



Northern States Power Company

Monticello Nuclear Generating Plant  
Nuclear Projects Department  
2807 West Highway 75  
Monticello, Minnesota 55362-0637

June 15, 1995

Report Required By  
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 95-004  
Capacitor Failure in an Electrical Protection Assembly  
Causes Partial Containment Isolation

The Licensee Event Report for this occurrence is attached. This report contains the following NRC commitments:

Replace all electrolytic capacitors in the power supplies for the RPS Electrical Protection Assemblies with new, currently available, electrolytic capacitors.

A method of ensuring periodic, future replacement of electrolytic capacitors in the electrical protection assemblies will be developed to address the aging of electrolytic capacitors.

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

*William J. Hill*

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 (5-92)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95						
<b>LICENSEE EVENT REPORT (LER)</b>  <small>(See reverse for required number of digits/characters for each block)</small>											
FACILITY NAME (1) <b>MONTICELLO NUCLEAR GENERATING PLANT</b>					DOCKET NUMBER (2) <b>05000 - 263</b>		PAGE (3) 1 OF 4				
TITLE (4) <b>Capacitor Failure in an Electrical Protection Assembly Causes Partial Containment Isolation</b>											
EVENT DATE (5)			LER NUMBER (6)		REPORT NUMBER (7)		OTHER FACILITIES INVOLVED (8)				
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
05	18	95	95	004	00	06	15	95	FACILITY NAME	DOCKET NUMBER	
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
				20.402(b)		20.405(c)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)		73.71(b)	
POWER LEVEL (10)		100 %		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
				20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER	
				20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)	
				20.405(a)(1)(iv)		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)(x)			
LICENSEE CONTACT FOR THIS LER (12)											
NAME Tom Parker						TELEPHONE NUMBER (Include Area Code) 612-295-1014					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	EE	52	G080	YES							
SUPPLEMENTAL REPORT EXPECTED (14)											
YES (IF YES, COMPLETE EXPECTED SUBMISSION DATE)					<input checked="" type="checkbox"/> NO		EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR

ABSTRACT LIMIT TO 1400 SPACES, I.E., APPROXIMATELY 15 SINGLE-SPACED TYPEWRITTEN LINES) (16)  
NCR FORM 366 (5-91)

An Electrical Protection Assembly tripped, de-energizing the "B" Reactor Protection System Bus. This de-energized the Spent Fuel Pool and Reactor Building Exhaust Radiation Monitors and the B Scram logic resulting in the closure of several primary containment isolation valves, a half scram, initiation of the Standby Gas Treatment System and isolation of the Reactor Building ventilation. The failure of an electrolytic capacitor due to aging was the cause of the Electrical Protection Assembly to trip. The failed capacitor was replaced. All electrolytic capacitors will be replaced in all Electrical Protection Assemblies in the future.

NRC FORM 366A (5-92)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
<b>LICENSEE EVENT REPORT (LER)</b> <b>TEXT CONTINUATION</b>				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 (MN88 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.	
FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)	
MONTICELLO NUCLEAR GENERATING PLANT		05000 263		YEAR	REVISION NUMBER
				95	004 00
				PAGE (3)	
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

## Description

On May 11, 1995, a normal six month surveillance was being conducted on the Electrical Protection Assemblies<sup>1</sup> (typically called an "EPA") which monitor power to the Reactor Protection System<sup>2</sup> Busses (EIS System Code: EF). One of the Electrical Protection Assemblies was found to have a degraded electrolytic capacitor (EIS Component Code: CAP). Because a replacement capacitor of identical type was no longer commercially available, the degraded capacitor was replaced with an identical type capacitor from a spare Electrical Protection Assembly control board. The replacement capacitor was tested and found to have a capacitance of 437 microfarads (nominal is 470 microfarads). Leakage was found to be acceptable and the capacitor was installed. At that time, a decision was also made to replace all electrolytic capacitors in the Electrical Protection Assemblies in the near future with newer, commercially available capacitors. This would include the capacitor that was just installed.

At 0342 on May 18, 1995, while operating at steady state power, the repaired Electrical Protection Assembly tripped, de-energizing the "B" Reactor Protection System Bus. This de-energized the Spent Fuel Pool and Reactor Building Exhaust Radiation Monitors (EIS Component Code: MON) and the B scram logic resulting in:

The closure of the Primary Containment Atmospheric Sample Valves (EIS System Code: JM) valves (EIS Component Code: ISV)

A half scram (EIS System Code: JD)<sup>3</sup>

Initiation of the Standby Gas Treatment System (EIS System Code: JE)

<sup>1</sup> The electrical protection assembly monitors the power provided to the Reactor Protection System. It consists of a circuit breaker and a monitoring module. When abnormal electric power is detected, the associated circuit breaker is tripped. Each module monitors undervoltage, overvoltage and underfrequency.

<sup>2</sup> The Reactor Protection System consists of reactor protection logic, the scram solenoids, the power range neutron monitors and process radiation monitors.

<sup>3</sup> A half scram does not cause equipment actuation. A full scram causes the control rods to be inserted, shutting down the reactor.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

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

Isolation of the Reactor Building ventilation (Reactor Building Supply and Exhaust Fans tripped and dampers closed)(EIS System Code: VA).

Following the trip of the Electrical Protection Assembly, all engineered safety feature equipment performed normally.

### Cause

Age related failure of an aluminum electrolytic capacitor in the electrical protection assembly was determined to be the cause of this event.

A contributing cause to the electrical protection assembly failure on May 18th is the use of an aged electrolytic capacitor from storage as a replacement. The circuit board from which the replacement capacitor was obtained had been in storage for the previous 7 months; prior to that the board had been in service. The capacitor's capacitance was below nominal, but was, in the opinion of the Instrument and Control personnel and the system engineer, acceptable for use.

No guidance was provided for periodic replacement of the electrolytic capacitors in the technical manual for the Electrical Protection Assembly. However, a General Electric Company notice (SIL 290) had been published on the aging of electrolytic capacitors in equipment in general.

History has shown that capacitors measuring below their nominal rating have degraded from their original condition (this is touched on in General Electric SIL 290). The personnel involved were not aware of this historical experience.

### Analysis

This event is reportable per 10 CFR Part 50, Section 50.73(a)(2)(iv) since an automatic actuation of an Engineered Safety Feature occurred. The signal was invalid but the Primary Containment Atmospheric Sample Valves closed which are not part of the systems exempted by Section 50.73(a)(2)(iv).

There are no consequences associated with the closing of these valves.

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

**Corrective Actions**

1. On May 18th, the capacitor in the electrical protection assembly was replaced with a new capacitor of a different type under the plant alteration process and the electrical protection assembly was tested and returned to service.
2. All the electrolytic capacitors in all the electrical protection assemblies will be replaced with new, currently available capacitors. New capacitors are on order and will be installed in the near future.
3. A method of ensuring periodic, replacement of electrolytic capacitors in the electrical protection assemblies will be developed to address the aging of electrolytic capacitors.
4. Training on this event has been provided to the Instrument and Control Specialists and will be provided to the Engineering Technical Staff.

**Failed Component Identification -**

Electrical Protection Assembly  
General Electric Company  
Model 914E175

**Previous Similar Events -**

There have been other partial containment isolations, but none caused by failures of the Electrical Protection Assemblies.

As the plant ages, there have been many electrolytic capacitor failures. This has prompted a replacement program for electrolytic capacitors in safety related power supplies. This program was in effect at the time of the failure but did not cover the electrical protection assemblies. Corrective actions associated with this LER will address this.