**Robert W. Boyce**
Plant Manager
Limerick Generating Station

PECO NUCLEAR
A Unit of PECO Energy

PECO Energy Company
Limerick Generating Station
PO Box 2300
Sanatoga, PA 19464-0920
610 718 2000

10CFR50.73

June 17, 1996

Docket Nos. 50-352
50-353
License Nos. NPF-39
NPF-85

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Units 1 and 2

This LER reports a reduction in the ability to maintain safe shutdown in the event of a fire as provided by the Fire Protection Program due to incorrectly sized fuses. This resulted in a failure to meet License Conditions for Limerick Generating Station Units 1 and 2 and in a condition that alone could have prevented the fulfillment of a safety function of a system needed to maintain safe shutdown.

| | |
|---|---|
| Reference: | Docket Nos. 50-352<br>50-353 |
| Report Number: | 1-96-012 |
| Revision Number: | 00 |
| Event Date: | April 16, 1993 Unit 1<br>November 3, 1992 Unit 2 |
| Discovery Date: | May 16, 1996 |
| Report Date: | June 17,1996 |
| Facility: | Limerick Generating Station<br>P.O. Box 2300, Sanatoga, PA 19464-2300 |

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v) and License Conditions 2.F for Unit 1 and 2.E for Unit 2.

Very truly yours,

Robert W Boyce

IE22/1

DBN:cah
cc: T. T. Martin, Administrator Region I, USNRC
N. S. Perry, USNRC Senior Resident Inspector, LGS

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Limerick Generating Station, Unit 1 | 05000352 | 1 OF 5 |

TITLE (4) **Improper Fuse Sizing Resulting in Potential Loss of Emergency Diesel Generator Control Following a Fire**

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | Limerick, Unit 2 | 05000 353 |
| 11 | 03 | 92 | 96 | -- 012 -- | 00 | 06 | 17 | 96 | FACILITY NAME | DOCKET NUMBER 05000 |

| OPERATING MODE (9) | 1 |
|---|---|
| POWER LEVEL (10) | 100 |

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

| | | | | | |
|---|---|---|---|---|---|
| | 20.402(b) | | 20.405(c) | | 50.73(a)(2)(iv) | | 73.71(b) |
| | 20.405(a)(1)(i) | | 50.36(c)(1) | X | 50.73(a)(2)(v) | | 73.71(c) |
| | 20.405(a)(1)(ii) | | 50.36(c)(2) | | 50.73(a)(2)(vii) | X | OTHER |
| | 20.405(a)(1)(iii) | | 50.73(a)(2)(i) | | 50.73(a)(2)(viii)(A) | | (Specify in Abstract below and in Text, NRC Form 366A) |
| | 20.405(a)(1)(iv) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(viii)(B) | | |
| | 20.405(a)(1)(v) | | 50.73(a)(2)(iii) | | 50.73(a)(2)(x) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| J. L. Kantner - Experience Assessment, LGS | (610) 718-3400 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| | YES (If yes, complete EXPECTED SUBMISSION DATE). | X NO | | | | |


ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 05/16/96, during a special review, offsite engineering personnel identified oversized sacrificial fuses in circuits needed to maintain safe shutdown in the event of a fire in certain locations in the plant. The fuses are designed to provide fire damage isolation and to assure that local control for the Unit 1 D11 and the Unit 2 D21 Emergency Diesel Generators (EDGs) remain available for the remote shutdown method. The fuses were installed by a modification on 04/16/93 for the D11 EDG and 11/03/92 for the D21 EDG. This resulted in a failure to maintain the provisions of the Fire Protection Program (FPP) and is a condition that alone could prevent the fulfillment of the safety function of a system needed to maintain safe shutdown. The actual consequences for this condition are minimal since a fire did not occur. Defense-in-depth features of the FPP minimize the potential consequences of a fire. During the modification design process, the design engineer and the independent reviewer failed to identify that the fuses were required for safe shutdown and incorrectly specified a larger fuse size. Roving fire watch patrols will remain in place until the fuses are replaced. Procedures have been revised to assist in the identification of associated circuits required for safe shutdown. Reviews of safe shutdown drawings and other modifications is planned.

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at 100% power when this event was discovered.

Unit 2 was in OPCON 1 at 100% power when this event was discovered.

Unit 1 and Unit 2 have operated at various power levels since the concern described in this report first existed. There were no systems or structures out of service which contributed to this event.

Background

As a result of concerns identified in NRC Bulletin 92-01 regarding failure of Thermo-Lag Fire Barriers, an engineering initiative was being performed to reduce the reliance on fire barriers. This program, titled the Thermo-Lag Reduction Program, involves a verification of the equipment and cabling required to achieve and maintain safe shutdown of Unit 1 and Unit 2 in the event of a fire in all areas of the plant.

Description of the Event

On May 16, 1996, during performance of the Thermo-Lag Reduction Program, offsite engineering personnel identified oversized sacrificial fuses (EIIS: FU) in circuits needed to maintain safe shutdown in the event of a fire in certain locations in the plant. These fuses are located in the start and stop control circuits for the Unit 1 D11 Emergency Diesel Generator (EDG, EIIS: EK) and the Unit 2 D21 EDG. The sacrificial fuses are designed to assure that the local control for the D11 and D21 EDGs remain available for the remote shutdown method in the event of a fire in the Main Control Room, the Cable Spreading Room, the Auxiliary Equipment Room, and five (5) other locations in the common Control Enclosure and Unit 1 Reactor Enclosure (i.e., fire areas 7, 20, 22, 23, 24, 25, 44W, 45E, and 47E). Without properly sized sacrificial fuses, fire damage could result in opening other fuses needed to permit local control of the D11 and D21 EDGs. The Limerick Generating Station (LGS) Updated Final Safety Analysis Report (UFSAR) Section 9.A.5 provides the safe shutdown analysis and states that the D11 and D21 EDGs are protected and available to

maintain safe shutdown using the remote shutdown method in the event of a fire in the above mentioned fire areas.

On May 16, 1996, at 1850 hours, the station was notified of the condition and compensatory fire watch patrols were established for the above mentioned fire areas. Many of the areas were already being inspected by hourly roving fire watch patrols prior to November 3, 1992, as a result of inoperable Thermo-Lag fire barriers.

Investigation into the cause of this condition identified that the new fuses were installed on April 16, 1993 for the D11 EDG and November 3, 1992 for the D21 EDG. This condition resulted in a failure to maintain the provisions of the approved Fire Protection Program and is a violation of Facility Operating License Conditions 2.C.(3) for the Limerick Generating Station Units 1 and 2. This condition also resulted in a condition that alone could have prevented the fulfillment of the safety function of a system needed to maintain safe shutdown. Therefore, a four (4) hour notification was made to the NRC at 2249 hours on May 16, 1996, in accordance with the requirements of 10CFR50.72(b)(2)(iii). This notification satisfied the twenty-four hour reporting requirement of License Conditions 2.F and 2.E for Units 1 and 2 respectively to report the failure to comply with License Condition 2.C.(3). This report is submitted in accordance with requirements of 10CFR50.73(a)(2)(v) and License Conditions 2.F and 2.E for Unit 1 and 2 respectively.

Analysis of the Event

The actual consequences for this condition are minimal since a fire did not occur challenging the fire protection program or requiring the shutdown of either unit. The design of the Fire Protection Program relies on a 'defense-in-depth' approach which serves to prevent a fire from starting, to quickly detect and suppress fires which do start, and protect safety related equipment so that a fire will not prevent safe shutdown of the plant. Automatic detection and automatic and manual suppression capabilities exist in many of the affected areas of the plant. In the unlikely event that a fire occurred and affected the cables involving the oversized fuses coincident with a total loss of offsite electrical power, safe shutdown of the plant could not be assured.

Cause of the Event

The primary cause of this condition is personnel error that occurred during the design of a modification in 1992. The modification replaced the sacrificial fuses with larger sized fuses resulting in incorrect fuse coordination with other fuses in the D11 and D21 EDG control circuits. Under certain fire damage conditions, control power fuses would open before the sacrificial fuses, and as a result, control power to the start and stop logic for the D11 and D21 EDGs would be lost. The modification scope was to replace many fuses located in DC circuits that had AC voltage ratings but did not have the proper DC voltage ratings.

During the modification design, the design engineer failed to identify that the fuses were required for safe shutdown and incorrectly specified a larger fuse size than required to maintain the fire damage isolation function. The modification procedures in place during 1992 required the design engineer to complete a Fire Protection Review Checklist (FPRC). Concerns identified during completion of the FPRC require further review by an engineering branch specialized in safe shutdown analysis. The design engineer incorrectly completed the FPRC. The independent reviewer of the modification also failed to identify this issue. Since the modification package did contain a FPRC and further safe shutdown reviews were determined to be unnecessary, higher level reviews and approvals of the modification performed in 1992 are not expected to have identified this concern.

Corrective Actions

A design change has been approved to establish proper fuse coordination for the D11 and D21 EDG control circuits and will re-establish the isolation function of the subject fuses. This change is expected to be completed by September 1, 1996. The fire watch patrols will remain in place until the fuses are changed.

A review of the modifications associated with the DC fuse ratings was performed and no additional safe shutdown concerns were identified. An in-depth review of the safe shutdown circuits for the remote shutdown fire areas was performed and determined that no deficiencies in the circuits exist. A further review of all of the drawings associated with safe shutdown is being performed. A sampling of

modifications designed in this time frame will be reviewed including the associated FPRCs to determine if additional concerns exist.

Enhanced FPRC and guidance was incorporated into an engineering procedure in 1995. The procedure provides specific guidance for completing the FPRC and includes a list of design documents to be reviewed to determine associated circuits for safe shutdown. A further review of this procedure was previously initiated to include human factors considerations in the FPRC. The ongoing review will include information from this LER and a revision to the FPRC will be issued as appropriate.

A review of the Independent Review (IR) process was previously initiated. The ongoing review will include information from this LER and the IR process will be upgraded as appropriate.

A design guide for fuses and molded case circuit breakers was issued in 1995 and provides the design methodology for fuse coordination. This guide will assist in determining proper fuse sizing in future modifications.

Previous Similar Occurrences

There have been other modification process deficiencies including fire safe shutdown concerns, however, the issues occurred after the modification identified in this LER. Therefore, the corrective actions associated with the other modification process deficiencies are not expected to have prevented the condition described in this LER.