



Entergy Operations, Inc.  
River Bend Station  
PO Box 220  
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May 27, 1994

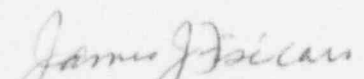
U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Subject: River Bend Station - Unit 1  
Docket No. 50-458  
License No. NPF-47  
Licensee Event Report 50-458/94-007  
File Nos.: G9.5, G9.25.1.3  
RBG- 40605

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv), enclosed is the subject report.

Truly yours,

  
James J. Bisicaro  
Director - Nuclear Safety

JJF/MKB  
Enclosure

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cc: U.S. Nuclear Regulatory Commission  
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ATTN: Administrator

**LICENSEE EVENT REPORT (LER)**

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNRB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) <b>RIVER BEND STATION</b>		DOCKET NUMBER (2) <b>05000458</b>	PAGE (3) <b>1 OF 5</b>
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TITLE (4)  
**ESF Actuation Due to EPA Breaker Failure**

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	01	94	94	007	00	05	27	94		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) <b>5</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) <b>0</b>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<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)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)							

LICENSEE CONTACT FOR THIS LER (12)

NAME <b>David N. Lorfing, Supervisor-Nuclear Licensing</b>	TELEPHONE NUMBER (Include Area Code) <b>(504) 381-4157</b>
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS
<b>B</b>	<b>ED</b>	<b>BKR</b>	<b>G082</b>	<b>Y</b>					

SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH <b>08</b>	DAY <b>30</b>	YEAR <b>94</b>
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At 0339 and again at 1435 hours on May 1, 1994, with the reactor in Operational Condition 5 (Refueling), power to the reactor protection system (RPS) bus B was lost. When these events occurred, RPS bus B was being powered from its alternate power source. The loss of the alternate power source resulted from a trip of the electrical protection assembly (EPA) breakers 1C71\*S003G and H. This transient caused a half-scrum on RPS Channel B and resulted in various Engineered Safety Features actuations. This report is submitted pursuant to 10CFR50.73(a) (2) (iv) to document these ESF actuations. Proper plant response was verified and documented in accordance with Abnormal Operating Procedure, AOP-0010, "Loss of One RPS Bus".

A failure of the electrical protection logic card of EPA breaker 1C71\*S003G is the root cause of this event. The most likely cause of the logic card failure is damage that occurred during the performance of the EPA channel calibration and channel functional test surveillance.

The corrective actions include replacement of the faulty equipment and a revision to the surveillance procedure, STP-508-1600. The logic card failure did not prevent the performance of the EPA breaker safety function to de-energize the RPS-B bus. All systems functioned in accordance with their design.

REQUIRED NUMBER OF DIGITS/CHARACTERS  
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 - FACILITY NAME 8 TOTAL - DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

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FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
RIVER BEND STATION		05000 458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
				94	- 007	- 00	

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

### REPORTED CONDITION

At 0339 and again at 1435 hours on May 1, 1994, with the reactor in Operational Condition 5 (Refueling), power to the Reactor Protection System (RPS) (\*JE\*) bus (\*BU\*) B was lost. When these events occurred, RPS bus B was being powered from its alternate source as the normal source had been removed from service for maintenance purposes. The loss of this alternate power source resulted from a trip of the electrical protection assembly (EPA) breakers (\*BKR\*) 1C71\*S003G and H. This transient caused a half-scam on RPS Channel B and resulted in the following ESF actuations:

- Division II nuclear steam supply shutoff system (NSSSS) (\*JM\*) isolation
- Standby gas treatment (\*BH\*) and annulus mixing (\*BH\*) train B start
- Fuel building charcoal ventilation treatment (\*VG\*) train B start
- Control building charcoal ventilation (\*VI\*) train B start
- Control building ventilation (\*VI\*) train B realignment
- Containment monitoring system hydrogen analyzer (\*IK\*) train B start

This report is submitted pursuant to 10CFR50.73(a) (2) (iv) to document these ESF actuations.

### INVESTIGATION

The EPA breakers provide redundant protection (2 EPA breakers in series) to the RPS, and other essential circuits against overvoltage, undervoltage and underfrequency. The EPA breakers trip to disconnect downstream components from input power when the input power exceeds the overvoltage, undervoltage or underfrequency trip setpoints. The electrical protection logic card in the EPA breaker senses these aberrant conditions and trips the EPA breaker. A three second time delay is included in the trip logic to preclude unnecessary trips due to short-lived voltage and frequency transients. The RPS B bus was aligned to the alternate power source. In this condition, power line conditioner (PLC) 1RPS\*XRC10B1 supplies the RPS B bus via EPA breakers 1C71\*S003G and H.

**LICENSEE EVENT REPORT (LER)  
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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
RIVER BEND STATION	05000458	94	007	00	3 OF 5

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

INVESTIGATION (continued)

The investigation of the initial event identified a failed relay (\*74\*), B21\*K149B (relay for the balance-of-plant isolation), as the potential cause for the EPA breaker trip. While the relay did fail, it was subsequently determined not to be the root cause of the loss of power to RPS bus B. This conclusion was based on the number of protective devices between the 1B21\*K149B relay and the EPA breaker, and the fact that the second EPA breaker trip at 1435 occurred after the relay had been replaced.

Further investigation identified a failure of the electrical protection logic card of EPA breaker 1C71\*S003G. As the EPA breaker 1C71\*S003H is in series and downstream of the failed EPA breaker 1C71\*S003G, 1C71\*S003H would trip by design when power was interrupted by the 1C71\*S003G trip. The cause of the equipment failure is indeterminate. The operability of these EPA breakers had been recently verified by the performance of STP-508-1600, EPA Channel Calibration and Channel Functional Test. This surveillance was performed on April 21, 1994 and did not indicate any abnormalities. The EPA Channel Calibration and Channel Functional Test on EPA breakers 1C71\*S003G and H was re-performed after this event on May 3. As-found data showed 1C71\*S003G had a failed card. Overvoltage, undervoltage, and underfrequency trip setpoints on both EPA breakers were within Technical Specification limits; however, the electrical protection logic card in 1C71\*S003G demonstrated an unacceptable repeatability for the undervoltage trip voltage setpoint and the underfrequency time delay setpoint. Testing of the underfrequency trip delay resulted in instantaneous trips (without the nominal delay period of approximately 3 seconds) in 3 out of 7 tests. This condition could trip the EPA breaker on a PLC tap change or other frequency transient.

The most likely cause of the EPA breaker electrical protection logic card failure is that the electrical protection logic card was damaged during the performance of STP-508-1600 on April 21, 1994. The damage probably occurred due to moving electrical connections with the electrical protection logic card energized and inadvertent shorting of the electrical connections. Such a transient could damage the sensitive logic card components.

ROOT CAUSE

The root cause of the loss of RPS bus B is equipment failure. The EPA breakers 1C71\*S003G and H tripped due to an intermittent failure of the EPA logic card underfrequency trip timer in 1C71\*S003G. The cause of the equipment failure is indeterminate; however, the most likely cause is that the EPA logic card was damaged during surveillance testing.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
RIVER BEND STATION	05000458	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
		94	007	00	

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

ROOT CAUSE (continued)

The causal factors associated with this event are:

- Inadequate precautions in STP-508-1600. Revision 9 of STP-508-1600 allowed the test leads to be moved while the EPA logic card was energized. This provided an opportunity to damage the EPA Logic card during the performance of this STP.
- The initial root cause determination (that relay 1B21\*K149B caused the EPA breaker to trip) was incorrect.

A review of previously submitted LERs identified four reported ESF actuations due to EPA breaker trips. These are LERs 85-006, 86-024, 87-033, and 90-015. LERs 85-006, 86-024, and 87-033 are similar to this event as their root causes were associated with failures of the EPA logic card. The event documented in 90-015 is not similar to this event since the root cause was the failure of the trip coil in an EPA breaker. A detailed discussion of recurring EPA card failures is provided in LER 87-033. The corrective action described in 87-033 includes numerous circuitry modifications. These modifications were intended to enhance the card's reliability and to minimize spurious trips. These design enhancements resulted from a concerted effort by River Bend personnel and General Electric, the EPA breaker vendor.

CORRECTIVE ACTION

1. Revise STP-508-1600 so that the EPA logic card is de-energized when moving test leads. This action has been completed.
2. Replace the EPA Logic card in 1C71\*S003G. This action has been completed.
3. Operations guidance for requesting technical assistance when evaluating the cause of plant events is being revised. The revised guidance will invoke a more conservative threshold for requesting further technical expertise for significant events.

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FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
RIVER BEND STATION		05000458		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 5
				94	007	00	

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

CORRECTIVE ACTION (continued)

- Additional corrective actions are being investigated to resolve this problem. Design alternatives such as replacing the logic cards with "Generation III" logic cards, replacing the EPAs with alternative protective devices, or replacing the PLCs with Motor-Generator sets are being considered. Other administrative actions such as real-time monitoring of power supply attributes and adjusting surveillance and testing schedules are also being considered.
- The actions taken as a result of the corrective actions described in items 3 and 4 above will be documented in a future supplement to this LER. We expect to submit this supplement by August 30, 1994.

SAFETY ASSESSMENT

The safety function of the EPA breaker electrical protection logic card is to de-energize the RPS bus in the event of an overvoltage, undervoltage or underfrequency condition. The card failure observed allowed the EPA breaker to trip with a zero time delay. The nature of this and previous card failures does not prevent the EPA breakers from tripping when required to perform their intend safety function. Furthermore, the breaker trip discussed in this LER would have had no operational impact if the RPS B bus had been in its normal alignment.

The half-scrum and all isolations were reset and the systems were returned to their normal configurations. Proper plant response was verified and documented in accordance with Abnormal Operating Procedure, AOP-0010, "Loss of One RPS Bus".

NOTE: Energy Industry Identification System Codes are identified in the text as (\*XX\*).