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MFN 06-431 Supplement 9

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 107 Related to ESBWR Design Certification Application - Technical Specifications - RAI Number 16.2-55 S01**

Enclosure 1 contains the subject supplemental RAI response resulting from NRC RAI Letter No. 107. The GE Hitachi Nuclear Energy (GEH) response to the original RAI was provided in the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 06-431, Letter from David Hinds to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.0-2 through 16.0-7, 16.2-10, 16.2-12 through 16.2-22, 16.2-25, 16.2-31 through 16.2-40, 16.2-43, 16.2-44, 16.2-46 through 16.2-49, 16.2-51, 16.2-53,* ***16.2-55*** *through 16.2-72, and 16.2-78 through 16.2-80,* November 13, 2006

Enclosure:

1. MFN 06-431, Supplement 9 – Response to Portion of NRC Request for Additional Information Letter No. 107 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-55 S01

cc:

AE Cubbage	USNRC (with enclosure)
DH Hinds	GEH (with enclosure)
RE Brown	GEH (with enclosure)
eDRFs	59-5595/4

Enclosure 1

MFN 06-431, Supplement 9

Response to Portion of NRC Request for

Additional Information Letter No. 107

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Number 16.2-55 S01

NRC RAI 16.2-55

Float current monitoring was proposed to be used as a method of verifying the battery's state-of-charge in lieu of specific gravity monitoring. Specific gravity monitoring is used to measure the strength of a battery cell's electrolyte, which is an important component of the battery's chemical reaction, and provides a direct indication of the battery's state-of-charge. Whereas, float current monitoring may or may not provide an accurate indication of the battery's state-of-charge. Float current monitoring is based on a calculation that is dependent on several variables. The staff has a concern with two variables of this calculation: the applied charging voltage and cell resistance. A change in either of these variables may provide a false indication of the battery's state-of-charge.

Provide assurance that float current monitoring will provide an accurate indication of the battery's state-of charge (during a battery recharge as well as steady-state operations) (LCO 3.8.1 Required Action A.2, LCO 3.8.2 Required Action A.2, LCO 3.8.4 CONDITION B, LCO 3.8.4 CONDITION F, SR 3.8.4.1).

GE Response

The NRC letter to the Technical Specification Task Force, dated April 11, 2006, "Request for Public Meeting to Discuss Enclosed Document Electrical Engineering Branch Concerns with Technical Specification Task Force (TSTF)-360, Revision 1 DC Electrical Rewrite," (ML061020636 and ML061100185) identifies the same issue as this RAI in "Staff Concern 2." TSTF-360 has already been incorporated into the BWR/6 Standard Technical Specifications (STS), NUREG-1434, Revision 3.1, and industry efforts to resolve this issue are ongoing.

The ESBWR Design Control Document (DCD) Chapter 16 Technical Specifications are based on the BWR/6 Standard Technical Specifications, NUREG-1434. It is GE's intent to maintain consistency with the latest approved Standard Technical Specifications to the extent practicable and applicable to the ESBWR design. Upon final resolution of the Staff Concerns with TSTF-360, the ESBWR will address any agreed to changes to NUREG-1434.

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

NRC RAI 16.2-55, Supplement 1

The NRC staff will need confirmation from the valve regulated lead acid (VRLA) battery manufacturer that float current monitoring provides an accurate indication of the battery state of charge (SOC) during steady-state and discharge conditions. If float current monitoring does not indicate 100% SOC, the COL applicant must commit to additional design margins in the battery sizing calculations to compensate for measurement uncertainty and that these design margins would be stated in the TS Bases.

GEH Response:

As stated in Design Control Document (DCD), Tier 2, Section 8.3.2.1.1, battery sizing calculations are performed in accordance with IEEE 485. IEEE 485, Section 6.2, "Additional Considerations," ensures that sizing calculations include allowances for aging, design margin, and temperature correction factors appropriate for a Valve Regulated Lead Acid (VRLA) battery.

GEH recognizes that IEEE 485 does not explicitly identify that the design margin may need to include capacity to compensate for the uncertainty resulting from the use of float current monitoring to determine the battery state of charge (SOC). To ensure that SOC uncertainty is considered in battery sizing calculations, GEH will revise DCD, Tier 2, Section 8.3.2.1.1, and the Bases for LCO 3.8.1, "DC Sources - Operating," to explicitly identify that SOC uncertainty is considered in battery sizing calculations.

GEH evaluated the affect on Technical Specifications of the potential need to add additional battery capacity to account for SOC uncertainty. Three Technical Specification items were evaluated: 1) acceptance criteria for the battery performance test in Surveillance Requirement (SR) 3.8.3.6; 2) acceptance criteria for verification of battery SOC in SR 3.8.3.1; and, 3) acceptance criteria for restoration of a discharged battery in LCO 3.8.1, Required Action (RA) A.2, and LCO 3.8.3, RA B.2.

SR 3.8.3.6 verifies battery capacity is $\geq$ {80}% of the manufacturer's rating when subjected to a performance discharge test or {a modified performance discharge test}. The acceptance criteria, $\geq$ {80}% of the manufacturer's rating, includes only the battery capacity margin provided to compensate for deterioration due to age or use. Any battery capacity margin applied for SOC uncertainty is in addition to capacity margin applied for aging. Battery capacity margin added for SOC uncertainty will increase total battery capacity but will not affect the acceptance criteria for SR 3.8.3.6, which is based only on the percentage of the total capacity allocated for the effects of age and use. Additionally, SR 3.8.1.3, the service test, and SR 3.8.3.6, the performance test, are both initiated from the as found condition. The as found condition is fully charged as verified by SR 3.8.3.1, which uses current monitoring to verify the SOC. Acceptable results for SR 3.8.1.3 and SR 3.8.3.6 provide an independent determination that the available battery capacity includes sufficient allowance for SOC uncertainty.

SR 3.8.3.1 and LCO 3.8.1, RA A.2, and LCO 3.8.3, RA B.2, require verification that a battery is fully charged based on current monitoring. As described in the response to RAI 16.2-126 (MFN 07-634, dated December 4, 2007), GEH will revise the Bases for LCO 3.8.1, "DC Sources - Operating," and LCO 3.8.3, "Battery Parameters," to include a "Reviewer's Note" specifying that use of the float current monitoring option to verify the SOC requires that the battery manufacturer confirm the acceptability of this method and the acceptance criteria and that battery capacity include margin for SOC uncertainty.

DCD Impact:

GEH will revise DCD, Tier 2, Section 8.3.2.1.1, as follows:

> Batteries are sized for the DC load in accordance with IEEE Standard 485 (Reference 8.3-2) with an expected 20-year service life and include margin to compensate for uncertainty in determining the battery state of charge.

GEH will revise the Background Section of the DCD, Tier 2, Chapter 16B, LCO 3.8.1 Bases, as follows:

> ~~The batteries are sized so that the sum of the required loads does not exceed {80%} of the battery ampere-hour rating, or warranted capacity at end-of-installed-life with 100% design demand.~~ Batteries are sized for the DC load in accordance with IEEE Standard 485 (Ref. 3) and include margin to compensate for uncertainty in determining the battery state of charge.