



**CENTERIOR
ENERGY**

PERRY NUCLEAR POWER PLANT

10 CENTER ROAD
PERRY, OHIO 44081
(216) 259-3737

Mail Address:
PO BOX 97
PERRY, OHIO 44081

Michael D. Lyster
VICE PRESIDENT - NUCLEAR

April 15, 1991
PY-CEI/NRR-1346 L

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

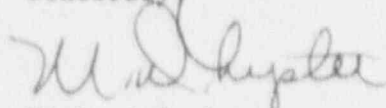
Perry Nuclear Power Plant
Docket No. 50-440
LER 91-009 and Special Report -
Valid Test Failure
Division 2 Diesel Generator

Dear Sir:

Enclosed is Licensee Event Report 91-009 for the Perry Nuclear Power Plant. Submittal of this report also satisfies the conditions of Technical Specification 4.8.1.1.3 and 6.9.2. This Special Report concerns a valid test failure of the Unit 1 Division 2 Diesel Generator.

Please feel free to contact me if you have any questions.

Sincerely,


Michael D. Lyster

MDL:NJL:njc

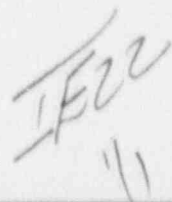
Enclosure: LER 91-009

cc: NRC Project Manager
NRC Resident
NRC Region III
NRC Director, Office of Resource Management

Operating Companies
Cleveland Electric Illuminating
Toledo Edison

9104220302 910415
PDR ADOCK 05000440
S PDR

22605



LICENSEE EVENT REPORT (LER)

ESTIMATED 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-820), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Perry Nuclear Power Plant, Unit 1

DOCKET NUMBER (2)

0500041401 OF 06

PAGE (3)

TITLE (4)

Violation of Technical Specifications and Inoperability of the Division 1 and 2 Diesel Generators Due to Equipment Malfunctions.

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	3	1	4	9	1	9	1	0	0	0	4	1	5	9	1	0	5	0	0	0	1	1
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																						
OPERATING MODE (9)			20.402(b)			20.406(e)			50.73(a)(2)(iv)			73.71(b)										
POWER LEVEL (10)			20.406(a)(1)(i)			50.38(a)(1)			50.73(a)(2)(iv)			73.71(c)										
			20.406(a)(1)(ii)			50.38(a)(2)			50.73(a)(2)(iv)			X OTHER (Specify in Abstract below and in Text NRC Form 396A)										
			20.406(a)(1)(iii)			50.73(a)(2)(ii)			50.73(a)(2)(iv)(i)			TS 4.8.1.1.3 and 6.9.2										
			20.406(a)(1)(iv)			50.73(a)(2)(iii)			50.73(a)(2)(iv)(ii)													
			20.406(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(iv)(iii)													

LICENSEE CONTACT FOR THIS LER (12)

NAME

Henry L. Hegrat, Compliance Engineer, Extension 5185

TELEPHONE NUMBER

AREA CODE

216 259-1317

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
B	DIG	CNT	RX	9/9/9	N				
X	DIG	3/3	W	2/9/0	N				

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

YES (If you complete EXPECTED SUBMISSION DATE)

X NO

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

On March 14, 1991 at 0915, a failure of the Division 2 Diesel Generator (DG) occurred when the field failed to flash during the monthly surveillance operability test. The Division 2 DG was declared inoperable and the other divisional DGs were run within 24 hours to verify operability. During the Division 1 DG test, the governor speed control failed to respond to manual operation in the lower direction, preventing synchronization to the grid. The Division 1 DG was declared inoperable on March 14, 1991 at 1425. Following repairs, the Division 2 DG was declared operable on March 15, 1991 at 0220 and the Division 1 DG was declared operable at 2305.

The root cause of both events was equipment malfunction. The Division 2 DG field contactor K1 failed to close due to a component failure, which occurred at completion of the last successful diesel surveillance run during engine shutdown on February 14, 1991. The Division 1 DG equipment malfunction was isolated to the governor control circuit, which was serviced and tested prior to declaring the DG operable.

To prevent recurrence, design and procedural changes were initiated to enhance the reliability of the field contactor and procedural changes will be made for servicing the governor control circuitry. In addition, the Division 2 DG failed component was returned to the vendor for failure analysis and a notification of the event was provided to the DG Owners Groups (DeLaval and General Motors EMD).

Submittal of this report satisfies the requirements of Technical Specifications 4.8.1.1.3 and 6.9.2.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)			
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER				
Perry Nuclear Power Plant, Unit 1	0500044091	—	009	—	010	02	OF	06

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

I. INTRODUCTION

From February 14, 1991 at 1124 to March 15, 1991 at 0220, the Division 2 Diesel Generator (DG) was rendered inoperable due to an undetectable equipment problem that occurred during shutdown after the previous monthly surveillance test. With the Division 2 DG inoperable, there was no diesel backup power available for Division 2 safety related equipment during this period, in violation of Technical Specification 3.8.1.1 action statement (b), which requires an inoperable DG to be restored to an OPERABLE condition within 72 hours. Otherwise, the reactor is required to be in Operational Condition 3 (HOT SHUTDOWN) within the next 12 hours and in Operational Condition 4 (COLD SHUTDOWN) within the following 24 hours. Additionally, from March 14, 1991 at 1425 to March 15, 1991 at 0220, the Division 1 and Division 2 DGs were both inoperable due to unrelated equipment problems. During the entire time of these events, the plant was in Operational Condition 1 (POWER OPERATION) at normal full power operations, with the Reactor Pressure Vessel [RPV] at saturated conditions at approximately 1040 psig.

II. DESCRIPTION OF EVENT

On March 14, 1991 at 0905, a monthly surveillance test instruction (SVI-R43-T1318) "Diesel Generator Start and Load Division 2" was initiated. The Division 2 Diesel Generator [DG] engine [ENG] started and accelerated to minimum speed (441 RPM) within the specified time; however, the field contactor (K1) failed to close, resulting in no generator output voltage. The Division 2 DG was declared inoperable at 0915 following this valid test and failure. The plant entered Technical Specification 3.8.1.1 action statements (b) and (e), which require among other things, the demonstration of operability of the remaining OPERABLE diesel generators by performing appropriate surveillance requirements separately for each diesel generator within 24 hours.

To accomplish the above mentioned requirements for the Division 1 DG, surveillance test instruction (SVI-R43-T1317) "Diesel Generator Start and Load Division 1" was initiated at 1425. During the operability test, the Division 1 DG engine started, accelerated and achieved rated speed and voltage, but the governor did not respond in the lower direction upon demand from the Control Room, prohibiting manual synchronization to the grid. The DG control was shifted from the Control Room to the local panel with the same result. As a result of the inability to satisfactorily complete the surveillance requirements, the Division 1 DG was declared inoperable at 1425. The plant entered Technical Specification 3.8.1.1 action statement (g), which requires restoration of either Division 1 or 2 DG to an OPERABLE condition within 2 hours or entry into Operational Condition 3 (HOT SHUTDOWN) within the next 12 hours and into Operational Condition 4 (COLD SHUTDOWN) within the following 24 hours. The NRC Operations Center was informed of the inoperability of both Division 1 and 2 DGs via the Emergency Notification System at 1614. The Division 3 DG surveillance test was satisfactorily completed at 2035.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 800 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Perry Nuclear Power Plant, Unit 1	0500044091	009	009	000	03	OF 06

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

It was decided to restore the Division 2 DG first due to the known nature of the Division 2 DG failure and the need to restore at least one of the Standby Diesel Generators in an expedient manner. At the time no field contactor K1 parts were available from warehouse stock. Therefore, it was decided to obtain the required field contactor K1 parts (carrier assembly and tripping coil assembly) from the Division 1 DG and transfer these parts for installation in the Division 2 DG. The carrier assembly and tripping coil assembly were transferred from the Division 1 DG at 1800. Following inspection, installation, functional testing and one successful maintenance run to verify proper latching of field contactor K1, the Division 2 DG surveillance test for operability was successfully completed on March 14, 1991 at 2353. The Division 2 DG was declared operable on March 15, 1991 at 0220. Following extensive troubleshooting including visual inspection, cleaning and exercising all accessible contacts, verification of all terminations, replacement of transferred parts and appropriate maintenance testing, the Division 1 DG surveillance test for operability was successfully completed on March 15, 1991 at 1730. The Division 1 DG was declared operable at 2305.

III. CAUSE ANALYSIS

The root cause of the Division 2 DG failure was a failure of the field contactor K1 (ITE Telemechanique Cat. No. A143G) to close due to a failure of the switching contact to reset. The troubleshooting investigation identified the switching contacts for the K1 close coil on the tripping coil assembly open. Disassembly of the mechanism revealed the contacts lightly welded in the trip position preventing contact reset on contactor trip. This was attributed to excessive play in the pivot point of the latch mechanism allowing the latch arm to twist sideways. The latch arm slid along the tang of the tripping coil assembly preventing a normal smooth contact snap reset. This resulted in an extended (time unknown) energization of the trip coil with subsequent contact arcing (in comparison to normal clearing time). The failed closed trip contact and the resultant open contact in the closure control circuit prevented K1 from closing, thereby constituting a valid failure of the Division 2 DG. During this investigation, it was further determined that the malfunction could have only occurred during the shutdown from the February 14, 1991 surveillance test. Therefore, the Division 2 DG was inoperable from February 14, 1991 at 1124 until March 15, 1991 at 0220; however, there were no indications of the failure which could have led to that discovery until the next attempt to run the engine.

This is a valid test and failure in accordance with Regulatory Guide (R.G.) 1.108 C.2.e.5. This is the first valid failure in the last 100 total valid tests to occur on the Unit 1 Division 2 Diesel Generator. The Division 2 DG failed to achieve specified generator voltage during surveillance testing. The total repair time for the Division 2 DG was 17 hours and 5 minutes. The total out-of-service time for the Division 2 DG was 28 days, 14 hours, and 56 minutes

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED 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-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.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Perry Nuclear Power Plant, Unit 1

0 5 0 0 0 4 4 0 9 1 - 0 0 9 - 0 0 0 4 OF 0 6

TEXT (If more space is required, use additional NRC Form 366A's) (7)

because the failure was determined to have occurred during engine shutdown from the previous monthly surveillance test completed on February 14, 1991 at 1124. The Division 2 Diesel Generator Surveillance Test interval will remain at once every 31 days in accordance with Perry Technical Specification Table 4.8.1.1.2-1.

The root cause of the Division 1 DG surveillance test suspension was equipment malfunction. After the successful engine start, when operators attempted to synchronize the generator with the grid, the manual governor control failed to respond in the lower direction. Extensive troubleshooting was performed on the Division 1 DG governor controls after the engine was shutdown. The lower limit switch on the motor operated potentiometer appeared to be the malfunctioning component. Based on the performance of automatic reset and the lack of manual control in the lower direction from either local or remote locations, the malfunction was isolated to a small portion of the circuit that includes two relays, the governor lower limit switch and associated wiring. Troubleshooting included visual inspection, cleaning and exercising all accessible contacts and limit switches, verification of all terminations, and appropriate maintenance testing. However, the conditions that prevented the governor speed control from functioning during the surveillance test could not be recreated during subsequent troubleshooting. Although no conclusive cause of the Division 1 DG governor speed control malfunction could be identified, it is believed that the conditions causing the event were corrected during these maintenance activities. The tripping coil assembly from the Division 2 DG was serviced and reinstalled on the Division 1 DG along with a new carrier assembly obtained from the salvage warehouse.

Followup investigation determined that the problem with frequency control, which prohibited synchronizing the Division 1 DG with the preferred source and required the DG to be declared inoperable, would not have prevented the DG from assuming loads under accident conditions. Thus in accordance with R.G. 1.108 c.2.e.2, the Division 1 DG test was not considered a valid failure since the DG was fully capable of performing its intended safety function. The Division 1 DG could have provided power promptly to the engineered safety features in the unlikely event a loss of offsite power occurred.

IV. SAFETY ANALYSIS

The Standby Diesel Generator System provides an independent source of AC power to the Division 1, 2 and 3 Class 1E buses in the event of a loss of the redundant offsite power supplies. During the entire event, Class 1E power was available from two physically independent circuits from the transmission network to the onsite electrical distribution system. Additionally, the High Pressure Core Spray System (BG) (HPCS) and its associated diesel generator were verified operable during this event. Upon failure of the synchronizing mechanism, the Division 1 DG could not be determined to be OPERABLE, due to the inability to

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0 9 1	---	0 0 9	---	0 0 0	5 OF 0 6

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

demonstrate loading capabilities per the surveillance test. During this time, however, the Division 1 DG was capable of responding properly to a loss of bus voltage until it was further disabled by the removal of parts to expedite the repairs to the Division 2 DG. The total time was 11 hours and 55 minutes that both Division 1 and 2 DGs were incapable of responding to a loss of power to their respective busses. Therefore, the event is considered safety significant because the loss of Division 1 and 2 backup power supplies results in conditions outside Updated Safety Analysis Report assumptions under certain accident scenarios.

Previous similar events with two or more inoperable divisions of the DG system were identified in LERs 87-009, 89-001, and 90-005. None of these events were caused by failures of the field contactor K1 assembly or the diesel governor mechanisms. Two previous plant events documented in Condition Reports occurred involving the field contactor K1. The first occurrence was due to a sticky latching mechanism resulting from aged grease. This resulted in a valid test failure of the Division 1 DG (reference letter PY-CEI/NRR-1120L dated January 19, 1990). The second event in December, 1990 was due to performance of an inadequate Periodic Test Instruction, resulting in an open closing coil on the Division 1 contactor and the switching contact welded. As part of the corrective actions from this event, the Division 2 contactor was inspected by work order on February 12, 1991 for similar damage and found in satisfactory condition. Subsequent to this inspection activity, proper operation of the Division 2 contactor was verified by independent maintenance and surveillance runs of the diesel generator on February 14, 1991. The failure discovered on March 14, 1991 on the Division 2 DG is, therefore, considered to be an isolated instance due to the cause for malfunction.

VI. CORRECTIVE ACTIONS

Corrective actions previously identified and implemented would not be expected to have prevented this event from occurring.

The following corrective actions were or will be completed to prevent recurrence:

1. The Division 2 DG carrier assembly was sent to the vendor (Basler Electric) for failure analysis. Conclusions and recommendations as a result of the failure analysis will be evaluated by the responsible system engineer in conjunction with the DG engineering support group. Appropriate corrective action(s) will be implemented as necessary.
2. Notification of this event was provided to the DG Owners Groups (DeLaval and General Motors EMD) on April 4, 1991.

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-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0 9 1	—	0 0 9	—	0 0 0	6 OF 6

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

3. Implement design changes (DCP 91-0086 and 91-0086A) to enhance the reliability of the field contactor (K1) by monitoring critical component position and addition of an electrical seal-in feature. This design change should prevent undetectable failures of the field breaker K1 causing the diesel generator to be inoperable. These design changes were already implemented on the Division 1 DG.
4. Revise Periodic Maintenance Instruction "Diesel Panel Maintenance" to incorporate specific inspection criteria and service requirements for both Division 1 and 2 field contactor K1.
5. Revise Instrument Maintenance Instruction "Diesel Generator General Maintenance" to incorporate specific inspection and service requirements for both Division 1 and 2 governor control circuitry.

This submittal satisfies the requirements of Technical Specifications 4.8.1.1.3 and 6.9.2.

Energy Industry Information System Codes are identified in the text as [XX].