

10.18 PLANT COMMUNICATIONS SYSTEM

10.18.1 Design Basis

The design of the plant communications system is such that the requirements for safe operation and safe shutdown are met and that compliance with the Radiological Emergency Plan is adequate. Plant communications are divided into two areas: onsite and offsite. The evacuation alarm is discussed in Section 10.18.6.

10.18.2 Onsite Communications - General

The primary onsite communications needs are furnished by the telephone switching system, the in-plant radio system which includes paging, the loudspeaker paging system, and an independent sound-powered telephone system which can be used to shut down the reactor units when the main control room has been abandoned and other communications systems are inoperative.

10.18.2.1 Onsite Communications - Specific

10.18.2.1.1 Telephone Switching System

The telephone switching system provides the primary means for two-way voice communications throughout the site. Multiple nodes or switches are interconnected by a network of copper and fiber optic cable and are powered by battery-backed supplies. This concept lends itself to a relatively easy expansion or contraction of capacity as dictated by changing plant needs. Node 1 primarily serves the powerhouse area and the other switching nodes primarily serve office/administrative type areas. The system is capable of providing service for several thousand voice and data lines and is equipped with provisions for the following:

- Regular two-way voice conversations
- Data circuits
- Access to loudspeaker paging
- Access to radio paging
- Access to off-site telephone lines
- Various convenience options
- Code Call (Fire and Medical Emergency Alarm)

The power for the Node 1 telephone switch is supplied from two independent 120V AC sources. One of the sources is an Uninterruptible Power Supply (UPS) and diesel backed. The battery is capable of providing power for a minimum of three hours should both power sources fail. Each of the other switching nodes is powered by a UPS. The switchover from primary source to battery is automatic for all nodes

10.18.2.1.2 Sound-Powered Telephone Systems

Backup Control Center Sound-Powered System

The backup control center system consists of two completely redundant systems. Each subsystem is wired directly and independently of any other communication system. Wiring routes avoid the spreading room, unit control rooms, and auxiliary instrument room. Sound-powered equipment and circuits are provided in the diesel generator building, electrical board rooms "A" through "F" in the reactor building, Units, 1, 2, and 3 backup control centers, and reactor core isolation cooling control panel 25-31 in each unit area.

There are telephones equipped with magnetos and magneto howlers provided in each system. The selector switch on the calling telephone is placed on the assigned number of the called telephone and then the magneto on the calling telephone is operated to sound the howler on the called telephone. There is no signaling on the jacks in this system, but jacks are near enough to telephones so that the howler on the telephone can be heard.

10.18.2.1.3 Inplant Radio Systems

Nuclear Security VHF Radio System

The Nuclear Security Service (NSS) Radio System is part of the UHF/VHF trunked radio system. A system is provided for communication between nuclear security officers, the central alarm station, the secondary alarm station, and Nuclear Security personnel located within the BFN reservation. Coverage includes the reservation and plant areas. The level of coverage is obtained through an inplant repeater system and inplant/external antenna systems that direct transmissions to portable radios.

Inplant Radio System

The Inplant Radio System consists of a UHF/VHF trunked system and an independent VHF channel (F4). The UHF/VHF trunked system and F4 channel are accessed by handheld radios. F4 channel is also accessed by hard-wired remote control units in various areas of the plant. The trunked system allows individual users to integrate large groups into specific talk groups for coordination (i.e., Fire Brigade, Operations, Maintenance, and Nuclear Security). The UHF/VHF trunked system consists of 6 UHF channels and 2 VHF channels. The power supply to UHF/VHF trunked system consists of two, redundant systems backed by emergency diesel generators. The four UHF channels of trunked systems are backed by an uninterruptible power supply (UPS). One channel is assigned as a control channel.

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Three channels are available for voice communication. The F4 channel is supplied by a separate uninterruptible power supply (UPS).

10.18.2.1.4 Paging System (Loudspeaker)

Paging speakers are installed throughout the Reactor, Turbine, and Control Buildings.

This equipment may be accessed by telephone. The speaker-amplifiers in each unit area are fed in parallel from a local AC lighting source.

10.18.2.1.5 Radio Page System

A radio page system is provided to signal key plant personnel throughout the BFN reservation. The telephone system is equipped with signaling trunks to permit the dialing of assigned radio page numbers from any plant telephone.

10.18.3 Offsite Communications - General

The offsite communications are accomplished by several diverse means, each having a redundant pathway. Dedicated telephone lines link the plant to the major administrative offices in Chattanooga for daily plant operations, and to the Central Emergency Control Center (CECC) to comply with the Radiological Emergency Plan (REP). An optical fiber based communications system serves as a redundant path for these lines. The plant also interfaces with the public switched network which provides local and long distance access. The emergency radio network and the Transmission Power Supply (TPS) radio serve as a voice pathway to the area surrounding the plant site. The offsite radio paging serves the same area for contacting key personnel carrying pagers.

10.18.3.1 Offsite Communications - Specific

10.18.3.1.1 Public Telephone Network

The public telephone system circuits enter the plant through a buried fiber-optics transmission cable. Power for the fiber-optics interface equipment is 120-V AC. A battery provided by an offsite vendor powers the system upon loss of AC power. Connections to the plant telephone system are made in the communications room.

Several types of connections are provided into the plant. These include:

- Direct inward dial trunks;
- Direct outward dial trunks;
- Dedicated tie lines to Chattanooga TVA telephone network;
- Dedicated tie lines to Chattanooga CECC.

10.18.3.1.2 Optical Fiber Based Communications

An optical fiber based communications system from the Athens Substation to the Node 3 Building is provided as a redundant means of providing communications circuits to the Chattanooga Administrative Telephone Network and the TVA Direct Distance Dial Network.

10.18.3.1.3 Emergency Radio System

This system is provided to communicate with field radiological monitoring teams, provide backup communication to the Chattanooga CECC, and provide mobile communications for key plant managers. Access to the system is provided from the main control room, the RADCON laboratory, the technical support center, the Operations support center, and the plant simulator.

Two independent repeaters are provided, accessing redundant, spatially diverse VHF transmitters. Field radiological monitoring vans are provided with VHF transceivers. The approximate area of coverage extends fifty miles from the plant.

10.18.3.1.4 Transmission Power Supply (TPS) UHF Radio System

This system is provided to assist the coordination of power transmission system control and maintenance activities. Control stations are provided in the technical support center (TSC) and the main control room. This system is independent of all other interplant communications systems and may be used in an emergency to communicate with the CECC in Chattanooga.

10.18.3.1.5 Sheriff's Radio System

A UHF radio is provided for communication between BFN Nuclear Security and the Limestone County Sheriff's Department. Access is provided from the Central Alarm Station and the Secondary Alarm Station.

10.18.3.1.6 Radio Paging System

This system is used to signal an employee carrying a pager in the surrounding areas of the plant. The range is approximately the same as the emergency radio system and the operation is the same as the onsite paging.

10.18.3.1.7 (Deleted)

10.18.3.1.8 NRC EMERGENCY NOTIFICATION SYSTEM (ENS)

The NRC Emergency Notification System (ENS) provides dedicated communication lines for emergency communication functions.

10.18.4 Evaluation

Onsite Systems

The telephone switching system, which is one of the primary onsite systems, is designed so that failures in individual processors or lines do not interrupt service. Such failures are annunciated and repairs are made promptly. The Node 1 switching equipment, which primarily serves the powerhouse area, is located in the communications room which is in a Seismic Class I building.

The sound-powered telephone systems are completely independent of power, each other, and all other systems provided. As long as a complete metallic path exists between instruments, communications can be maintained since the instruments supplied with these systems are very rugged and will successfully withstand high shocks, negligence, and abuse. If permanently installed wires are rendered unusable for any reason, a temporary pair of wires can be used with the sound-powered instruments.

The Nuclear Security radio must provide continuous coverage from all areas of the plant to the Central Alarm Station (CAS) and the Secondary Alarm Station (SAS). The Sheriff's radio is a separate system with radios in the CAS and in the SAS and a transmitter in the turbine building to send to the Limestone County repeater.

The Transmission Power Supply (TPS) radio is located in the Telecommunication & Computer Center (Node 3) Building with a remote terminal unit in the TSC and in the Main Control Room. This radio operates on 120-V AC lighting power feed and is backed by a 48-V DC source in the T&CC Building. This radio system keys the repeater at Monte Sano Mountain which provides communication to the Transmission Dispatch Control Center in Chattanooga. The transmitter at the Monte Sano repeater is primarily powered by 120-V AC and emergency backed by motor generator.

The loudspeaker paging equipment is dispersed in the control building and powerhouse areas. Single or multiple open circuits or amplifier failure in individual units will not prevent the remaining equipment from functioning.

Both onsite and offsite radio paging are accomplished through a fully redundant paging terminal located in Chattanooga and powered from an uninterruptable power supply. Access is provided by dedicated circuits with diversely routed backups.

Offsite Systems

Commercial telecommunications circuits enter the plant through a buried cable. The demarcation point is in a hut provided by an offsite vendor just outside the security fence. If this cable was cut, an alternative offsite route would be the TVA fiber optic system. Both systems are redundantly powered.

The Emergency Radio System operates with either of two separate and spatially diverse repeater sites. These sites are redundant with respect to operating area and access to the CECC.

10.18.5 Inspection and Tests

The most effective test of the telecommunications at the plant is the constant daily usage of this system. User troubles are reported and repaired promptly. In addition to daily usage, the Emergency Preparedness Staff performs periodic checks of the TSC telephones.

10.18.6 Accountability Alarm System

Plant-wide siren coverage is provided for signaling accountability to the plant personnel. These sirens are operated in the undulating mode for accountability.

There are two completely separate control stations provided for the system and also redundant automatic timers. The timers may be manually bypassed in case both fail.

The motor-driven sirens operate in groups by separate contactors, each of which has two diesel-backed, 480-V AC power supplies and two redundant actuating relays.

The electronic sirens and strobe lights operate in groups. Each group has two redundant actuating relays and is powered from an uninterruptible power supply. Uninterruptible power supply 0-BUPS-244-0004 is disabled by TACF 0-08-003-244. Uninterruptible power supply 1-BUPS-244-0001 is disabled by TACF 1-08-007-244. Uninterruptible power supply 1-BUPS-244-0002 is disabled by TACF 1-08-008-244. Uninterruptible power supply 2-BUPS-244-0002 is disabled by TACF 2-08-007-244.

The design of the siren system is such that it will not likely be inoperative for the following reasons.

1. Two independent, widely separated operating centers are provided.

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2. Duplicate timers located in widely separated bays are furnished with provision for manual override in case both fail. Each timer is powered by a separate ac source.
3. Duplicate actuating relays are provided in each remote control unit.
4. Independent, remote-control units are provided, each controlling a group of sirens or sirens and strobe lights. Failure of one control unit will not affect the others.
5. Two sources of diesel-backed AC power are provided for each control unit, with provisions for annunciation upon failure of each source. The control units that control the sirens and strobe lights are supplied from an uninterruptible power supply.
6. Power failure to the timers and to the remote control unit actuating relays is annunciated.