GE-Hitachi Nuclear Energy Americas LLC

James C. Kinsey
Vice President, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

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

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 107 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.3-38 S01**

The purpose of this letter is to submit the GE-Hitachi Nuclear Energy Americas (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter dated August 31, 2007 (Reference 1). RAI 9.3-38 was addressed in Reference 2 in response to Reference 3. GEH response to RAI Number 9.3-38 S01 is addressed in Enclosure 1.

Should you have any questions about the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

References:

1. MFN 07-492, Letter from U. S. Nuclear Regulatory Commission to Robert E. Brown, Senior Vice President, Regulatory Affairs, *Request for Additional Information Letter No. 107 Related to ESBWR Design Certification Application*, August 31, 2007.

2. MFN 07-398, Letter from GEH to U. S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 98 – Auxiliary Systems – RAI Numbers 9.3-37, 9.3-38, and 9.3-39,* July 23, 2007.

3. MFN 07-317, Letter from U. S. Nuclear Regulatory Commission to Robert E. Brown, General Manager, Regulatory Affairs, *Request for Additional Information Letter No. 98 Related to ESBWR Design Certification Application*, May 29, 2007.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 107 Related to ESBWR Design Certification Application - Auxiliary Systems- RAI 9.3-38 S01.

cc:

AE Cubbage	USNRC (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
eDRF	0000-0076-0242

Enclosure 1

MFN 07-398 Supplement 1

Response to Portion of NRC Request for

Additional Information Letter No. 107

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.3-38 S01

For historical purposes, the original text of RAI 9.3-38 with GE response is included.

NRC RAI 9.3-38

Clarify whether the means for storing and handling oxygen comply with EPRI Report NP-5283-SR-A, "Guidelines for Permanent BWR Hydrogen Water Chemistry Installations." In addition, please clarify whether the decision to implement the Oxygen Injection System relies on the COL Applicant or the COL Holder and the basis for it.

GE Response

The Oxygen Injection System (OIS) is part of the ESBWR Standard Plant design and is not determined by the COL Applicant. The OIS is designed to add sufficient oxygen to the Condensate and Feedwater Systems to suppress corrosion and corrosion product release. Implementation of the Hydrogen Water Chemistry System changes the demand for oxygen and also the storage requirements. The COL applicant defines the site storage requirements based on oxygen demand and Hydrogen Water Chemistry Requirements (if implemented). If the Hydrogen Water Chemistry system is implemented, the hydrogen and oxygen storage facilities will comply with the guidelines of EPRI Report NP-5283-SR-A.

DCD Impact

None

NRC RAI 9.3-38 S01

It is not clear to the staff whether the OIS would still need to meet the guidelines of EPRI Report NP-5283-SR-A if the Hydrogen Water Chemistry System is not implemented. If the OIS does not need to meet the guidelines of the above report please clarify which document contains the requirements for design, operation, maintenance, surveillance, and testing of the oxygen storage facility and discuss how the ESBWR meets those requirements.

GEH Response

The Oxygen Injection System uses the guidelines for gaseous oxygen injection systems in EPRI Report NP-5283-SR-A, "Guidelines for Permanent Hydrogen Water Chemistry Installations-1987 Revision, September 1987." This document will be used for Oxygen Injection System design guidance even if Hydrogen Water Chemistry is not employed.

DCD Impact

DCD Tier 2, subsection 9.3.10 will be revised under Revision 5 as shown in the attached markup.

9.3.10 Oxygen Injection System

9.3.10.1 Design Bases

Safety (10 CFR 50.2) Design Bases

The Oxygen Injection System (OIS) does not perform any safety-related function. Therefore, the OIS has no safety design basis.

Power Generation Design Bases

The OIS is designed to add sufficient oxygen to the condensate system to suppress corrosion and corrosion product release in the Condensate and Feedwater System. Experience has shown that the preferred feedwater dissolved oxygen concentration is 30 to 200 ppb. During startup and shutdown operation, the feedwater dissolved oxygen concentration is usually greater than the 30 to 200 ppb range. However, during power operation, deaeration in the main condenser can reduce the condensate dissolved oxygen concentration below 30 ppb, requiring that oxygen be added. The main function of the Oxygen Injection System is to maintain the dissolved oxygen concentration in the condensate and feedwater between 30 and 200 ppb with a target of less than 100 ppb during reactor operation.

The OIS is also designed to inject oxygen into the offgas system when Hydrogen Water Chemistry is implemented, to ensure that excess hydrogen in the offgas stream is recombined.

9.3.10.2 System Description

The Oxygen Injection System uses the guidelines for gaseous oxygen injection systems in EPRI Report NP-5283-SR-A, "Guidelines for Permanent Hydrogen Water Chemistry Installations-1987 Revision, September 1987." The condensate oxygen injection module and the feedwater injection module are provided with pressure regulators and associated piping, valves, and controls to depressurize the gaseous oxygen and route it to the condensate and feedwater injection modules. There are check valves and isolation valves between the oxygen injection modules and the condensate lines, downstream of the condensate demineralizers, and in the feedwater lines, downstream of the direct contact feedwater heater.

The flow regulating valves in this system are operated from the MCR. Analyzers in the Process Sampling System (Subsection 9.3.2) monitor the dissolved oxygen concentration in the condensate and feedwater system. An operator can make changes in the oxygen injection rate in response to changes in the dissolved oxygen concentration in the condensate and feedwater systems. An automatic control system is not required because short-term changes in oxygen injection rate are not required.

The Hydrogen Water Chemistry oxygen injection module is based on the generic Electric Power Research Institute "Guidelines for Permanent BWR Hydrogen Water Chemistry Systems EPRI NP-5283-SR-A 1987 Revision." The expected oxygen injection flowrate for condensate injection is identified in Reference 9.3.10-3.

The COL Applicant will provide a description of the oxygen storage facility (COL item 9.3.10-1-A).