

**Response to**

**Request for Additional Information No. 36 (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 09.05.02-1:**

Section 9.5.2.1 of the U.S. EPR states that an isolation device is placed between the non-Class 1E COMS system and the Class 1E power supply to provide the required independence per IEEE Std 384-1992 (Reference 2). What is the isolation device employed? Provide information demonstrating the adequacy of this isolation device as required by IEEE 603 clause 5.6.3, Independence between safety systems and other systems.

**Response to Question 09.05.02-1:**

The non-Class 1E communication (COMS) subsystems that are powered from Class 1E power sources are isolated by a single Class 1E circuit breaker or fuse.

The adequacy of this isolation device as required by IEEE 603 clause 5.6.3<sup>1</sup>, independence between safety systems and other systems, is demonstrated as follows:

Clause 5.6.3.1 is met by the following:

- The isolation device is classified as part of the safety system (Class 1E power system). The isolation device will be qualified to Class 1E standards.
- The circuit breaker or fuse used for this isolation is applied so that the maximum credible voltage or current transient applied to the non-Class 1E side of the circuit breaker or fuse does not degrade below an acceptable level the operation of the circuit on the other side of that circuit breaker or fuse, in accordance with IEEE Std 384-1992<sup>2</sup>.

Clause 5.6.3.2 is met by the following:

- Following the isolation device, the COMS power circuit is treated as an “associated circuit” and routed with the division from which it originated, or it remains separated from the Class 1E circuit. The separation of Class 1E equipment shall be in accordance with IEEE Std 384-1992<sup>2</sup>.

Clause 5.6.3.3 is met by the following:

- Isolation of the communication systems from Class 1E power systems prevents degrading the Class 1E power source below an acceptable level.

**FSAR Impact:**

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

---

<sup>1</sup> IEEE Std 603-1998, “IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations, “ Institute of Electrical and Electronics Engineers, 1998.

<sup>2</sup> IEEE Std 384-1992, “IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits, “ Institute of Electrical and Electronics Engineers, 1992.

**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:**

A response to the question will be provided by November 24, 2008.

**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:**

A response to the question will be provided by November 24, 2008.

**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:**

A response to the question will be provided by November 24, 2008.

**Question 09.05.02-5:**

Section 9.5.2.2.4 in the DC-FSAR describes the sound-powered system provided for normal, abnormal, and accident conditions. This system allows uninterrupted communication between the MCR and the control rod drive equipment areas, refueling platform area, turbine generator operating deck, areas containing switchgear, motor control centers, and other maintenance areas. 10 CFR 50 Appendix E Part IV.E (9) requires one onsite and one offsite emergency communications system; each with a backup power source. The staff understands that the sound-powered system is provided in addition to the one onsite and one offsite emergency communications systems. However, the staff requests additional information regarding the operation and design of the sound-powered system and an update to Section 9.5.2.2.4 to reflect this additional information.

**Response to Question 09.05.02-5:**

The sound-powered system does not require an external source of power for operation; therefore the system does not need a backup source of power. The sound-powered phone works on the principle of creating an electrical signal from sound waves. An electro-mechanical transducer in a sound-powered telephone converts sound pressure from a user's voice into electrical current. The electric current is sent through standard telecommunication wiring to the receiver. At the receiving end, the electrical current is converted back to sound energy by the receiving transducer. The phones require no batteries, amplifiers, or power supplies. The sound-powered phone circuit emits no electromagnetic or radio frequency interference. Several stations (phones) can be connected on the same circuit.

**FSAR Impact:**

U.S. EPR FSAR, Tier 2, Section 9.5.2.2.4 will be revised as described in the response and indicated on the enclosed markup.

**Question 09.05.02-6:**

Section 9.5.2 of the FSAR states that the emergency communications equipment are adequately described in this section, but no specific information follows this statement that is identifiable as applicable to the COLA Emergency Response Plan. The statement is therefore considered inaccurate.

**Response to Question 09.05.02-6:**

AREVA disagrees with the characterization of the statement as being inaccurate. The design bases in U.S. EPR FSAR Tier 2, Section 9.5.2.1.3 indicate that adequate onsite communication equipment to support emergency response is provided in Section 9.5.2. The next sentence indicates that details of the emergency response facilities and associated communication capabilities are provided by the COL applicant as addressed in U.S. EPR FSAR Tier 2, Section 13.3. The intraplant portions of the communication system are described in the U.S. EPR FSAR. The capability for tying in to the offsite communication systems is provided. To clarify responsibilities, a COL Information item has been added to U.S. EPR FSAR Tier 2, Section 9.5.2.1.1 to address details of the offsite communication systems: "A COL Applicant that references the U.S. EPR design certification will provide a description of the offsite communication system that interfaces with the onsite communication system."

The existing COL Information item in U.S. EPR FSAR Tier 2, Section 13.3 requires that the site-specific emergency plan be provided in accordance with 10 CFR 50.47 and 10 CFR 50 Appendix E. 10 CFR 50 Appendix E(9) outlines the requirements for the communications systems that must be addressed by the site-specific emergency plan. These requirements include describing the provisions for the emergency offsite communications, such as communications with state/local governments, federal emergency response organizations, and NRC headquarters. Note that U.S. EPR FSAR Tier 2, Section 13.3 (3<sup>rd</sup> paragraph) also states that "Voice communications between the TSC and the plant, local and offsite emergency response facilities, local and state governments and the NRC are provided by the plant telephone, paging and radio systems."

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Sections 9.5.2.1.1, 9.5.2.1.3 and 9.5.2.2.5 will be revised as described in the response and indicated on the enclosed markup.

**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:**

A response to the question will be provided by November 24, 2008.

**Question 09.05.02-8:**

NRC Bulletin 80-15 requires licensees to address Emergency Notification System backup power requirements in case of loss-of-offsite power. Section 9.5.2.1 states that one offsite communication consists of at least two independent communication subsystems to provide emergency 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/local government agencies. A backup power source is provided for the offsite communication systems. AREVA NP has not provided any specific information regarding the backup power source in case of loss-of-offsite power. Demonstrate how the U.S. EPR offsite communications systems address this Bulletin 80-15.

**Response to Question 09.05.02-8:**

The Emergency Notification System (ENS) is implemented using the following:

- The onsite communications subsystems described in U.S. EPR FSAR Tier 2, Section 9.5.2.
- The interface to the emergency offsite communications system.
- The emergency offsite communication system.

The possible loss of ENS with the loss of offsite power (NRC Bulletin 80-15) is addressed by examining the power sources for the systems that support ENS.

NRC Bulletin 80-15 is addressed by the fact that the onsite communication systems and the interface to the emergency offsite communication system are powered from the Class 1E emergency uninterruptible power supply (EUPS), which is supported by the emergency and station blackout diesel generators to provide a long term backup source of power. The EUPS also allows for the continued operation of the COMS subsystems after a loss of power since the EUPS supplies a continuous DC backup power for a period of 2 hours. The EUPS is described in U.S. EPR FSAR Tier 2, Section 8.3.2.1.1.

The power source for the emergency offsite communication system, including backup power, will be addressed by the COL Applicant as specified in the response to RAI Question 09.05.02-6.

**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, SRP 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:**

A response to the question will be provided by November 24, 2008.

**Question 09.05.02-11:**

Section 9.5.2.2.1 of the U.S. EPR FSAR describes the portable wireless communication system. The applicant has not provided sufficient information regarding the application of the portable wireless communication system to meet 10 CFR 73.55(f)(3). 10 CFR 75.55(f)(3) requires the licensee to provide the capability of continuous communication, radio or microwave transmitted two-way voice communication, either directly or through an intermediary, in addition to conventional telephone service, between local law enforcement authorities and the facility and shall terminate in each continuously manned alarm station. Demonstrate how the communications systems described for offsite communications addresses the requirements of 10 CFR 73.55(f)(3).

**Response to Question 09.05.02-11:**

This is a COL Applicant responsibility. As noted in the response to RAI Question 09.05.02-6, a COL Information item has been added to U.S. EPR FSAR Tier 2, Section 9.5.2.1.1 to address details of offsite communication systems. U.S. EPR FSAR Tier 2, Section 9.5.2.1.7 indicates that "Design features required for security, including alarms and communications required by 10 CFR 73.55, are listed in Section 13.6. A physical security plan, as addressed in Section 13.6, is provided by the COL Applicant per 10 CFR 52.79(a)(35) that satisfies the requirements of 10 CFR Part 73." U.S. EPR FSAR Tier 2, Section 13.6 (last 2 bullets) also states that the Physical Security Plan and supporting documents include the following design features: "(1) Alarm stations have conventional telephone service and other means for communication with law enforcement authorities, and (2) alarm stations have the capability for continuous communication capability with security personnel."

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Sections 9.5.2.1.1 and 9.5.2.1.3 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

**Table 1.8-2—U.S. EPR Combined License Information Items**  
**Sheet 29 of 42**

Item No.	Description	Section	Action Required by COL Applicant	Action Required by COL Holder
9.5.17	A COL applicant that references the U.S. EPR design certification will evaluate the differences between the as-designed and as-built plant configuration to confirm the Fire Protection Analysis remains bounding. This evaluation will be performed prior to fuel loading and will consider the final plant cable routing, fire barrier ratings, combustible loading, ignition sources, purchased equipment, equipment arrangement and includes a review against the assumptions and requirements contained in the Fire Protection Analysis. The applicant will describe how this as-built evaluation will be performed and documented, and how the NRC will be made aware of deviations from the FSAR, if any.	9.5.1.3		Y
9.5-18	A COL applicant that references the U.S. EPR design certification will perform a supplemental Fire Protection Analysis for site-specific areas of the plant not analyzed by the the FSAR.	9.5.1.3	Y	
9.5-19	A COL applicant that references the U.S. EPR design certification will provide a description and simplified Fire Protection System piping and instrumentation diagrams for site-specific systems.	9.5.1.2.1	Y	
9.5-20	A COL applicant that references the U.S. EPR design certification will describe the program used to monitor and maintain an acceptable level of quality in the fire protection system freshwater storage tanks.	9.5.1.2.1	Y	
9.5-21	A COL applicant that references the U.S. EPR design certification will provide a description of the offsite communication system that interfaces with the onsite communication system.	9.5.2.1.1	Y	

Question  
09.05.02-6

The communications subsystems are designed in accordance with applicable codes and standards regarding adverse environmental conditions (including weather, moisture, noise level, electromagnetic interference (EMI), and radio frequency interference (RFI)).

Except for the sound-powered system, the onsite communication subsystems are powered from the onsite Class 1E emergency uninterruptible power supply (EUPS), which is supported by the emergency and station blackout (SBO) diesel generators to provide backup power. An isolation device is placed between the non-Class 1E COMS system and the Class 1E power supply to provide the required independence per IEEE Std 384-1992 (Reference 2). The interface to the emergency offsite communication system is fed by the EUPS to maintain operability during SBO and LOOP conditions.

The communication system design enables communication for the plant personnel in vital areas during fire conditions, which tend to result in high noise levels. Areas of the plant that are subject to high-ambient noise conditions may require the use of headsets with noise-attenuating double ear cups and dynamic noise-canceling microphones, including boom or noise-shielded microphones, or acoustic booths or hoods.

In areas where voice pages are not discernible above the ambient noise, alarm-type alerts are used in addition to visual alerts.

The respiratory protective devices to be used with the communication equipment are in accordance with NUREG-0654/FEMA-REP-1, Rev 1, Section II.E.7 (Reference 1).

**9.5.2.1.1 10 CFR 50 Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities**

Part IV.E(9) of 10 CFR Part 50, Appendix E, requires that emergency facilities and equipment include at least one onsite and one offsite communications system with each system having a backup power source.

The portable wireless system, PA and alarm system, digital telephone system, and sound-powered system provide onsite communications. With the exception of the sound-powered system, the onsite communications systems have a backup power source.

Question  
09.05.02-6

Offsite communication consists of at least two independent communication subsystems to provide emergency communication links from the Emergency Operation Facility (EOF) to the onsite MCR and Technical Support Center (TSC) as well as to the NRC and other federal, state, and local government agencies. A backup power source is provided for the offsite communication systems. A COL applicant that references the U.S. EPR design certification will provide a description of the offsite communication system that interfaces with the onsite communication system.

**9.5.2.1.2 10 CFR 50.34 (f)(2)(xxv), Emergency Response Facilities**

Details of the emergency response facilities, including the TSC, Operational Support Center (OSC), and the EOF, are provided by the COL applicant as addressed in Section 13.3.

**9.5.2.1.3 10 CFR 50.47(ab)(8), Equipment and Facilities to Support Emergency Response**

Questions  
09.05.02-6  
and  
09.05.02-11

Adequate communications equipment to support emergency response is provided, as described in this section. Details of emergency response facilities and associated communication capabilities are provided by the COL applicant as addressed in [Section 9.5.2.1.1](#) and Section 13.3.

**9.5.2.1.4 10 CFR 50.55 (a), Codes and Standards**

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.

**9.5.2.1.5 10 CFR 50 Appendix A - General Design Criteria**

GDC 1, GDC 2, GDC 3, and GDC 4 apply to SSC important to safety. The COMS is classified as a non-Class 1E system, and therefore serves no safety-related functions.

GDC 19 requires equipment at appropriate locations outside the MCR to be provided for prompt hot shutdown of the reactor with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures. While there is COMS equipment located in the RSS, the COMS equipment is not required to function for hot or cold shutdown of the reactor.

**9.5.2.1.6 10 CFR 73.45(e)(2)(iii), Performance Capabilities for Fixed Site Physical Protection Systems – Communications Subsystems, and 10 CFR 73.45(g)(4)(i), Provide Communications Networks**

The COMS provides communication capability for plant security personnel, guards, and watchmen at certain locations as necessary to support the transmission of security information among onsite forces. Additional security communication measures are included as part of the physical protection intercommunication system including the use of private, secure communication radios.

system. For dedicated areas with a highly fluctuating noise level an automatic loudspeaker volume control is used.

Announcements are made from a variety of sources, such as an engineer test panel, operator access panels, telephones via PABX interface, radio via PABX interface, and digitally recorded messages. A trunk cable connects the PABX to the PA system.

#### 9.5.2.2.4 Sound-Powered System

A sound-powered system, independent from the other COMS subsystems, is provided for normal and abnormal and accident conditions. This system allows uninterrupted communication between the MCR and the control rod drive equipment areas, refueling platform area, turbine generator operating deck, areas containing switchgear, motor control centers, and other maintenance areas.

Question  
09.05.02-5

The sound-powered phone works on the principle of creating an electrical signal from sound waves. An electro-mechanical transducer in a sound-powered telephone converts sound pressure from a user's voice into electrical current. The electric current is sent through standard telecommunication wiring to the receiver. At the receiving end, the electrical current is converted back to sound energy by the receiving transducer. The phones require no batteries, amplifiers, or power supplies. The sound-powered phone circuit emits no electromagnetic or radio frequency interference. Several stations (phones) can be connected to the same circuit.

The sound-powered system provides party-line communication between designated areas by the use of corded headsets or handsets that are plugged into dedicated phone jacks throughout the facility. The jacks are connected in a loop configuration throughout the plant which does not require any switching or manual intervention to acquire the desired channel. Figure 9.5.2-2—Sound-Powered System, illustrates the loop configuration of the system. The jacks are designated with unique identification labels to determine which channel is associated for each jack.

Question  
09.05.02-6

The sound-powered system does not require an external power source.

#### 9.5.2.2.5 Emergency Offsite Communication

Details of emergency response facilities and associated communication capabilities are provided by the COL applicant as addressed in [Section 9.5.2.1.1](#) and Section 13.3.

#### 9.5.2.2.6 Security Communication

Design features required for security, including communications, are listed in Section 13.6. A physical security plan and a site-specific security assessment are provided by the COL applicant as addressed in Section 13.6.