

LICENSEE EVENT REPORT (LER)

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TITLE (4) **Technical Specification Violation Due to Inadequate Surveillance Testing Due to Incomplete Surveillance Test Procedure Overlap**

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)			
MON	DAY	YR	YR	SEQUENTIAL NUMBER	REVISION NUMBER	MON	DAY	YR	FACILITY NAMES		DOCKET NUMBER (9)		
9	28	95	95	- 0 0 7 -	0 0	10	27	95			0	5	
											0	5	

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)	
POWER LEVEL (10) 0 9 6	<input checked="" type="checkbox"/> 10 CFR 10CFR50.73(a)(2)(i)(B) <input type="checkbox"/> OTHER _____ (Specify in Abstract below and in text, NRC Form 366A)	

LICENSEE CONTACT FOR THIS LER (12) Ken Riches - Compliance Engineer	TELEPHONE NUMBER AREA CODE: 313 NUMBER: 586-5529
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		

SUPPLEMENTAL REPORT EXPECTED (14)	EXPECTED SUBMISSION DATE (15)	MONTH DAY YEAR
[] YES (If yes, complete EXPECTED SUBMISSION DATE) [X] NO		

ABSTRACT (16)

On September 28, 1995, at 1700 EST, Detroit Edison determined that surveillance testing for certain portions of the emergency diesel generator (EDG) output breaker and 480-volt motor control center (MCC) load sequencer logic circuitry was inadequate.

This event was caused by procedural deficiency: not all attributes of the associated logic were fully verified by the test procedure. During the surveillance testing the appropriate components were placed in the position required to test the desired function, and the tests were completed in the prescribed manner. The surveillance testing overlap review identified several parallel logic paths that could hypothetically result in a false satisfactory test of the contact function assuming that contact failures masked otherwise successful surveillance testing. This problem was discovered by an effort conducted as a result of a reportable condition discussed in LER 94-003 (Reference 2).

The NRC granted enforcement discretion allowing Detroit Edison to complete this testing prior to startup from the next plant outage. Detroit Edison will evaluate whether performing any of the testing on-line is consistent with prudent risk management. The appropriate surveillance test procedures will be revised to include positive verification that the EDG output breaker re-close permissive logic circuitry is initiated via the load shed feature. Existing procedures will be revised, or new procedures will be developed, to ensure positive verification that after the EDG starts, the 480-volt MCC automatically connected loads are energized through the load sequencer.

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Initial Plant Condition:

Operational Condition: 1 (Power Operation)
 Reactor Power: 96 Percent
 Reactor Pressure: 1020 psig
 Reactor Temperature: 540 degrees Fahrenheit

Description of the Event:

Electrical surveillance overlap drawings were created as a result of Licensee Event Report (LER) 94-003, "Inadequate Logic Functional Test" (Reference 2). An independent review was performed in conjunction with the development of these overlap drawings. This review identified concerns of contact ambiguity for certain portions of the emergency diesel generator (EDG) [EK][DG] output breaker [EB][BKR][52] and 480-volt emergency bus [ED][BU] load sequencer [ED][34] surveillance tests. These concerns were reviewed and found to be valid by Fermi 2 engineering personnel on September 28, 1995. The review determined that contacts [EJ][69] in parallel with the contacts intended to be functionally tested are not verified to be open. Failure to verify parallel contacts can result in a false satisfactory test of the contact function, from hypothetical contact failures, masking otherwise successful surveillance testing. This situation was discovered as a direct result of the effort to improve documentation and verify adequacy of required electrical system surveillance testing.

As described in Reference 4, the affected contacts fall into two general categories, the EDG output breaker re-closure circuitry that is initiated following a load shed, and the 480-volt motor control center (MCC) [ED][MCC] load sequencer control relay contacts. Failure to provide positive verification that the proper logic path energized the relay coils [RLY][CL] resulted in the EDGs being inoperable in accordance with Technical Specification (TS) 3.8.1.1. TS 3.8.1.1 requires two separate and independent onsite A.C. electrical power sources [EK], Division I and Division II, each consisting of two EDGs. TS 3.8.1.1, Action d, requires that with both of the required onsite A.C. electrical power divisions inoperable, restore at least one of the above required inoperable divisions to operable status within 2 hours or be in at least hot shutdown within the next 12 hours and cold shutdown within the following 24 hours. TS 4.0.3 allows the action requirements to be delayed for up to 24 hours for action requirements that are less than 24 hours. On September 28, 1995, at 1700 EST, all four EDGs were declared inoperable due to missed TS surveillance requirements due to incomplete control switch [ED][HCO] and relay contact position verification during surveillance testing.

Detroit Edison evaluated the condition and concluded that the potentially untested portions of the logic circuitry did not, and would not, prevent the surveillance testing which has been performed from demonstrating that the EDGs are functional. Detroit Edison determined that the EDGs would perform their safety functions if needed, and that there was no potential adverse impact on the public health and safety. Therefore, Detroit Edison requested enforcement discretion. The enforcement discretion request was submitted to obtain deferral from limited aspects of surveillance requirements which had not been adequately completed. The enforcement discretion would allow testing to be completed for the affected components in an orderly manner. The enforcement discretion was requested to begin at 1700 hours on September 29, 1995, and to remain in effect until an emergency TS change is approved.

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The NRC granted the enforcement discretion request at 1635 hours on September 29, 1995. The NRC approved the emergency TS change on October 13, 1995.

Cause of the Event:

This event is attributable to procedural deficiency. For the two conditions described above, procedural steps placed the appropriate components in the position required to test the desired function, and the surveillance tests were completed in the prescribed manner. Procedures did not, however, contain adequate verification steps to determine that all individual contacts within the logic worked as intended. Failure to verify parallel contacts can result in a false satisfactory test of the contact function, from hypothetical contact failures, masking otherwise successful surveillance testing.

Analysis of the Event:

4160-volt emergency busses [EK][BU] are equipped with undervoltage relaying [EK][27]. This relaying will initiate a load shed sequence to remove pre-determined electrical loads from the associated busses. The same relaying will automatically initiate an EDG start. Once started, the EDG output breaker will close. An automatic sequencer then controls the rate of loading on the busses connected to the EDG to prevent an EDG overload. Otherwise, the combined starting currents of all the components powered by that bus starting concurrently could cause the EDG to overload.

The logic associated with the undervoltage relaying, the loads and logic associated with the loss of offsite power, and the EDG start logic were all tested during the last refueling outage that ended in December, 1994.

For the testing deficiencies associated with the EDG output breaker logic, the function of the inadequately tested contact is not needed (function bypassed) when the breaker control switch is in the "open" position, the normal plant operations state. Further, any hypothetical failure of the subject contacts could have gone undetected during the surveillance testing only if a parallel contact in the breaker control switch or the anti-pumping relay [EK][69][RLY] had failed closed. If this had occurred, the output breaker would still function as needed because the anti-pumping relay would reset via the failed closed parallel contact(s) and provide the required breaker closing coil permissive logic.

Anti-pumping is a feature of an electrically operated circuit breaker whereby repeated closing and tripping, pumping, is prevented after a breaker closure signal is initiated. For Fermi 2 circuit breakers, a shunt contact [EJ][52][3] is connected across the anti-pumping relay coil. The shunt contact closes whenever the circuit breaker closes, thereby shorting past the relay coil causing the relay to drop out. This scenario prevents the breaker from attempting to reclose until the shunt contact opens when the breaker opens, and the anti-pumping relay energizes. Therefore, in the hypothetical event that either the anti-pumping seal-in contact or the control switch "open" contact welded in the closed position (i.e., situation necessary for the undervoltage load shed contact function to have been masked), there is no adverse impact on the operation of the EDG output breaker since the anti-pumping relay coil shunt contact configuration is unaffected by this situation.

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For the inadequately tested load sequencer contacts, any hypothetical failure of the subject contacts could have gone undetected during the surveillance testing only if a parallel contact from an associated control switch or control relay had failed closed and had not been detected. If this failure had occurred, the associated load would still function as needed. The logic would be completed via the failed closed parallel contact(s) and the automatically connected 480-volt MCC loads would load onto the bus when the EDG breaker closes. In addition, since the surveillance testing did verify that the EDGs were able to respond adequately to the connection of all loads, any failure which had not been detected during previous testing has had no impact on the function of the EDGs. If, in the worst case, one of the contacts parallel with the load sequencer was welded closed, the associated load would operate as needed to perform its safety function. The only consequence of a parallel contact welded closed would be that the associated 480-volt load would be immediately connected to the EDG upon closing of the EDG output breaker, instead of being sequenced on after the EDG output breaker closes.

The enforcement discretion request (Reference 4) described a worst case, highly improbable scenario, represented by concurrent failure of all of the incompletely tested contacts. For the worst case EDG, this would result in approximately 185 hp of additional load being immediately connected to an EDG when the EDG output breaker closes. Engineering evaluations determined that the EDGs are capable of accepting the simultaneous connection of all of the additional loads coincident with the emergency loads when the EDG output breaker closes. This evaluation is based, in part, on pre-operational testing when a core spray pump [BM][P] and a residual heat removal pump [BO][P] were simultaneously loaded onto the EDG (approximately 800 hp, at the 4160-volt bus level, above the 2,000 hp normal initial loading). The engineering evaluation also addressed the effects to individual connected loads as a result of adding the additional block loading at the time the EDG output breaker is closed. The evaluation determined that plant equipment would not be adversely affected by the additional voltage drop and recovery time. The resulting short term change in voltage drop will not damage the individual components, motor operated valves [MO][V] and continuous duty motors, that start when the EDG output breaker closes, and the terminal voltage and overall voltage recovery time are acceptable. The results of these evaluations indicate that all individual loads connected to the EDGs would perform their required safety function in the required time with no adverse affects or consequences.

As described in Reference 4, as part of the investigation into the consequences of the potential incomplete control switch and contact position verification during surveillance testing, a problem and failure history search was performed for the components integral to the EDG load shed and load sequencing logic. The results of this investigation determined that given the relatively large population of these components, as well as the number of operations they have been subjected to, the overall failure rate involving welded contacts is very low.

Based on successful operation of the EDGs during the last refueling outage and the monthly surveillance testing, and the industry and Fermi 2 history of high reliability for the associated control switches and contacts, Detroit Edison is confident that the EDGs are fully functional as tested.

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Furthermore, as described in Reference 5, Detroit Edison has concluded that the proposed emergency TS change for this condition does not involve a significant hazards consideration and does not involve an unreviewed safety question as defined in 10 CFR50.59.

Therefore, the health and safety of the public were not adversely affected by this event.

Corrective Action(s):

A. Immediate Corrective Actions

On September 29, 1995, Detroit Edison requested discretionary enforcement (Reference 3) to obtain deferral from limited aspects of surveillance requirements which may not have been adequately completed so that surveillance testing can be completed for the affected components in an orderly manner. The request was subsequently revised in Reference 4. The enforcement discretion was requested until an emergency TS change is approved. The NRC has approved both the enforcement discretion and the emergency TS change.

On October 2, 1995, Detroit Edison requested (Reference 5) TS sections 4.3.3.2, 4.8.1.1.2.e.4.b, and 4.8.1.1.2.e.6.b be amended to defer a portion of the logic system functional test surveillance requirements related to EDG output breaker re-closure circuitry that is initiated following a load shed, and to defer portions of the emergency 480-volt MCC load sequencer control relay contacts surveillance testing requirements until the next plant outage.

As described in Reference 5, Detroit Edison will complete the remainder of the testing necessary to satisfy surveillance requirements prior to startup from the next plant outage. Detroit Edison will evaluate whether performing any of the testing on-line is consistent with prudent risk management.

B. Corrective Actions to Prevent Recurrence

1. The appropriate surveillance test procedures associated with logic system functional testing for each of the 4160-volt emergency busses and undervoltage circuits will be revised to include positive verification that the EDG output breaker re-close permissive logic circuitry is initiated via the load shed feature.
2. Existing procedures will be revised, or new procedures will be developed, to ensure positive verification that after the EDG starts, the 480-volt MCC automatically connected loads are energized through the load sequencer.

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Additional Information

A. Failed Components

None.

B. Previous LERs on Similar Problems

LER 94-003-03, dated March 17, 1995 (Reference 2), described conditions where inadequate testing was identified. The cause of the conditions was attributed to procedural deficiencies. Corrective actions included revising the deficient procedures and performing the surveillances, reviewing similar surveillances, creating electrical overlap drawings, and conducting training for procedure authors and technical reviewers. In addition, programmatic changes were made to ensure continued TS compliance. The investigations and commitments made in LER 94-003-003 directly led to the discovery of conditions described in this LER (95-007). There are no changes to the investigations and commitments described in LER 94-003-03, as modified by the Detroit Edison follow-up letter NRC-95-0086, dated September 15, 1995.