

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)  
D. C. COOK PLANT - UNIT 1DOCKET NUMBER (2)  
0 5 0 0 0 3 1 5 1 OF 0 2TITLE (4)  
REACTOR TRIP AND SAFETY INJECTION

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 NAMES		DOCKET NUMBER(S)
0 6	1 7	8 4	8 4	0 1 0	0 0 0	0 7	1 6	8 4			0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)									
1		20.402(b)		20.406(e)	X	50.73(a)(2)(iv)		73.71(b)			
		20.406(a)(1)(i)		50.36(n)(1)		50.73(a)(2)(v)		73.71(a)			
POWER LEVEL (10)	0 6 1 8	20.406(a)(1)(ii)		50.36(e)(2)		50.73(a)(2)(vi)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)			
		20.406(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(vii)(A)					
		20.406(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(vii)(B)					
		20.406(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(ix)					

LICENSEE CONTACT FOR THIS LER (12)  
NAME  
A. A. BLIND  
ENGINEERING DEPARTMENT SUPERINTENDENTTELEPHONE NUMBER  
AREA CODE  
6 1 6 4 6 5 - 5 9 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		
B E F	C I A P	X 9 9 9	Y								

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

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

ON JUNE 17, 1984, AT 2034 HOURS, WHILE IN MODE 1 AND OPERATING AT 68% POWER, A REACTOR TRIP AND SAFETY INJECTION OCCURED FROM THE LOSS OF C.R.I.D. (CONTROL ROOM INSTRUMENT DISTRIBUTION) IV INVERTER. THE REACTOR TRIP OCCURED DUE TO INDICATION OF LOW RCS FLOW WITH REACTOR POWER GREATER THAN THE P-8 SETPOINT. THE SAFETY INJECTION OCCURED DUE TO AN INDICATION OF LOW STEAMLINE PRESSURE CONCURRENT WITH HIGH STEAM FLOW CAUSED BY THE OPERATION OF THE STEAM DUMPS.

THE CAUSE OF THE C.R.I.D. FAILURE WAS DETERMINED TO BE A SHORTED C-2 CAPACITOR ON THE SHORTING CIRCUIT BOARD.

THIS EVENT AND THE PREVIOUS C-2 CAPACITOR FAILURE ARE THE RESULT OF HIGH AMBIENT TEMPERATURES.

A DESIGN CHANGE HAS BEEN INSTALLED WHICH REPLACED THE C-2 CAPACITORS IN ALL FOUR INVERTERS WITH CAPACITORS HAVING A HIGHER TEMPERATURE RATING. AIR CONDITIONING WAS ALSO ADDED SO THAT COOL AIR IS DIRECTED INTO THE INVERTER ENCLOSURES.

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PDR ADOCK 05000315  
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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

FACILITY NAME (1) D. C. Cook Plant Unit - 1	DOCKET NUMBER (2)  0 5 0 0 0 3 1 5 8 4 - 0 1 0 - 0 0 0 2 OF 0 2	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			

TEXT (if more space is required, use additional NRC Form 365A 31 (17))

ON JUNE 17, 1984, AT 2034 HOURS, WHILE IN MODE 1 AND OPERATING AT 68% POWER, A REACTOR TRIP AND SAFETY INJECTION OCCURED FROM THE LOSS OF C.R.I.D. ( CONTROL ROOM INSTRUMENT DISTRIBUTION) IV INVERTER. THE REACTOR TRIP OCCURED DUE TO INDICATION OF LOW RCS FLOW WITH REACTOR POWER GREATER THAN THE P-8 SETPOINT. THE SAFETY INJECTION OCCURED DUE TO AN INDICATION OF LOW STEAMLINE PRESSURE CONCURRENT WITH HIGH STEAM FLOW CAUSED BY THE OPERATION OF THE STEAM DUMPS. DURING ACTIVATION OF THE SAFETY INJECTION, THE MAIN STEAM ISOLATION VALVES CLOSED TO THE DETENT POSITION DUE TO THE SHORT TERM INDICATION OF THE HIGH STEAM FLOW.

## FOLLOW-UP TESTING INCLUDED:

-VERIFICATION THAT A SHORT TERM ACTIVATION OF THE SAFETY INJECTION MASTER RELAY WOULD CLOSE THE MAIN STEAM ISOLATION VALVES TO THE DETENT POSITION.

-THE HIGH STEAM FLOW BISTABLES AND THE STEAMLINE PRESSURE MISMATCH BISTABLES WERE TESTED. THE BISTABLE TRIP SETPOINTS WERE FOUND TO BE WITHIN SPECIFICATIONS.

-TRAIN - A OF THE SOLID STATE PROTECTION SYSTEM WAS VERIFIED TO OPERATE CORRECTLY BY THE PERFORMANCE OF A SURVEILLANCE TEST WHICH CHECKS THE LOGIC AND OUTPUT RELAYS.

THIS TESTING VERIFIED THAT THE SAFETY FUNCTIONS OPERATED CORRECTLY AT THE PROPER ACTUATION POINTS.

THE CAUSE OF THE C.R.I.D. FAILURE WAS DETERMINED TO BE A SHORTED C-2 CAPACITOR (IEEE COMPONENT FUNCTION IDENTIFIER = CAP) ON THE SHORTING CIRCUIT BOARD. THE FAILED CAPACITOR WAS MANUFACTURED BY SPRAGUE - PART NO. 330 P 72.

PREVIOUS OCCURRENCES OF A SIMILAR NATURE WERE REPORTED ON LERS: 050-315/1980-20, 1979-22 AND 050-316/1983-81, 52, 1981-27.

THE CAUSE OF THE NUMEROUS C-2 CAPACITOR FAILURES HAS BEEN DETERMINED TO BE THE HIGH AMBIENT TEMPERATURES.

A DESIGN CHANGE HAS BEEN INSTALLED WHICH REPLACED THE C-2 CAPACITORS IN ALL FOUR INVERTERS WITH CAPACITORS HAVING A HIGHER TEMPERATURE RATING. AIR CONDITIONING WAS ALSO ADDED SO THAT COOL AIR IS DIRECTED INTO THE INVERTER ENCLOSURES.

INDIANA AND MICHIGAN ELECTRIC COMPANY  
DONALD C. COOK NUCLEAR PLANT

Operating License: DPR-58  
Docket No.: 50-315  
Special Report: SI-17

SAFETY INJECTION ACTUATION - JUNE 17, 1984

Conditions Prior to Occurrence

The Reactor was in Mode 1 at about 68% power in the process of a power increase from 58% to 100% at 3% per hour. Power had been reduced to 58% at 0745 hours on June 17, 1984 to remove the West Main Feed Pump from service for a condenser tube leak check.

Description of Occurrence

At 2034 hours on June 17, 1984 while in the process of a power increase from 58% to 100% the unit tripped and a Train A Safety Injection occurred. The cause of this trip was the failure of the Crid IV Inverter which caused a low Reactor Coolant Flow Signal. This Low flow signal in coincidence with being above the P-8 permissive setpoint caused the Reactor Trip. The cause of the Crid IV Inverter failure was a failed commutating capacitor. The cause of the Train A Safety Injection was low steamline pressure (signal given by loss of Crid IV) concurrent with high steamline flow via the steam dumps. A Train B Safety Injection did not occur because the Train B output relays are powered by Crid IV so they did not energize to give a Safety Injection Signal.

Designation of Cause of Occurrence

As stated in the "Description of Occurrence", a failed commutating capacitor caused the Crid IV Inverter to fail, which in turn caused the Unit to trip and the Train A Safety Injection to occur.

Analysis of Occurrence

The following is a list of major items that were reviewed for their safety implication:

(a) Reactor Coolant System Cooldown Rate

The Reactor Coolant System was at 562°F at the time of the injection and a fairly rapid cooldown to about 520°F occurred. The cause of this cooldown was attributed to the steam line drains being open while the operators were concentrating on the recovery from the Safety Injection. This cooldown rate is well within the allowable Technical Specification limit of 100°F per hour.

(b) Thermal Effects of Safety Injection

During this occurrence, the East Centrifugal Charging Pump injected into the Reactor Coolant System through the Boron Injection lines (1½" nozzles) for a period of about ten minutes. The maximum flow one pump can put through these lines is 470 gpm (T.S. 4.5.2f). The maximum total injection into the RCS for a pump operating for ten minutes is 4700 gallons. The injection of 4700 gallons corresponds to a 16 minute injection of the design base used in FIRL Report F-C4542 which calls for two charging pumps, each having a flow rate of 150 gpm. This is the 17th inadvertent Safety Injection into the Reactor Coolant System and conservatively constitutes 3.1/10,000 of allowable cycles. This is conservative from the fact that the maximum injection flow of 470 gpm required by Tech Spec 4.5.2f is verified at zero RCS pressure. The pressure at the time of the injection was 2235 psig which would have caused a flow less than 470 gpm. The total accumulated cycles to date are 38.1/10,000.

(c) Effects on Emergency Core Cooling System Piping

The piping and supports in the ECCS were given a thorough visual inspection to determine if any mechanical damage was experienced during the safety injection. There was no evidence of any mechanical damage or abnormal movements of the piping.

Corrective Actions

The commutating capacitor which failed in the Crid IV Inverter was replaced by a new generation commutating capacitor which has a higher dielectric strength and a higher temperature rating. The same commutating capacitor in each of the other three Crid Inverters was also replaced with this new generation commutating capacitor. Air conditioning was also added so that cool air is directed into the inverter enclosures.



**INDIANA & MICHIGAN ELECTRIC COMPANY**

DONALD C. COOK NUCLEAR PLANT  
P.O. Box 458, Bridgman, Michigan 49106  
(616) 465-5901

July 16, 1984

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

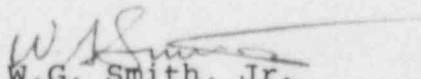
Operating License DPR-58  
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10CFR50.73  
entitled Licensee Event Reporting System, the following  
report/s are being submitted:

RO 84-010-0  
Special Report SI-17

Sincerely,

  
W.G. Smith, Jr.  
Plant Manager

/cbm

Attachment

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