



HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

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

T 910 819 6192
F 910 362 6192
rick.kingston@ge.com

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Subject: 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

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission Request for Additional Information (RAI) sent by NRC Letter 251, dated September 04, 2008 (Reference 1). The GEH response to RAI Number 9.5-93 is addressed in Enclosure 1.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

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HRO

Reference:

1. 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 04, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 251 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Numbers 9.5-93

cc:	AE Cabbage	USNRC (with enclosures)
	DH Hinds	GEH (with enclosures)
	RE Brown	GEH (with enclosures)
	eDRF	0000-0094-6711

Enclosure 1

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

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.

9.5.1-7-H ***FHA Compliance Review***

The COL Holder referencing the ESBWR Standard Plant will conduct a compliance review of the final as-built design against the assumptions and requirements stated in the FHA. Based on this review, the FHA will be updated as necessary (Subsection 9.5.1.12).

9.5.1-8-A ***FP Program Description***

The COL Applicant shall provide a milestone for implementation of the applicant's fire protection program (Subsection 9.5.1.15).

9.5.1-9-A ***FP License Changes (Deleted)*****9.5.1-10-H** ***Fire Brigade***

The COL Holder shall provide provisions for manual fire-fighting capability for all plant areas (Subsection 9.5.1.15.4).

9.5.1-11-A ***Quality Assurance***

The COL Applicant shall provide details of the QA program for the fire protection program (Subsection 9.5.1.15.9).

9.5.1.17 ***References***

All applicable references are listed in Table 9.5-1.

9.5.2 **Communications System**

The communication system provides the means to conveniently and effectively communicate between various plant locations and with offsite locations during normal, maintenance, transient, fire, and accident conditions under maximum potential noise levels. The communication system allows guards and watchmen on duty to maintain continuous communication with personnel in manned alarm station, and offsite/onsite agencies as required by 10 CFR 73, Sections 55(e) and (f) (Reference 9.5.2-3). This is accomplished by either PABX or wireless communication system. Communication equipment used with respiratory protection gear ~~are~~is designed and selected in accordance with EPRI NP-6559 (Ref: 9.5.2-2). The communication system consists of the following subsystems:

- Plant page/party-line (PA/PL) subsystem;
- 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.

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 even with the failure of the radio base station, PA/PL system, and PABX. The power for the base station and consoles is from the security system power supply that is backed by batteries and a standby generator.

Portable, hand-held radios provide two-way voice communications between the various units for personnel who need mobility. The radios are equipped with multiple channels as follows:

- | |
|--|
| <ul style="list-style-type: none"> • Emergency (alternate security); • Fire brigade (alternate securityOptional); • Operations; • Maintenance (alternate operations); |
|--|
- Management;
 - Health physics; and
 - Crisis management (or Unassigned).

The radios are equipped with tone-coded squelch so that a message cannot be received unless the message contains the proper address code. Therefore, individual, all-channel (zone), and all-system calls can be made. The emergency channel is not coded. Calls are made between the telephone system and the in-plant radio system by dialing through the PABX to a radiotelephone interconnect panel.

Any portable radio systems operate at frequencies that ensure that they do not interfere with DCIS functions.

Evacuation Alarm and Remote Warning System

The evacuation alarm and remote warning system is provided to warn personnel of emergency conditions. This system supplements the Area Radiation Monitoring System described in Subsection 12.3.4.

The evacuation alarm system consists of a siren tone generator, public address system speakers, and an outdoor siren. A selector switch in the MCR is used to manually initiate the evacuation alarm. This selector switch also selects the evacuation alarm coverage in the drywell or the entire plant including the initiation of the outdoor siren and the remote broadcast speakers.

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 - Provides communication capability and consists of a base unit, mobile units, and portable units in accordance with BTP SPLB 9.5-1, Position C. C.5-g(4)7.1.8 and RG 1.189, Position 4.1.7 (b) (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 <u>communication capabilities</u> System in accordance with BTP SPLB 9.5-1, Position C.7.1.8 and RG 1.189, Position 4.1.7, System	
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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”.
- 9.5.2-8 NUREG-0654, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plan”.
- 9.5.2-9 IE Bulletin 80-15, “Possible Loss of Emergency Notification System (ENS) with Loss of Offsite Power.” June 18, 1980.
- 9.5.2-10 NRC Generic Letter 89-15, Emergency Response Data System.
- 9.5.2-11 NUREG 0696, Functional Criteria for Emergency Response Facilities.

9.5.3 Lighting System

This section covers all onsite systems that provide artificial illumination for rooms, spaces, and outdoor areas of the plant. These systems include normal, standby, emergency and security