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Docket No.: 50-364



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NL-03-2581

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant – Unit 2  
Licensee Event Report 2003-001-00  
Reactor Trip Due to Loss of Power to Reactor Coolant Pump Breaker Position Indication

Ladies and Gentlemen:

Joseph M. Farley Nuclear Plant – Licensee Event Report (LER) No. 2003-001-00 is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A).

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

A handwritten signature in black ink, appearing to read "J. B. Beasley, Jr.", is written over a printed name. The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

J. B. Beasley, Jr.

JBB/WAS/sdl

Enclosure: Licensee Event Report 2003-001-00

cc: Southern Nuclear Operating Company  
Mr. J. D. Woodard, Executive Vice President  
Mr. D. E. Grissette, General Manager – Plant Farley  
Document Services RTYPE: CFA04.054; LC# 13894

U. S. Nuclear Regulatory Commission  
Mr. L. A. Reyes, Regional Administrator  
Mr. S. E. Peters, NRR Project Manager – Farley  
Mr. T. P. Johnson, Senior Resident Inspector – Farley

IE22

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

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

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TITLE (4)  
**Reactor Trip Due to Loss of Power to Reactor Coolant Pump Breaker Position Indication**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	10	2003	2003	001	00	12	22	2003	FACILITY NAME	DOCKET NUMBER
										<b>05000</b>

OPERATING MODE (9) <b>1</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)									
POWER LEVEL (10) <b>100</b>	<input type="checkbox"/>	20.2201(b)	<input type="checkbox"/>	20.2203(a)(3)(ii)	<input type="checkbox"/>	50.73(a)(2)(ii)(B)	<input type="checkbox"/>	50.73(a)(2)(ix)(A)		
	<input type="checkbox"/>	20.2201(d)	<input type="checkbox"/>	20.2203(a)(4)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(x)		
	<input checked="" type="checkbox"/>	20.2203(a)(1)	<input type="checkbox"/>	50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)(A)	<input type="checkbox"/>	73.71(a)(4)		
	<input type="checkbox"/>	20.2203(a)(2)(i)	<input type="checkbox"/>	50.36(c)(1)(ii)(A)	<input type="checkbox"/>	50.73(a)(2)(v)(A)	<input type="checkbox"/>	73.71(a)(5)		
	<input type="checkbox"/>	20.2203(a)(2)(ii)	<input type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(v)(B)	<input type="checkbox"/>	OTHER Specify in Abstract below or in NRC Form 366A		
	<input type="checkbox"/>	20.2203(a)(2)(iii)	<input type="checkbox"/>	50.46(a)(3)(ii)	<input type="checkbox"/>	50.73(a)(2)(v)(C)				
	<input type="checkbox"/>	20.2203(a)(2)(iv)	<input type="checkbox"/>	50.73(a)(2)(i)(A)	<input type="checkbox"/>	50.73(a)(2)(v)(D)				
	<input type="checkbox"/>	20.2203(a)(2)(v)	<input type="checkbox"/>	50.73(a)(2)(i)(B)	<input type="checkbox"/>	50.73(a)(2)(vii)				
<input type="checkbox"/>	20.2203(a)(2)(vi)	<input type="checkbox"/>	50.73(a)(2)(i)(C)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)					
<input type="checkbox"/>	20.2203(a)(3)(i)	<input type="checkbox"/>	50.73(a)(2)(ii)(A)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)					

LICENSEE CONTACT FOR THIS LER (12)									
NAME <b>D. E. Grissette, General Manager Nuclear Plant</b>						TELEPHONE NUMBER (Include Area Code) <b>334-899-5156</b>			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	
X	EF	INVT	A363	Y						
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 15 single-spaced typewritten lines) (16)

On November 10, 2003 at 1036, with the reactor at 100% power, Unit 2 automatically tripped due to loss of power to the 2A Reactor Coolant Pump (RCP) breaker position input to the Reactor Protection System. By design, loss of this single breaker position input results in a direct reactor trip above 30% power. The power to the breaker position input circuit was lost due to a momentary loss of voltage on the 2A 120 VAC Vital Instrument Bus, which is normally powered by the 2A Inverter. The inverter automatically transferred to bypass during the electrical transient as it is designed to do on a fault. All safeguards equipment functioned as designed following the trip. The 2A Reactor Coolant Pump (RCP) breaker did not change position and the pump remained in operation throughout this event.

Extensive troubleshooting on both the inverter and the instrument bus failed to determine any reason for the momentary loss of voltage or the transfer of the inverter output to bypass. Possible causes considered included an inverter failure, an electrical fault on the 2A 120 VAC Vital Instrument Bus or its connected loads, and maintenance activities possibly causing a short which would impact the 2A 120VAC Vital Instrument Bus. None of these could be confirmed. The RCP breaker position indication power supplies have been realigned from the inverters to independent dedicated regulated AC sources.

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Joseph M. Farley Nuclear Plant - Unit 2	05000364	2003	- 001	- 00	2 OF 4

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

Westinghouse -- Pressurized Water Reactor  
Energy Industry Identification Codes are identified in the text as [XX]

Description of Event

On November 10, 2003 at 1036, with the reactor at 100% power, Unit 2 automatically tripped due to loss of power to the 2A Reactor Coolant Pump (RCP) breaker position input to the Reactor Protection System [JC]. By design, loss of a single RCP breaker position input results in a direct reactor trip above 30% power. The power to the breaker position input circuit was lost due to a momentary loss of voltage on the 2A 120 VAC Vital Instrument Bus [EF], which is normally powered by the 2A Inverter [EF].

The following is the sequence of events as determined from the plant process computer:

- 10:36:34.742 RCP Bus A Underfrequency trip signal input to Reactor Protection System (first symptom, due to low voltage on 2A 120 VAC Vital Panel. By itself, this signal will not cause a reactor trip).
- 10:36:34.743 RCP 2A Breaker Open Reactor Trip (due to low voltage) – this signal caused the reactor trip.
- 10:36:34.749 By this time, four additional single channel trip signal inputs were received due to loss of voltage on 2A 120 VAC Vital Panel (none by design making required coincidence to cause the reactor trip).
- 10:36:34.823 Reactor Trip Breakers Open
- 10:36:35.365 All trip signal inputs to reactor protection have returned to normal (i.e. not trip) state.

As noted above, the condition existed for less than one second.

At the completion of this transient, the 2A Inverter was found to have transferred to bypass as it is designed to do on a fault. The actual times of the beginning of 2A 120 VAC Vital Panel voltage decay, initiation of transfer of the 2A Inverter to bypass, and completion of transfer to bypass on the 2A 120 VAC Vital Panel could not be determined.

All safeguards equipment functioned as designed following the trip. The 2A Reactor Coolant Pump (RCP) breaker did not change position and the pump remained in operation throughout this event.

Following completion of troubleshooting activities, realignment of RCP breaker position indication from the inverters to power supplies independent of the inverters, and realignment of the 2A Inverter to normal mode, the unit was returned to power on November 11, 2003.

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

**Cause of Event**

Extensive troubleshooting with vendor assistance on the inverter, and on the instrument bus, failed to determine any reason for the momentary loss of voltage or the transfer of the inverter output to bypass. Possible causes considered included an inverter failure, an electrical fault on the 2A 120 VAC Vital Instrument Bus or its connected loads, and maintenance activities possibly causing a short. None of these could be confirmed.

A detailed visual inspection and electrical checkout of the inverter for any indication of fault, overheating, electrolytic capacitor degradation, or other problems was performed with vendor assistance. No problems were identified during the inspection. Inverter control voltages, AC and DC voltages, full load current, and running frequency were all verified to be within specification. The static switch transfer capability was functionally tested satisfactorily. Transfer time was measured and found satisfactory. Capacitor capacitance, ripple voltage and current were measured satisfactorily. Square wave constant voltage transformer (CVT) input, and inverter output sine wave were verified satisfactorily. Based on this testing, the inverter was determined to be operable.

A physical inspection of the 2A 120 VAC Vital Instrument Bus was performed with no evidence of fault conditions. A physical inspection of the loads powered by the 2A 120 VAC Vital Instrument Bus was performed (18 breakers) with no problems identified.

Work in progress at the time of the event was reviewed. Interviews with personnel did not identify any abnormal noises or alarms prior to the event. No work activities that could potentially have caused a short were in progress at the time of the event. One job in progress involving the replacement of a recorder powered by the 2B Vital Instrument Bus (independent channel from 2A) had been in work, but was not actually in progress at the time of the event. This job was questioned due to the physical proximity of the work to circuits associated with the 2A bus. An inspection of this jobsite did not identify any arc or burn marks or other evidence that a short could have occurred. Other work activities in progress were determined not to be in proximity to components associated with the 2A 120 VAC Vital Instrument Bus.

**Safety Assessment**

The inverter bypass source to the 2A 120 VAC Vital Instrument Bus is powered by an A Train emergency bus. Therefore, the ability of the A Train Engineered Safety Features (ESF) equipment to mitigate an accident was not affected by this event. The only functional capability degraded would have been the ability of the Channel 1 instrumentation to function during the interval between LOSP and Emergency Diesel Generator (EDG) loading. The remaining three inverters and associated 120 VAC vital instrument buses were unaffected and remained operable throughout this event. Therefore, the health and safety of the public were not affected by this event.

Since only one channel was affected by this event, this event does not represent a Safety System Functional Failure.

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

Corrective Action

The Unit 2 RCP breaker position reactor trip circuits have been realigned from the inverters to independent dedicated regulated 120 VAC power supplies.

Additional Information

The Unit 1 RCP breaker position reactor trip circuits will be realigned to the 120 VAC regulated power supplies at the next opportunity.

A Technical Specification change to remove the RCP breaker position trip is being pursued. This trip function is anticipatory and is not required by accident analysis. Appropriate design change packages to remove this function will be prepared and implemented following approval of the Technical Specification change.

The following information, although not believed to represent a direct cause of the event, is related to the function of the inverters:

A 10CFR21 report filed by Ametek Solidstate Controls Inc., dated January 26, 2000, identified that a static switch board contained a "UJT1" transistor of a type which can initiate spurious transfer of the inverter to bypass mode. Farley was not identified as an affected plant by the report. The spurious initiation of transfer to bypass does not affect the time required to complete the transfer to bypass mode and therefore is not the cause of the event reported in this LER. Prior to this event, FNP had planned inspections and repairs related to the "UJT1" issue for the next refueling outage.

The following LER has been submitted in the past two years concerning a reactor trip associated with loss of vital instrument power:

LER 2002-001-00 Unit 1, Reactor Trip Due to Inadvertent Electrical Contact During Recorder Maintenance.