

Response to

Request for Additional Information No. 36 Supplement 1 (553, 1026), Revision 0

8/14/2008

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 09.05.02 - Communications Systems

Application Section: 9.5.2.1

Question 09.05.02-2:

Section 9.5.2.1.4 states the structures, systems, and components (SSC) of the COMS are designed, fabricated, erected, constructed, tested, and inspected to quality standards as required by industry standards. The SSC are installed in structures and anchored to sustain earthquake or other natural events without causing damage to any Class 1E SSC that are important to safety. The staff finds that additional information is required to determine whether the SSCs meet 10 CFR 50.55a. Provide the industry standards that will be used to design, fabricate, erect, construct, test, and inspect the SSCs of the COMS within the U.S. EPR design.

Response to Question 09.05.02-2:

The communication system (COMS) is non-safety-related and is not required to perform any nuclear safety functions. The base station equipment of each subsystem is located in a Seismic Category I structure in separate rooms to avoid losing multiple communication capabilities with a single accident or fire. COMS components that could damage safety-related equipment as a result of a seismic event are classified as Seismic Category II equipment.

The following codes and standards as applicable will be utilized for the COMS design.

- IEEE Std 269-2002, "IEEE Standard Methods for Measuring Transmission Performance of Analog and Digital Telephone Sets, Handsets, and Headsets."
- IEEE Std 487-2000, "IEEE Recommended Practice for the Protection of Wire-Line Communication Facilities Serving Electric Supply Locations."
- IEEE Std 692-1997, "IEEE Standard Criteria for Security Systems for Nuclear Power Generating Stations."
- IEEE Std 1613-2003, "IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations."
- NFPA 70-2005, "National Electrical Code (NEC)."
- NFPA 72-2007, "National Fire Alarm Code."
- 29 CFR Part 1910.165 Occupational Safety and Health Standards, "Employee Alarm Systems."
- EPRI TR-102323-R3, "Guidelines for Electromagnetic Interference Testing of Power Plant Equipment."
- MIL-STD-810F, "Environmental Engineering Considerations and Laboratory Tests."
- IEEE/ANSI C63.12-1999, "American National Standard Recommended Practice for Electronic Compatibility Limits."
- ANSI/TIA-603-C-2004, "Land Mobile FM or PM - Communications Equipment - Measurement and Performance Standards."
- IEC 60529-2004, "Degrees of Protection Provided by Enclosures (IP Code)."

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.05.02-3:

Section 9.5.2.1 states the communications subsystems are designed in accordance with applicable codes and standards regarding adverse environmental conditions (including weather, moisture, noise level, electromagnetic interference, and radio frequency interference). However, AREVA NP does not provide sufficient information regarding what applicable codes and standards are used. Provide the detail list of which applicable codes will be used in the design of the communications subsystems and how will they be applied.

Response to Question 09.05.02-3:

The following industry standards regarding adverse environmental conditions (including weather, moisture, noise level, electromagnetic interference, and radio frequency interference) are used for the design of the communications subsystems:

1. IEEE Std 1613-2003, "Standard for Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations."
2. MIL-STD-810F, "Environmental Engineering Considerations and Laboratory Tests."
3. EPRI TR-102323-R3, "Guidelines for Electromagnetic Interference Testing of Power Plant Equipment."
4. IEC 60529-2004, "Degrees of Protection Provided by Enclosures (IP code)."
5. NFPA 70-2005, "National Electric Code (NEC)."
6. NFPA 72-2007, "National Fire Alarm Code."
7. 29 CFR Part 1910.165 Occupational Safety and Health Standards, "Employee Alarm Systems."
8. ANSI/TIA-603-C-2004, "Land Mobile FM or PM - Communications Equipment - Measurement and Performance Standards."

The standards provided in the IEEE Std and the MIL-Std (Items 1 & 2) are applied to define the required service conditions (such as temperature, solar radiation, atmospheric pressure, vibration, shock, salt fog, dust and rain) and the test requirements for the COMS components.

The guidelines provided in the EPRI Report (Item 3) for nuclear power plant emission limits and the recommended equipment susceptibility levels are used in the COMS equipment design specifications for electromagnetic and radio frequency interference (EMI/RFI). The related test requirements included in the standards in the EPRI Report are specified for the COMS equipment factory testing. Also, the COMS equipment arrangement and layout design is based on the practices recommended in the EPRI guidelines for minimizing susceptibility to EMI/RFI.

The enclosures for the COMS equipment and components are based on the IP codes assigned in IEC 60529 (Item 4) to protect against weather.

The COMS installations and grounding design is in accordance with the NEC (Item 5). The guidelines provided in NFPA 72 (Item 6) for noise level and the general requirements included in OSHA regulation 29 CFR Part 1910.165 (Item 7) for fire protection are utilized for the design of the fire alarm interface with the public address (PA) and alarm system.

The methods of measurement, test conditions, and performance specifications provided in TIA-603-C (Item 8) are applied to radio equipment used in the portable wireless communication subsystem.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.05.02-4:

The staff finds the PA and alarm system description does not provide sufficient information to meet 10 CFR 50.47(a)(8) and 10 CFR 50 Appendix E regarding the types of sirens or tones that will be used by plant personnel. Provide the specific design detail regarding the types of alarms that are incorporated in the PA and alarm system. For example, how many tones will be available for the alarms?

Response to Question 09.05.02-4:

The public address (PA) system utilizes amplifiers, loudspeakers, tone generators, sirens, and party-line access terminals and transceiver equipment as a means of supplying verbal and alarm signal communication throughout the entire plant. A tone generator is provided with five warning tones: (1) pulse, (2) siren, (3) yelp, (4) warble, and (5) steady. Tones are activated by a number of external sources, which include fire equipment, or by manually closing user-supplied contact switches. Higher priority tones can be programmed to override those of lower priority. This unit is user-programmable and is programmed by the COL applicant.

Emergency notification alarms can be broadcast manually or automatically. Each alarm is fully configurable.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.05.02-7:

Section 9.5.2.1.1 states that the offsite communication consists of at least two independent communication subsystems to provide communication links from the Emergency Operation Facility to the onsite main control room and Technical Support Center, as well as to the NRC and other federal, state, and local government agencies. Part IV E(9) of 10 CFR Part 50, Appendix E, Emergency Planning and Preparedness or Production and Utilization Facilities, requires that emergency facilities and equipment include at least onsite and one offsite communication system with each system having a backup power source. Provide specific details regarding the two types of communications subsystem that is available for offsite communication, including the details on the communications subsystem interfaces with these facilities. In addition, Table 2.4.21-2-Communication System ITAAC, does not address testing of offsite communications systems to the NRC and other federal/state/local government agencies. Demonstrate how testing of the communications equipment to these offsite agencies will be completed.

Response to Question 09.05.02-7:

To facilitate two-way (incoming and outgoing) emergency communications from onsite to offsite facilities/agencies, at least two independent communication links are provided. The onsite facilities provided with the emergency communication links are the main control room (MCR), remote shutdown station (RSS), Technical Support Center (TSC) and Operations Support Center (OSC). The offsite facilities that are considered are the Emergency Operations Facility (EOF), NRC resident office, and federal, state and local government agencies as identified in the emergency response plan, to be addressed by the COL applicant (as identified in COL Item 13.3-1). The two independent communication links are as follows:

1. Dedicated "hotline" telephones that provide direct communications to the selected locations when in an off-hook condition. The provisions for "hotline" telephones are incorporated into the design of the onsite digital telephone subsystem.
2. Provisions for two-way radio communications via the portable wireless communication subsystem for personnel having access to specific wireless radios onsite and for the offsite personnel as required by the COL applicant.

In addition, the onsite digital telephone subsystem has interconnectivity via PABX to the public switched telephone network (PSTN) which allows incoming and outgoing offsite communications.

The onsite portable wireless communication (radio) subsystem has an interface to the onsite public address (PA) and alarm subsystem as well as to the digital telephone subsystem via PABX. Also, the onsite digital telephone subsystem has an interface to the PA and alarm subsystem. These interfaces provide the capability to page and broadcast over the PA system loudspeakers by onsite and offsite personnel, as designated by the COL applicant.

Except for the sound-powered subsystem, the onsite communication subsystems are powered from separate divisions of the Class 1E emergency uninterruptible power supply (EUPS). The EUPS is supported by the emergency diesel generator (EDG) and station blackout diesel generators (SBO DG) to allow continued long-term operation of the onsite communication subsystems.

Specific details with respect to type of "hotline" telephone connectivity (cable or voice over IP), number of parties to be connected, radio frequency (UHF, VHF, or microwave), normal and backup power supplies, plant security system interface etc. for the offsite communication system will be provided by the COL applicant as indicated in U.S. EPR FSAR Tier 2, Section 9.5.2.1.1 in response to RAI 36, Question 09.05.02-6.

Testing of the offsite communications system is addressed by existing COL Items 13.3-1 and 14.3-1.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.05.02-10:

IEEE Std. 603-1991, Clause 5.4 discusses equipment qualification. SRP Section 9.5.2 provides reviewer guidance on the design of communication systems. Part of that guidance states, "Communication systems will be protected from EMI/RFI effects of other plant equipment and there will be adequate testing and field measurements where necessary to demonstrate effective communications." In addition, SPR Section 9.5.2 discusses the general equipments for communication equipment to provide effective communication during the "full spectrum of...conditions...under maximum potential noise levels."

The staff believes that the FSAR does not adequately cover communications testing for plant startup and operations in sufficient detail, including the EMI/RFI effects on equipment, to understand how effective communications will be demonstrated. For example, how will the EMI/RFI levels be tested and to what maximum level will the equipment be tested. The staff also believes that the FSAR does not sufficiently address how effective communications will be sustained during maximum potential noise levels. How does AREVA NP plan to meet the testing requirements for EMI/RFI effects? In addition, how will AREVA NP demonstrate that effective communications will be sustained during maximum potential noise levels?

Response to Question 09.05.02-10:

Communication systems (COMS) described in U.S. EPR FSAR Tier 2, Section 9.5.2 are conventional and have a history of reliable operation. Since most of these systems are in routine use, their availability is demonstrated. Those systems not routinely used, but required during emergency situations, are tested at periodic intervals to demonstrate operability when required. The COMS equipment will be factory tested to verify compliance with the emission limits specified in EPRI TR-102323-R3 for electromagnetic and radio frequency interference (EMI/RFI).

The COL applicant will test the communication equipment in accordance with the startup and preoperational procedures recommended by the equipment supplier to verify COMS operability under the potential maximum noise levels. U.S. EPR FSAR Tier 2, Section 14.2.12.11.7 Communication System (Test #130), subsection 3.0, will be revised to include testing for EMI/RFI effects and testing under maximum potential noise levels, as follows:

"Verify that the communication equipment will perform under anticipated maximum plant noise levels.

Verify the effectiveness of the exclusion zones established for protecting the safety-related I&C equipment from mis-operation due to EMI/RFI effects from the portable phones and radios of the communication system."

Section 14.2.12.11.7 was previously revised in response to RAI 46, Question 14.02-18 to include the acceptance criterion in subsection 5.0 that the communications equipment is capable of operating under maximum noise conditions. In addition, Section 14.2.12.11.7 will be revised to add the following additional acceptance criterion:

“Safety-related I&C equipment is not adversely impacted by the portable phones and radios of the communication system.”

SRP Section 9.5.2, Communications Systems, Rev. 3 (March 2007) does not address the requirements of testing and field measurements for EMI/RFI effects. Therefore, field testing of COMS equipment under the worst-case EMI/RFI environment is not included in U.S. EPR FSAR Tier 2, Section 14.2.12.11.7.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 14.2.12.11.7 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

- 2.2 Support systems required for operation of the intraplant communication system are complete and functional.
- 2.3 Plant equipment that contributes to the ambient noise level shall be in operation.

3.0 TEST METHOD

- 3.1 Verify the intraplant portable wireless communication system functions as designed.
- 3.2 Verify that the intraplant (PABX) telephone system functions as designed.
- 3.3 Verify the intraplant sound powered telephone system functions as designed.
- 3.4 Verify the intraplant public address system functions as designed.
- 3.5 Verify that the intraplant cell telephone system functions as designed.
- 3.6 Verify the security radio system functions as designed at locations throughout the plant.
- 3.7 Verify the normal offsite telephone system functions as designed.
- 3.8 Verify the emergency telephone system (emergency notification system, health physics network and ring down phone system) function as designed.
- 3.9 Verify that the communication system responds as designed to actual or simulated limiting malfunctions or failures.
- 3.10 Verify redundancy and electrical independence of the communication system.
- 3.11 Verify that the communication system's response meets the accident analysis assumptions.
- 3.12 Verify electrical independence and redundancy of power supplies for safety-related functions.

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- 3.13 Verify that the communications equipment will perform under anticipated maximum plant noise levels.
- 3.14 Verify the effectiveness of the exclusion zones established for protecting the safety-related I&C equipment from mis-operation due to EMI/RFI effects from the portable phones and radios of the communication system.

4.0 DATA REQUIRED

- 4.1 Record the results of communication attempts from each system and its locations.

5.0 ACCEPTANCE CRITERIA

- 5.1 The portable wireless communication system provides radio coverage throughout the plant, except in areas restricted due to potential EMI/RFI considerations.~~The intraplant and offsite communication system operates as described in Section 9.5.2.~~
- 5.2 The portable wireless communication system provides an interconnection to the public switched telephone network (PSTN) to allow offsite communications.
- 5.3 The digital telephone system provides plant-wide intercom capability.
- 5.4 The digital telephone system provides an interconnection to the public switched telephone network (PSTN) to allow offsite communications.
- 5.5 The public address and alarm system operates as described in the design specification.
- 5.6 The sound powered system operates as described in the design specification.
- 5.7 The security communication system operates as described in the design specification.
- 5.8 The communication system provides communication with the emergency notification system and the health physics network.
- 5.9 The communication equipment is capable of operating under maximum noise conditions.
- 09.05.02-10 5.10 Safety-related components meet electrical independence and redundancy requirements.
- 5.11 Safety-related I&C equipment is not adversely impacted by the portable phones and radios of the communication system.

14.2.12.11.8 **Vibration Monitoring System**~~Reserved~~ (Test #131)

1.0 OBJECTIVE

- 1.1 To verify that the operation of the non-safety-related vibration monitoring system meets the design requirements.
- 1.2 To verify that the vibration monitoring setpoints are suitable for initial power operation.

2.0 PREREQUISITES

- 2.1 Construction activities on the vibration monitoring system are completed.
- 2.2 Sensors, cables, and conditioning electronics are installed and functional.
- 2.3 Power cabinets, test circuits, and amplifiers are ready to support testing.
- 2.4 Required test equipment is functional.