

L I C E N S E E E V E N T R E P O R T (L E R)

FACILITY NAME (1) Arkansas Nuclear One, Unit Two										DOCKET NUMBER (2) PAGE (3) 05010101 31 61 8110F012									
TITLE (4) CPC/COLSS Non-conservative Fxy Constants																			
EVENT DATE (5)					LER NUMBER (6)					REPORT DATE (7)					OTHER FACILITIES INVOLVED (8)				
					Sequential Revision														
Month Day Year					Number Number					Month Day Year					Facility Names Docket Number(s)				
01 21 07					8 4 8 4 -- 0 1 0 -- 0 0 0 4 1 9 8 4										05010101				
OPERATING THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: MODE (9) 1 (Check one or more of the following) (11)																			
POWER 20.402(b) 20.405(c) 50.73(a)(2)(iv) 73.71(b)																			
LEVEL 20.405(a)(1)(i) 50.36(c)(1) 50.73(a)(2)(v) 73.71(c)																			
(10) 11 01 01 20.405(a)(1)(ii) 50.36(c)(2) 50.73(a)(2)(vii) Other (Specify in																			
20.405(a)(1)(iii) 50.73(a)(2)(i) 50.73(a)(2)(viii)(A) Abstract below and																			
20.405(a)(1)(iv) 50.73(a)(2)(ii) 50.73(a)(2)(viii)(B) in Text, NRC Form																			
20.405(a)(1)(v) 50.73(a)(2)(iii) 50.73(a)(2)(x) 366A)																			
LICENSEE CONTACT FOR THIS LER (12)																			
Name															Telephone Number				
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Donald B. Lomax, Plant Licensing Supervisor															50119641321151				
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																			
Cause System Component Manufacturer Reportable					Cause System Component Manufacturer Reportable														
to NPRDS					to NPRDS														
SUPPLEMENT REPORT EXPECTED (14)															EXPECTED				
															SUBMISSION				
[X] Yes (If yes, complete Expected Submission Date) No															DATE (15)				
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																			

At 1430 on March 20, 1984 Arkansas Power and Light (AP&L) was notified by Combustion Engineering (CE) of an error in the CECOR computer code. CECOR is a CE computer code which utilizes incore detector signals to synthesize reactor core parameters (e.g. axial and radial power distribution, azimuthal tilt and flux peaking). The CECOR computer code is used by AP&L Nuclear Engineering for beginning of cycle physics testing, Technical Specification power distribution surveillances and core follow. The specific error was incorporation of incorrect pin-to-box factors into a CECOR coefficient library. These factors are used to determine peak pin power from fuel assembly average power. Peak pin power is then utilized to determine Fxy, the planar radial peaking factor. Calculations of Fxy were performed with CECOR as part of Cycle 4 startup testing for rodged and unrodged conditions. As a result of the non-conservative calculation of these Fxy values, non-conservative addressable constants were input for Fxy versus rod configuration lookup tables in the Core Protection Calculators (CPC's) and Core Operating Limit Supervisory System (COLSS). Upon notification of the error, conservative values for Fxy constants were immediately incorporated into the COLSS and CPC's. Calculations other than Fxy by CECOR were not affected by this error.

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, Unit Two	0151010101 31 61 81 81 41 --	0	1	0	012101012

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

At 1430 on 3/20/84, AP&L was notified by Combustion Engineering (CE) of an error in the CECOR code which resulted in installed non-conservative values of planar radial peaking factors, F_{xy} , for the Core Protection Calculators (CPC's) and the Core Operating Limit Supervisory System (COLSS). CECOR is CE computer code which synthesizes core parameters from incore detector signals (e.g. axial and radial power distributions, azimuthal tilt and flux peaking). The CECOR coefficient library for Cycle 4 contained an error in the pin-to-box factor coefficients for the F* fuel subbatch (16 low enrichment new fuel assemblies). This error resulted in a non-conservative calculation by CECOR of F_{xy} . Calculations of F_{xy} were performed at 50% power during cycle 4 initial power ascension testing for all rods out (ARO) and all Technical Specification permissible rodged configurations. F_{xy} values were input via addressable constants into lookup tables of F_{xy} versus rod configuration in the CPC's and COLSS and are utilized in calculating DNBR and linear heat rate. The error originated from incorrect geometry input data in the DIT model used to generate fine mesh cross sections for the F* fuel subbatch which are then used in the MC code. The MC code performs fine mesh imbedded diffusion/depletion calculations of the pin power distribution for the individual fuel assemblies and produces the pin-to-box factors used in the CECOR library. CECOR coefficients are obtained from core diffusion theory calculations performed with the MC computer code.

The error was discovered by CE during an evaluation to determine whether MC cross section data for the F* fuel subbatch would be applicable for use in the calculations for the Cycle 5 G* fuel subbatch. The cause of the error was a failure to adequately review the geometry input data to the DIT model. Subsequent review of the models and calculations used to generate the CECOR library revealed no other errors. The error affected only the F_{xy} measurements. Other uses of CECOR were not affected.

Upon discovery of the non-conservatism, the CPC's and COLSS were immediately updated such that conservative penalties were applied. A 3% increase in the ARO F_{xy} and a 5% increase in the rodged F_{xy} values were applied until further analyses and calculations could be made. Non-conservative factors existed from 2/7/84 when the power escalation test results were entered into the COLSS and CPC's until 3/20/84 when the error was discovered and conservative penalties applied.

Preliminary evaluations indicate that offsetting conservatisms existed for the time in which non-conservative F_{xy} values were installed. However, specific cycle dependent analyses are needed to confirm these conservatisms and these analyses are being performed at this time.

The safety consequences for this event appear to be negligible since it is believed that more precise calculations will confirm that other COLSS and CPC conservatisms existed which would offset the non-conservative F_{xy} values installed.

A corrective measure to prevent recurrence of this event has been developed by CE and will be implemented within the CE organization by April 30, 1984, in that a specific checklist which will require uniform, systematic review of nodal input data relative to design specifications will be included as part of recorded calculations.



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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Licensee Event Report
No. 84-010-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(v), 10CFR50.73(a)(2)(vii) and 10CFR50.73(a)(2)(i), attached is the subject report concerning CPC/COLSS non-conservative Fxy constants.

Very truly yours,

John R. Marshall
Manager, Licensing

JRM:mab

Attachment

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