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Subject: **Response to Portion of NRC Request for Additional Information Letter No 89 Related to ESBWR Design Certification Application – DCD Section 14.3 – RAI Numbers 14.3-107, 14.3-112, 14.3-120, 14.3-121, 14.3-123, and 14.3-124**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

Reference:

1. Letter from U.S. Nuclear Regulatory Commission to David Hinds, "Request for Additional Information Letter No. 89, Related ESBWR Design Certification Application, dated 1/30/2007

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No 89 Related to ESBWR Design Certification Application – DCD Section 14.3 – RAI Numbers 14.3-107, 14.3-112, 14.3-120, 14.3-121, 14.3-123, and 14.3-124

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Enclosure 1

Response to Portion of NRC Request for Additional Information Letter No 89
Related to ESBWR Design Certification Application
DCD Section 14.3
RAI Numbers 14.3-107, 14.3-112, 14.3-120, 14.3-121, 14.3-123, and 14.3-124

NRC RAI 14.3-107

In DCD Tier 1, Rev 2, Section 2.13.2, the design description states that the control circuits, control power circuits, and instrumentation circuits passing through electrical penetrations minimize the need to protect the penetration from the effects of fault or overload currents. Provide justification for the electrical wiring penetrations design description.

GE Response:

Revision 3 of DCD Tier 1, Section 2.13.2 added the description:

"Redundant over-current interrupting devices are provided for all electrical circuits routed through containment penetrations, if the maximum available fault current (including failure of upstream devices) is greater that the continuous rating of the penetration. This avoids penetration damage in the event of failure of any single over-current device to clear a fault within the penetration or beyond it."

This clarified design description is consistent with DCD Tier 2, Subsection 8.3.1.4.1 and provides the additional description needed to validate the assertion questioned by the Staff.

DCD Impact:

No DCD changes result from this response.

NRC RAI 14.3-112

In DCD Tier 1, Rev 2, Table 2.13.3-1, add the following direct current power supply requirement:

Charging current when battery charger is fully charged is equal to or less than [2] amps.

GE Response

Per the teleconference conducted on Friday, March 2, 2007, the Staff now agrees that this requirement will be addressed in the Tech Specs or Bases.

ITAAC 2.13.3-1, #4 addresses the battery charger's ability to recharge the battery to a fully charged condition within 24 hours while it supplies the full load of the respective division.

The increased cell plate size and amperage, together with inter-cell and inter-tier connections for a battery as much as three times larger than batteries used in past nuclear plants, will cause the fully charged current of those batteries to be higher than past batteries. In accordance with the vendor manual for charging, the float current will level off and stabilize with no further reduction for three hours. This reflects a state-of-charge of approximately 95 to 98%.

DCD Impact

Charging current will be addressed in Tech Specs, included in DCD Tier 2, Chapter 16.

NRC RAI 14.3-120

In DCD Tier 1, Rev 2, Table 2.13.3-1, Acceptance Criteria 11, the vague description in 2.13.3 does not clearly identify if there are 8 alarms or one common alarm. No description of displays is provided in 2.13.3. Clarify Table 2.13.3-1, Acceptance Criteria 11.

GE Response

Critical DC system parameters will be monitored and displayed in the Main Control Room. Each parameter will be individually alarmed when it exceeds acceptable limits. (The revision to the description of Subsection 2.13.3, attached DCD, R4 excerpt, provides the clarification requested by the Staff to satisfy Acceptance Criteria 11.)

DCD Impact

DCD Tier 1, Revision 4 will revise Subsection 2.13.3, sixth paragraph (as shown on the next page), to reflect the change.

2.13.3 Direct Current Power Supply

Design Description

The plant direct current (DC) power supply system shall consist of five non-divisional 250 VDC power supplies, two non-divisional 125 VDC power supplies, and eight 72-hour divisional safety-related 250 VDC power supplies.

The eight 72-hour safety-related DC power supplies provide power to 120Vac safety-related inverters for post-accident monitoring, MCR emergency lighting and safe shutdown loads.

Each of the four divisions of safety-related DC power is separate and independent. Divisions 1, 2, 3 and 4 each have two 72-hour batteries. The DC systems operate ungrounded (with ground detection circuitry) for increased reliability. Each division has a battery charger fed from its divisional Isolation Power Center (IPC). This system is designed so that no single failure in any division prevents safe shutdown of the plant.

The safety-related DC power supply is designed to permit periodic testing for operability and functional performance.

Nonsafety-related DC power is supplied through four nonsafety-related IPCs in the same manner as the safety-related DC power. Each of the two load groups receives power from two of the nonsafety-related IPCs. One IPC in each group provides power to a bus through a battery charger.

Critical DC system parameters are monitored and displayed in the Main Control Room. Each parameter is individually alarmed when it exceeds acceptable limits.

~~Alarms initiate in the Main Control Room (MCR) to indicate loss of battery chargers and inverters. Computer inputs can then be monitored to determine the source of the problem. Alarm and computer inputs from safety-related equipment or circuits are treated as safety-related and retain their divisional identification up through their safety-related isolation device. The output circuit from this isolation device is classified as nonsafety-related.~~ The plant design and circuit layout of the DC systems provide physical separation of the safety-related equipment, cabling and instrumentation. Each 250VDC battery is separately housed in a ventilated room apart from its charger, distribution, and ground detection panels. Equipment of each division of the DC distribution system is located in an area separated physically from the other divisions. All the components of safety-related 250 VDC systems are housed in Seismic Category I structures. The battery charger output is of a current limiting design. The battery charger output voltage is protected against over voltage by a high voltage shutdown circuit. The over voltage protection feature is incorporated to protect equipment from damage caused by high voltage. An initial composite test of the on-site DC power systems is called for as a prerequisite to initial fuel loading. This test verifies that each battery capacity is sufficient to satisfy a safety load demand profile under conditions of a LOCA and loss of preferred power. Battery capacity tests are conducted. These tests ensure that the battery has the capacity to meet safety-related load demands.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.13.3-1 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the Direct Current Power Supply.

NRC RAI 14.3-121

In DCD Tier 1, Section 2.13.4, add ITAAC for the standby on-site power supply per Reg Guide 1.9 & IEEE 387.

GE Response:

Regulatory Guide 1.9, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," and IEEE 387, "Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," address traditional safety-related diesel generator units.

The ESBWR standby diesel generators are non safety-related and do not have the same requirements as the safety-related diesel generators in active plants. The ESBWR non safety-related diesels are not required for safe shutdown.

No ITAAC will be added for the non safety-related standby diesel generators.

DCD Impact:

No DCD changes result from this response.

NRC RAI 14.3-123

In DCD Tier 1, Rev 2, Section 2.13.6, even though the Instrument and Control Power Supply may be non-safety, if its failure could cause a plant transient, ITAACs should be provided.

GE Response:

Per the teleconference conducted on Friday, March 2, 2007, the Instrument and Control Power Supply supplies only miscellaneous non safety-related instrumentation and control loads. The postulated failure of this supply should not cause a plant transient. The Staff now agrees that no ITAAC is required.

DCD Impact:

No DCD changes result from this response.

NRC RAI 14.3-124

In DCD Tier 1, Rev 2, Section 2.13.7, the Communications System includes a dial telephone system, a power-actuated paging facility, a sound-powered telephone system, and an in-plant radio system. Some elements of the system (such as the off-site security radio system, crisis management radio system, and fire brigade system) are COL applicant scope and should have ITAAC to demonstrate conformance to regulations.

GE Response:

Revision 3 of DCD Tier 1, Section 2.13.7 was revised to read that some elements of the Communications System are site specific. With rapidly changing communications technologies, it is not feasible to specify all details of the Communications System at this time.

However, as agreed upon in the teleconference with the Staff on Friday, March 2, 2007, GE will add an ITAAC in DCD Tier 1, Section 2.13.7, Revision 4 to ensure that the installation and functionality of the Communications System is in accordance with its final design.

DCD Impact:

Revision 4 of DCD Tier 1, Section 2.13.7 will add an ITAAC as noted above.