PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-4000

December 27, 1984

Docket No. 50-352

Dr. Thomas E. Murley, Administrator
Region I
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Dr. Murley:

The purpose of the following letter is to inform you of an event which occurred at the Limerick Generating Station on Unit No. 1 on November 18, 1984, prior to initial criticality. Although this event was not considered to be reportable under 10CFR50.73, this report is provided due to the NRC interest expressed at the time of this event based on its possible generic implications.

Reference:	Docket No. 50-352
Event Date:	November 18, 1984
Report Date:	December 27, 1984
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

Description of the Event:

On November 18, 1984 at 6:43 a.m., during fuel loading of Unit 1 prior to initial criticality with the reactor at zero percent power level and all control rods fully inserted, alarms were received in the control room indicating downscale, upscale, and inoperability of the 'D' SRM, 'D' IRM, and 'H' IRM detector channels in the Neutron Monitoring System. Investigation revealed a loss of the -20 VDC power within the DC power supply. This loss of power resulted in the inoperability of the "D" SRM, "D" IRM and "H" IRM channels along with tripping the auxiliary relays within the trip auxiliary unit, which brought up the alarms in the control room. The RPS shorting links had been removed as directed by Technical Specification 3.9.2 due to ongoing

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Core Alterations during Control Rod Scram Timing Tests. With the shorting links removed, the alarms received from these SRM and IRM channels were expected to be accompanied by a non-coincident scram. However, a scram signal was not received because the loss of power did not cause de-energization of the trip relays.

During subsequent testing on November 19, 1984, at 3:30 a.m., this event was simulated with the shorting links installed. During the testing, the -20 VDC power supply was de-energized and a half scram signal was received on RPS channel B2. If the shorting links had been removed, this testing would have resulted in the occurrence of a non-coincident full scram, which differs from the lack of scram signal during the actual loss of -20 VDC power previously.

Consequences of the Event:

No core alterations were being performed at the time of the actual loss of power or during the loss of power testing. The unit was in the initial fuel loading phase with the reactor at zero percent power level and all control rods fully inserted during this event. All other SRM and IRM channels were in service and remained operable.

Multiple testing, subsequent to the actual loss of power on November 18, 1984, revealed that loss of -20 VDC power to the IRM channels may or may not result in initiating a reactor scram signal. If a reactor scram signal did occur, it was the result of an INOP trip caused by low voltage from the detector's high voltage power supply. The testing suggested that this action was dependent upon the time it took for the -20 VDC to decay to common. This testing also suggested that, if the -20 VDC power decayed to common at a slow enough rate, the high voltage power then decayed and dropped low enough to cause an INOP trip. Furthermore, if a loss of -20 VDC power did result in a reactor scram due to the high voltage power supply's low voltage trip, the scram signal could be reset in a matter of seconds even with the IRM channels still inoperable.

Additionally, the INOP trip relays located within the trip auxiliary units and associated with each individual IRM channel are kept energized using power developed by the +20 VDC power. Therefore, a loss of the +20 VDC power would de-energized the INOP trip relay and initiate a reactor scram. In this event, since only the -20 VDC power was lost while

the +20 VDC power remained, a reactor scram was not initiated.

Cause of the Event:

During surveillance testing of the 'D' Reactor Enclosure Exhaust Radiation Monitor, an Instrument and Controls Technician, while installing a jumper to bypass the monitor's INOP trip, shorted the -20 VDC power. This power is supplied by the DC power supply which also supplies power to the 'D' SRM, 'D' IRM, and 'H' IRM channels. This loss of -20 VDC power resulted in the inoperability of these channels.

Corrective Actions:

After the short circuit was rectified, the -20 VDC power supply was reset. This returned the -20 VDC power to the affected channels and made them operable. This event was analyzed in concert with the NSSS and a modification package was prepared and implemented to provide positive protection against a recurrence of such an event. To ensure an INOP trip on loss of the -20 VDC power supply, a relay was installed in the -20 VDC power supply line of each of the four trip auxiliary units. This relay is energized by -20 VDC power with output contacts located in series with the power used to energize IRM INOP trip relays for each individual IRM channel. When the -20 VDC power is lost, the -20 VDC power monitor relay will de-energize, de-energizing the IRM INOP trip relay, initiating a reactor scram signal and initiating the appropriate alarms in the control room for the affected IRM channel. The trip signal cannot be reset until the loss of -20 VDC condition is rectified. This improvement was completed and verified as operable by December 10, 1984.

Additionally, a modification to install test jacks and key switches to the radiation monitoring instruments was completed. This modification alleviates the need to install jumpers when performing surveillance testing on the Reactor Enclosure Exhaust Radiation Monitors.

Very truly yours,

W. T. Ullrich
Superintendent
Nuclear Generation Division

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