



Commonwealth Edison
Braidwood Nuclear Power Station
Route #1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

May 24, 1991
BW/91-0467

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

Dear Sir:

The enclosed Licensee Event Report from Braidwood Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv) which require a 30-day written report.

This report is number 91-006-00; Docket No. 50-456.

Very truly yours,

K. L. Kofron
Station Manager
Braidwood Nuclear Station

KLK/DN/clf
(226/ZD85G)

Enclosure: Licensee Event Report No. 91-006-00

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1) Braidwood 1 Docket Number (2) 0 5 0 0 0 4 5 6 Page (3) 1 of 0 4
 Title (4) ESF Actuation During Surveillance Testing Caused by Lifted Lead on Undervoltage Relay

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 4	2 7	9 1	9 1	0 0 6	0 0	0 5	2 4	9 1	None	0 5 0 0 0 1 1
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)							
5			20.402(b)		20.405(c)		X 50.73(a)(2)(iv)		73.71(b)	
POWER LEVEL (10)			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
0 0 0			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		Other (Specify in Abstract below and in Text)	
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)			
			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 Phil Lav, HPES Coordinator Ext. 2957 TELEPHONE NUMBER AREA CODE 8 1 5 4 5 8 - 2 8 0 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
				No					

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 fifteen single-space typewritten lines) (16)

Unit 1 was in Mode 5 (Cold Shutdown) with preparations to enter Mode 4 (Hot Shutdown) in progress. On April 27, 1991 surveillance testing had been performed for 4160 Volt Bus 141 and relay 462-B141 failed to operate correctly. The relay design purpose is to start a timer when a degraded voltage condition is detected. To repair the relay, the electrical schematic diagram was reviewed and relay 462-B141 was isolated. At 2011, the 1A Diesel Generator (DG) was started for surveillance testing. At 2204, the 1A DG output breaker was opened after completion of surveillance testing. The System Auxiliary Transformer (SAT) main feed breaker also opened and deenergized Bus 141. The 1A DG output breaker automatically closed but immediately reopened. Bus 141 remained deenergized. This resulted in an unexpected trip of the 1A Residual Heat (RH) and 1A Component Cooling (CC) pumps. An anti-pumping interlock prevented further closure attempts of the 1A DG output breaker. The deenergization of Bus 141 resulted in the generation of a Containment Ventilation Isolation Signal because power was removed to the Containment Fuel Handling Incident Radiation Monitor. At 2210, the 1B RH pump was started and placed in the shutdown cooling mode. At 2332, the anti-pump interlock was reset and the 1A DG output breaker immediately closed to energize Bus 141. The relay had been properly isolated. However, a positive potential was still applied to the disconnected portion of the circuit and allowed for a 125Vdc potential to exist at the 1A DG output breaker contact. When the output breaker was opened, the contact closed and completed the circuit to the load shed relays which tripped the loads on Bus 141. The current flowpath was not readily apparent during the review of the electrical schematic diagram. Relay 462-B141 was replaced and surveillance testing was satisfactorily completed. There have been no previous occurrences.

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TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]							

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: Braidwood 1; Event Date: April 27, 1991; Event Time: 2204
 Mode: 5 - Cold Shutdown; Rx Power: 0%;
 RCS [AB] Temperature / Pressure: 180 F/375psig;

B. DESCRIPTION OF EVENT:

There were no systems or components inoperable at the beginning of the event which contributed to the severity of the event.

Unit 1 was in Mode 5 (Cold Shutdown) with preparations to enter Mode 4 (Hot Shutdown) in progress. Technical Staff personnel (non-licensed) were performing surveillance BwVS 4.6.2.2-1, "Reactor Coolant System Pressure Isolation Valve Leakage Surveillance." The "B" Train of Residual Heat Removal (RH) [BP] was in the shutdown cooling (SDC) mode of operation.

On April 27, 1991 surveillance BwVS 3.2.2-4 "Undervoltage Response Time Testing, Division 11 or 12" had been performed for 4160 Volt Bus 141. During this surveillance, relay 462-B141 failed to operate within the required time delay interval. Nuclear Work Request (NWR) A48336 was prepared to troubleshoot/repair relay 462-B141. The design purpose of the relay is that when a degraded voltage (approximately 3800 volts) condition is detected on Bus 141, a timer starts. If voltage does not increase in the next 5 minutes, then a contact on relay 462-B141 closes. When this contact closes, the System Auxiliary Transformer (SAT) feed breaker opens and loads are stripped from the bus. The Emergency Diesel Generator (DG) [EK] receives a start signal. After the DG starts and is at rated speed and voltage, the DG output breaker closes to supply the bus with power. The loads are then sequentially started in accordance with the safe shutdown sequencer.

At 1705, the 1A DG was started for post-maintenance verification (PMV) testing. At 1715, an Electrical Maintenance mechanic (non-licensed) discussed the NWR and reviewed the electrical schematic diagram with the Station Control Room Engineer (licensed SRO). It was determined that relay repair could not be done with the 1A DG in operation unless the relay was taken Out-of-Service (OOS). At 1802, after completion of PMV testing, the 1A DG was shutdown. Since the 1A DG would soon be restarted for operability determination and surveillance testing, an OOS was requested at 1830 to remove power to relay 462-B141.

To complete surveillance testing for BwVS 4.6.2.2-1, preparations were started to place the "A" Train of RH in the SDC mode. An awareness briefing was held in the control room to discuss potential problems with the concurrent activities.

At 2011, the 1A DG was started for operability testing in accordance with 1BwOS 8.1.1.2.a-1 "Unit One 1A Diesel Generator Operability Monthly and Semi-Annual Surveillance." At 2129, the 1A RH pump was started. It was placed in the SDC mode at 2136 when the 1B RH pump was shutdown.

At 2137, relay 462-B141 was taken OOS by opening two test switches on cubicle 5 of Bus 141. Electrical Maintenance (EM) personnel then lifted leads from terminals on the relay. A recorder was connected to spare contacts on the relay to determine the time of relay closure. A temporary power supply was connected to energize the relay. At 2158, EM personnel were preparing to energize the relay.

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TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]																							

At 2204, the 1A DG output breaker was opened in accordance with 1BWOS 8.1.1.2.a-1. The SAT main feed breaker also opened and deenergized Bus 141. The 1A DG output breaker automatically closed to supply power to the bus. However, the breaker control switch was still in the trip position and the 1A DG output breaker immediately reopened. Bus 141 remained deenergized, resulting in an unexpected trip of the 1A RH and 1A Component Cooling (CC) [CC] pumps. An anti-pumping interlock prevented further closure attempts for the 1A DG output breaker. The deenergization of Bus 141 removed power to the Containment Fuel Handling Incident Radiation Monitor 1AR011 (AR) [IL]. This resulted in the generation of a Containment Ventilation Isolation Signal for Train A. No components repositioned because they were already in their required isolation position.

With no RH pumps in the SDC mode, Reactor Coolant System (RCS) temperature started to increase. At 2210, the 1B RH pump was started and placed in the SDC mode. During this time, RCS temperature increased approximately 3 degrees F mainly due to the heat input from reactor coolant pump operation.

At 2330, relay 462-B141 was returned to a normal configuration and the OOS was removed. At 2332, the anti-pump interlock was reset when the unit crosstie breaker was cycled. The 1A DG output breaker immediately closed and energized Bus 141.

At 0000 on April 28, 1991 the SAT feed breaker was closed to restore offsite power to Bus 141. At 0002, the 1A DG output breaker was opened.

The appropriate NRC notification via the ENS phone system was made at 0148 pursuant to 10CFR50.72(b)(2)(ii).

This event is being reported pursuant to 10CFR50.73(a)(2)(iv) - any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System.

C. CAUSE OF EVENT:

The relay had been properly taken OOS and isolated. However, a positive potential was still applied to the disconnected portion of the circuit. The lifted lead on the relay allowed for a 125Vdc potential to exist at the 1A DG output breaker contact. This contact is a 52/b contact. Under this condition when the output breaker was opened, the 52/b contact closed and completed the circuit to the load shed relays. This current flowpath was determined during an independent circuit analysis review performed by a team of electrical engineers. This review took approximately 50 hours. The current flowpath was not readily apparent during the NWR review of the electrical schematic diagram. When the load shed relays energized, a trip signal was sent to the loads on Bus 141. This signal tripped the 1A RH and 1A CC pumps and also opened the SAT feed breaker.

When the 1A DG output breaker was manually opened in the control room, it received a close signal. The breaker closed and immediately reopened because the control switch was still in the trip (open) position. The breaker was then prevented from closing due to the anti-pumping interlock. The purpose of this interlock is to prevent rapid breaker closure attempts. The interlock was reset when the unit crosstie breaker was cycled. This allowed the 1A DG output breaker to close and restore power to Bus 141.

The deenergization of Bus 141 removed power to Containment Fuel Handling Incident Radiation Monitor 1AR011. This resulted in the generation of a Containment Ventilation Isolation Signal for Train A.

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D. SAFETY ANALYSIS:

This event had no effect on the safety of the plant or the public. All systems operated as designed. The unit was in Mode 5 (Cold Shutdown) with stable reactivity conditions. The rise in RCS temperature was mainly due to heat input from reactor coolant pump operation. The unit had just been reloaded with new fuel and there was very little decay heat from the core. The loss of RH cooling for 6 minutes resulted in a temperature increase of approximately 3 degrees F. Redundant equipment was available, as all steam generators were operable and the standby train of RH was promptly placed in service.

E. CORRECTIVE ACTIONS:

After the anti-pump interlock of the 1A DG output breaker was reset, the breaker closed and the 1A DG supplied power to Bus 141. The SAT feed breaker was closed to restore offsite power and the DG was shutdown. Relay 462-B141 was replaced and surveillance BwVS 3.2.2-4 was satisfactorily completed.

The Maintenance Department will issue a memorandum associated with working on Bus Protective Relays and the possible effect(s) on plant operations. This item will be tracked to completion by Action Item No. 456-200-91-03401.

The Maintenance Department will conduct training sessions describing the above memorandum to Electrical Maintenance personnel and Operational Analysis Department personnel within 30 days of issuance of the memorandum. This item will be tracked to completion by Action Item No. 456-200-91-03402.

The Operating Department will issue a Special Operating Order to address lifting of leads associated with Bus Protective Relays. This item will be tracked to completion by Action Item No. 456-200-91-03403.

The Operating Department will provide necessary material to the Training Department for inclusion of the Special Operating Order in the initial and requalification training for all licensed and non-licensed operator training programs within 30 days of issuance of the Special Operating Order. This item will be tracked to completion by Action Item No. 456-200-91-03404.

The Work Planning Department will conduct training to planning personnel on the Maintenance Memorandum and the Special Operating Order within 30 days of issuance of each of the documents. This item will be tracked to completion by Action Item No. 456-200-91-03405.

F. PREVIOUS OCCURRENCES:

There have been no previous occurrences.

G. COMPONENT FAILURE DATA:

This event was not the result of component failure, nor did any components fail as a result of this event.