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Subject: **Response to Portion of NRC Request for Additional Information
Letter No. 298 Related to ESBWR Design Certification Application -
Auxiliary Systems - RAI Number 9.5-93 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC Letter 298 dated February 11, 2009, Reference 1. The original RAI response was submitted to the NRC via Reference 2 in response to Reference 3. GEH response to RAI Number 9.5-93 S01 is addressed in Enclosure 1.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. MFN 09-130, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 298 Related to ESBWR Design Certification Application*, February 11, 2009.
2. MFN 08-945, Response to Portion of NRC Request for Additional Information Letter No. 251 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.5-93, December 8, 2008.
3. MFN 08-687, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 251 Related to ESBWR Design Certification Application*, September 4, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 298 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.5-93 S01

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Enclosure 1

MFN 09-209

Response to Portion of NRC Request for

Additional Information Letter No. 298

Related to ESBWR Design Certification Application

Auxiliary Systems

RAI Number 9.5-93 S01

For historical purposes, the original text of RAI 9.5-93 and the related GEH response is included. The historical response does not include any attachments or DCD mark-ups.

NRC RAI 9.5-93

DCD Section 9.5.2 does not fully address the guidance provided in RG 1.189 communications Sections 3.5.1.3 and 4.1.7 including both the on-site fire brigade radio and offsite systems. mutual aid requirements.

DCD Section 9.5.2 does not clearly identify the portable radio communications system used by the fire brigade. If the onsite brigade uses the Plant Radio System, the Plant Radio sub-section should specifically state that the Plant Radio System will be the fire brigades primary portable communications onsite. In addition, DCD Section 9.5.2 should identify the RG 1.189 Position 4.1.7 performance requirements applicable to the portable radio communications systems (e.g. no dead zones, protected repeaters, must not interfere with security, frequencies will not affect relay actuations, etc.).

DCD Section 9.5.2 does not clearly identify the onsite fixed communications system for use by the fire brigade. DCD Section 9.5.2 should state whether the onsite fixed communications system is independent of the normal plant comm. system and state which stations (locations) will receive the fixed communication consistent with RG 1.189 Position 4.1.7.

DCD Section 9.5.2 does not clearly identify the offsite communications system for use by the fire brigade. DCD Section 9.5.2.2, in the discussion of 'Emergency Communication Systems,' identifies that the Fire Brigade Radio System provides communication capability and consists of a base unit, mobile units, and portable units in accordance with BTP SPLB 9.5-1, Position C.5.g(4). However, it is unclear if the Fire Brigade Radio System is (1) is the communications link with the offsite mutual aid, (2) is separate from the Plant Radio System with a fire brigade channel, and (3) provides for both onsite and offsite communications or are there multiple systems. Clarify the use of the Fire Brigade Radio System in the DCD. Additionally, the applicable BTP SPLB 9.5-1, Rev 4, position is C.7.1.8, not C.5.g(4) as referenced in the DCD.

Also, 9.5.2.2 states "... [the 3 voice communication systems] are designed and installed to provide assurance that any single event does not cause a complete loss of intraplant communication."

Does "any single event" include any single fire event?

Does "a complete loss" include a partial loss such as a fire taking out a single repeater thus causing a dead zone but not taking down the whole system?

Any other communication systems that are to be used (either primary or back-up) by the onsite fire brigade should be identified as such and explained as to when the fire brigade would use them (e.g. the Plant Radio System goes down due to loss of power, or fire). Communication system descriptions should include the type of system (portable, fixed, telephone, radio, etc.), who will be using it, when it will be used, if this is a primary or back-up system, listing of all relevant BTP and RG 1.189 requirements, and how each system relates to other systems.

Clarify the potential effects a single fire can have on the fire brigade communications systems. Can a single fire take out the diverse nonsafety-related power supplies that power the PA/PL telephone, PABX, and plant radio systems in such a way as to not have communication in any given fire area? Can a single fire affect cabling from the above systems in such a way as to not have communication in any given fire area? Does every fire area including containment have the above system capabilities? Are the sound powered phones credited for fire and are they in every fire area and can a single fire adversely affect this system and any other communication system credited for fire in such a way as to not have communication in any given fire area?

GEH Response

Note: To fully address the questions, the RAI was divided into seven separate questions and the answers were provided separately for each question.

1. DCD Section 9.5.2 does not fully address the guidance provided in RG 1.189 communications Sections 3.5.1.3 and 4.1.7 including both the on-site fire brigade radio and offsite systems mutual aid requirements.

a) RG 1.189, Section 3.5.1.3 describes Procedures and Pre-Fire Plans for Fire Brigades, which is not within the scope of DCD for Communication Systems. Refer to Tier 2 DCD, Chapter 9, subsection 9.5.1 and specifically subsections 9.5.1.15.5 and 9.5.1-10-H for information pertaining to Fire Brigades.

b) The onsite Fire Brigade Communication System is site specific and is not within ESBWR standard plant design. As identified in subsection 9.5.2.5, the COL applicant will address the specific details and individual equipment associated with onsite and offsite Fire Brigade Communication System.

Subsections 9.5.2.2 and 9.5.2.5-5-A of the DCD Tier 2 will be revised in Rev.6 to specifically include compliance to BTP SPLB 9.5-1, Position C 7.1.8 and RG 1.189, Position 4.1.7. Also Refer to response 4(b) below.

c) "Emergency Communication System" subsection of the DCD Tier 2 states in part that "... emergency offsite communications are provided by public telephone lines, the

private utility network connected to the PABX and radio systems.” The COL applicant will describe the detail of the offsite mutual aid requirements as identified in subsection 9.5.2.5-3-A of the DCD.

2. DCD subsection 9.5.2 does not clearly identify the portable radio communications system used by the fire brigade. If the onsite brigade uses the Plant Radio System, the Plant Radio sub-section should specifically state that the Plant Radio System will be the fire brigade’s primary portable communications onsite. In addition, DCD subsection 9.5.2 should identify the RG 1.189 Position 4.1.7 performance requirements applicable to the portable radio communications systems (e.g. no dead zones, protected repeaters, must not interfere with security, frequencies will not affect relay actuations, etc.).

As stated in response 1(b) above, the COL applicant will identify the primary portable radio communication system for the onsite Fire Brigade. Refer to response 4(b) below. The COL applicant will also address the requirements of RG 1.189, Position 4.1.7 as stated in subsection 9.5.2.5-5-A of the DCD. (Refer to response 1b above).

The first paragraph under Plant Radio System subsection of the DCD subsection 9.5.2 will be revised in Revision 6 to add that the “system complies with the performance requirements of RG 1.189, Position 4.1.7 as applicable to portable radio communication system.”

3. DCD Section 9.5.2 does not clearly identify the onsite fixed communications system for use by the fire brigade. DCD Section 9.5.2 should state whether the onsite fixed communications system is independent of the normal plant communication system and state which stations (locations) will receive the fixed communication consistent with RG 1.189 Position 4.1.7.

The second paragraph under Plant Radio System states that “Communication consoles are located at selected plant locations including the MCR and remote shutdown rooms. Communications between consoles is through hardwire, therefore providing a means of communication between selected areas of the plant...” These fixed communication systems are independent of the normal Plant communication system. However, the COL applicant will state whether to use this fixed communication for onsite fire brigade’s as stated in responses to 1(b) and 4(b).

4. DCD Section 9.5.2 does not clearly identify the offsite communications system for use by the fire brigade. DCD Section 9.5.2.2, in the discussion of

'Emergency Communication Systems,' identifies that the Fire Brigade Radio System provides communication capability and consists of a base unit, mobile units, and portable units in accordance with BTP SPLB 9.5-1, Position C.5.g(4). However, it is unclear if the Fire Brigade Radio System is (1) is the communications link with the offsite mutual aid, (2) is separate from the Plant Radio System with a fire brigade channel, and (3) provides for both onsite and offsite communications or are there multiple systems. Clarify the use of the Fire Brigade Radio System in the DCD. Additionally, the applicable BTP

SPLB 9.5-1, Rev 4, position is C.7.1.8, not C.5.g(4) as referenced in the DCD.

GEH clarifies that:

- a) Fire Brigade Radio System is not the communication link with the offsite mutual aid,
- b) The ESBWR Plant Radio Systems are equipped with multiple channels. A dedicated channel is available and may be assigned for the onsite Fire Brigade's use should the COL applicant elect to do so. However, GEH clarifies that this is an optional provision and is separate from the description under "Emergency Communication System" subsection (5th. Bullet) and the COLA information in paragraph 9.5.2.5-5-A of the DCD and;
- c) Fire Brigade Radio System provides onsite communication and does not provide offsite communication. The COL applicant will describe the detail of the offsite communication provisions as identified in subsection 9.5.2.5-3-A of the DCD. Refer to response 1c above. DCD, Tier 2, subsection 9.5.2.2 will be revised in Rev.6 to correct the position from "C.5.g (4)" to "C.7.1.8". The channel assignments under Plant Radio System, third paragraph will be revised in Revision 6 of the DCD as follows:
 - Emergency;
 - Fire Brigade (Optional);
 - Operations;
 - Maintenance;
 - Management;
 - Health physics; and
 - Crisis management (or Unassigned)

5. Also, 9.5.2.2 states "... [the 3 voice communication systems] are designed and installed to provide assurance that any single event does not cause a complete loss of intraplant communication."

Does "any single event" include any single fire event?

Does "a complete loss" include a partial loss such as a fire taking out a single repeater thus causing a dead zone but not taking down the whole system?

- a) "Any single event" that disables a system or a component within the system does include any single fire event.
- b) Complete loss of intraplant communication does not include partial loss of communication. Partial loss of communication may be caused by failure of a

component within the system. For example, failure of a repeater, or antenna due to fire will cause a dead zone in one area without disrupting communication in other areas of the plant.

6. Any other communication systems that are to be used (either primary or back-up) by the onsite fire brigade should be identified as such and explained as to when the fire brigade would use them (e.g. the Plant Radio System goes down due to loss of power, or fire). Communication system descriptions should include the type of system (portable, fixed, telephone, radio, etc.), who will be using it, when it will be used, if this is a primary or back-up system, listing of all relevant BTP and RG 1.189 requirements, and how each system relates to other systems.

- a) All other communication systems such as PA/PL, PABX and Sound-Powered Telephone Systems are available for use by the onsite Fire Brigade as back up. However, as stated in response 1b. above, the COL applicant will describe the specific details pertaining to onsite Fire Brigade.
- b) Plant Radio System is the primary means of communication for operations and maintenance personnel. PA/PL, PABX serve as the backup to Plant Radio System. As stated in DCD, the Sound Power Radio System is used by maintenance personnel working at control rod drive equipment area, refueling platform area, turbine-generator operating deck and areas containing switchgear, load centers, MCC and other high-maintenance areas. The PA/PL is a fixed communication system used during plant operations, maintenance, testing, startup and limited emergencies. The PABX is also a fixed system and is connected to commercial telephone system and utility private network.
- c) Standard Review Plans, Branch Technical Positions, and Regulatory Guides that are applicable to ESBWR, are provided in Tables 1.9-20, 1.9-21 and 1.9-22 Tier 2, Chapter 1 of the DCD. As stated in response 1(b) above, the Fire Brigade Communication System and compliance to the relevant documents BTP SPLB 9.5.1, Appendix B, Position 7.1.8 and RG.1.189, section 4.1.7 (a) & (b) will be addressed by the COL applicant.

7. Clarify the potential effects a single fire can have on the fire brigade communications systems. Can a single fire take out the diverse nonsafety-related power supplies that power the PA/PL telephone, PABX, and plant radio systems in such a way as to not have communication in any given fire area? Can a single fire affect cabling from the above systems in such a way as to not have communication in any given fire area? Does every fire area including containment have the above system capabilities? Are the sound powered phones credited for fire and are they in every fire area and can a single fire adversely affect this system and any other communication system credited for fire in such a way as to not have communication in any given fire area?

- a) A single fire may disable communication equipment located in the area of the fire resulting in the partial loss of function of the Fire Brigade Communications.

Antennas and radio repeaters will be located in multiple fire areas of the plant enabling communication between Fire Brigades.

Other communication systems, such as PABX and PA/PL systems may be available as back-up for use by the Fire Brigades, since the power supply and communication equipment for these systems may not be located in the fire area that experiences the fire.

- b) A single fire cannot take out the diverse nonsafety-related power supply equipment, that power the PA/PL, PABX, and Plant Radio systems. PA/PL and PABX systems are powered from the redundant DC power supply equipment and the Plant Radio System is powered by the redundant nonsafety-related UPS. To the extent possible, this power supply equipment will be located in different areas separated by fire barriers. If a single fire disables the power supply equipment for PABX system in any one fire area, PA/PL and the Radio System will continue to function because the power supply equipment for these systems will be located in a different fire area.
- c) Multiple raceways containing some or all forms of communication system cabling could be located in a given fire area. Therefore, a single fire may potentially affect cabling for PA/PL, PABX, and Plant Radio systems in such a way as to not have communication in a given fire area. However, since antennas and repeaters will be located at multiple locations, the onsite fire brigade will be able to communicate with the control room.
- d) *Sound Powered Phones are not located inside the containment and are not located in every fire area of the plant. Sound Powered Phones are not credited for fire. A single fire in one area may partially disable the system but will not disable the entire system.*
- e) *Every fire area including the containment has communication capabilities. The plant communication system is nonsafety-related and thus is not credited for fire. In case of failure of one communication system in a given fire area, communication will be available via the backup communication systems.*

DCD Impact

DCD Tier 2, Revision 5, Section 9.5.2.2 and 9.5.2.5-5-A will be revised in Revision 6 as marked.

NRC RAI 9.5-93 S01

The NRC staff has reviewed GEH's letter dated December 8, 2008, concerning GEH's response to RAI 9.5-93 on fire brigade communication systems. After reviewing this letter and the ESBWR DCD Revision 5, the NRC staff has determined that GEH's proposal to direct the COL applicants to describe in full the fire brigade communication systems, including portable radio/wireless and fixed emergency communication systems, is acceptable. The NRC staff accepts the revised COL information item 9.5.2-5-5-A requiring the COL applicants to provide this information. However, the NRC staff believes that the current information provided in the DCD and that which was provided in GEH's letter dated December 8, 2008 is inconsistent and falls short of meeting the requirements of RG 1.189 Position 4.1.7. In response, the staff requests that GEH remove all descriptions and details concerning the fire brigade communication systems except to state that these systems will meet RG 1.189 Position 4.1.7. In addition, the newly proposed COL information item 9.5.2-5-5-A must remain in the DCD. This is to ensure no inconsistencies or confusion between the OCD and COLAs.

Section 9.5.2 lists the subsystems that make up the plant's communication system. Section 9.5.2.2 gives a description of each of these subsystems. The last subsystem described in Section 9.5.2.2 has the heading "Emergency Communications System". In the Section 9.5.2 list of subsystems it is titled "Emergency Offsite Communication Subsystem". Since the Fire Brigade radio system is described in this section and is not considered an offsite communications system remove the word "offsite" from the sixth bulleted item in Section 9.5.2.

GEH Response

As agreed upon during teleconference on 2/3/09, GEH will make the suggested changes described above to the DCD Subsection 9.5.2 and COL Item 9.5.2.5-5-A.

DCD Impact

DCD Tier 2, Subsection 9.5.2 and COL Item 9.5.2.5-5-A will be revised as noted in the attached markups.

- Private automatic branch exchange (PABX) subsystem;
- Plant sound-powered telephone subsystem;
- Plant radio subsystem;
- Evacuation alarm and remote warning subsystem;
- Emergency ~~offsite~~ communication subsystem; and
- Completely independent radio subsystem for security purposes as described in Section 13.6.

9.5.2.1 Design Bases

Safety (10 CFR 50.2) Design Bases

The communication system serves no safety-related function and thus has no safety design basis.

Power Generation Design Bases

The communication system power generation design bases are as follows:

- Communication subsystems are independent of one another, therefore, a failure in one subsystem does not degrade the performance of the other subsystems;
- The communication system is in accordance with applicable codes and standards and the equipment is shielded as necessary, from the adverse effects of electromagnetic interference (EMI) and radio frequency interference (RFI); and
- The communication subsystems are functional during a loss of offsite power.

9.5.2.2 System Description

Summary

The PA/PL, PABX, and plant radio systems are physically independent systems powered from diverse nonsafety-related power supplies backed from the standby onsite AC power supply system. They serve as backup to one another in the event of system failures. These three independent voice communication systems are designed and installed to provide assurance that any single event does not cause a complete loss of intraplant communication. This is accomplished by the use of diverse technology, separate routing of cables, and separate standby diesel-generator-backed power supplies.

Attention is given to the supports and anchoring of emergency communication system components and components of the other communication systems located in normally occupied areas or in areas containing safety-related equipment so as to enhance the earthquake survivability of these components and ensure that they do not present a personnel or equipment hazard when subjected to seismic loading.

Descriptions of these systems are given in the following sections.

Plant Page/Party Line (PA/PL)

This system provides communication means such as ringing, mutual telephonic communication, and simultaneous broadcasting in various select buildings and areas including outdoor locations

The remote warning system consists of a message storage device, microphone, remote broadcast speakers, and an output/feedback monitoring system. The message storage device transmits recorded messages and the microphone transmits warning instructions through the remote broadcast speakers. An initiation signal from the MCR starts the message storage device or opens the microphone available for transmission.

The output/feedback monitoring system monitors the output of the remote broadcast speakers and retransmits the output back to the monitoring speaker when the message storage device is initiated or to the sound level meter when the microphone is activated. The monitoring speaker and sound level meter are located in the MCR.

Power for this system is supplied from a nonsafety-related bus backed from standby on site AC power supply system and backed by the station batteries.

Emergency Communication Systems

Normal and emergency offsite communications are provided by public telephone lines, the private utility network connected to the PABX and radio systems.

Emergency telephones are color-coded to distinguish them from normal telephones and include, but are not limited to, the following:

- Emergency Notification System (ENS) - Provides a communications link with the Nuclear Regulatory Commission (NRC) in accordance with IE Bulletin 80-15. (COL 9.5.2.5-1-A);
- Health Physics Network - Provides a communications link with the NRC health physics personnel (COL 9.5.2.5-3-A);
- Ringdown Phone System - Provides a communications link with local and state agencies (COL 9.5.2.5-4-A);
- Crisis Management Radio System – Provides communication capability in accordance with the intent of NUREG-0654 (COL 9.5.2.5-3-A);
- Fire Brigade Radio System - The COL Applicant will describe the Fire Brigade Radio System in accordance with RG 1.189, Position 4.1.7 ~~Provides communication capability and consists of a base unit, mobile units, and portable units in accordance with BTP SPLB 9.5-1, Position C.~~ (COL 9.5.2.5-5-A); and
- Transmission System Operator Communication Link (COL 9.5.2.5-2-A).

9.5.2.3 Safety Evaluation

The communication system is not safety-related and is classified as nonsafety-related. The failure of any communications system does not adversely affect safe shutdown capability. It is not necessary for plant personnel in safety-related areas of the plant to communicate with the MCR in order to achieve safe shutdown of the plant.

Diverse nonsafety-related power supplies connected to the plant standby generators power the PA/PL telephone, PABX and plant radio systems. Failure of any or all of its components does not affect any safety-related equipment.

9.5.2.4 Inspection and Testing Requirements

The communications system is preoperational tested. The systems described above are conventional and have a history of successful operation at similar plants. These systems are used and maintained routinely to ensure their availability.

The power sources for the PA/PL telephone system and the PABX are tested separately during the preoperational and startup test program. Measurements or tests required to identify long-term deterioration are performed on a periodic basis.

9.5.2.5 COL Information**9.5.2.5-1-A Emergency Notification System**

The COL applicant will describe the Emergency Notification System provisions required by 10 CFR 50.47(b)(6) and will address recommendations described in BL-80-15.

9.5.2.5-2-A Grid Transmission Operator

The COL applicant will describe the voice communication link availability with the grid transmission operator.

9.5.2.5-3-A Offsite Interfaces (1)

The COL applicant will describe the means of communication between the control room, TSC, EOF, State and local emergency operation centers and radiological field personnel in accordance with NUREG – 0696 and NUREG – 0654.

9.5.2.5-4-A Offsite Interfaces (2)

The COL applicant will describe the communication methods from the control room, TSC, and EOF to NRC head quarters including establishment of Emergency Response Data Systems (ERDS) in accordance with NUREG – 0696.

9.5.2.5-5-A Fire Brigade Radio System

The COL applicant will describe the Fire Brigade Radio System [in accordance with RG 1.189, Position 4.1.7 \(Subsection 9.5.2.2\).](#)

9.5.2.6 References

- 9.5.2-1 (Deleted)
- 9.5.2-2 EPRI Report NP 6559, “Voice Communication System Compatible with Respiratory Protection”.
- 9.5.2-3 10 CFR 73 Section 55(e) and (f), “Physical Protection of Plants and Material”.
- 9.5.2-4 10 CFR 50, Appendix E, IV.E.9, ERF Communication System”.
- 9.5.2-5 NRC Information Notice 86-097, “Emergency Communication Systems”.
- 9.5.2-6 NRC Information Notice 87-058, “Continuous Communication Following Emergency Notification”.
- 9.5.2-7 NRC IE Circular No.80-09, “Problems with Plant Internal Communication Systems”.