accident and transient conditions."

The staff disagrees with the response provided. For the minimal identification of instruments, the staff refers to NUREG-0800, Section 14.3, Appendix C, Detailed Review Guidance, Section 1.B Figures, states "As a minimum, the instruments (pressure, temperature, etc.) required to perform Generic Technical Guidelines (e.g., ERGs, EPGs)(as described in the DCD, Tier 2, Chapter 18) should be shown on the figures, or described in the DD."

In addition DCD, Tier 1, Section 1.1.2.4 "Interpretation of Figures" states "Unless specified explicitly, these figures are not indicative of the scale, location, dimensions, shape, or spatial relationships of as-built structures, systems, or components. In particular, the as-built attributes of structures, systems, and components may vary from the attributes depicted on these figures, provided that those safety functions discussed in the Design Description pertaining to the figure are not adversely affected."

GEH Response

As revised in Revision 5 of the Design Control Document, Figure 2.2.2-1 in Tier 1 is now the same as Figure 4.6-8, "Control Rod Drive System Simplified Process and Instrumentation Diagram," which depicts the process flow and the scram system. A Revision 5 addition to the figure depicts pressure instruments in the charging header. Other instrumentation and controls included on the figure are flow elements and valve actuators, which perform many of the system control functions.

Though not required, GEH has attempted, to the extent practical when adapting an existing document to revised guidance and as described in Tier 2, Section 14.3, to conform Tier 1 to the NRC guidance in NUREG-0800, Section 14.3. This guidance was revised after NRC acceptance and docketing of the ESBWR design certification application. The purpose of figures is explained in Tier 2, Section 14.3, as depicting the functional arrangement of the system, which means (as defined in Tier 1) the physical arrangement of systems and components to provide the service for which the system in intended, and which is described in the system Design Description.

GEH revised Tier 1 in Revision 4 to move away from the use of "basic configuration" ITAAC at the recommendation of the NRC and, instead, to have more discrete ITAAC. The use of figures and tables in the Tier 1 design description is intended to provide sufficient information to perform a system walkdown of the major design features of systems to verify the "functional arrangement" of the components within that system once construction is complete. Also note that the information in Tier 1 figures is not intended to be more specific than Tier 2, as Tier 2 provides the supporting information.

Although not all of the information discussed in NRC guidance regarding figures is included on all Tier 1 figures, figures in Tier 1 are intended to be consistent with Tier 2, be a simplified version of one or more Tier 2 figures, or be drawn based on information from Tier 2 if necessary. This approach conforms to NRC guidance regarding the content of Tier 1. On that basis, Figure 2.2.2-1 is of sufficient detail, along with the other information in the design description, for performing the functional arrangement ITAAC for the CRD system. This conclusion is based on the plethora of NRC guidance regarding the use of figures in Tier 1, as stated in various parts of NUREG-0800, Section 14.3, as quoted below. In addition, Figure 2.2.2-1, Revision 5, is sufficiently detailed for design certification.

Various Paragraphs Excerpted From NUREG-0800, Section 14.3:

> 4. Review Tier 1 for whether all information is clear and consistent with the Tier 2 information. If any new items are added to ITAAC, then ensure that they are added, including appropriate supporting analyses, to the applicable sections of Tier 2. Figures and diagrams should be reviewed to ensure that they accurately depict the functional arrangement and requirements of the systems.
>
> E. Interpretation of Figures
>
> The design descriptions include the figures in Tier 1, where the figures are provided. They are intended to depict the functional arrangement of the significant SSCs of the standard design. An as-built facility referencing the

certified design should be consistent with the performance characteristics and functions described in the design descriptions and figures.

The design descriptions include a narrative and *simplified schematic figures* in Tier 1, where the figures are provided [*emphasis added*]. ... Figures should be provided for most systems, with the amount of information depicted based on the safety significance of the SSCs. Where figures are not required, generally for simple non-safety significant systems, the narrative should be sufficient to describe the system. The figures are intended to depict the functional arrangement of the significant SSCs of the standard design. Particular attention should be paid to the legend for the figures to ensure common understanding of requirements, system boundaries, piping code breaks, electrical configurations, etc.

vi. Alarms, Displays and Controls. The DD for the systems should describe the important system alarms, displays (do not use the term "indications"), and controls available in the control room. Important instrumentation that is required for direct operation or accident mitigation should be shown on the system figure, or described in the DD if there is no figure. Those that are provided for routine system performance monitoring or operator convenience need not be shown or discussed.

The Generic Technical Guidelines (e.g., ERGs, EPGs) in DCD Tier 2 Chapter 18 should have identified the minimum set of controls, displays, and alarms necessary for the main control room (MCR) and remote shutdown panel (RSP), and these should be included in Tier 1. The functioning of the alarms, displays, and controls in the MCR and RSP should be verified in either the system ITAACs or in the MCR/RSP ITAACs. The intent is to test the integrated as-built system; however, separate testing of the actual operation of the system and the alarms/displays/controls circuits using simulated signals may be acceptable where this is not practical. See also the standard ITAAC for control room features and the remote shutdown panel in Appendix C to this SRP section.

B. Figures

i. In general, figures and/or diagrams are required for all systems. However, a separate figure may not be needed for simple systems, structures, and components (e.g., the condenser). The format for the figures and/or diagrams should be simplified piping diagrams for mechanical systems. Symbols used on the figures should be consistent with the legend provided by the applicant.

ii. All components discussed in the design description should be shown on the figure.

iii. System boundaries with other systems should be clearly delineated in the figures. With few exceptions, system boundaries should occur at a component.

iv. ASME code class boundaries for mechanical equipment and piping are shown on the figure and form the basis for the basic configuration check (system) that is required in each individual system ITAAC. The configuration check includes an inspection of the welding quality for all ASME Code Class 1, 2, and 3 piping systems described in the design description. A hydrotest is also required in each system ITAAC for ASME Code Class 1, 2, and 3 piping systems to verify the pressure integrity of the overall piping system, including the process of fabricating the system, and welding and bolting requirements.

v. As a minimum, the instruments (pressure, temperature, etc.) required to perform Generic Technical Guidelines (e.g., ERGs, EPGs)(as described in the DCD Tier 2 Chapter 18) should be shown on the figures, or described in the DD.

vi. The minimum inventory of alarms, indications, and controls, if established in the main control room or remote shutdown panel ITAAC, do not have to be discussed in individual DD's or shown on figures. Other "essential" alarms (e.g., associated with shutdown cooling system (SCS) high pressure (ISLOCA), SCS performance monitoring indications) not part of the minimum inventory should be shown on the figures.

vii. Identification of all alarms, displays and controls on the remote shutdown panel should be included in the system diagram or alternatively in the remote shutdown panel ITAAC.

viii. Class 1E power sources (i.e., division identification) for electrical equipment can be shown on the figure in lieu of including them in the Design Description.

ix. Figures for safety-related systems should include most of the valves on the DCD Tier 2 P&ID except for items, such as fill, drain, test tees, and maintenance isolation valves. The scope of valves to be included on the figures are those MOVs, POVs, and check valves with a safety related active function, a complete list of which is contained in the IST plan. Valves remotely operable from the Control Room should be shown if their mis-positioning could affect system safety function. Other valves are evaluated for exclusion on a case-by-case basis. Figures for non-safety related systems may have less detail.

x. Fail-safe positions of the pneumatic valves need not be shown on figures or discussed in the DD unless the fail-safe position is relied on to accomplish a direct safety function of the system.

xi. Containment isolation valves (CIVs) should be shown on the figures of the applicable system ITAAC, or discussed in the DD if there is no figure. The demonstration of CIV performance to a Containment Isolation Signal, electrical power assignment to the CIVs and failure response to the CIVs, as applicable, may be included in the system ITAAC or in a separate containment isolation system ITAAC that encompasses all CIVs. Leak rate testing of the CIVs should be addressed in Tier 1, and may be addressed in the containment ITAAC.

xii. Heat loads requiring cooling, e.g., pump motors, heat exchangers, need not show the source of cooling unless the source of cooling has a specific or unique characteristic that would require Tier 1 treatment, e.g., RCP seal water cooling.

DCD Impact

Based on the discussion above, no change to the DCD will be made as a result of this response.