Enclosure 1

MFN 13-040, Supplement 2

GEH Supplemental Response to RAI 8.1-22

RAI 8.1-22

Question Summary:

The staff's question is in regard to the ESBWR design basis and ITAAC information in view of the design vulnerability identified in NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System."

Full Text:

General Electric-Hitachi (GEH) Nuclear Energy on Economic Simplified Boiling-Water Reactor Design Control Document (DCD) Section 8.1.5, "Design Basis," Revision 9, Chapter 8, Electrical Power states:

The offsite power system is designed to provide a continuous source of power to the onsite power system throughout plant startup, normal operation (including shutdown), and abnormal operations.

AC safety-related loads are powered by four physically separate and electrically independent divisions. Any two out of four divisions can safely shut down the unit and maintain it in a safe shutdown condition.

DCD 2.13.1, "Electric Power Distribution System," Revision 9 states:

The Plant Investment Protection buses also supply power to the four (4) safetyrelated, 480VAC, Isolation Power Center buses and the two (2) ancillary diesel buses. The nonsafety-related PIP buses and ancillary diesel buses have a function to supply power to RTNSS credited loads.

DCD 4.2, "Interface Requirements," of "Offsite Power," states:

A combined license applicant referencing the ESBWR certified design shall develop an ITAAC to verify that the as-built offsite portion of the PPS [Preferred Power Supply] from the transmission network to the interface with the onsite portions of the PPS satisfy the applicable provisions of GDC 17.

GEH stated the following in a public meeting dated June 6, 2013, regarding the design basis of offsite power circuits to provide adequate capacity and capability for important to safety systems in view of the design vulnerability identified in NRC Bulletin 2012-01," Design Vulnerability in Electric Power System."

Because the ESBWR offsite and onsite high and medium voltage circuits will be monitored and alarmed in the Main Control Room, operator manual action can address an issue and take actions to maintain power to nonsafety-related plant loads in the unlikely event that the automatic logic did not maintain power continuity (safety-related plant loads are continuous without operator action).

ESBWR detailed design already includes plans and requirements documents for detection and alarms of three phases of AC power.

No further action is necessary for ESBWR design capabilities to address NRC Bulletin 2012-01.

GEH is requested to provide the design basis (Chapter 8, Tier 2) and ITAAC information (Chapter 2, Sections 2.13 and 4.2, Tier 1) in accordance with § 52.47, "Contents of applications: technical information." for the Electrical Engineering Branch staff to determine whether it meets the 10 CFR 50 Appendix A, GDC 17, "Electric power systems," requirements regarding the offsite power circuits and onsite electrical power distribution system to provide adequate capacity and capability in view of the design vulnerability identified in NRC Bulletin 2012-01," Design Vulnerability in Electric Power System." The design bases and ITAAC information for interface requirement submitted should include, as a minimum, design details to automatically detect and alarm in the main control room for a single-phase open phase condition (with or without a ground), on the high voltage side of a transformer connecting a GDC-17 offsite power circuit to the transmission system. The information should have sufficient details for the combined operating license applicants to complete the detailed design (e.g., location of relays) and analyses (e.g., setpoints) in final safety analysis report in accordance with § 52.79, "Contents of applications; technical information." In addition, GEH is requested to provide the delineation of scope between the DCD and COL applicants in regards to the bulletin. GEH is also requested to provide information regarding the adequacy of electric power system design as stated above (GEH DCD Section 8.1.5 and DCD Sections 2.13.1 and 4.2) in view of the single-phase open phase issue.

GEH Supplemental Response – Supplement 2

NOTE: The supplemental information provided below is additive to GEH's original response, as provided in ML13211A206 (MFN 13-040), Letter from Jerald G. Head, GEH, to USNRC, "NRC Request for Additional Information Related to ESBWR Design Certification Application – GEH Response to RAI 8.1-22," July 30, 2013, and the first supplemental response, as provided in ML 13242A211 (MFN 13-040, Supplement 1), Letter from Jerald G. Head, GEH, to USNRC, "NRC Request for Additional Information Related to ESBWR Design Certification Application – GEH Response to RAI 8.1-22," July 30, 2013, and the first supplemental response, as provided in ML 13242A211 (MFN 13-040, Supplement 1), Letter from Jerald G. Head, GEH, to USNRC, "NRC Request for Additional Information Related to ESBWR Design Certification Application – GEH Response to RAI 8.1-22," August 28, 2013.

During a public meeting of the ESBWR Design-Centered Working Group (DCWG) and the NRC on November 14, 2013, the NRC provided feedback on the GEH response to NRC Request for Additional Information (RAI) 8.1-22 (GEH Letter to NRC, MFN 13-040, July 30, 2013) and the supplemental information provided in MFN 13-040, Supplement 1, August 28, 2013. The NRC requested and GEH agreed to clarify in the ESBWR Design Control Document (DCD) that the monitoring of transformers for loss of phase will detect and alarm the loss of one or more phases, to address NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," July 27, 2012, and subsequent information that the NRC discussed with industry representatives in a public meeting held November 1, 2013. The original response indicated that all three phases are monitored such that a loss of phase on one or more of the three phases would be detected and alarmed. The DCD is clarified accordingly.

As shown on the attached marked-up pages from the ESBWR DCD, , clarifications (shown in yellow highlight) are being added in DCD Tier 1, Section 2.13.1 and Table 2.13.1-2 (ITAAC Items 14a and 14b); and DCD Tier 2, Subsection 8.2.1.2.2.

Changes shown on the attached markups will be included in Revision 10 of the DCD, which is expected to be issued in December 2013.

Impact on DCD

DCD markups related to this supplemental response are provided in Enclosure 2.