10 CFR 50.73

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATIC

P. O. BOX A

SANATOGA, PENNSYLVANIA 19464

(215) 327-1200 EXT. 2000

M. J. McCORMICK, JR., P.E.
PLANT MANAGER
LIMERICK GENERATING STATION

July 12, 1990

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 concerns a failure to meet Limerick Generating Station Units 1 and 2, License Conditions 2.C.(3), Fire Protection, due to underrated fuses in the Division 1 and Division 2 DC Electrical Distribution systems. Also, inadequate electrical isolation between Class 1E and non-Class 1E circuits resulted in Unit 1 and Unit 2 Division 1 and 2 250 Volt DC system inoperability that resulted in a condition prohibited by Technical Specifications.

Reference:	Docket Nos. 50-352 and 50-353
Report Number:	1-90-013
Revision Number:	00
Event Date:	June 11, 1990
Report Date:	July 12, 1990
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

This LER is being submitted in accordance with Unit 1 License Condition 2.F, and Unit 2 License Condition 2.E which requires a follow up written report in accordance with 10 CFR 50.73(b),(c), and (e). Additionally, this LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B). This LER is being submitted one day late to ensure adequate review and approval prior to submittal. We regret any inconvenience this may have caused.

Very truly yours,

M. J. McCormick Jr.

WGS:cah

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

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NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Limerick Generating Station, Unit 1	0 5 0 0 0 3 5 2	1 OF 1 3

TITLE (4) This LER reports the affects of under rated DC fuses and the failure to maintain adequate electrical isolation between Class 1E and non-Class 1E components

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 NAMES	DOCKET NUMBER(S)
0 6	1 1	9 0	9 0	– 0 1 3 –	0 0	0 7	1 2	9 0	Unit 2	0 5 0 0 0 3 5 3
										0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	License Condition 2.E and 2.F
		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	
	AREA CODE	
G. J. Madsen, Regulatory Engineer, Limerick Generating Station	2 1 5	3 2 7 - 1 2 0 0

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
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 9	1 1	9 0

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

On June 11, 1990, based on the review of the DC electrical distribution system, it was identified that the Unit 1 and Unit 2 Division 1 and Division 2 DC distribution systems had inadequate isolation capability between Class 1E and non-Class 1E components and under-rated DC fuses. Units 1 and 2 Divisions 1 and 2 DC distribution systems were declared inoperable until electrical disconnects were opened to ensure proper electrical isolation between the associated Class 1E and non-Class 1E components. A modification was implemented that provides additional isolation protection. Further investigation on June 13, 1990 identified that Fire Protection Safe Shutdown (SSD) methods 'B' (Unit 1) or 'C' (Unit 2) could be affected due to postulated fire induced high impedance faults resulting from the under-rated DC fuses failing to isolate high overload current conditions. Immediate corrective actions were taken to establish hourly fire watches in the affected Unit 2 fire areas until June 26, 1990 when a modification was completed replacing under-rated fuses. The affected Unit 1 fire area was not fire watched since Unit 1 was in cold shutdown at the time. Proximate causes of these conditions are errors made during the original design when we incorrectly assumed that double fusing was sufficient isolation and that the DC fuses had a +10% tolerance. The cause and actions taken to prevent recurrence of this event are under further investigation and details will be provided in a supplement to this LER by September 11, 1990.

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Background:

Below is a brief summary description of relevant features of the Limerick Generating Station (LGS) DC electrical distribution system and the identification of an under-rated fuse concern. Limerick Generating Station DC Safeguard power consists of four independent and redundant divisions per unit. Divisions 1 and 2 contain 125/250 volt (V) DC distribution system in each of the two divisions. Divisions 3 and 4 batteries only provide 125V DC distribution system (See Figure 3). The LGS DC electrical distribution system is nominally rated at 250V and 125V DC. The 250V DC battery banks are comprised of two sets of 60 series connected cells. The batteries are center tapped resulting in nominal voltages of 125V between the negative and neutral terminals, 125V between the neutral and positive terminals, and 250V between the positive and negative terminals. DC power is distributed to safety-related electrical equipment via 125V distribution panels and 250V DC Motor Control Centers (MCCs). The 250V DC fuses are used to supply nominal voltage from MCCs 1/20D201, 1/20D202 and 1/20D203 to various safety-related systems including the High Pressure Core Injection (HPCI) system, the Reactor Core Isolation Cooling (RCIC) system, and other systems. The 125V DC fuses are used to supply power from distribution panels to various safety-related systems. These fuses are also used to prevent propagation of faults through the distribution system.

The battery chargers are set to operate at 135V DC (float) normally and 140V DC during equalization as compared to the nominal voltages of the batteries at 125V DC. This also results in a 250V DC battery operating at 270V DC (float) normally and 280V DC during equalization as compared to nominal voltages of batteries at 250V DC.

Philadelphia Electric Company (PECo) conducted an Electrical Distribution Safety System Functional Inspection (SSFI) and a subsequent investigation of DC fuses at our Peach Bottom Atomic Power Station (PBAPS). As a result, questions were raised regarding the adequacy of voltage rating and current interrupting capacity of DC electrical distribution system fuses installed at LGS. As a result of the review of the LGS DC electrical distribution system, some fuses installed in the nominal 250V/125V DC distribution system were found to be underrated in that their actual rating based on manufacturer testing is only 250V and 125V DC. These fuses were installed in safety related fuse boxes, MCCs, distribution panels and other supporting DC system cabinets as listed below.

	Unit 1	Unit 2
Ground Detection Cabinets:	1AD104 1BD104	2AD104 2BD104
Transducer Cabinets:	1AD106 1BD106	2AD106 2BD106

125 Volt Distribution Panels:	1AD102	2AD102
	1BD102	2BD102
	1CD102	2CD102
	1DD102	2DD102
125/250 Volt Fuse Panels:	1AD105	2AD105
	1BD105	2BD105
250 Volt Motor Control Centers:	10D201	20D201
	10D202	20D202
	10D203	20D203

To determine the adequacy of these fuses, the results of the PBAPS test program were applied to LGS. These supplementary tests were conducted at the Gould Shawmut High Power Test Laboratory in accordance with the requirements of UL Standard 198L, "DC Fuses for Industrial Use," with the exception of the modified acceptance criteria described below.

The Bussman Type FRN-R fuses installed in the 125V DC distribution panels were tested for current interrupting capability at 13,000 amperes and 140V DC, 200% and 900% rated current overload tests at 140V DC, and maximum energy tests. These fuses passed all applicable tests with the modified UL standard 198L acceptance criteria. This modified acceptance criteria allows fuse blistering, smoking, or puncture as long as the fuses would permanently clear test circuit current without any potential hazards or damage to adjacent fuses and electrical wiring. This is acceptable since 1) the fuses are installed in seismically qualified panels, and 2) the panels are physically separated to preclude any damage from propagating to adjacent circuits.

In addition, the Gould Shawmut type TR-R fuses used in the 250V DC MCCs were tested. These fuses were tested for a current interrupting capability at 20,000 amperes and 280V DC, 200% and 900% rated current overload tests at 280V DC, and maximum energy tests. The acceptance criteria was as described above and the test results showed that the 12 ampere and 200 ampere fuses passed all tests. The 35, 40, 50, 60, and 100 ampere fuses passed the current interrupting capability tests and the maximum energy test, but did not pass the 200% and 900% current overload tests at 280V DC. The fuses failed due to a restrike condition (see figure 1) following the initial clearing of the test circuit current. The gap created following the overcurrent condition was not wide enough, and due to the higher voltage, a current carrying spark bridged the gap.

During the detailed review of the fuses, it was identified that an electrical isolation problem existed in the Unit 1 and Unit 2 Division 1 and Division 2 DC distribution systems between Class 1E and non-Class 1E circuits. Additionally, it was identified that some fuses in these circuits with a rating of 150V DC (250V AC) were installed in 250V DC circuits.

Plant Conditions Prior to the Event:

	Unit 1	Unit 2
Operating Mode:	4(Cold Shutdown)	1(Power Operation)
Reactor Power:	0%	100%

Unit 1 and Unit 2 have operated at various power levels and operational conditions since installation of the under-rated fuses which occurred as part of original construction. These conditions existed since issuance of the Unit 1 Low Power Operating License and Unit 2 Fuel Load License which were issued on October 26, 1984 and June 22, 1989, respectively.

Description of the Event:

On June 11, 1990, based on an engineering review of the DC electrical distribution system fuses installed at LGS, station personnel were notified that the Unit 1 and Unit 2 Division 1 DC Class 1E (safety related) electrical distribution systems (EIIS:EJ) did not have adequate electrical isolation capability between Class 1E and non-Class 1E components and contained under-rated DC fuses (EIIS:FU).

The LGS Final Safety Analysis Report (FSAR), Chapter 8, "Electrical Power", Section 8.1.6.1.14, states that the guidance of Regulatory Guide (RG) 1.75, "Physical Independence of Electrical System," Revision 2, 1978, are met and also states that except for specific cases delineated in this FSAR Section, non-Class 1E circuits are isolated from Class 1E circuits by an isolation device and are isolated on a Loss Of Coolant Accident (LOCA) signal. The basis for this is to protect Class 1E loads from potential damage due to the propagation of an electrical fault from non-Class 1E loads during accident conditions. However, in the Class 1E 250V DC Division 1 electrical distribution system Motor Control Center (MCC) (EIIS:MCC) [10D201 (Unit 1) and 20D201 (Unit 2)], two non-Class 1E loads were not adequately electrically isolated from Class 1E loads. These loads consist of the Reactor Core Isolation Cooling (EIIS:BN) (RCIC) Barometric Condensor Vacuum Pump (EIIS:P) and the RCIC Vacuum Tank Condensate Pump. It was later discovered on June 11, 1990 that this same condition existed in the Class 1E 250V DC Division 2 MCC [10D202 (Unit 1) and 20D202 (Unit 2)], where the two non-Class 1E loads consisted of the High Pressure Core Injection (EIIS:BJ) (HPCI) Vacuum Tank Condensate Pump and the HPCI Gland Seal Condensate Vacuum Pump. In the non-Class 1E loads described above, there is only one fuse in each of the positive and negative legs of the DC circuits. These fuses do not qualify as standard isolation devices per RG 1.75 and FSAR section 8.1.6.1.14 does not contain a specific exception for these circuits. Additionally, this configuration was re-evaluated and it was determined that the two fuses did not provide adequate isolation capability. It was determined that these conditions affected the operability of the Division 1 and Division 2 DC electrical distribution systems for both Unit 1 and Unit 2. The associated non-Class 1E circuits were then disconnected from the Class 1E DC bus. This action removed the possibility of non-Class 1E equipment disabling Class 1E equipment. The HPCI and RCIC systems had been analyzed without these loads and both systems are considered operable in this condition.

At 1630 hours on June 11, 1990, the Unit 1 and Unit 2 Division 1 DC electrical distribution systems were declared inoperable. Since the RCIC system loads described above were not needed to maintain RCIC system operability, the electrical disconnects (EIIS:DISC) to these non-Class 1E RCIC system loads on both Units were opened at 1800 hours, isolating the non-Class 1E components from the Class 1E components and restoring operability to the Unit 1 and Unit 2 electrical Division 1 DC systems.

At 1840 hours, the Unit 1 and Unit 2 Division 2 DC electrical distribution systems were also declared inoperable. Similarly, since the HPCI system loads described previously were not needed to maintain HPCI system operability, the Unit 1 and Unit 2 electrical disconnects to these non-Class 1E HPCI system loads on both units were opened at 2045 hours, isolating the non-Class 1E components from the Class 1E components and restoring operability to the Unit 1 and Unit 2 Division 2 DC systems.

This condition has existed since October 26, 1984 and June 22, 1989, the dates of the issuance of the Unit 1 Fuel Load License and Unit 2 Low Power Operating License respectively. The "Action" required by Technical Specifications (TS) Limiting Condition for Operation Sections 3.0.3, and 3.8.2, "DC Sources," with two divisions of the DC electrical distribution system inoperable was not taken in the specified time period. This constitutes a condition prohibited by TS and is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

Upon further investigation, it was determined that Fire Protection Safe Shutdown (SSD) methods '3' (Unit 1) or 'C' (Unit 2) could be affected by fire induced high impedance faults due to under-rated fuses installed in Unit 1 and Unit 2 Division 1 and 2 DC electrical distribution systems. This resulted in no remaining SSD methods for fire areas 45 and 65. Fire areas 67 and 69 still had at least one SSD method available. As described in the Background section of this LER, these under-rated fuses have a potential for a fuse restrike condition caused by high overload currents which could result from fire damage to electrical cabling.

As shown in Figure 1, a fuse restrike condition is such that a current overload condition exists causing a fuse to blow; however, the air gap resistance created is insufficient to isolate current flow. An arc is produced and allows continued overload current flow in the DC circuit. This fault condition can then propagate to the upstream fuse (see Figure 2), causing it to blow and result in a loss of DC power to all loads in the associated division of DC power. The Fire Protection Evaluation Report (FPER) states that at least one

SSD method be available in the event of fire. The FPER evaluates SSD method 'B' (Unit 1) to to be available for the Unit 1 Reactor Building fire area 45 West and SSD method 'C' (Unit 2) to be available for the Unit 2 Reactor Building fire areas 65, 67, and 69. Other SSD methods are available for fire areas 67 and 69. SSD method 'C' (Unit 2) relies on Division 1 DC power and SSD method 'B' (Unit 1) relies on Division 2 DC power for operation and control of SSD equipment. However, on June 13, 1990, at 1440 hours, it was determined that specific Unit 2 DC circuits within the noted fire areas, contained under-rated fuses that are not capable of preventing propagations of fire induced high impedance faults. This condition could result in the loss of Division 1 or 2 DC power, and therefore a loss of SSD methods 'B' (Unit 1) or 'C' (Unit 2) to support SSD of Units 1 and 2, respectively. Later on June 14, it was determined that specific Unit 1 DC circuits within the noted fire area were similarly affected.

This is a failure to maintain in effect the provision of the fire protection program, as described in the FPER and is reportable under License Condition 2.C.3 for both Units 1 and 2. A 24 hour notification was made on June 14, 1990 at 0845 hours in accordance with the requirements of License Condition 2.E for Unit 2. After this notification, the similar condition was identified on Unit 1 which is similarly reportable under License Condition 2.F for Unit 1. These License Conditions also require a thirty-day written report. This report is being submitted to satisfy all of the written reporting requirements stated above.

The investigation also revealed that there were 150V DC (250V AC) rated fuses installed in the 250V DC circuits for the MCC main feeder fuses in Unit 1 and Unit 2. An evaluation concluded that the effect of these under-rated fuses was limited to the high impedance fault situation discussed above. No additional reporting requirements were identified as a result of this under rating condition.

Consequences of the Event:

There were no adverse consequences and no radioactive material was released to the environment as a result of this event. With regard to the improper electrical isolation deficiency, the actual normal operation of Unit 1 and 2 DC electrical distribution systems was unaffected by the lack of proper separation between Class 1E and non-Class 1E components. Actions were also taken to open disconnect switches associated with the Units 1 and 2 RCIC and HPCI non-Class 1E loads thereby preventing any potential adverse impact on the Division 1 and 2 DC electrical distribution systems.

However, operating with under-rated fuses in the DC distribution system may decrease the reliability of the Unit 1 or Unit 2 Division 1 or Division 2 systems by allowing faults at the MCC level or below to propagate through the protective fuses to the batteries or chargers which could cause loss of one DC division. This postulated failure is within the design basis accident analysis which considers the failure of an entire division of DC power. The only events that could be postulated to develop high fuse overload current conditions were two simultaneous motor locked rotor conditions or a high current fire induced high impedance fault in Class 1E DC circuits. These circumstances are considered extremely remote. The actual damage from a high current fire induced high impedance fault would be limited since this type of fault results in rapid cable damage which arrests the fault.

Additionally, it was concluded that the safety function of the fuses (to connect the DC electrical power supply to the associated electrical loads) was not in question. The availability of the DC power system would only be challenged if a fault occurred. When the SSD issue was identified, hourly fire watches were established in the operating Unit 2. With the non-Class 1E loads isolated, the Division 1 and 2 DC systems declared operable and the fire watches established, we concluded that continued operation of Unit 2 was justified. Unit 1 was in cold shutdown when the condition was identified and remained shutdown until the under-rated fuses were replaced.

If a fire had initiated in Unit 1 fire area 45 West or a fire in Unit 2 fire areas 65, 67 East or 69, the loss of a HPCI or RCIC 250V DC MCC could have occurred. This could then result in the loss of Unit 1 or Unit 2 Division 1 or 2 DC Class 1E power, thereby possibly disabling some or all of the analyzed SSD methods available in these areas. However, the actual consequences of these conditions were minimal in that a fire in the Unit 1 or Unit 2 Reactor Building did not occur, and therefore, a SSD of the plant due to a fire was not required.

Fire areas 45 West, 65, and 67 East contain heat and/or smoke detection. In the event of a fire, early detection by the fire detection systems would enable the operators to quickly respond to extinguish the fire before extensive damage could occur to cabling in the area. Fire area 45 West (Control Rod Drive Hydraulic Equipment Room) is provided with an automatic pre-action sprinkler system, a combustible free zone and associated manually initiated water curtain and a manual fire hose station; fire areas 65 and 67 East (Safeguard System Access Areas) are provided with an automatic pre-action sprinkler system and manual fire hose stations. In addition, fire area 67 East contains a combustible free zone and associated manually initiated water curtain. In the event of a fire in fire area 69 (Main Steam Tunnel), which contains no combustible materials, the control room should be alarmed of a potential fire condition via temperature indication provided by the Steam Leak Detection system in this fire area. Main Control Room Operators would then investigate and if notified of a fire dispatch the fire brigade. This fire brigade would utilize manual fire hoses and portable extinguishers located outside the entrances to this fire area. Therefore, if a fire had occurred in one of these areas, fire suppression methods were available and would have prevented the loss of DC power.

Furthermore, plant design, administrative controls and existing procedures ensure that potential fire hazards are kept to a minimum. In fire areas 45 West, 65, 67 East and 69, the primary combustible loading is due to control cables. The safety related cables used at LGS meet the flame test requirements of the IEEE-383 Standard, and therefore, ignition is extremely unlikely in the absence of an external fire source. In addition, administrative controls exist to prohibit storage and limit the amount of combustible liquids permitted in these fire areas. Therefore, it is very unlikely that a fire would spread instantaneously throughout these fire areas.

We consider that the emergency response capability, including the use of the LGS Transient Response Implementation Plan (TRIP) procedures, would provide the operators a success path to safely shutdown the plant in the event that a fire had occurred. The TRIP procedures, derived from the Emergency Procedure Guidelines developed by the Boiling Water Reactor Owners' Group provide distinct symptom-oriented operator guidance in bringing the plant to a cold shutdown condition.

The combination of conditions required to cause faults in the non-Class 1E circuits, loss of Division 1 and 2 DC power and an unmitigated all consuming fire is so highly unrealistic that it is probable that the plant could be safely shutdown. However, using regulatory required design assumptions we recognize that due to the above described conditions, safe shutdown of the plant could not be assured.

Cause of the Event:

The proximate cause of the physical separation deficiency was an error made during the design of the plant. We assumed that a single fuse in each the positive and negative legs would provide adequate electrical isolation between the non-Class 1E and Class 1E circuits.

The proximate cause of the under-rated fuse condition was an error made during the design of the plant. On August 16, 1984, prior to Licensing of Units 1 and 2, NRC IE Information Notice No. 84-65, "Underrated Fuses Which May Adversely Affect Operation of Essential Electrical Equipment," was issued informing nuclear power reactor facilities of a potential generic problem involv ng the use of certain DC fuses which have improper voltage ratings. A subsequent review of the LGS DC electrical distribution systems was performed and a modification was then implemented in 1984 which replaced the existing fuses with DC fuses with higher voltage ratings. However, when the DC fuse ratings were increased to 125V DC and 250 V DC (UL ratings) in 1984, we assumed that the DC fuses had a +10% tolerance. We subsequently discovered in 1990 that UL DC fuse ratings do not provide any tolerance in the positive direction as is normally the case with other electrical component ratings. Therefore, the DC fuses are considered inadequate since the voltage ratings on both 125V DC and 250V DC fuses are less than the DC battery charger float and equalizing voltages of 135V DC and 140V DC, respectively, for the 125V DC system and 270V DC and 280V DC, respectively, for the 250V DC system.

A detailed Root Cause Analysis (RCA) is currently being performed to identify all aspects of the causes of the errors associated with the lack of isolation between Class 1E and non-Class 1E components and the use of under-rated fuses including the installation of the 150V DC fuses in the 250V DC circuit. This RCA is expected to be completed by August 11, 1990. A supplement to this LER will be issued by September 11, 1990, and will include a detailed description of the cause of this event.

Corrective Actions:

On June 11, 1990, the Units 1 and 2 electrical divisions 1 and 2 DC electrical distribution systems were declared inoperable at 1630 and 1840 hours, respectively (Division 1 then Division 2), by operations shift supervision. The disconnects associated with the non-Class 1E RCIC and HPCI system loads located in the Division 1 and Division 2 DC electrical distribution systems were opened to provide adequate separation between Class 1E and non-Class 1E components. The Units 1 and 2 Divisions 1 and 2 DC systems were declared operable by 2140 hours.

Three modifications, 6108-1, 6109-1 and 6108-2, were immediately initiated. The Unit 1 Division 1 DC main fuses and Class 1E 250V DC MCC fuses were replaced on June 15, 1990 and the Unit 1 Division 2 DC fuses were replaced on June 16, 1990 under modification 6108-1. Full implementation of the Unit 1 modification 6108-1 occurred on June 17, 1990 when additional fusing was installed for the non-Class 1E circuits in question. The Unit 2 Divisions 1 and 2 DC fuses were replaced on June 26, 1990 under modification 6108-2. Modification 6109-1 incorporated fuses feeding the loads off the 250V DC MCC and the 125V DC distribution panels. These modifications are complete except for three HPCI system loads for both Units. The failure of these loads in the HPCI system will not result in a loss of Division 2 DC power. Modifications will be completed for both Unit 1 and 2 once parts are received. These modifications replaced or will replace the under-rated fuses in the 125V/250V DC circuits with properly rated fuses capable of meeting the design requirements for voltage and interrupting capability. In addition, the non-Class 1E RCIC and HPCI system circuits were modified by 6108-1 and 6108-2 to ensure proper electrical isolation by installing a second series fuse in both the positive and negative DC circuit legs. An evaluation was performed that concluded this double fusing is an adequate isolation mechanism and the design basis will be revised to reflect this exception.

Also, on June 13, 1990, hourly fire watches were established for the Unit 2 fire areas 65, 67, and 69 to mitigate the occurrence of a fire and maintain SSD capability. These fire watches were maintained while Unit 2 was in operation until the modification for Unit 2 was completed. Unit 1, fire area 45, did not need to be fire watched since Unit 1 was in cold shutdown.

Actions Taken to Prevent Recurrence:

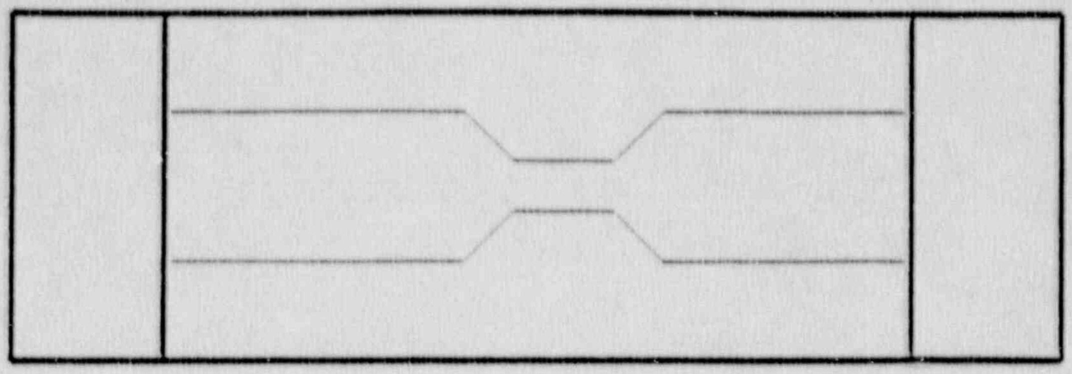
Due to the continuing cause investigation of this event, actions to prevent recurrence will be provided in a supplement to this LER by September 11, 1990.

Previous Similar Occurrences:

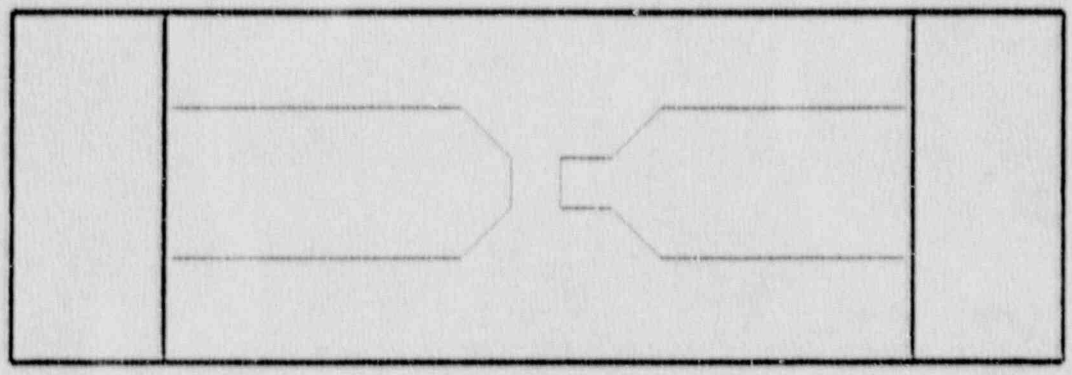
No previous similar occurrences have been identified at this time, however, once the cause investigation is completed, a secondary review will be performed and if similar occurrences are identified, they will be provided in the supplement to this LER.

Tracking Codes: (B) Design Error

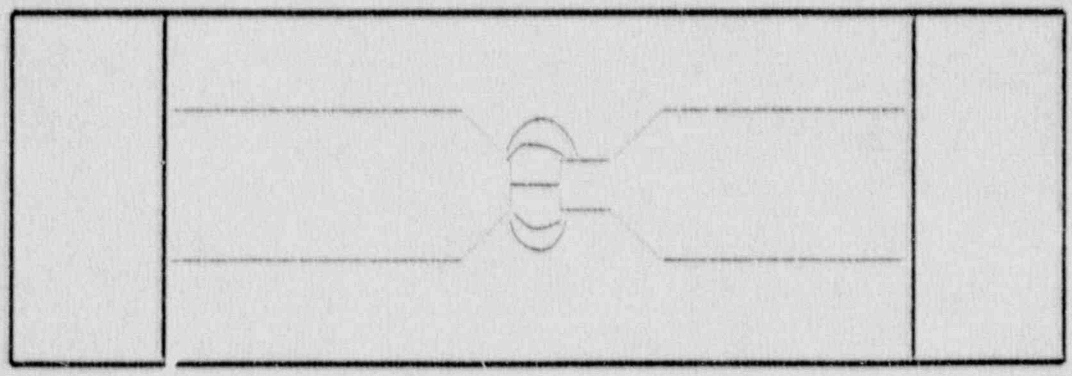
FIGURE 1



INTACT FUSE

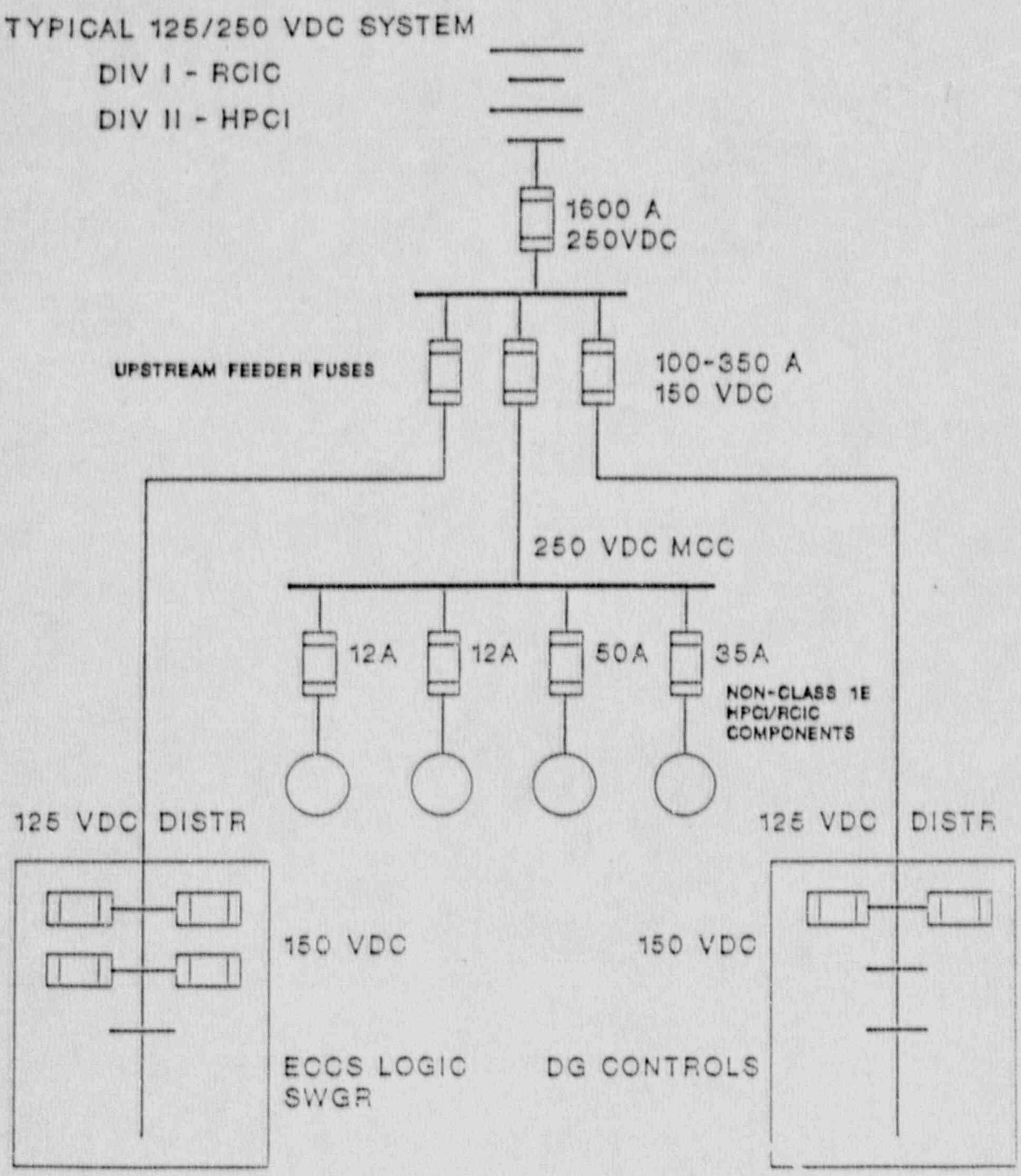


BLOWN FUSE



RE-STRIKE

FIGURE 2


TYPICAL 125/250 VDC SYSTEM
DIV I - RCIC
DIV II - HPCI
1600 A
250VDC
UPSTREAM FEEDER FUSES
100-350 A
150 VDC
250 VDC MCC
12A
12A
50A
35A
NON-CLASS 1E
HPCI/RCIC
COMPONENTS
125 VDC DISTR
125 VDC DISTR
150 VDC
150 VDC
ECCS LOGIC
SWGR
DG CONTROLS

NRC Form 366A
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

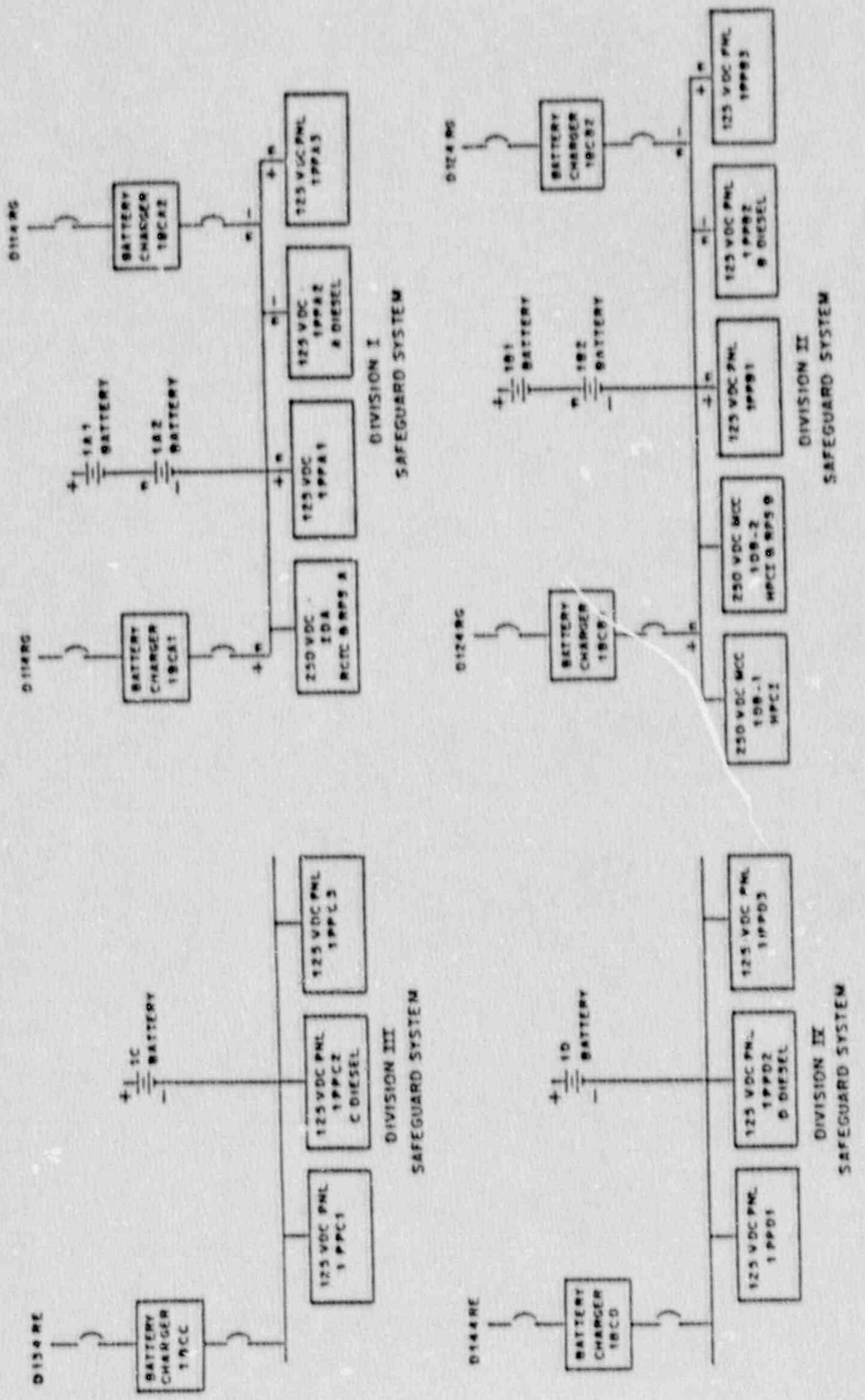
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Limerick Generating Station	0 5 0 0 0 3 5 2	9 0	— 0 1 3	— 0 0	1 3 OF 1 3

TEXT (If more space is required, use additional NRC Form 366A's) (17)

FIGRURE 3



NRC FORM 366A
(9-83)