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L45-92(04-10)-LP  
2C.220

April 10, 1992

10CFR50.73

Docket No. 50-461

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

Subject: Clinton Power Station - Unit 1  
Licensee Event Report No. 92-004-00

Dear Sir:

Please find enclosed Licensee Event Report No. 92-004-00:  
Failure to Prepare a System Impact Matrix Identifying Potential  
Equipment Actuations During Circuit Card Installation Results in  
Unplanned Automatic Containment Isolation. This report is being  
submitted in accordance with the requirements of 10CFR50.73.

Sincerely yours,

F. A. Spangenberg, III  
Manager, Licensing and Safety

RSF/alh

Enclosure

cc: NRC Clinton Licensing Project Manager  
NRC Resident Office, V-690  
NRC Region III, Regional Administrator  
Illinois Department of Nuclear Safety  
INPO Records Center

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## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Clinton Power Station

DOCKET NUMBER (2)

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PAGE (3)

TITLE (4) Failure to Prepare a System Impact Matrix Identifying Potential Equipment Actuations During Circuit Card Installation Results in Unplanned Automatic Containment Isolation

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	3	1	1	9	2	0	0	4	None	0 5 0 0 0 0
0	3	1	1	9	2	0	0	4		0 5 0 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)								
5		<input checked="" type="checkbox"/> 20.402(b) <input type="checkbox"/> 20.405(c) <input type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> 73.7(b)								
POWER LEVEL (10)		<input type="checkbox"/> 20.405(a)(1)(i) <input type="checkbox"/> 50.36(c)(1) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 73.71(c)								
0 0 0		<input type="checkbox"/> 20.405(a)(1)(ii) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.73(a)(2)(vi) <input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)								
		<input type="checkbox"/> 20.405(a)(1)(iii) <input type="checkbox"/> 50.73(d)(1)(i) <input type="checkbox"/> 50.73(a)(2)(vii)(A) <input type="checkbox"/>								
		<input type="checkbox"/> 20.405(a)(1)(iv) <input type="checkbox"/> 50.73(d)(2)(i) <input type="checkbox"/> 50.73(a)(2)(vii)(B) <input type="checkbox"/>								
		<input type="checkbox"/> 20.405(a)(1)(v) <input type="checkbox"/> 50.73(d)(2)(ii) <input type="checkbox"/> 50.73(a)(2)(viii) <input type="checkbox"/>								

LICENSEE CONTACT FOR THIS LER (12)

NAME

E. P. Bader, Supervisor - Control and Instrumentation,  
Extension 3357

TELEPHONE NUMBER

AREA CODE 2 1 7  
9 3 5 - 8 8 8 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

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> 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 fifteen single-space typewritten lines) (16)

With the plant in REFUELING during the third refueling outage, an unplanned actuation of Group 11 containment isolation valves occurred. A Control and Instrumentation (C&I) maintenance technician was performing load driver circuit card testing to ensure proper functioning of the untested islands, those portions of the circuit card which are not automatically tested by the Self-Test System. The testing requires removal of the circuit cards from the Nuclear Systems Protection System (NSPS) circuitry. While reinserting a load driver circuit card into the NSPS circuitry after satisfactorily testing the card, apparently the C&I technician inadvertently touched adjacent connector pins with circuit card edge pins resulting in a short circuit and isolation valve actuation. The NSPS power was de-energized prior to beginning the testing activity; however, the field power downstream of the circuit card cannot be conveniently de-energized due to the design of the NSPS system. The cause of the unplanned actuation was a failure to prepare a system impact matrix as required by an administrative procedure. Corrective actions include revising a maintenance procedure to require use of System Impact Matrices, and reducing the performances of untested island testing.

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

## DESCRIPTION OF EVENT

On March 11, 1992, the plant was in Mode 5 (REFUELING) and the reactor [RCT] was at atmospheric pressure and about eighty-two degrees Fahrenheit. The plant's third refueling outage (RF-3) was in progress.

At about 1800 hours, Control and Instrumentation (C&I) maintenance technicians received permission from Operations personnel to perform preventive maintenance (PM) task PCISPM225 in accordance with maintenance procedure CPS 8630.31, "NSPS Untested Islands Load Driver". This task requires technicians to test Nuclear Systems Protection System (NSPS) [JE] circuit cards to confirm that the untested islands (UTIs), those portions of the circuit card which are not automatically tested by the S-17-Test System, function properly. The test is accomplished by removing the specified circuit card from the plant circuitry and connecting the card to a separate micro-computer which determines if the card's UTIs function properly. Following the test, the card is re-installed in the plant circuitry.

The specific card being tested under PM task PCISPM225 was Division 2 Residual Heat Removal (RHR) [BO] load driver circuit card 1H13-P662-D-A15-A127. Operations personnel had de-energized Division 2 NSPS at about 1705 hours in accordance with system operating procedure CPS 3509.01, "Instrument Power System (IP)."

At about 1835 hours, after verifying the Division 2 NSPS power supplies [JX] were de-energized, the C&I technicians removed the circuit card from the plant circuitry and started the UTI testing.

At 1855 hours, an annunciator [ANN] alarmed in the Main Control Room indicating a drop in voltage in Divisions 2 and 4 125 Volts Direct Current (VDC) power supplies MCC 1B and MCC 1D. Additionally, indicator lamps [IL] illuminated indicating that Drywell Cooling (VP) System [VB] and Plant Chilled Water (WO) System [KM] containment isolation valves [ISV] were closing.

At 1900 hours, Control Room operators questioned the C&I maintenance technicians and determined that the technicians had reinserted the load driver circuit card about five minutes earlier after satisfactorily completing the UTI test. The operators concluded that reinsertion of the load driver circuit card caused the alarms and the unplanned automatic isolation of Division 2 Group 11 containment isolation valves.

In addition, operators concluded that the load driver circuit card insertion caused unplanned shunt trips of the Division 2 and 4 125 VDC power supply ground detectors [GDET] for power supplies MCC 1B and MCC 1D, the Division 2 VP fans [FAN], the "B" VP pump [P], and the "B" VP chiller [CHU] and local panel [PL]. Containment isolation valves for the Shutdown Service Water [BI]/Component Cooling Water [CC], VP, WO, and RHR

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

systems were found in the closed position during Operations performance of off-normal procedure checklist CPS 4001.02C001, "Automatic Isolation Checklist."

Other equipment, including the Division 2 suppression pool makeup [BT] dump valves and the Division 2 emergency diesel generator [EK], which normally receive signals from this load driver circuit card did not actuate because they were out of service.

Following the event, UTI load driver circuit card testing was immediately suspended pending an investigation of the cause of the event and development of methods to prevent further inadvertent actuations.

All equipment responded appropriately during the event. All equipment was restored to required configuration after the event.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No other equipment or components were inoperable at the start of this event such that their inoperable condition contributed to this event.

## CAUSE OF EVENT

The cause of the unplanned actuation of Engineered Safety Features (ESFs) has been attributed to personnel error due to a failure to follow a procedure.

Administrative procedure CPS 1034.01, "Station Preventive Maintenance," requires initiation of a System Impact Matrix for maintenance activities such as those involving interruption of electrical circuit continuity. The System Impact Matrix is used to inform the work authority (in this event, the Shift Supervisor) of the potential consequences of performing the activity. The work authority uses this information to determine protective actions that should be taken to prevent incidents such as inadvertent actuations (when necessary) and equipment damage. Per CPS 1034.01, a System Impact Matrix is not required when the work activity is being performed within the boundaries of equipment tagged out of service. Maintenance procedure CPS 8630.31 did not include the requirement for a System Impact Matrix. Additionally, corrective action in response to LER 88-009-00, a similar previous event, requires a System Impact Matrix for non-Technical Specification UTI testing which is incorporated into the Preventive Maintenance program.

Review of this event identified that the preventive maintenance task for the load driver circuit card was originally planned to perform the UTI testing within the boundaries of an equipment tagout. Therefore, the PM task did not contain an impact matrix which is allowed by CPS 1034.01 but is contrary to the corrective actions of LER 88-009-00. In lieu of an equipment tagout, system procedure CPS 3509.01 was used to de-energize



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the circuitry; however, using this procedure only de-energizes NSPS power (signals feeding the load driver circuit card), and the field power (inputs downstream of the load driver circuit card) is left energized.

C&I Maintenance supervision incorrectly assumed that de-energizing the NSPS input power to the load driver circuit card was an adequate method of preventing an inadvertent actuation. Supervision failed to give sufficient consideration to the energized circuitry downstream of the load driver circuit card. If a System Impact Matrix had been initiated for the activity as required by CPS 1034.01 and LER 88-009-00 corrective action, the actuation of Engineered Safety Features (ESF) would have been identified in the matrix, would have been considered a preplanned sequence, and therefore would not have been reportable.

Removing and installing the circuit card edge connectors is difficult because of extremely small tolerances in the spacing of adjacent card edge connector pins. The card edge connector pins are designed and constructed such that the spacing between adjacent pins is less than the width of the individual pins. This creates a very small margin for error in the alignment of the card to the card edge connector. This configuration can result in the shorting together of adjacent pins if the alignment is not precise during installation or removal.

Illinois Power believes that when the C&I maintenance technician reinstalled the load driver circuit card, he inadvertently touched adjacent connector pins with circuit card edge pins resulting in a short circuit thereby causing the actuation of ESFs. Although the NSPS power to the load driver circuit card was de-energized as verified by the C&I maintenance technicians, the downstream circuitry was still energized, and the equipment actuations occurred as described in the "Description of Event" portion of this report.

The C&I technician performing the UTI testing was aware that the downstream circuitry was not de-energized. The design of the NSPS system does not allow circuit card field connectors to be conveniently de-energized prior to their removal/reinstallation; therefore, the potential for inadvertent actuation from short circuits during circuit card removal/reinstallation cannot be completely eliminated.

## CORRECTIVE ACTION

Future performances of load driver circuit card preventive maintenance tasks will include use of a System Impact Matrix regardless of the existence of an equipment tagout. Maintenance procedure CPS 8630.31 has been revised to require a System Impact Matrix and Operations review of plant conditions prior to performing the test activity. Although this action will not eliminate the possibility of an inadvertent actuation, it will allow Operations personnel to take appropriate action to prevent actuations or to consider the actuation a preplanned sequence.

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Therefore, this action will prevent unplanned actuations of Engineered Safety Features and the need to report future similar events.

Illinois Power investigated the possibility of reducing UTI testing which requires circuit card removal. As a result of this investigation, the number of performances has been reduced, and therefore, the possibility of future occurrences of this type of event should be reduced. Additionally, NSPD will continue to review the load driver card performance and reliability to further reduce the amount of testing required. This review will continue through the plant's sixth refueling outage.

The design of the NSPS will not be modified as a result of this event.

## ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73(a)(2)(iv) because of the unplanned automatic actuations of Engineered Safety Features.

Assessment of the safety consequences and implications of this event indicates that this event was not nuclear safety significant. The systems/components responded to the event as designed. These system/component actuations place the plant in a safe and stable condition.

## ADDITIONAL INFORMATION

No component failures were identified for this event.

LERs 88-009-00, 89-012-00, and 90-015-00 discuss actuations of Engineered Safety Features that occurred during removal or reinsertion of NSPS circuit cards. The root causes of these events were not the same as the event discussed in LER 92-004-00.

Corrective actions for LER 88-009-00 included a requirement for a System Impact Matrix for non-Technical Specification UTI testing which is incorporated into the Preventive Maintenance program. The "Cause of Event" section of this report discusses the failure to use a System Impact Matrix.

For further information regarding this event, contact E. P. Bader, Supervisor - Control and Instrumentation at (217)935-8881 extension 3357.