

Fermi 2  
6400 North Dixie Hwy., Newport, Michigan 48166  
Tel: 313.586.5201 Fax: 313.586.4172

**Detroit Edison**



April 28, 2000  
NRC-00-0032

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington D C 20555-0001

- References:
- 1) Fermi 2  
NRC Docket No. 50-341  
NRC License No. NPF-43
  - 2) Enrico Fermi, Unit 2 Operational Safety Inspection (NRC  
Inspection Report 50-341/96-201) dated November 12, 1996
  - 3) Licensee Event Report 97-008, Detroit Edison  
Letter NRC-97-0053, "Potential Common Mode  
Failure Mechanism for 480-Volt Motor Control  
Center Disconnect Switches Due to Not Being Fully  
Latched Due to Inadequate Maintenance,"  
dated May 12, 1997
  - 4) Notice of Violation and Proposed Imposition of  
Civil Penalty-\$50,000 (EA 97-201), dated September 23, 1997
  - 5) Detroit Edison Letter to NRC, NRC-97-0097,  
"Reply to a Notice of Violation (EA 97-201),"  
dated October 23, 1997
  - 6) NRC Inspection Report 50-341/99002 (DRS), dated March 8, 1999
  - 7) Detroit Edison Letter to NRC, NRC-99-0012, "Notification of  
Changes to Commitments Identified by Detroit Edison Letters  
NRC-97-0097 and NRC-97-0053," dated March 12, 1999

8) Fermi Inspection Report 50-341/2000001(DRP), dated March 23, 2000

Subject: Notification of Changes to Commitments Related to Motor Control Center Disconnect Switch Replacement and Preventive Maintenance

The purpose of this letter is to notify the NRC regarding changes to previous commitments related to Motor Control Center (MCC) disconnect switch replacement schedule and preventive maintenance frequency. These commitments were made in response to longstanding issues with MCC disconnect switches which surfaced in 1997. There were several occurrences where these switches opened unexpectedly because they were not fully latched. The lack of adequate preventive maintenance contributed to the difficulties in assuring that the switches were fully latched when closed. Once fully latched, these switches do not unexpectedly open. The genesis of this issue, and related commitments made by Detroit Edison are documented in References 3, 4, 5, and 7.

By References 3, 5, and 7, Detroit Edison committed to performance of preventive maintenance (cleaning and lubrication) at a frequency of at least once per 670 days. Additionally, Detroit Edison committed to replace the remaining safety related MCC positions with a new type of disconnect switch by the end of the Eighth Refueling Outage (RFO8) scheduled for the autumn of 2001. Fulfillment of these commitments has and continues to necessitate routine work on energized equipment. Over 90% of Detroit Edison's work on energized equipment results from these activities.

Recently, Detroit Edison has extensively reviewed our electrical safety practices as result of a continuing unacceptable frequency of electrical safety incidents. This trend has also been evident to the NRC Resident Inspectors. Fermi 2 Inspection Report 50-341/2000001 (Reference 8) documents a recent event where an electrician received a minor burn while performing maintenance on a non-safety related security battery. Although the equipment was non-safety related, the inspectors were concerned because corrective actions from a 1998 event, where an electrician was severely injured (while performing preventive maintenance on an energized MCC position), were not fully implemented or completely effective in addressing electrical safety issues.

Detroit Edison sought outside assistance to review electrical safety practices at Fermi 2. Detroit Edison contracted Duke Engineering Services to perform an independent review of electrical safety practices at Fermi 2. In addition, Detroit Edison contracted with Dorian Conger, of Conger & Elsea, to assist in the performance of a root cause review for three recent electrical safety incidents. These reviews indicate that Fermi 2 is an outlier with respect to the rest of the industry from the standpoint

of the amount of work conducted on energized electrical equipment. In view of these assessments of electrical safety practices at Fermi 2, Detroit Edison recently has strengthened policies at Fermi 2 regarding work on energized equipment. These policy changes require greater scrutiny and higher levels of management approval, making work on energized equipment even more of an exception than it was previously. This will further advance a culture where personnel and equipment safety is the priority that will not be compromised by schedule considerations. In this regard, implementation of this policy required re-examination of the MCC disconnect switch related commitments, recognizing that fulfillment of these commitments account for in excess of 90% of electrical work on energized equipment performed at Fermi 2.

Detroit Edison has reviewed the past issues associated with the MCC disconnect switches. Detroit Edison no longer believes that it is necessary to perform MCC disconnect switch preventive maintenance activities at a committed frequency. Nor is it necessary to replace the remaining safety related rotary disconnect switches on a committed schedule. The purpose of this letter is to retract prior scheduled commitments related to the ITE rotary disconnect switch issue. Detroit Edison believes that program improvements instituted since 1997 are adequate to prevent recurrence of this issue. Detroit Edison's basis for this conclusion is discussed below.

In the spring of 1997, an ITE rotary disconnect switch unexpectedly opened and the mechanism was binding when attempts were made to reclose it. A review of this event determined that there were other similar events (four in total were identified over the preceding five years). The unexpected opening of the disconnect switches was determined to be caused by the switch not being in the fully toggled or mechanically latched position. The switches are seismically qualified only in either the closed and latched position, or the full open position. Otherwise, the switches may unexpectedly change position if mechanically disturbed. It was believed that the underlying cause of the switches not being fully toggled or mechanically latched in the closed position was attributed to binding of the toggle mechanism due to lubricant failure and dust in the mechanism. This was determined to result from inadequate preventive maintenance.

Immediate actions were taken to clean, lubricate and exercise the entire population of rotary disconnect switches prior to restart from the then, ongoing forced outage. (Disconnect switches in spare positions were excluded from the population). In addition, procedures were developed and implemented and operator training was conducted to ensure that operations personnel could recognize when a switch was latched in the closed position, and identify switches that exhibit abnormal behavior. In the event that a switch exhibited abnormal behavior, or would not latch, the procedure directs initiation of a corrective action document. The corrective action

document results in generation of appropriate work requests and provides information for trending of switch performance.

The effectiveness of the preventive maintenance (i.e., clean, lubricate, exercise) was validated by an independent testing laboratory, Farwell & Hendricks. In addition, Farwell & Hendricks conducted an accelerated aging test to define a lower bound on the preventive maintenance interval. A 24 hour accelerated aging test was conducted, which established a minimum preventive maintenance interval of 679 days for bounding in plant, installed, disconnect switch configuration and operating conditions. An Arrhenius relationship was used to correlate the accelerated aging duration to plant operating conditions. A conservative generic value for the activation energy was assumed, since a specific value for the silicone lubricant used in the preventive maintenance was not identified from the literature. Silicone lubricants are chemically very stable and a less conservative, higher activation energy for degradation mechanisms for silicone lubricants could be justified. Since the accelerated aging was not conducted to failure, an upper bound on the preventive maintenance interval was not established. As a result, it is likely that this lower bound for the preventive maintenance interval (670 days) to which Detroit Edison originally committed by References 3, 5, and 7, is conservative.

This conclusion is born out by Detroit Edison's experience since April, 1997, when the issue was first identified. There have been no failures where a disconnect switch opened unexpectedly. Since that time, there have been over 2500 disconnect switch operations. There have been three failures where a disconnect switch exhibited abnormal behavior or would not latch. These failures were detected by operations personnel based on training and procedural requirements to verify correct switch operation. As explained in Reference 7, preventive maintenance was not conducted within the 670 day interval since April, 1997, for disconnect switches in 936 MCC positions (180 Safety-Related and 756 Balance of Plant). Therefore, not performing the preventive maintenance since the initial baseline in April, 1997, has had no effect on disconnect switch performance from the standpoint of unexpected opening.

It is also noteworthy, that performance of the PM alone does not prevent unexpected opening of the disconnect switches. Only verification that a switch is latched when it is closed can prevent unexpected opening. Of the three disconnect switch failures to latch which have occurred since April, 1997, one had preventive maintenance conducted within the 670 day interval. The other two were identified during performance of the preventive maintenance. In all cases, the switch failures to latch were discovered by the enhanced training and procedures for ensuring latching. These failures were not prevented by performance of the preventive maintenance. This is not to say that preventive maintenance is not important, but it needs to be managed on a frequency that supports personnel safety and maintains adequate reliability, considering other measures in place that effectively prevent the event of

concern, the unexpected opening of disconnect switches. Detroit Edison's experience since April, 1997 validate this approach.

In 1997, the disconnect switch issue was the subject of escalated enforcement. A Severity Level III violation and \$50,000 civil penalty (References 4 and 5) were assessed for failure to take corrective action to prevent recurrence from prior occurrences. A second Severity Level IV violation for failing to take corrective actions to prevent recurrence for an unrelated issue was also identified in Reference 4. At that time, Fermi 2 lacked a strong corrective action program as discussed in NRC Report 50-341/96201, Reference 2. These two violations were further examples of concerns with the effectiveness of the corrective action program. As a result there was little confidence in the corrective action program to be able to identify trends as had been seen in disconnect switch performance, and institute corrective actions to prevent recurrence. However, actions were already in progress to improve the effectiveness of the corrective action program, and the current Condition Assessment and Resolution Document (CARD) process was introduced in the Autumn of 1997. As documented in NRC Inspection Report 50-341/99002 (Reference 6), the CARD process was considered strong, effective and well implemented. Thus, any adverse trend in disconnect switch performance resulting from changes in preventive maintenance would be expected to be identified through the CARD process and with appropriate corrective actions resulting. Procedures in place explicitly address initiation of CARDS for disconnect switches that do not fully latch or exhibit abnormal behavior. No adverse trend has been identified since corrective actions to address disconnect switch issues were implemented in 1997.

In addition to the preventive maintenance commitments discussed above, Detroit Edison was committed to replacement (References 5 and 7) of the ITE rotary disconnect switches in safety related MCC positions with switches of a different design by the end of RFO8. To date, switches have been replaced in approximately 190 of 320 safety related MCC positions. Replacement of the switches obviates the need for cleaning and lubrication, and verification of latching. However, as discussed above, verification of positive latching is sufficient alone to prevent recurrence of unexpected disconnect switch opening. As such, barring the development of an adverse trend in disconnect switch performance which would be detected by the corrective action program, the schedule for further replacements becomes a management decision, independent of an otherwise arbitrary commitment date.

In summary Detroit Edison is revising its commitments related to resolution of MCC disconnect switch issues discussed in References 3, 5, and 7. Detroit Edison is no longer committed to performance of preventive maintenance (cleaning, lubrication and exercising) for disconnect switches at intervals not exceeding 670 days. Rather preventive maintenance intervals will be determined consistent with Detroit Edison's preventive maintenance program with intervals established on the basis of equipment

performance and sound engineering judgment. Further, Detroit Edison is no longer committed to replacement of the remaining rotary disconnect switches installed in safety related MCC positions by the end of RFO8. Procedural requirements and associated training governing verification of latching, recognition of abnormal switch behavior, and documentation in the corrective action program, remain in effect and are unaltered by this letter. These actions are fully implemented and sufficient to prevent recurrence of unexpected opening of rotary disconnect switches. Therefore, all actions necessary to address this issue have been completed.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson, Director, Nuclear Licensing at (734) 586-4258.

Sincerely,

A handwritten signature in black ink, appearing to read "N. Peterson", written over the word "Sincerely,".

cc: J. Dyer  
A. J. Kugler  
M. Ring  
NRC Resident Office  
Regional Administrator, Region III  
Supervisor, Electric Operators,  
Michigan Public Service Commission