

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Arkansas Nuclear One Unit 2 DOCKET NUMBER (2) 050003618 PAGE (3) 10F21

TITLE (4)

Reactor Trip

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	3	1	0	8	4	0	0	7	0	0	0	4	0	6	8	4	0	5	0	0	0

OPERATING MODE (9) 2 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:

(Check one or more of the following) (11)

POWER LEVEL (10)	0	0	0	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vi)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text, NRC Form 366A)
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LICENSEE CONTACT FOR THIS LER (12)

Name	Telephone Number
Area	Code
Donald B. Lomax, Plant Licensing Supervisor	5019643215

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

SUPPLEMENT 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 fifteen single-space typewritten lines) (16)

## ABSTRACT

On 3/10/84 at 0551, Unit 2 tripped from approximately 10<sup>-3</sup>% full power during a controlled shutdown. The Core Protection Calculators (CPCs) generated a low DNBR trip when an out of range value of local heat flux resulted in a calculated minimum DNBR value of zero. The CPCs calculate local heat flux for 20 nodal points along the core length. A conversion is performed to expand the 20 node local heat flux distribution to a 21 node local heat flux distribution. For the particular power level and control rod configuration at the time of the trip, the local heat flux distribution expansion algorithm caused the local heat flux at the end node #21 to be negative. The CPCs are functionally designed to calculate a value of zero for minimum DNBR when calculated local heat flux values are < zero. Procedure changes have been made to limit control element assembly (CEA) insertion for operations >10<sup>-4</sup>% full power (power level at which CPCs trips may be bypassed).

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Sequential	Revision		
		Year	Number	Number	
Arkansas Nuclear One	05101013 618	84	-- 0 0 7	-- 0 0	01210F1012

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

On 3/10/84 at 0551, Unit 2 reactor tripped at approximately 10<sup>-3</sup>% full power during a controlled shutdown for replacement of a resistance temperature detector (RTD). During CEA insertion, with regulating CEA group 4 at approximately 120 inches withdrawn, the CPCs generated a low DNBR trip. The cause of the DNBR trip was an out of range value of local heat flux which is an input to the calculation for minimum DNBR determination. This out of range condition resulted in the value of minimum DNBR being set equal to zero.

The CPCs calculate an axial local heat flux distribution of 20 nodal points along the core length. Due to different software subroutine requirements, a conversion is performed to expand the 20 node distribution to a 21 node distribution. The 21 node local heat flux distribution is then utilized for the calculation of a 21 node hot channel heat flux distribution. The CPCs are functionally designed to calculate a value of zero for minimum DNBR when calculated local heat flux values are less than or equal to zero.

Hand calculations performed by plant Nuclear Engineering personnel verified for the particular power level and CEA configuration at the time of the trip that the algorithm used in the heat flux distribution expansion caused the end node #21 to be negative. By design, the CPCs set the value of minimum DNBR at node #21 equal to zero and the trip occurred.

Operational procedures have been changed to limit the amount of CEA insertion until core power is less than 10<sup>-4</sup>% full power. With core power less than 10<sup>-4</sup>% full power, the trip bypass permissive will allow bypassing the CPCs trip functions and thus permits additional CEA insertion.

Arkansas Power and Light will consider software modifications to preclude this type of calculational event should a system software update be required for other reasons in the future.

Due to the low power level at the time of the trip, no anomalies or difficulties were encountered as a result of the trip.



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

Subject: Arkansas Nuclear One - Unit 2  
Docket No. 50-368  
License No. NPF-6  
Licensee Event Report  
No. 84-007-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv), attached is the subject report concerning the Core Protection Calculators.

Very truly yours,

John R. Marshall  
Manager, Licensing

JRM:RJS:ac

Attachment

cc: Mr. John F. Streeter, Chief  
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U. S. Nuclear Regulatory Commission  
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