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JUN 07 1984

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

Docket Nos.: 50-352
50-353

SUBJECT: Limerick Generating Station, Units 1 and 2
Information on Confirmatory Issue #28

REF: (1) Letter from J. S. Kemper to A. Schwencer dated December 14, 1983
(2) Telecon between M. Virgilio (NRC/ICSB) and E. F. Sproat (PECo) on 5/24/84

FILE: GOVT 1-1 (NRC)

Dear Mr. Schwencer:

The reference (1) letter provided information concerning isolation of circuits, Limerick SER confirmatory issue #28. As agreed upon in the reference (2) conference call, the enclosure provides the additional information necessary to close confirmatory issue #28. Because the attachments identified in the enclosure have not been revised since their transmittal in the reference (1) letter, they are not being retransmitted at this time.

Sincerely,

J. J. Gallagher
for
J. S. Kemper

EFS/la
Attachment
la5258411000
Copy to: See attached service list

B001
1/1

cc: Judge Lawrence Brenner (w/enclosure)
Judge Richard F. Cole (w/enclosure)
Troy B. Conner, Jr., Esq. (w/enclosure)
Ann P. Hodgdon, Esq. (w/enclosure)
Mr. Frank R. Romano (w/enclosure)
Mr. Robert L. Anthony (w/enclosure)
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Atomic Safety & Licensing Appeal Board (w/enclosure)
Atomic Safety & Licensing Board Panel (w/enclosure)
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Martha W. Bush, Esq. (w/enclosure)
Mr. James Wiggins (w/enclosure)
Mr. Timothy P. S. Campbell (w/enclosure)
Ms. Phyllis Zitzer (w/enclosure)
Judge Peter A. Morris (w/enclosure)

ELECTRICAL ENGINEERING DIVISION
N3-1, 2301 MARKET STREET

Revised May 29, 1984

Limerick Confirmatory Issue #28

The NRC staff will confirm successful completion of tests and the adequacy of (1) the GE isolators for the redundant reactivity control system, and (2) Love Model 106 process signal converter-isolator. (LGS SER Section 7.2.2.9).

RESPONSE

G. E. Isolators

The Limerick RRCS panels utilize an optical isolator printed circuit board system for communication between Class 1E and non-Class 1E circuits. The isolators are in a two card configuration. The input card is located on one side of a thermal and electrical barrier and the output card is located on the other side of this barrier. The Class 1E input signal is transmitted via a light emitting diode through the barrier on a quartz rod to a photo transistor located on the output card. The quartz rod is approximately 1.2 inches in length. The isolator cards are grouped together in common input and output housings as shown on Attachments 1, 2, and 3. All cards in a common housing are of the same separation division, therefore, no separation is needed between adjacent input or output cards. Also, the isolator housings are grouped in the RRCS panel section which only contains wiring and components of the same division as the isolator.

All of the isolator cards have been seismically qualified to IEEE Standard 344-75 and environmentally qualified to IEEE Standard 323-74 by test.

The suitability of these cards to provide isolation for Limerick Class 1E circuits has been evaluated and found to be acceptable through a combination of test and analysis. General Electric performed testing which confirmed the capability of the isolators to prevent the following failure conditions on the output card from affecting the input card circuits:

- Switching surges of 142 VDC or 132 VAC at 200 Ma.
- Conductive EMI using 100 to 500 KHz, 300 volt peak-to-peak test signals
- Radiated EMI using .5 to 100 MHz, 5 volt peak-to-peak test signals

All isolator cards successfully met the acceptance criteria listed below for these tests:

°No card malfunction
°No undesired response on the input circuit
°No degradation of performance
°No permanent damage

The results of the General Electric test program are contained in GE design record file DRF C22-00017.

Philadelphia Electric has considered the above GE test results and has inspected the as-installed configuration of the RRCS isolators. PECo has concluded that these isolators are satisfactory for application at Limerick based on the following analysis:

1. Separation of input and output circuits is inherent in the design of these isolators. All input cards and their associated connecting wiring are segregated from the output cards and their wiring by a steel plate barrier which runs the height of the panel. (See Attachment 1). Ceramic blocks which contain the quartz rods form the only penetrations to this steel panel. After installation, these ceramic blocks are contained within the metallic isolator card housing (See Attachments 2 and 3). No failure, either electrical or thermal can propagate through this barrier to the other side.

2. Failures in the output cannot reflect back into the input circuits. Because the input and output cards are photoelectrically coupled, the following failure modes on the output cannot reflect back to the input:

   °Open Circuit
   °Short Circut
   °Short to grou..

The maximum credible hot short voltage that could be impressed on the output card at Limerick is 530 VAC. The input and output cards are separated by the 1.2 inch quartz rod at their closest interface point. The resistance of the quartz rod is at least 10^{14} ohms/CM or $3X10^{14}$ ohms total resistance between the input and output cards. It can be seen that the leakage current at 530V would be negligable and therefore, the isolator will prevent a hot short on the output circuit from propagating back into the input.

Based on the above test data and analysis, the General Electric RRCS optical isolators are considered to be qualified for use at Limerick.

Love Model 106 Converter-Isolator

Love Model 106 Converter-Isolators are used as isolation devices in analog HVAC control circuits at Limerick. They are used to provide isolation between both Class 1E to Class 1E and Class 1E to non-Class 1E circuits. The isolator circuitry is contained within a metal enclosure which is mounted in the local HVAC control panels. Wiring entering and leaving the isolator are separated per the Limerick internal panel wiring separation criteria.

The isolation testing was performed by Philadelphia Electric in accordance with test procedure FE-9 (See Attachment #4). The test report is enclosed as Attachment #5. The test results showed that the overvoltage test on the isolator output caused the failure of the device as a signal converter. The isolation properties of the device, however, were not impaired and the input circuitry was unaffected by the fault on the output. All failures of the device were contained within the housing.

EFS/la
Attachment to KLH