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July 15, 1983

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Limerick Generating Station, Units 1&2
Power Systems Branch Open Items

Reference: Meeting Between Power Systems Branch and
Philadelphia Electric Company on July 12, 1983

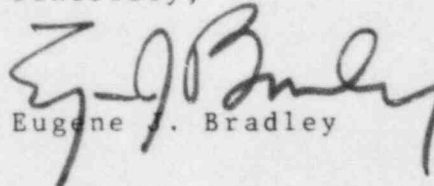
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Dear Mr. Schwencer:

The attached documents are revisions to FSAR Section 8.1.6.1.12.C, and the responses to Questions 430.57 and 430.62 which have been prepared as a result of discussions at the referenced meeting.

The information contained on these draft FSAR pages changes will be incorporated into the FSAR, exactly as it appears on the attachments, in the revision scheduled for August, 1983.

Sincerely,


Eugene J. Bradley

JTR/gra/26

Attachment

Copy to: See Attached Service List

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PDR ADOCK 05000352
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cc: Judge Lawrence Brenner (w/o enclosure)
Judge Richard F. Cole (w/o enclosure)
Judge Peter A. Morris (w/o enclosure)
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Atomic Safety and Licensing Board Panel (w/o enclosure)
Docket and Service Section (w/o enclosure)

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a. Medium-Voltage System

The only medium-voltage loads in the primary containment are two variable frequency reactor recirculating pump motors. Each recirculating pump motor is fed by a 13.8kV motor generator set. The motor generator sets are located in the turbine enclosure.

To protect the penetration assemblies, two redundant Class 1E circuit breakers are used in series to provide the required primary and backup protection. Separate divisions of 125V dc control power are used for the operation of these breakers. Tripping signals for these primary and backup breakers are independent, physically separated, and powered from separate sources.

The mechanical integrity of the penetration assemblies is maintained under the most severe fault condition.

b. 440 V System

In addition to the primary circuit breaker, a backup breaker located in the same motor control center cubicle is connected in each circuit to provide backup protection of the penetration assemblies. For all such Class 1E circuits, the primary and backup breaker overload and short circuit protection systems are qualified for the environmental conditions. For all non-Class 1E circuits that penetrate into the containment, two breakers are connected in series to provide primary and backup protection. These non-Class 1E breakers are identical in design and construction to that of Class 1E breakers, thereby assuring high reliability.

Typical time-current characteristics of these protective devices indicate that the penetration assemblies can withstand the available fault current for the time duration required to trip either or both the primary and backup circuit breakers.

c. 208 V and Lower-Voltage Systems

The low-voltage control circuits powered from control power transformers are self-limiting in that the circuit resistance and/or short circuit capability limits the fault current to a level that does not damage the penetration assemblies. The remaining control and power circuits have a primary and backup fuse or breaker to ensure fault isolation. Typical time-current characteristics of these protective devices substantiate

Insert (A) attached

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INSERT "A" TO 8.1.6.1.12.C

The maximum fault current available from the control circuit transformers at the transformer terminals are as follows:

<u>TRANSFORMER SIZE</u>	<u>MAX. FAULT CURRENT ON SECONDARY</u>
120 VA	15.6 A
200 VA	45.6 A
250 VA	21.9 A
350 VA	39.8 A

The minimum conductor size for control circuits through the electrical penetrations is #8AWG. Per the vendor, each #8AWG conductor can carry 53 A continuously. The smallest wire size used in control circuits is #14AWG. PECO Test Report #48503 shows that a #14AWG wire can carry 75 A continuously without insulation breakdown. Based on the above, it is concluded that both the conductor through the penetration and the rest of the control circuit can carry the maximum fault current developed by the control circuit transformers.

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- (7) A ground on each dc system is annunciated in the control room by a Class 1E ground detector dedicated to that division.
- (8) The integrity of the battery fuses is continuously monitored in the control room by the battery ammeters. If the fuses should blow or be removed, the ammeters will read zero.
- ↳ Insert (A) attached*
- (9) The tripping of the battery charger output breaker is alarmed in the control room by the battery charger trouble annunciator. Low dc output current initiates this alarm.
- (10) A battery charger trouble alarm is provided in the control room for each battery charger. This alarm is initiated for the following conditions:

High/low dc voltage

Low dc current

Low ac voltage

- e. A study has recently been completed which retabulated the dc system loads based on the present design. This load information was sent to the battery manufacturer to obtain the resulting voltage profiles. The results verified that the dc bus voltages will remain above the design minimum voltages during any expected accident or post-accident mode of operation.
- f. All Class 1E dc equipment is rated and qualified to operate at the voltage it will see at the end of the battery duty cycle with the battery at the end of its life, which is defined as 1.75 volts per cell at minimum rated temperature. A voltage drop study has recently been completed which verified that the minimum operating voltages will be available at the utilizing dc devices when the

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INSERT "A" TO RAI 430.57

The fuse integrity is also continuously monitored by ERFDS as the signal from the battery ammeters is inputted to this computer system and updated at least every 30 seconds. When battery current reads zero for longer than a specified time period, the power systems status light changes colors on the ERFDS display to direct the operator to the power system sub-display where the current value is displayed.

QUESTION 430.62 (Section 9.5.2)

Consider the design basis seismic event with coincident failure of all non-seismic equipment and components. Demonstrate that there will be effective intra-plant communications with all safety related areas to attain a safe, cold plant shutdown following the seismic event.

RESPONSE

Section 9.5.2.3 has been changed to provide the requested information. Following a design basis seismic event with coincident failure of all non-seismic equipment and components, Limerick will attain a safe, cold plant shutdown from the main control room without the use of intra-plant communication because all actions required under this scenario are taken in the control room.

However, because the three intra-plant communication systems described in Section 9.5.2 utilize diverse Technology and Class 1E power sources, and because the critical active components of the PA system and the In-plant Radio system are installed in Seismic Category I structures, there is reasonable assurance that intra-plant communications will be maintained following a design basis seismic event.

located in safety-related areas, are supported on a selective basis to seismic Category IIA requirements as described in Section 3.2. The criteria for this selective basis and the design basis for seismic Category IIA supports are described in Section 3.2.

9.5.2.2 System Description

The plant communication systems consists of the intra-plant public address (PA) system, the private automatic branch exchange (PABX) telephone system, the intra-plant maintenance telephone system, the evacuation alarm and river warning system, and the in-plant radio system. Descriptions of these systems are given in the following sections.

The plant communication systems are illustrated in riser diagram form in Figures 9.5-2 through 9.5-7.

→ [Insert A]

9.5.2.2.1 Intra-Plant Public Address (PA) System

The PA system is a 6-channel system permitting simultaneous usage of a page line and five party lines for intra-plant use. Loudspeakers powered by individual amplifiers are located throughout the plant with muting facilities provided where required. The PA system is provided with a telephone line matching network for operation of the page channel by the PABX system described in Section 9.5.2.2.2.

→ [Insert B]

~~The PA system is powered from the Division 4 diesel bus to provide continuous operation under all plant operating conditions.~~

9.5.2.2.2 Private Automatic Branch Exchange Telephone System (PABX)

The private automatic branch exchange telephone system (PABX) equipment and cabling is supplied and installed by the telephone company. The telephones are located throughout the plant. The power for this system is supplied from a non-Class 1E motor control center which is powered from the Division 1 safeguard power system. This MCC (10B129) is automatically shed on a LOCA but can be manually reconnected in the control room. [Insert C] ←

9.5.2.2.3 Intra-Plant Maintenance Telephone System

The intra-plant maintenance telephone system is part of the PABX system consisting of telephone jacks. Portable PABX (dial-type) telephones may be connected to the maintenance telephone jacks.

This system provides an additional station-to-station, intra-plant communication system for use during startup, maintenance, and normal operation, and consists of telephone jack stations located at various selected areas throughout the plant.

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[Insert D]

circuits. ~~The distributed antenna system will allow radio communications from any location within the plant to any other location to within a 5 mile radius of the plant. The walkie talkies are battery powered, and the distributed antenna system is powered from a source of power diverse from the PA and PABX systems.~~

9.5.2.3 Safety Evaluation

The communications systems are not safety-related and are classified as non-Class 1E. When components of the communications systems are located within seismic Category I structures, these components are supported on a selective basis to seismic Category IIA requirements described in Section 3.2. The basis for providing Category IIA supports is to prevent the communications equipment from falling on safety-related equipment and impairing its ability to perform safe shutdown functions during a seismic event. [Insert from page 9.5-23]

The systems described above are conventional and have a history of successful operation at similar existing plants. System design considerations include diversity and operational reliability.

Physical and electrical separation is provided between primary and backup systems to minimize the possibility of a single occurrence affecting more than one system.

The communications systems have adequate flexibility to keep plant personnel informed of plant operational status at all times. If one handset station of the PA system is damaged or inaccessible or if extreme background noise prevents its use, multiple handset locations at each plant elevation provide easy access to an alternate handset of the PA system.

Failure of a single PABX telephone station does not affect the balance of the PABX telephone system. If failure of the central exchange or some other such failure makes the complete system inoperable, the public address system is used as backup in-plant communications.

The public address system is powered from a Class 1E 440V motor control center through a 430V-120V transformer and a 3-phase, 120V distribution panel. The transformer and panel are seismic

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Category I and feed only the PA system and fire alarm system which are non-Class 1E. The cabling for these systems is routed in independent and separate conduits and no other systems' cables are routed in these conduits. For this reason and reasons of plant safety, this panel remains connected to the Class 1E bus during a LOCA. The Class 1E 440V motor control center is powered by the Division 4 Class 1E 440V load center. The Class 1E 440V motor control center and load center are part of the Class 1E ac power system (Section 8.3.1.1.2). Failures of the fire alarm or PA systems will not affect the Class 1E bus because of the use of overcurrent protection devices. ~~and isolation transformers.~~

redundant

The PABX telephone system is powered by a non-Class 1E power source which can be connected to the Division 1 diesel generator. Failure of any or all of its components will not affect any nuclear safety-related equipment.

and the In-Plant Radio System.

During the loss of both offsite power and the diesel generator associated with Division 4 bus, communication is maintained by the PABX telephone system. It is not necessary for plant personnel in safety-related areas of the plant to communicate with the control room in order to achieve a safe, cold shutdown of the plant following a design basis seismic event. The failure of any non-seismic communications systems will not adversely affect safe shutdown capability.

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Page
9.5-22

[Insert E]

9.5.2.4 Inspection and Testing Requirements

The communications systems will be tested by a preoperational test (1-P-99.3). Systems described above are conventional and have a history of successful operation at similar existing plants. These systems will be in routine use and maintenance, and this will ensure their availability.

Also, these systems will be used extensively during the preoperational and startup phases. Any deficiencies will become readily apparent and will be corrected. The power sources, for the private automatic branch exchange telephone system and Class 1E bus for the public address system, are tested separately via the preoperational and startup test program.

9.5.3 LIGHTING SYSTEM

The plant lighting system provides illumination levels required for safe performance of plant operation, security, shutdown, and

Insert A (page 9.5-20)

The PABX, PA, and In-Plant radio systems are physically independent systems ultimately powered from diverse Class 1E power sources. They serve as backup to one another in the event of system failures. These three independent voice communication systems have been designed and installed to provide reasonable assurance that any single event will not cause a complete loss of intra-plant communication through the use of diverse technology, separate routing of cables and separate diesel generator-backed power supplies.

Insert B (page 9.5-20)

PA handsets and speakers are located in vital areas throughout the plant and remote buildings. Multiple handsets are provided at many plant elevations.

The public address system is powered from a Class 1E 440V motor control center through a 480/120V transformer and distribution panel. The transformer and distribution panel are seismic Category I. The panel remains connected to the Class 1E bus during all accident conditions.

Insert B (continued)

The Class 1E 440 V motor control center is powered by the Division 4 Class 1E AC power system.

The cables for the PA system are routed in independent and separate conduits dedicated to the P.A. system, the majority of which are embedded. The main amplifier panel for this system is located in a Seismic Category I structure in a mild environment and is mounted Seismic Category II A. The individual hand stations are securely mounted to the walls using four arch anchored bolts.

The PA System is designed to remain functional during normal and emergency conditions. Additionally, there is reasonable assurance that it will remain functional following a seismic event.

Insert C (page 9.5-20)

Upon failure of the PABX main frame, a bypass switch provides connection of 60 selected telephone extensions to the Bell of Pa. network through the Philadelphia Electric Company microwave network.

Insert D (page 9.5-22)

The system is designed to permit walkie-talkie to walkie-talkie and walkie-talkie to console communications from any location within the plant and satellite buildings. Communication consoles are located at selected plant locations including the Control Room and Remote Shutdown Room. Communications between consoles is via hardware thus providing a means of communication between selected areas of the plant even with the failure of the radio base station, PA system and PABX system. The power for the base station and consoles is from the Division 2 Safeguard power system through a non-Class 1E motor control center (10B130). This bus is automatically shed on a LOCA signal but can be manually reconnected in the control room.

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Insert E (page 9.5-23)

The In-Plant radio system is powered by a non-Class 1E power source which can be connected to the Division 2 diesel generator. Failure of any or all of its components will not affect any nuclear safety-related equipment.