



Northern States Power Company

Monticello Nuclear Generating Plant
2807 West Hwy 75
Monticello, Minnesota 55362-9637

April 4, 1996

10 CFR Part 50, Section 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22
LER 96-002

Emergency Diesel Generator Operability Concerns Due to
Missing Fastener in Voltage Regulator

The Licensee Event Report for this occurrence is attached. This report contains no new NRC commitments.

Please contact Tom Parker at (612) 295-1014 if you require further information.

William J Hill
Plant Manager
Monticello Nuclear Generating Plant

c: Regional Administrator - III NRC; Sr Resident Inspector, NRC; NRR Project
Manager, NRC; State of Minnesota, Attn: Kris Sanda
Attachment

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NRC FORM 366 (5-82)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95																																																
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="font-size: small; margin: 5px 0;">(See reverse for required number of digits/characters for each block)</p>		ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST, 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.																																																
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NAME Tom Parker															TELEPHONE NUMBER (Include Area Code) 612-295-1014																																			
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ABSTRACT LIMIT TO 1400 SPACES, I.E., APPROXIMATELY 15 SINGLE-SPACED TYPEWRITTEN LINES) (16)
 NCR FORM 366 (5-81)

While at 83% power on March 8, 1996, system engineers found a wire in the No. 12 Emergency Diesel Generator voltage regulator not properly secured. The wire provides the electrical connection between a potential transformer and a rectifier in the voltage regulator. A qualified fastener was promptly installed and No. 12 Emergency Diesel Generator was successfully tested. The unaffected redundant emergency diesel generator (No. 11) was also successfully tested.

The investigation could find no cause for the missing fastener. This condition could have potentially affected the emergency diesel generator operation during a seismic event. The electrical connections in this panel are periodically inspected. These procedures will be revised to provide more specific inspection guidance.

NRC FORM 366A (5-92)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95			
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				<small>ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.</small>			
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Description

While at 83% power on March 8, 1996, system engineers found a wire in the No. 12 Emergency Diesel Generator (EIS System Code: EK) voltage regulator (EIS Component Code: EC) not properly secured. The wire provides the electrical connection between a potential transformer and a rectifier in the voltage regulator (see attached figure). The wire was promptly secured and the emergency diesel generator (No. 12) was successfully tested. The unaffected redundant emergency diesel generator (No. 11) was also successfully tested.

The wire had a lug on it and the rectifier terminal connection is a metal tab with a hole for the bolt to penetrate. No bolt or nut was present at the connection. The wire was found with the lug in contact with the rectifier terminal and held against the terminal by spring tension in the wire. However, continuous contact between the lug and the terminal during a seismic event could not be assured.

The voltage regulator is located inside an electrical panel in the emergency diesel generator room. Marks on the component lug indicated that the wire had been attached with a fastener at one time. A search for the missing fastener was unsuccessful.

Cause

The cause of the missing fastener is not known. The following possibilities were considered: 1) the bolt and nut were missing when the voltage regulator panel was delivered to the plant, 2) the nut and bolt vibrated loose after installation, and 3) the bolt and nut were removed by plant personnel and were not replaced. The personnel involved were interviewed; past electrical connection inspections were reviewed; a search of work packages was performed and no cause could be identified.

This cabinet has been inspected many times over the 25 year plant life. Electrical connections in this cabinet were formally inspected during the last two outages. The electrician performing the most recent inspection (approximately 18 months ago) was interviewed and, although the electrician could not remember the specific component, the inspection process used was comprehensive and properly performed. It could not

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be determined if the bolt and nut were installed when the equipment was delivered to the plant 25 years ago.

The nut and bolt could have vibrated loose. The cabinet, however, has very little vibration as it is mounted to the floor, well braced and not located on the diesel generator skid.

The fastener could have been removed in accordance with: 1) the jumper/lifted wire process, 2) the maintenance or modification process, 3) an equipment isolation, 4) a deliberate act to lift the wire or an error. The system engineer and operations personnel know of no reasons to lift this wire for testing. No maintenance or modifications were done on the voltage regulator since the 1994 refueling outage¹. No wires are lifted to isolate this equipment. This is an unlikely sabotage event as this missing fastener, by itself, did not affect the safety of the plant. In addition, this area is controlled by a card reader and all personnel on site are screened or escorted. Someone could have removed the bolt in error, realized their error and forgot to re-install the bolt. No evidence was found to support this possibility.

There is no evidence to support one of these possible causes over another.

Analysis of Reportability

This report is being made in accordance with 10 CFR Part 50, Section 50.73 since the plant could have been outside the plant design basis (50.73(a)(2)(ii)(B)). This section requires reporting of "... a condition that was outside the design basis of the plant;"

Principal Design Criteria 1.2.6 and 1.2.11 (see Monticello's Updated Safety Analysis Report, Section 1.2) require the emergency diesel generator's design to take into account the design basis earthquake. In the as found condition, the loose wire cannot be assured to have remained in contact with its terminal during a seismic event. Therefore, the operability of No. 12 Emergency Diesel Generator could not be assured during a design basis earthquake.

¹ Since the establishment of the Emergency Diesel Generator Reliability Program in 1990, no voltage regulator problems have been observed on No. 12 Emergency Diesel Generator during refueling or monthly testing.

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No. 11 Emergency Diesel Generator did not have a similar problem. However, during periods when the No. 11 Emergency Diesel Generator was removed for service, No. 12 Emergency Diesel Generator could not be guaranteed to have been operable during a seismic event.

Safety Significance

This event was not safety significant.

Engineering personnel have concluded that the No. 12 Emergency Diesel Generator was operable, assuming no seismic event occurred. The contact between the wire lug and the terminal connection and the low current normally passing through the connection, indicate that the No. 12 Emergency Diesel Generator was operable in the as found condition, except for seismic events.

The only time operability of the No. 12 Emergency Diesel Generator would have been in question, was during a seismic event which interrupted the connection between the wire and the rectifier terminal. Disconnection of the wire would have resulted in the failure of the Emergency Diesel Generator to perform its design function. The panel, however, is located on ground level, is well braced and therefore would experience low seismic acceleration. Had the connection not remained intact during the seismic event, the loss of contact would have been brief as the spring tension in the wire would have likely returned the wire to the termination. Following the seismic event, the Emergency Diesel Generator would likely have been operable.

In order to have been a safety significant problem, 1) an earthquake of sufficient magnitude to move this wire off the terminal would have had to occur, 2) at a time when the redundant Division I safety related equipment was out of service and 3) offsite power was lost (possibly due to the earthquake). Since no seismic events have occurred (and are unlikely), this event was not safety significant.

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Corrective Actions

No cause could be identified for this event.

1. The wire lug was secured to the terminal promptly, following identification.
2. Both Emergency Diesel Generators were tested and determined to be fully operable.
3. The cabinet with the loose fastener was visually inspected for other loose fasteners; none were found. The similar panel for the No. 11 Emergency Diesel Generator was also visually inspected and no problems were found.
4. The periodic electrical connection inspection procedures will be revised to provide additional guidance for personnel performing the inspections. Past inspections have been comprehensive, however, this change will clarify the requirement to inspect for missing fasteners.

After researching plant history, it was concluded that this event is an isolated event. Safety related equipment is extensively tested during plant operation and more thoroughly tested during refueling outages. This testing and the electrical connection inspections will assure the continued availability of the plant equipment necessary to protect the health and safety of the public. New techniques for problem identification are being used, such as thermography, to identify electrical problems before component operability is affected.

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Failed Component Identification - None

Previous Similar Events -

Two events involving loose electrical connections, but not involving missing fasteners, have been reported as LERs:

In 1982, a core spray system relay malfunctioned due to a loose connection, LER 82-002.

In 1989, a partial containment isolation occurred due to a loose terminal connection, LER 89-032.

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EMERGENCY DIESEL GENERATOR VOLTAGE CONTROL (SIMPLIFIED)

