

James A. FitzPatrick  
Nuclear Power Plant  
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October 19, 1992  
JAFF-92-0730

Harry P. Salmon, Jr.  
Resident Manager

United States Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-137  
Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333  
LICENSEE EVENT REPORT: 92-024-01 - Emergency Diesel  
Generators Declared Inoperative  
Due to Unanalyzed Condition

Dear Sir:

This revision to LER 92-024, dated June 4, 1992, is submitted in  
accordance with 10 CFR 50.73(a)(2)(ii)(A).

Questions concerning this report may be addressed to  
Mr. Paul McGuire at (315) 349-6362.

Very truly yours,

HARRY P. SALMON, JR.

HPS:PJM:tld  
Enclosure

cc: USNRC, Region 1  
USNRC Resident Manager  
INPO Records Center

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ESTIMATE BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P&30), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555 AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) James A. FitzPatrick Nuclear Power Plant										DOCKET NUMBER (2) 0 5 0 0 0 3 3 3				PAGE (3) 1 OF 0 5		
TITLE (4) Emergency Diesel Generators Declared Inoperative Due to Unanalyzed Condition																
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 5	0 6	9 2	9 2	0 2	4	0 1	1 0	1 6	9 2					0 5 0 0 0		
														0 5 0 0 0		
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)														
N		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)		
POWER LEVEL (10)		0 0 0				20.405(a)(1)(i)				50.36(c)(1)				73.71(c)		
		20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(v)				OTHER (Specify in Abstract below and in Text, NRC Form 366a)		
		20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(vii)(A)						
		20.405(a)(1)(iv)				X 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)(ix)						
LICENSEE CONTACT FOR THIS LER (12)																
NAME Paul McGuire, Licensing Engineer										TELEPHONE NUMBER						
										AREA CODE 3 1 5 3 4 9 - 6 3 6 2						
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC						
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 fifteen single spaced typewritten lines) (16)

UPDATE REPORT - Previous Report Dated June 4, 1992

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The plant was shutdown and in the cold condition for maintenance and refuel. As a result of an observed Emergency Diesel Generator [EK] load excursion, an analysis of the Emergency Diesel Generators (EDGs) electrical circuitry was performed and indicated a potential for engine governor offset in the event of a control circuit power supply ground. Testing performed on April 14, 1992 confirmed that introduction of a ground resulted in EDG load and frequency shifts. Testing results were sent to Engineering for review and analysis. Engineering determined that a potential for an unanalyzed condition existed. Engineering notified Plant Management on May 6, 1992 and the Emergency Diesel Generators were declared inoperative. A special EDG load test with grounds on the DC system was conducted to obtain data on the problem. Engineering evaluated the data and developed a modification package. The modification was installed on the EDG system, and post installation pre-operational testing performed. Results of these final tests have been reviewed, and corrective actions for the EDGs have been completed.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

UPDATE REPORT - Previous Report Dated June 4, 1992

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Event Description

During a test of the B & D Emergency Diesel Generators (EDGs) [EK] operating in parallel with offsite power in July of 1990, Control Room Operators observed EDG load excursions which were concurrent with the presence of grounds on the 125VDC station battery bus [EJ]. Instrument & Control (I&C) was contacted to troubleshoot the problem. The ground on the battery bus detected in the control room was traced back to a ground on the actuator for the High Pressure Coolant Injection (HPCI) [BJ] turbine. The ground problem for the HPCI actuator was corrected, and no further diesel generator problems were detected. FitzPatrick uses the station batteries as its DC power supply to supply the EDG governors. The diesel generator response in this configuration revealed that an intermittent ground on the DC bus creates a transient on the EDG governor at the time the ground was introduced or removed (fraction of a second). The self correcting feature of the governor stabilized the transient.

During an evaluation of the electrical circuit, it was found that intermittent grounds on the battery produce EDG governor offsets with the attendant load and frequency offsets. This type of problem would be difficult to detect due to the self-correcting features of the governor. Based on the concern identified by this analysis, a test was developed to provide confirmation of the existence (or non-existence) of the problem.

The results of the test confirmed that frequency or load swings could occur given a ground on the 125 VDC bus. Engineering contacted the manufacturer of the EDG speed controller, Woodward Governor Company, to discuss the problem. Woodward stated that the controller is susceptible to grounds on the DC supply. A ground could cause the DC input voltage to the controller to oscillate. However, Woodward knew of no other industry experience similar to FitzPatrick. Woodward believes that the problem is not related to the controller, but to the DC power supply. Engineering also performed an industry search on this problem, and found no other similar experience.

Based on their review, Engineering notified plant management on May 6, 1992, that this was a potential unanalyzed condition. All EDGs were declared inoperative on May 6, 1992 and the NRC notified per the requirements of 10CFR50.72(b)(2).

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		SEQUENTIAL NUMBER 9 2 — 0 2 4 — 0 1	REVISION NUMBER 0 3 OF 0 5

TEXT (If more space is required, use additional NRC Form 306A's) (17)

The following activities have occurred since the EDGs were declared inoperative:

- 1) A special test was prepared and performed to obtain operating data for the condition when a ground is applied to the EDG speed controller DC power supply.
- 2) Due to the similarities with the EDG, HPCI and Reactor Core Isolation Cooling (RCIC) [BN] speed control systems, a review of the HPCI and RCIC systems was performed to determine if a similar grounding concern should be addressed for these systems.
- 3) Engineering completed their evaluation and developed modification packages for the EDG, RCIC and HPCI systems to correct the problem.
- 4) Modifications were made to the EDG speed control system, and a test performed to verify the effectiveness of the modification.
- 5) Modifications were made to the RCIC and HPCI control systems.

Cause

This condition was caused by a combination of the power supply system design and the type of EG-M (Electro-hydraulic governor) control box currently installed. This central box is susceptible to transients caused by grounds on the 125VDC system. By isolating the power supply, the transients are eliminated.

Analysis

The effect of grounds on the power supply to the EDG control box was not addressed in the system design basis analysis. This constituted an unanalyzed condition and was reported under 10CRF50.73(a)(2)(ii)(A) in Interim LER-92-024 dated June 4, 1992.

Plant operating experience has shown that when a intermittent ground is applied to the positive or negative station battery bus, a transient is induced on the governor speed control system of the Emergency Diesel Generators via the power supply connection to the EDG governor. A special test was performed to verify that this behavior was due to a transient shift in the reference voltage for the EG-M (Electro-hydraulic governor).

LICENSEE EVENT REPORT (LER)  
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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAYMENT WORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

A ground causes a change in the DC voltages between the positive bus, negative bus and station ground. The EG-M speed controller reacts to these ground disturbances causing the actuator to oscillate. The disturbance is transient in nature and lasts for a fraction of a second, as long as the ground is fixed in value. Should the ground vary in magnitude, the generator's output oscillation may become unacceptable and lead to an emergency diesel generator trip.

An EDG load test with grounds on the DC system was performed to obtain baseline information and data to use in identifying an effective solution. Based on the test information and Engineering analysis, modifications were made to install an isolated power supply for the EG-M speed controller units. The EDG system modification installed a DC to DC converter in place of the existing voltage dropping resistor assembly, thereby isolating grounds on the 125VDC system from the EG-M speed controller unit. A post installation test was performed and verified the effectiveness of the modification.

The HPCI and RCIC turbine speed control systems also use an EG-M speed controller to control turbine speed. The HPCI and RCIC EG-Ms get their reference voltage from the station battery bus via a configuration similar to the EDGs. Because of the similarity of the configuration, the HPCI and RCIC control systems were evaluated to determine if grounds on the station battery could have an adverse effect on system operation. Modifications are being made to the HPCI and RCIC EG-M speed control systems to replace the existing voltage dropping resistor assembly with a DC to DC converter.

Corrective Action

The following actions were taken:

1. A special test was performed to determine the operability of the EDGs, and generate data on the effects of grounds on the system.
2. Modifications to the EDGs were completed prior to fuel load. Testing was performed to verify the effectiveness of the modification. Test results have confirmed the effectiveness of the changes.
3. The RCIC and HPCI system modifications were completed prior to startup.



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TEXT (If more space is required, use additional NRC Form 305A's) (17)

Additional Information

Failed Components: None

Previously Similar Events: No previous LERs identified similar to the grounding concern discussed in this LER.

This LER update provides the results of the special test performed to verify the effects of grounds applied to the EDG speed controller power supply, and the corrective action taken to address these concerns.