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Subject: **Response to NRC Request for Additional Information Letter No. 47 Related to ESBWR Design Certification Application – Conduct of Operations – RAI Numbers 13.3-1 through 13.3-6**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter. This completes GE's response to RAI Letter No. 47.

If you have any questions about the information provided here, please let me know.

Sincerely,

Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

Reference:

1. MFN 06-270, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 47 Related to ESBWR Design Certification Application,* August 1, 2006

Enclosure:

1. MFN 06-394 – Response to NRC Request for Additional Information Letter No. 47 Related to ESBWR Design Certification Application – Conduct of Operations – RAI Numbers 13.3-1 through 13.3-6

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRFs 0059-4576, 0059-3538

ENCLOSURE 1

MFN 06-394

Response to NRC Request for

Additional Information Letter No. 47

Related to ESBWR Design Certification Application

Conduct of Operations

RAI Numbers 13.3-1 through 13.3-6

NRC RAI 13.3-1

Guidance for Technical Support Center (TSC) staffing size is found in NUREG-0654, Table B-1 and Section B.7, and NUREG-0696, Section 2.4. Appropriate supervisory positions are typically assigned to the emergency response organization (ERO) with oversight responsibility for the various functions/positions called out in NUREG-0654. The resultant TSC maximum staffing size may therefore be larger than 26 people. The TSC needs to be sized to accommodate augmented positions/functions as defined on NUREG-0654, Table B-1, and as defined in NUREG-0654 B.7, licensee specific supervisory positions in the ERO, and the NRC Response Team, i.e., TSC maximum staffing. Please provide more detail as to how the TSC staffing size of 26 was determined.

GE Response

The Technical Support Center (TSC) for the ESBWR is housed in the Electrical Building (EB) at grade elevation and is shown on Figure 1.2-26. The EB is constructed of reinforced concrete and is classified as nonsafety-related and Seismic Category NS. Access to the TSC from the Main Control Room (MCR) is via an underground personnel tunnel shown in Figures 1.2-3 and 1.2-26.

The overall floor space set aside for the TSC is approximately 483 square meters, excluding rooms 5102, 5188, and 5189. This space is divided up into 15 spaces; the largest of which is the TSC General Area (Room 5180) at ~192 square meters. In addition the TSC includes the following:

4 offices ~with total area of 52 square meters (Rooms 5181 A-D)
1 NRC office ~ 30 square meters (Room 5185)
2 Conference Rooms ~27 and 24 square meters each (Rooms 5182 A&B respectively). One of these can be used for shift turnover.
Communications room ~ 82 square meters (Room 5189) – this room is outside the TSC, but the communications personnel are part of the TSC staffing size.
Computer Room
File Room
Kitchen and Rest Area
Restrooms Men's and Women's

The operation and accident recovery sequences of the ESBWR are significantly reduced from earlier LWRs designs. Therefore, GE believes that the minimum staffing level assumed for the TSC of 21 utility personnel and 5 NRC personnel which is consistent with the minimum suggested by NUREG-0696 is conservative. GE has discussed the TSC staffing level with at least one potential COL applicant and determined that the existing staffing assumption of the TSC for that utility was 22 utility personnel.

As can be seen in the discussion above the available floor space of the TSC is more than sufficient to accommodate a significant increase of personnel without overcrowding.

No DCD changes will be made in response to this RAI.

NRC RAI 13.3-2

Guidance for locating the TSC is found in NUREG-0696 Section 2.2. The TSC is to be within 2-minutes walking time from the Control Room, and preferably in the same building. This 2-minutes does not include the time to do any required radiation protection gear but it does include the time to clear any security checkpoints. There should be no major security barriers between the TSC and the Control Room beyond normal access control stations. Please provide more detail as the proximity of the TSC to the Control Room and if any security barriers exist between the two facilities.

GE Response

The Technical Support Center (TSC) for the ESBWR is housed in the Electrical Building (EB) at grade elevation and is shown on Figure 1.2-26. Access to the TSC from the Main Control Room (MCR) is via an underground personnel tunnel shown in Figures 1.2-3 and 1.2-26.

It is approximately 120 meters walking distance from the Main control room to the entrance to the TSC. This includes a stair climb of 6.65 meters from the below grade tunnel to the grade elevation of the Electrical Building. Along this path way there are no security control points other than card reader controlled doors at the exit of the MCR and the entrance into the TSC. Any person who would be employed in the day-to-day operation of an ESBWR can easily cover this distance in less than 2 minutes.

No DCD changes will be made in response to this RAI.

NRC RAI 13.3-3

Guidance for TSC displays and instrumentation is found in NUREG-0696, Sections 2.8 and 2.9, and NUREG-0654, Section H. The TSC requires the necessary equipment to monitor plant parameters for the determination of applicable emergency action levels and protective action recommendations. Please provide more detail as to the displays and instrumentation to be made available in the TSC.

GE Response

Plant parameters are collected by the Essential Distributed Control and Information System (E-DCIS) and the Non-Essential Distributed Control and Information System (NE-DCIS). Safety-related data is transmitted via the E-DCIS to the NE-DCIS. The NE-DCIS provides many different functions including archiving and manipulating data. After data is moved to the NE-DCIS it can be accessed by the non-safety systems connected directly to NE-DCIS. Any computer within the plant can access data from NE-DCIS. This capability is described in Subsection 7.9.2.1 and illustrated on Figure 7.1-1

Computers with connections to the plant NE-DCIS network are provided in the TSC; permitting TSC personnel to access data available on the DCIS network. This includes parameters developed by the HFE process identified in Chapter 18. The plant does not have a dedicated Safety Parameter Display System (SPDS); instead this capability has been incorporated into the NE-DCIS design.

No DCD changes will be made in response to this RAI.

NRC RAI 13.3-4

Guidance for TSC backup power is found in NUREG-0696, Section 2.8 and NRC Information Notice (IN) 2004-19. Sufficient alternate or backup power sources shall be provided to maintain continuity of TSC functions and to immediately resume data acquisition, storage,and display of TSC data if loss of the primary TSC power sources occurs. Please provide more detail as to the backup power capabilities of the TSC.

GE Response

Figures 8.1-2 sheet 2 and 8.1-5 sheet 2, show the non-1E, 2 hour uninterruptible power supply (UPS) feeds to the TSC. The TSC is provided power via 2 hour UPS feeds from both trains A and B which are part of the Plant Investment Protection (PIP) loads. The PIP trains are provided backup power via the non-safety on-site diesel generators. The UPS feeds are provided for emergency lighting and informational display.

The data collection is accomplished via the Essential Distributed Control and Information System (E-DCIS) and Non-Essential Distributed Control and Information System (NE-DCIS). The E-DCIS systems are powered by 72 hour UPS. The NE-DCIS is powered by 2 hour UPS. In all cases these UPS sources can be powered and re-charged by either off-site power or either of the 2 non-safety on-site diesels.

No DCD changes will be made in response to this RAI.

NRC RAI 13.3-5

Guidance for TSC ventilation is found in NUREG-0696, Section 2.6. Please provide more detail as to the level of radiological protection provided by the TSC ventilation system.

GE Response

The HVAC subsystem for the Technical Support Center (TSC) is described in Subsection 9.4.7.1.and 9.4.7.2 and depicted in Figure 9.4-12. Each of the 100% capacity redundant HVAC trains is provided with a 100% capacity filter train consisting of HEPA and charcoal filtration to provide radiological protection to the occupants of the TSC.

The TSC HVAC Air Intake Radiation Monitoring Subsystem (RMS) is described in Subsection 11.5.3.2.13 and its' range of channel measurement and display are given in Tables 11.5-1 and 11.5-2. The TSC HVAC subsystem automatically transfers from its normal operation mode to its radiological mode upon detection of radioactivity at the outside air intakes to limit the introduction of airborne radiation into the TSC. As stated in Section 13.3, the radiation exposure to any person working in the TSC will not exceed 0.05 Sv (5 rem TDE) for the duration of the accident. This defines the level of radiological protection that the detailed system and components will be designed to meet.

No DCD changes will be made in response to this RAI.

NRC RAI 13.3-6

The ESBWR design is sufficiently different from those plant designs used for the development of the RG 1.101 endorsed emergency action levels (EALs), (i.e., NUREG-0654, NESP-007, NEI 99-01 Rev. 4) that the applicability of these schemes to the ESBWR plant is in question. Please provide details as to the applicability of RG 1.101 EAL schemes to the ESBWR design.

GE Response

Regulatory Guide 1.101 Rev. 5 June 2005 provides guidance to co-located licensees on methods that the staff of the U.S. Nuclear Regulatory Commission considers acceptable for complying with the agency's regulations for emergency response plans and preparedness relative to conducting emergency response activities and interactions (A&I) in the years between participation in the offsite full or partial participation exercises with offsite authorities. This regulatory guide does not impose any new positions or requirements.

Revision 4 of Regulatory Guide 1.101 endorsed the guidance in Revision 4 of NEI 99-01 as acceptable to the NRC staff as an alternative to the method described in Appendix 1 to NUREG-0654/FEMA REP-1 and NUMARC/NESP-007 for developing Emergency Action Levels (EALs) required in Section IV.B of Appendix E to 10CFR Part 50 and 10CFR 50.47 (b)(4).

The emergency classification scheme is based on four classes of emergency established by the NRC in 10 CFR 50, Appendix E. NUREG-0654/FEMA-REP-1 provides the definitions and example initiating conditions for each class of emergency. The nuclear power industry has developed improvements to this guidance in a document promulgated through the Nuclear Energy Institute (NEI), NEI 99-01. The NEI guidance under NEI 99-01 Rev. 4, issued in January 2003, accommodates the industry experience but the guidance will need to be adjusted for advanced light water reactors; especially those that utilize passive safety systems.

For the ESBWR, the definitions for each of the four emergency classes will be adopted verbatim from NUREG-0654/FEMA-REP-1, with clarifications offered in NEI 99-01. The process for developing EALs and example initiating conditions to support the emergency plan will follow the steps described below.

1. Using the NEI 99-01 EALs and initiating conditions as a starting point, determine those EALs that are directly applicable to the ESBWR. This will include natural phenomena, security events, contaminated injuries, and emergency director discretion, at a minimum.
2. Next, identify those NEI 99-01 EALs that are technology-dependent and which require some modification to correctly apply to the ESBWR design. Modify accordingly.

3. The final binning of NEI 99-01 EALs will be to identify those EALs that are clearly not applicable to the new plant technologies.
4. Document the set of EALs and compare against NUREG-0654 example initiating conditions. Develop a technical basis for the resulting EALs and initiating conditions consistent with the approach taken in NEI 99-01.
5. Review EALs, initiating conditions, and bases with utility representatives and offsite agencies. This step should provide these stakeholders the opportunity to ask questions and raise any concerns with the approach. Comments should be documented along with how the comments were resolved.

Emergency action levels and initiating conditions are a critical aspect of emergency plans for each of the COL applications. Current regulatory and industry guidance may not adequately address advanced light water technologies. In order to support the development of standard emergency plans for the COL applications for ESBWRs, an alternative approach of adapting NEI 99-01 EALs and initiating conditions to the ESBWR will be pursued. This approach will be made in a systematic manner including severe accident sequences and precursors. Accordingly, the resulting EALs will include documentation of the technical bases for their selection, for those included, as well as the basis for those that are not applicable to the ESBWR. This approach assures that NRC requirements are met and supports industry efforts to incorporate standardization into the licensing of these new nuclear plants.

No DCD changes will be made in response to this RAI.