CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9803030221 DOC.DATE: 98/02/25 NOTARIZED: NO DOCKET #
FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
AUTH.NAME AUTHOR AFFILIATION
FARLOW,S. Indiana Michigan Power Co.
SAMPSON,J.R. Indiana Michigan Power Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-002-01:on 980108,discovered several broken master relay (MR) covers inside SSPS logic cabinet.Caused by past practice of removing MR covers to perform time response testing.Replaced all unnacceptable SSPS MRs.W/980225 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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INDIANA MICHIGAN POWER

February 25, 1998

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating Licenses DPR-58
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report System, the following report is being submitted:

98-002-01

Sincerely,

J. R. Sampson
Site Vice President

/mbd

Attachment

c: A. B. Beach, Region III
E. E. Fitzpatrick
P. A. Barrett
S. J. Brewer
R. Whale
D. Hahn
Records Center, INPO
NRC Resident Inspector

1e22

NRC FORM 366 (5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Donald C. Cook Nuclear Plant - Unit 1	50-315	1 OF 4

TITLE (4) Degraded Solid State Protection System Master Relays Result in Condition Outside the Design Basis

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	08	98	98	-- 002 --	01	02	25	98	Donald C. Cook Nuclear Plant	50-316
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5
POWER LEVEL (10)	0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

20.2201(b)	20.2203(a)(3)(i)	50.73(a)(2)(iii)	73.71(b)	
20.2203(a)(1)	20.2203(a)(3)(ii)	50.73(a)(2)(iv)	73.71e	
20.2203(a)(2)(i)	20.2203(a)(4)	50.73(a)(2)(v)	OTHER	
20.2203(a)(2)(ii)	50.36(c)(1)	50.73(a)(2)(vii)	(Specify in Abstract below and in Text, NRC Form 366A)	
20.2203(a)(2)(iii)	50.36(c)(2)	50.73(a)(2)(viii)(A)		
20.2203(a)(2)(iv)	50.73(a)(2)(i)	50.73(a)(2)(viii)(B)		
20.2203(a)(2)(v) X	50.73(a)(2)(ii)	50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Stan Farlow - Instrumentation and Controls Engineering Manager	616/465-5901 Extension 2858

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

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

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

On January 8, 1998, during the performance of Unit 1 Train B reactor protection system (RPS) and engineered safety feature (ESF) reactor trip breaker and solid state protection system (SSPS) automatic trip/actuation logic functional testing, it was discovered that several master relay (MR) covers located inside the SSPS logic cabinet were broken. A master relay actuates slave relays and/or provides control board annunciation or cross train tripping. Inspection of Unit 1 and Unit 2 MR covers commenced on January 10, 1998 and completed on January 11, 1998. The results of the inspection identified 6 MRs for Unit 1 Train A, 9 MRs for Unit 1 Train B, 18 MRs for Unit 2 Train A and 5 MRs for Unit 2 Train B that were unacceptable.

This event is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(ii) as a condition outside the plant's design basis. The cause of condition is the past practice of removing the MR covers to perform time response testing. The practice of removing the covers to perform time response testing was discontinued in 1988. All unacceptable SSPS MRs were replaced.

An evaluation of the actual forces experienced during a safe shutdown earthquake and the probability of malfunction associated with this event determined that there was no significant safety consequence to the plant or the health and safety of the public as a result of the subject condition.

Conditions Prior to Event
Unit 1 Mode 5, Cold Shutdown
Unit 2 Mode 5, Cold Shutdown

Description of Event
On January 8, 1998, during the performance of Unit 1 Train B Reactor Protection System (RPS) and Engineered Safety Feature (ESF) reactor trip breaker and solid state protection system (SSPS) automatic trip/actuation logic functional testing, it was discovered that several master relay (MR) covers located inside the SSPS logic cabinet were broken. A master relay actuates slave relays and/or provides control board annunciation or cross train tripping. Inspection of Unit 1 and Unit 2 MR covers commenced on January 10, 1998 and was completed on January 11, 1998. The results of the inspection identified 6 MRs for Unit 1 Train A, 9 MRs for Unit 1 Train B, 18 MRs for Unit 2 Train A and 5 MRs for Unit 2 Train B that were unacceptable as the covers were not adequately secured. On January 12, 1998, actions were intiated to replace the unacceptable relays.

On January 12, 1998, a letter from Westinghouse dated May 10, 1988 was found. This letter contained a direct reference to the MR cover problem. The letter documents discussions (circa March 1988) between a Westinghouse Training instructor and the Cook plant's Technical Engineering Department Superintendent regarding pulling off MR covers and manually actuating the MR for time response testing. The letter states that the practice of removing the covers for testing purpose at Cook had been discontinued. The letter continues with an assessment by Westinghouse that the covers in no way affect the seismic response of the relay as long as the covers stay in place. The letter states that if loose covers are found they should be replaced or secured with a suitable epoxy. The letter summarizes that the relays are to be inspected and verified to not be loose. No evidence can be found to suggest the relays were inspected and verified not to be loose for that time frame (Spring/Summer 1988).

Replacement of the unacceptable Unit 1 MR covers was completed on January 25, 1998, and the Unit 1 SSPS trains were declared operable at 1028 hours the same day. Replacement of the unacceptable Unit 2 MR covers was completed on January 31, 1998, and Unit 2 SSPS trains were declared operable at 1100 hours the same day. Additional inspections of those relays removed from the SSPS cabinets indicated no electrical degradation of the relays or cracks in the relay base material. The degradation found consisted of damage to the relay cover hold down holes and to the cover hold down catches on the relay base.

During the investigation of this event, consideration was given to other relays used throughout the plant with regard to the reported problem; no other similar condition was identified.

Cause Description
The cause of the degraded condition is the inappropriate actuation technique used on the master relays for Technical Specification time response testing through June 1988. A contributing factor is that no evidence could be found that action was taken in 1988 to inspect the relays and either repair or replace the relays once the inappropriate actuation technique was discontinued.

Analysis of Event

This event is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(ii) as a condition outside the plant's design basis.

Investigation into the degraded MR covers demonstrated that some of the SSPS MR covers located in the control room are susceptible to being loosened and becoming loose parts during an earthquake that imparts 12 g of acceleration to them, which is 50 times the acceleration experience during a safe shutdown earthquake (SSE).

The maximum control room floor peak acceleration during a SSE is 0.236 g, which is rounded up to 0.24 g. The MRs are mounted on the SSPS panel in two rows. One row is approximately 1 foot off of the floor and the other is elevated about 16 inches above the control room floor.The panels within which these relays are mounted do not exhibit any resonances in the low-frequency range below 33 Hz corresponding to the energy input of an earthquake. For this reason, no significant magnification of the acceleration signal would be expected within the 16 inches of elevation from the floor input level. The relays would, therefore, not be expected to experience acceleration significantly different from ~0.24 g. This is far less than the 12 g for which the testing was designed and would, therefore, result in far fewer relay covers being loosened than indicated in the results of the test. Therefore, the risk to relay operability is far less than indicated by the results of this test.

The MR covers weigh less than 6 grams. The covers on the top row will fall 4 inches before reaching the elevation of the bottom row of relays. To cause a malfunction, the cover would have to contact the relay fingers with enough force to displace them or would have to "jam" itself into the lower relay. This would be even less likely if the lower relay was still covered. A 6 grams mass falling 4 inches would not provide enough force to have any significant effect on the relay. The relay covers are designed such that none of the dimensions afford an opportunity for the cover to be "jammed" in a relay as it fell. Based on this, the likelihood of an SSE affecting the operability of the SSPS system is not significant.

For the period that the as-found condition clearly existed, 1988 to 1998, no earthquakes of the SSE magnitude have occurred. Therefore, there was no actual safety consequence as a result of this condition. If we assume that any SSE at Cook Nuclear Plant introduces the potential of a failure of one or more SSPS relays. The design ground acceleration value of a Safe Shutdown Earthquake for the Cook Nuclear Plant is 0.2 g. According to the Cook Plant Probabilistic Risk Assessment, the frequency of an earthquake in the range of 0.1 g to 0.25 g is 5.76E-05 per year. This figure conservatively includes earthquakes which are below and slightly above the SSE ground acceleration level of 0.2 g. Therefore, the cumulative risk to Cook Nuclear Plant is conservatively calculated to be 5.76E-04 over the 10 years for which this condition clearly existed. This is the cumulative frequency for a potential malfunction as a result of these covers being loosened during a seismic event over a ten-year period. This frequency is one to two orders of magnitude less than the numbers used for relay failures in the current revision of the Probabilistic Risk Assessment. Therefore, this frequency would not significantly affect the core damage frequency over this period.

Based on the above evaluation, there was no significant safety consequence to the plant or the health and safety of the public as a result of the subject condition.

Corrective Action

All master relays which had been discovered in an unacceptable condition were replaced. The actions that lead to the unacceptable condition were discontinued in 1988. This event will be reviewed with maintenance workers and their first line supervisors, as they may have cause to know of other similar long standing material condition deficiencies.

Failed Component Identification

C.P. Clare & Co., model number GP1R21D3000

Previous Similar Events

None