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MFN 06-309
Supplement 5

Docket No. 52-010

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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. 54 –Auxiliary Systems– RAI Number 9.1-20 S01**

Enclosure 1 contains GEH's response to the subject NRC RAI transmitted via Reference 1 which is a supplemental request to the RAIs transmitted via Reference 2. The original RAI response was submitted to the NRC via Reference 3.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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NRO

Reference:

1. E-mail dated May 3, 2007, from L. Quinones (NRC) to P. Jordan (GE).
2. MFN 06-302, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, *Request for Additional Information Letter No. 54 Related to the ESBWR Design Certification Application*, August 23, 2006.
3. MFN 06-309, Letter from GE to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter 54 Related to ESBWR Design Certification Application – Auxiliary Systems – RAI Numbers 9.1-1 through 9.1-26 and Amended Response to RAI Number 2.4-23 from NRC RAI Letter No. 32,* September 8, 2006.

Enclosure:

1. MFN 06-309, Supplement 5 – Response to Portion of NRC Request for Additional Information Letter No. 54 – RAI Number 9.1-20 S01

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Enclosure 1

MFN 06-309
Supplement 5

Response to Portion of NRC Request for Additional Information Letter No. 54 Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.1-20 S01

For historical purposes, the original text of RAI 9.1-20 and the GE response are included.

NRC RAI 9.1-20

DCD Tier 2, Section 9.1.3 states that the FAPCS is designed to provide post accident recovery (defense-in-depth) functions of suppression pool cooling, low pressure coolant injection drywell spray, and alternate shutdown cooling, which all take suction from the suppression pool. Describe the water flow rate and heat removal capacity to perform these defense-in-depth functions, how those values are determined, and how the FAPCS will be designed and tested to provide those flow rates and heat removal capacities.

GE Response:

The FAPCS is not required to satisfy any flow rate or heat removal requirement for the functions described in the question. The FAPCS functions of suppression pool cooling, low pressure injection, drywell spray, and alternate shutdown cooling are non-essential to plant safety, and no credit is taken for them in any safety analysis. Therefore the FAPCS provides these functions to the extent it has available capacity, but it is not specifically designed to perform these functions.

The FAPCS is designed for SFP cooling based on the requirements of URD Volume III, Chapter 7, Section 2.2.2.3. This is the available capacity used to perform the defense-in-depth functions.

No changes will be made to the DCD as a result of this RAI.

Supplement received via e-mail dated 5/3/07 from L. Quinones (NRC) to P. Jordan (GEH):

NRC RAI 9.1-20 S01:

The response is insufficient. The Chapter 19 PRA credits the FAPCS in performing certain functions (e.g., low pressure injection and suppression pool cooling). Provide the basis for concluding that successful actuation of the assumed number of FACPS trains is adequate to satisfy PRA success criterion for the respective coolant injection and heat removal functions.

GE Response:

Neither low pressure injection or suppression pool cooling are credited by the safety analysis, however, they are considered in the PRA under certain scenarios (see DCD Tier 2 Subsection 19A.8.4.8):

In a scenario where passive containment cooling is not removing decay heat, suppression pool cooling is considered as a backup. The success criterion for suppression pool cooling is that a single train of the FAPCS be capable of removing core decay heat at a rate that prevents the containment from exceeding its design pressure. A single FAPCS train (sized for the function of spent fuel pool cooling as described in Subsection 9.1.3) is sufficient to achieve this criterion

In a scenario in which the Gravity Driven Cooling System (GDCS) is not providing makeup water to the reactor, the low pressure injection function of FAPCS is considered as a backup. The success criterion for low pressure injection is that a single train of the FAPCS is capable of pumping water from the suppression pool to the reactor at a rate of 340 m^3/hr when the differential pressure is 1.03 MPa (150 psi).

DCD Impact:

DCD Tier 2, Subsection 9.1.3, is to be updated for Revision 4 as shown in the attached markup.

The FAPCS may be operated in the following modes for post-accident recovery following an accident:

- Spent Fuel Pool Cooling;
- Low Pressure Coolant Injection (LPCI);
- Suppression Pool Cooling (SPC);
- Drywell Spray; and
- Alternate Shutdown Cooling (ASDC).

All FAPCS lines penetrating the containment that do not have a post-accident recovery function are automatically isolated upon receipt of a containment isolation signal from Leak Detection and Isolation System (LD&IS).

The FAPCS piping provides flow paths for delivery of makeup water to IC/PCCS pools and Spent Fuel Pool from offsite emergency water supply or Fire Protection system as needed 72 hours after a design basis accident.

For the RTNSS function of low pressure coolant injection, a single train of the FAPCS shall be capable of pumping water from the suppression pool at a rate of 340 m^3/hr at a differential pressure of 1.03 MPa (150 psi).

System Operating Modes

FAPCS is designed to operate in the modes listed in Table 9.1-2. The following paragraphs describe the major operating modes of FAPCS:.

Spent Fuel Pool Cooling and Cleanup Mode – One of the FAPCS C/C trains is continuously operated in this mode to cool and clean the water in the Spent Fuel Pool during normal plant operation and refueling outage. This mode may be initiated following an accident to cool the Spent Fuel Pool for accident recovery. During this mode of operation, water is drawn from the skimmer surge tanks, pumped through the heat exchanger and water treatment unit to be cooled and cleaned and then returned to the Spent Fuel Pool (SFP). As the SFP level rises, water will spill into the weir and flow back to the skimmer surge tanks. When necessary, a portion or all of the water may bypass the water treatment unit.

Fuel and Auxiliary Pool Cooling and Cleanup Mode - During a refueling outage, one or both FAPCS C/C trains are placed in this mode of operation to cool and clean the water in the Spent Fuel Pool and pools listed below depending on the heat load condition in these pools.

- Upper fuel transfer pool;
- Buffer pool;
- Reactor well; and
- Dryer and separator storage pool.

During this mode of operation, water is drawn from the skimmer surge tanks, pumped through the heat exchanger and water treatment unit to be cooled and cleaned and then returned to these pools. When necessary, portion or all of the water may bypass the water treatment unit.