



Monticello Nuclear Generating Plant
2807 West County Road 75
Monticello, MN 55362-9637
*Operated by Nuclear Management
Company LLC*

April 19, 2001

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

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

LER 2001-006
Alternate Shutdown System Design Deficiencies
Result in Vulnerability To Single Hot Shorts During
Postulated Control Room or Cable Spreading Room Fire

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

Contact David Musolf, Consulting Production Engineer, at (763) 295-1201 if you require further information.

Byron Day
Plant Manager
Monticello Nuclear Generating Plant

c: Regional Administrator - III NRC
NRR Project Manager, NRC

Sr Resident Inspector, NRC
Minnesota Department of Commerce

Attachment

IE22

NRC FORM 366 (1-2001)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001 Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)		

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TITLE (4)x
 Alternate Shutdown System Design Deficiencies Result in Vulnerability To Single Hot Shorts During Postulated Control Room or Cable Spreading Room Fire

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	22	2001	2001	006	00	04	19	2001	FACILITY NAME	DOCKET NUMBER
										05000
										05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)								
		20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)					
		20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)					
POWER LEVEL (10)	100	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)					
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5) OTHER Specify in Abstract below or in NRC Form 366A					
		20.2203(a)(2)(ii)	50.36(c)(2)	X 50.73(a)(2)(v)(B)						
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)						
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)						
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)						
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)						
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)						

LICENSEE CONTACT FOR THIS LER (12)	
NAME David Musolf	TELEPHONE NUMBER (Include Area Code) (763) 295-1201

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

During an engineering review, hot short vulnerabilities were discovered in the Alternate Shutdown System (ASDS) in the event of loss of offsite power. The ASDS maintains the plant in a safe shutdown condition in the event of a severe Control Room or Cable Spreading Room fire. The first of these vulnerabilities affects the ASDS when powering Bus 16 from 12 Emergency Diesel Generator (EDG) and could lead to the inability to operate 12 Residual Heat Removal (RHR), 12 Core Spray, and 12 RHR Service Water pumps from the ASDS panel. The other vulnerabilities involve Bus 14 and Bus 16 breakers which receive a load shed signal on transfer of 12 EDG and associated controls to the ASDS panel. Hot shorts have the potential to reclose these breakers following the load shed causing the EDG or 1AR transformer sources to be overloaded. This could result in a lockout or possible damage to the source. Design changes were completed prior to startup from a recent maintenance outage to eliminate these hot short vulnerabilities.

(6-1998)

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Description

During an assessment conducted in December, 2000, by the Nuclear Management Company (NMC) Fire Protection Program Group, it was found that wiring for several components credited for plant shutdown from the Alternate Shutdown System¹ (ASDS) panel was not completely independent of the Control Room or Cable Spreading room. The ASDS provides alternative safe shutdown capability as required by 10 CFR 50.48 and 10 CFR 50, Appendix R, in the event of a fire in the Control Room or Cable Spreading Room.

An extent of condition review was initiated by the ASDS system engineer to determine if fire damage to the wiring in question could adversely affect the function of the ASDS. On February 22, 2001, during this review, a vulnerability to hot short failures in the ASDS was confirmed. This vulnerability occurs on loss of offsite power when powering Bus² 16 from 12 Emergency Diesel Generator³ (EDG). Under these conditions a hot short is postulated to occur in the wiring connected to relay⁴ 97-31 located in Control Room panel⁵ C-08. This hot short has the effect of energizing the load shed relays for 12 EDG, which in turn strips Bus 16 of all large loads. The net effect is the inability to operate the following loads from the ASDS under loss of offsite power conditions:

1. 12 Residual Heat Removal⁶ (RHR) pump
2. 12 Core Spray⁷ pump
3. 12 RHR Service Water⁸ pump

Following discovery of this condition, the ASDS controls were declared inoperable, a Limiting Condition for Operation was entered in accordance with Technical Specification 3.13.H.2, and a compensatory fire watch was established in the Control Room and Cable Spreading Room as required by the Technical Specifications.

On February 24, 2001, continuing engineering evaluation identified additional postulated hot shorts that, taken one at a time, could reclose breakers on loads that were shed on loss of offsite power and that are not associated with equipment controlled from the ASDS. While some of these failures

¹ EIS System Code: JL
² EIS Component Code: BU
³ EIS Component Code: DG
⁴ EIS Component Code: RLY
⁵ EIS Component Code: PL
⁶ EIS System Code: BO
⁷ EIS System Code: BM
⁸ EIS System Code: BI
⁹ EIS Component Code: XFMR

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would be non-consequential, others could cause 12 EDG or the emergency offsite 1AR transformer⁹ to be overloaded resulting in a lockout or possible damage. Breakers which could result in source overloading were:

1. 14 Bus to 16 Bus 4KV Supply Breaker, 152-408
2. 14 RHR Pump 4KV Supply Breaker, 152-603
3. 12 Control Rod Drive Pump 4KV Supply Breaker, 152-606
4. 14 RHR Service Water 4KV Supply Breaker, 152-607

Monticello Design Change 01Q055 was designed and installed on an expedited basis to resolve all hot short vulnerabilities described above. Installation and testing were completed on March 8, 2001.

Event Analysis

Analysis of Reportability

This condition was determined to be reportable in accordance with 10 CFR Part 50, Section 50.73(a)(2)(v)(B). The hot short vulnerabilities that were identified had the potential to cause inoperability of the ASDS in the event of a fire in the Control Room or Cable Spreading Room coincident with a loss of offsite power.

Safety Significance

A risk assessment performed by Monticello Probabilistic Risk Assessment (PRA) Group concluded that the hot short vulnerabilities described above have a low safety significance. This conclusion was based on the following considerations:

1. The frequency of a fire in the Control Room or Cable Spreading Room.
2. The probability that the Control Room or Cable Spreading Room fire is not suppressed (i.e. control room evacuation is required).
3. The probability of a loss of offsite power requiring 12 EDG to be the source of power to bus 16 (Note: It takes multiple hot shorts for the fire to cause a total loss of offsite power).
4. The probability of the hot short scenarios described above.
5. The probability of failure of an alternate injection system which is not dependent on AC power.

(6-1998)

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There are many other alternative considerations which, if credited, would further lower the calculated safety significance of these hot short vulnerabilities.

Cause

The hot short vulnerabilities described in this report have existed since the original design and installation of the ASDS in 1986.

Backfitting of an ASDS to Monticello involved many interfaces with existing plant design features. The existence of the hot short vulnerabilities described above represent complex system interactions which were not recognized during the original ASDS design.

Corrective Actions

The following wiring changes were made under Monticello Design Change 01Q055 to eliminate the hot short vulnerabilities described in this report:

- A "b" contact on the 12 EDG output breaker, 152-602, was rewired so that breaker closure blocks the postulated hot short in panel C-08 from energizing the load shed relays. This allows the relays to automatically reset and allow operation of their associated ASDS loads.
- A relay contact was inserted in the negative side of the control circuits for breakers 152-408, 152-603, 152-606, and 152-607. This isolates the closing coil and prevents the postulated hot short from closing the associated breaker.

An extensive engineering review was completed to determine if other similar potential hot short vulnerabilities existed beyond those identified in this report. No other credible or consequential hot shorts were identified.

Failed Component Identification

Not applicable.

Similar Events

No similar Monticello events have been identified.