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MEADE,K.E. Tennessee Valley Authority
CAMPBELL,G.G. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-005-00:on 881108,loss of power to 4160 volt shutdown board due to inadequate breaker alignment causes ESFA.
W/8 ltr.

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

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EXTERNAL:	EG&G WILLIAMS,S	4	4	FORD BLDG HOY,A	1	1
	H ST LOBBY WARD	1	1	LPDR	1	1
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RIDS/ADDS RIDS/ADDS

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
BROWNS FERRY UNIT 3	0 5 0 0 0 2 9 6	1 OF 0 4

TITLE (4) LOSS OF POWER TO 4160 VOLT SHUTDOWN BOARD DUE TO INADEQUATE BREAKER ALIGNMENT CAUSES ENGINEERED SAFETY FEATURE ACTUATIONS

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)
									BROWNS FERRY UNIT 1	0 5 0 0 0 2 5 9
1 1	0 8	8 8	8 8	0 0 5	0 0	1 2	0 8	8 8	BROWNS FERRY UNIT 2	0 5 0 0 0 2 6 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		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, NRC Form 366A)
		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	TELEPHONE NUMBER
	AREA CODE
Kenneth E. Meade, Engineer, Plant Reporting Section	2 1 0 1 5 7 2 9 - 2 5 4 0

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 fifteen single-space typewritten lines) (16)

On November 8, 1988, at approximately 1436 hours, with all three units defueled, unit 3 received an Engineering Safety Feature (ESF) signal which caused the actuation of several components. The signal was generated by a loss of power to the 3EA 4160 volt shutdown board. The event occurred when maintenance personnel were installing a rebuilt GE normal feeder breaker on the 3A 4160 volt unit board. When an attempt was made to return the unit board back on its normal supply after the breaker was replaced, the rebuilt breaker failed to close resulting in a deenergizing of the 3EA 4160 volt shutdown board and several ESF actuations and isolations.

The cause of the breaker not closing was determined to be bent contactors in the breaker cabinet. The contactors apparently were bent when the breaker was fully racked into position. The breaker did not align properly, causing the breaker contactors to bend and not make the necessary contact to close the circuit. The root cause of this event was the failure to ensure breaker alignment prior to racking the breaker into its normal position and energizing the system.

In order to prevent recurrence of this event, Operations, Maintenance, and Systems Engineering developed a corrective action plan to correct the programmatic problems involved with the rebuilt breakers. This plan included the inspection of all 4KV breakers overhauled by General Electric to ensure proper alignment. Also, a procedure has been developed for the breaker-compartment alignment. The procedure is being used for new installation and the transfer of breakers between compartments.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
BROWNS FERRY UNIT 3	0 5 0 0 0 2 9 6	8 8	— 0 0 5	— 0 0	0 2 OF 0 4

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

Description of Event

On November 8, 1988, at approximately 1436 hours, with all three units defueled, unit 3 received an Engineering Safety Feature (ESF) signal (EIIS code JE) which caused the actuation of several components. The signal was generated by a loss of power to the 3EA 4160 volt shutdown board (EIIS code EB).

The event occurred when maintenance personnel were installing a rebuilt GE normal feeder breaker. The 3A 4160 volt unit board (EIIS code EA) normally supplies the 3EA 4160 volt shutdown board. However, this unit board was having its normal feeder breaker replaced with a rebuilt breaker. The unit board was being powered by its alternate power supply, the 1A 4160 volt start bus. After maintenance personnel replaced the subject component, the breaker in the "test position" satisfactorily passed the required testing. The breaker was then racked into its normal position and an attempt was made to place the unit board back on its normal supply. The rebuilt breaker failed to close resulting in a deenergizing of the 3EA 4160 volt shutdown board and the following ESF actuations and isolations.

- Diesel Generator (DG) 3A autostarted (EIIS code EK)
- Reactor protection system bus 3A deenergized (EIIS code JC)
- Primary containment isolations groups 2, 3, and 6 actuated on unit 3 (EIIS code BD)
- Refuel zone isolations in units 1 and 2 (EIIS code IL)
- Fuel pool cooling pump A tripped (EIIS code DA)
- Reactor water cleanup pump 3A tripped (EIIS code CE)
- Reactor building closed circulating water FCV-70-48 closed (EIIS code CC)

The following components would have actuated due to the loss of voltage if not for the specified reasons. The standby gas treatment system (EIIS code BH) trains A, B, and C and Control Room Emergency Ventilation (CREV) (EIIS code VI) train A were actuated prior to the event due to the performance of a surveillance instruction. CREV train B had been previously removed from service for maintenance. The Emergency Equipment Cooling Water pumps (EIIS code BI) associated with the 3A DG were running prior to the event due to an earlier planned DG start. The 3EB 4160 volt shutdown board logic was tripped in preparation for an outage on the board.

Eight seconds after receiving the loss of voltage signal the 3EA shutdown board loaded onto DG 3A as designed. The actuations and isolations were reset at 1445. All components performed as designed upon receiving the loss of voltage signal.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Cause of Event

The cause of the breaker not closing was determined to be bent contactors in the breaker cabinet. This resulted in a ground to the breaker control power for the unit 3 unit boards. Thus, not allowing the breaker to close and energize the system. The contactors apparently were bent when the breaker was fully racked into position. The breaker was tested in the "test position", however, upon successfully completing this test, the breaker was racked in further to its normal position. During this step, the breaker apparently did not align properly, causing the breaker contactors to bend and not make the necessary contact to close the circuit. Thus, the root cause of this event was the failure to ensure breaker alignment prior to racking the breaker into its normal position and energizing the system.

Corrective Action

After receiving the loss of voltage signal and subsequent ESF actuations and isolations, all components were reset at 1445. The subject breaker had its contactors straightened. The breaker was reinstalled, successfully passed the testing requirements, and was properly racked into its normal position. This second attempt to place the unit board back on its normal supply was successful.

In order to prevent recurrence of this event, Operations, Maintenance, and Systems Engineering developed a corrective action plan to correct the programmatic problems involved with the rebuilt breakers. This plan included the inspection of all 4KV breakers overhauled by General Electric to ensure proper alignment. Also, a procedure has been developed for breaker-compartment alignment. The procedure is being used for new installation and the transfer of breakers between compartments.

Analysis of Event

This event is being reported in accordance with 10 CFR 50.73 a.2.iv, as an event that resulted in the automatic actuation of an engineered safety feature.

Analysis of Event (continued)

Unit 3 was defueled when this event occurred. The plant's electrical system is designed such that on a loss of a normal voltage to a shutdown board, a signal is given to start the corresponding diesel generator. Once the diesel generator obtains full speed and the correct frequency the shutdown board is loaded onto the DG. The shutdown boards and those boards which are supplied by the shutdown boards are considered safety related loads. Components which are required to function in order to shutdown the plant in the event of an accident are supplied by these boards. During this event the system involved functioned as designed. Upon receiving a signal for the loss of normal voltage to the 3EA 4160 volt shutdown board the 3A diesel generator started and the shutdown board loaded onto the DG. Thus, this event did not have an adverse affect on plant safety.

If the event occurred while the reactor was in operation (with the unit 3 bus-tie operable), the loss of the 3A 4160 volt unit board would have resulted in a transfer to the alternate feeder supply, the 1A 4160 volt start bus. This would have resulted in a DG start, however, the 3EA 4160 volt shutdown board would not have loaded onto the DG due to the transfer of the feeder supply. All the ESF actuations and isolations which were generated during this event as well as the actuation of train A of the Reactor Protection Systems would have resulted. Presently, the unit 3 bus-tie is inoperable. In this condition the loss of the 3A 4160 volt unit board would send a loss of voltage signal to the 3EA 4160 volt shutdown board and subsequently generate the ESF actuations and isolations which occurred during this event as well as actuation of train A of the Reactor Protection System.

Commitments - None

Previous Similar Events - BFRO-50-259/86003
BFRO-50-259/88020
BFRO-50-296/84003

TENNESSEE VALLEY AUTHORITY
Browns Ferry Nuclear Plant
Post Office Box 2000
Decatur, Alabama 35602

DEC 8 1988

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

Dear Sir:

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT UNIT 3 - DOCKET NO. 50-296 - FACILITY OPERATING LICENSE DPR-68 - REPORTABLE OCCURRENCE REPORT BFRO-50-296/88005

The enclosed report provides details concerning the loss of power to 4160 volt shutdown board due to inadequate breaker alignment resulting in engineered safety feature actuations. This report is submitted in accordance with 10 CFR 50.73 (a)(2)(iv).

Very truly yours,

TENNESSEE VALLEY AUTHORITY

Guy G. Campbell
Plant Manager
Browns Ferry Nuclear Plant

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NRC Resident Inspector, Browns Ferry Nuclear Plant

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