NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Browns Ferry Nuclear Plant Unit 2	05000260	1 OF 5

TITLE (4)

Reactor Protection System Trip Resulting In Safety Feature System 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 NAME	DOCKET NUMBER
									NA	05000
05	30	99	99	004	00	06	28	99	NA	05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	100	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	X 50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Steven W Austin Site Licensing Engineer	(205)729-2070

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
X	JC	CL	G080	Y						

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

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

On May 22, 1999, at 0522 central daylight time CDT, Unit 2 received an unexpected channel 2B reactor protection system (RPS) actuation when power was lost to the 2B RPS bus. The RPS actuation resulted in the automatic actuation or isolation of primary containment isolation system (PCIS) groups 2, 3, 6, and 8. The loss of power also resulted in the initiation of stand by gas treatment (SGT), and control room ventilation (CREV). At approximately 0527 hours CDT the 2B RPS was placed on the alternate feed and the half scram was reset and the affected PCIS groups were returned to their pre-event configuration. The SGT and CREV systems were also returned to pre-event configuration. The cause of the event was the loss of the 2B RPS bus when the 2B RPS MG set shutdown. The root cause of this event was a failure of the MG set AC drive motor starter contactor coil. The failed motor starter coil on the 2B RPS MG set AC drive motor was replaced. The plant response to this event was uncomplicated and the affected systems responded as designed during the loss of power to the 2B RPS bus. Also, there were no ongoing plant activities that could have led to the RPS actuations. The RPS is designed to fulfill this safety function upon loss of initiating logic power. In this event, the loss of power was to RPS bus 2B, and because RPS bus 2A remained energized throughout the event a full scram was not initiated. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv) as an event or condition that resulted in an automatic actuation of an engineered safety feature.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	2 OF 5
Browns Ferry Nuclear Plant Unit 2	05000260	1999	-- 004 --	00	

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. PLANT CONDITION(S)

At the time the event occurred, Units 2 and 3 were in Mode 1, 100 percent reactor power, at 3458 megawatts thermal. Unit 1 was shutdown and defueled.

II. DESCRIPTION OF EVENT

A. Event:

On May 22, 1999, at 0522 hours central daylight time CDT, Unit 2 received an unexpected channel 2B reactor protection system (RPS) [JC] actuation when power was lost to the 2B RPS bus.

The loss of power to the 2B RPS bus resulted in the automatic actuation or isolation of the following primary containment isolation system (PCIS) [JE] systems and components:

- PCIS group 2, shutdown cooling mode of Residual Heat Removal (RHR) [BO] system; drywell floor drain isolation valves; drywell equipment drain isolation valves [WP].
- PCIS group 3, Reactor Water Cleanup (RWCU) system [CE].
- PCIS group 6, primary containment purge and ventilation [JM], Unit 2 reactor zone ventilation [VB]; refuel zone ventilation [VA]; Standby Gas Treatment (SGT) [BH] system; Control Room Emergency Ventilation (CREV) [VI] system.
- PCIS group 8, Traversing Incore Probe (TIP) [IG].

At approximately 0527 hours CDT, the 2B RPS was placed on the alternate feed, PCIS isolations and actuations were reset. The SGT and CREV systems were subsequently returned to pre-event configuration.

At approximately 0633 hours CDT, a Unit Supervisor dispatched to the MG set determined that the 2B RPS MG set [JC] control power fuse had cleared. Following initial trouble shooting, a maintenance work order was then generated to troubleshoot and determine the cause of 2B RPS MG set trip.

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv), as an event that resulted in an automatic actuation of an engineered safety feature, including the reactor protection system.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

May 30, 1999 at 0522 hours CDT	Unit 2 received trip of the 2B RPS MG set. Expected isolations and initiations occurred.
May 30, 1999 at 0527 hours CDT	Operations reset the PCIS isolations and actuations. The CREV and SGT systems were returned to pre-event status.
May 30, 1999 at 0700 hours CDT	A four-hour non-emergency report is made to NRC in pursuant to 10 CFR 50.72 (b) (2) (ii) as an event that resulted in a manual or automatic actuation of an Engineered Safety Feature.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

This condition was discovered when the Unit 2 control room operators received the RPS actuation.

F. Operator Actions

No operator actions contributed to the event.

G. Safety System Responses

The safety systems operated as expected in response to this event.

III. CAUSE OF THE EVENT

A. Immediate Cause

The immediate cause of the event was the loss of the 2B RPS bus that occurred when the 2B RPS MG set shutdown. This was caused by a failure of the motor starter contactor coil [CL] for the 2B RPS MG set AC drive motor.

B. Root Cause

The root cause of this event was a failure of the MG set AC drive motor starter contactor coil. The motor starter contactor coil for the RPS MG set was found to have extremely low resistance, approximately 0.003 ohms. As such, this is considered a short circuit and would result in the clearing of the upstream control power fuse and the subsequent loss of power

to the 2B RPS bus.
Visual inspection indicated no physical damage to the epoxy encapsulated coil. There is no periodic testing that is performed that could damage or degrade the coil insulation nor predict its failure. Also, there is no suggested preventative maintenance activity or replacement frequency required by the vendor. A review of the plant maintenance history has indicated that this is the first failure of an RPS MG set AC drive motor starter contactor coil at BFN.

Additionally, BFN has six RPS MG sets, two for each of the three units. A review of the operating history of these MG sets has indicated there is no difference in the manner in which the MG sets are operated which could have led to a failure. Moreover, there were no plant no plant evolutions or operations associated with the loss of the 2B RPS MG set. Therefore, the most probable cause of the contactor coil failure is a random failure.

C. Contributing Factors

None.

IV. ANALYSIS OF THE EVENT

The RPS actuations that occurred on Unit 2 resulted from a loss of the Unit 2 RPS bus B. The normal power to RPS bus B is supplied by a MG set. The MG set flywheel maintains voltage to the bus within 5 percent of rated for at least one second following a total loss of power to the MG set AC drive motor. On Unit 2, the alternate power is supplied through a transformer shared with the unit preferred system from 480 reactor motor operated valve board 2B [EC]. Following the trip of the 2B motor-generator set, Unit 2 RPS bus B was manually transferred to the alternate power supply and the PCIS isolations and actuations were manually reset in accordance with plant procedures.

The effects on Units 1 and 3 were limited to the start of SGT, CREV initiation and the isolation of the respective unit's Refuel Zone Ventilation.

V. ASSESSMENT OF SAFETY CONSEQUENCES

The plant response to this event was uncomplicated and the affected systems responded as designed during the loss of power to the 2B RPS bus. Also, there were no ongoing plant activities that could have led to the RPS actuations. The systems affected during the event are designed to shutdown the reactor, contain and process and radioactive releases. The RPS is designed to fulfill this safety function upon loss of initiating logic power. In this event, the loss of power was to RPS bus 2B, and because RPS bus 2A remained energized throughout the event a full scram was not initiated. The effected systems were returned to the pre-event status on the assigned alternate power supply in approximately five minutes. If a design basis event had occurred during the five minutes that the 2B RPS bus was tripped, the 2A RPS system would have tripped as designed initiating a full scram. If a design basis accident had occurred while the 2B RPS bus was powered from its' alternate power supply, both the 2A and 2B RPS systems would have tripped as designed. Therefore, the event did not affect the safety of the plant personnel or the public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

The 2B RPS bus was placed on the alternate feed, the half scram was reset and affected systems were returned to the pre-event configuration.

B. Corrective Actions to Prevent Recurrence

The failed motor starter coil on the 2B RPS MG set AC drive motor was replaced. The 2B RPS bus was transferred from the alternate feed back to the MG set. Because the failure of the MG set starter coil is considered a random failure, there are no further corrective actions required.

VI. ADDITIONAL INFORMATION

A. Failed Components:

The starter contactor coil for the AC drive motor, a 115 VAC 60 HZ General Electric model 55-501336G2 coil failed.

B. Previous LERs on Similar Events:

None.

C. Additional Information:

None.

D. Safety System Functional Failure:

Although the RPS was involved, there was no failure of a reactor scram function during the event. Therefore, the event did not result in a safety system functional failure in accordance with NEI 99-02.

VII. COMMITMENTS

None.

Energy Industry Identification System (EIIS) system and component codes are identified in the text with brackets.