NRC FORM 195 (2-76)

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TO:	FROM:	DATE OF DOCUMENT
Mr. Edson G. Case	Duke Power Company Charlotte, North Carolina William O. Parker, Jr.	5/2/77
		DATE RECEIVED: 5/5/77

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DESCRIPTION

Ltr. consisting of info. pertaining to the manner in which the postulated effect of rod bow on DNBR is factored into the thermal-hydraulic performance requirements of future reload fuel cycles....

ACKNOWLEDGED

(2-P)

ENCLOSURE

PLANT NAME:

Oconee Units 1-2-3

RJL

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FOR ACTION/INFORMATION

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NRC FORM 195 (2-76)

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

May 2, 1977

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. A. Schwencer, Chief
Operating Reactors Branch #1

Re: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Mr. Case:

The following information pertains to the manner in which the postulated effect of rod bow on DNBR is factored into the thermal-hydraulic performance requirements of future reload fuel cycles of Oconee Units 1, 2, and 3 and is submitted in response to your letter of March 25, 1977.

On September 17, 1976, Babcock & Wilcox Company (B&W) submitted to the NRC (letter of K. E. Suhrke to D. F. Ross) an interim rod bow evaluation for the Mark B fuel assembly design representative of Oconee fuel. This interim evaluation is based on extensive bow measurements performed on irradiated fuel assemblies from Oconee Unit 1 discharged after end-of-Cycle 1 and end-of-Cycle 2. A correlation relating the magnitude of bow and fuel assembly burnup was obtained in the same form as that by the NRC. The empirical constants of the correlation were adjusted to encompass the cold-to-hot adjusted measured data at the 95 x 95% upper tolerance limit. The resulting equation for the maximum rod bow magnitude is $\sigma_b(\text{mils}) = 11.5 + 0.069 \sqrt{Bu}$. The rod bow DNBR penalty assigned for future reload fuel cycles of Oconee units is consistent with this bow equation and results in a DNBR penalty of approximately 6% for fuel burnups equivalent to three cycles of operation.

The thermal-hydraulic design analyses of future reload cycles are based on closed vent valve configuration and without the effect of densification power spike on DNBR but including the customary flow area reduction factor. Thus, considering 1% DNBR margin credit for the flow area reduction factor, the additional thermal margin to be provided for rod bow DNBR penalty is 5%. The procedure now employed for future reloads, in general, is to

explicitly provide a minimum of 5% DNBR margin in the design analyses that establish the RPS setpoints based on minimum DNBR requirements - that is, those setpoints previously based on a minimum DNBR of 1.3 would now be based on a minimum DNBR of 1.365 (1.05 x 1.3). An exception to this would be the flux-flow ratio for Cycle 3 of Units 2 and 3 wherein thermal margin credit for 1-3% excess RCS flow will be claimed to demonstrate the required DNBR margin. (The RCS flow for Units 2 and 3 are 111.5% and 110%, respectively, compared to thermal design flow of 106.5%.) It should be noted that the actual setpoints would have varying degrees of additional thermal margin.

The procedure described above represents the manner in which the rod bow DNBR penalty is accounted for in the upcoming Cycle 4 of Unit 1 or Cycle 3 of Units 2 and 3, and unless otherwise stated, this procedure would be used for all future reloads of Oconee units.

Very truly yours,

William O. Parker, Jr.

PMA:vr