



GE Energy

Robert E. Gamble  
Manager, ESBWR

1989 Little Orchard St., M/C 365  
San Jose, CA 95125-1030  
USA

T 408 925 3352  
F 408 925 5665  
Robert.gamble@ge.com

MFN 05-043

Project 717

June 29, 2005

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555-0001

**Subject: Use of Design Acceptance Criteria for the ESBWR**

To allow for technology improvements and as-procured equipment characteristics, GE is requesting the NRC to review the acceptability of utilizing the Design Acceptance Criteria (DAC) approach to support the development of the design certification application for the ESBWR. Enclosure 1 contains information to support utilizing DAC in the following areas:

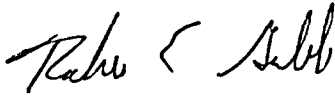
- Piping Design
- Digital Instrumentation and Control
- Human Factors Engineering

The DAC will be contained in the Design Control Document (DCD) Tier 1 and will consist of a set of prescribed limits, parameters, procedures and attributes in the above technical areas.

DBLB

If you have any questions about the information provided here, or if we can provide any additional information, please let me know.

Sincerely,



Robert E. Gamble  
Manager, ESBWR

Enclosure:

1. MFN 05-043 – Use of Design Acceptance Criteria for the ESBWR

cc: WD Beckner USNRC (w/o enclosures)  
LA Dudes USNRC (w/o enclosures)  
AE Cabbage USNRC (with enclosures)  
MB Fields USNRC (with enclosures)  
GB Stramback GE (with enclosures)

MFN 05-043  
Enclosure 1

ENCLOSURE 1

MFN 05-043

Use of Design Acceptance Criteria  
for the ESBWR

### **Piping Design Acceptance Criteria**

GE requests that the NRC approve the use of Design Acceptance Criteria (DAC) in the area of piping design for the ESBWR for the following reasons:

- 1) The general arrangement of all safety-related piping greater than 3 inches within the reactor containment will be available for review as part of the Design Certification review and approval process. The Staff will be able to determine if the routing of the piping is subject to any potential hazards from other structures, systems or components (SSC), and also any piping effect on other SSCs.
- 2) GE does not currently intend to seek approval of Leak Before Break (LBB) methodology. It is GE's assessment that LBB does not offer any significant benefit to the ESBWR due to the types of piping materials used and the limitations on its use for terminal ends, as well as the minimal improvement effect on any safety analyses.
- 3) It is GE's experience that routing of piping to satisfy the thermal stress analyses is almost always the limiting case for piping within the reactor containment. For the ESBWR, this is even more applicable, because the relative displacements of the piping terminal ends for thermal stress is comparatively greater than normal. This is the result of having a taller reactor pressure vessel within the containment structure. GE intends to complete the thermal stress analysis part of the design for the most significant safety-related and high energy piping systems to support the DCD submittal.
- 4) The dynamic analyses of the piping systems typically are developed after the thermal design is complete. Satisfying the code stress allowances for dynamic movement involves the subsequent selection and proper locating of pipe supports. With the ESBWR design, the selection and location of pipe supports in the necessary locations will be readily accommodated in conjunction with the design of the structures. Consideration of space for pipe supports is being considered in the routing of piping. In addition, the dynamic analyses are site dependent because of the significant effect of the seismic response, which is unique for each site. Additionally, the final design of the piping will demonstrate that it is in full compliance with the acceptance criteria and standards specified in the DCD submittal.

### **Digital Instrumentation and Control**

GE requests that the NRC approve the use of Design Acceptance Criteria (DAC) in the area of Instrumentation and Control (I&C) design for the ESBWR for the following reasons:

- 1) Digital technology continues to evolve rapidly from year to year. The latest, improved and qualified digital technology should be allowed to be implemented over the lifetime of the ESBWR certified design.
- 2) The digital I&C system design should not be frozen (stagnated) for the lifetime of the Design Certification. The life cycles of digital technology are short enough that what was State of the Art and readily available today may no longer be commercially available 5 years later. Neither the licensee nor equipment suppliers seek to re-invent unnecessarily the hardware/software application design of the I&C system for each plant; however, there is continual evolution in this area. Enhanced safety and life cycle cost will determine when a licensee and their suppliers decide that an equipment change in the I&C system design is appropriate.
- 3) The potential licensees and vendors do not want to lock-in to a particular equipment design at the time that the certification is granted. It is possible that the first order might not occur for several years, during which time the State of the Art technology would have changed.
- 4) Previously, DAC for I&C systems has been reviewed and approved and the reasons for doing so have not changed in the intervening time.

### **Human Factors Engineering**

GE requests that the NRC approve the use of Design Acceptance Criteria (DAC) in the area of Human Factors Engineering (HFE) design for the ESBWR for the following reasons:

- 1) The technologies for Operator Interface continue to improve. Significant increases in the resolution, size, and interactive ability of video screens have occurred over the past few years.
- 2) The methodologies being proposed for the evaluation of HFE applications have continued to change, improving the characterization of functions as they apply to alarms, group-view displays, interactivity and maintainability of digital systems.
- 3) The regulatory guidelines and criteria for the development of Human-System Interface (HSI) have been revised to be more applicable to the new digital I&C systems being applied in the ESBWR.
- 4) The ESBWR design process is consistent with the review procedures of the HFE Program Model, NUREG-0711 and future improvements in the design process and program models can be considered for integration.
- 5) As regulatory guidelines change, suppliers of digital hardware and software continue to become aware of the potential impacts to their designs and products. A whole new segment of the industry will become involved in the design and fabrication of distributed systems. Because of the operator interfaces being used by ESBWR (e.g., mimic, VDUs, etc.), new suppliers with more advanced equipment designs may be identified
- 6) The latest regulatory guidelines place additional importance on equipment design for maintainability down to the circuit board level.