ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

May 31, 1983

2CAN058305

Director of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
CPC Software Discrepancy

Gentlemen:

In our letter dated April 14, 1983, (2CAN048307), we agreed to provide additional information regarding the Local Power Density (LPD) penalty factor (PF) software. The information below provides the results of our technical evaluation of the need for this upgrade and the proposed implementation schedule.

We would like to restate our position regarding the impact on safety of operation with the present Core Protection Calculator (CPC) software configuration. The proposed software modification concerns application of the LPD PF by the CPC's when both Control Element Assembly Calculators (CEAC) are in the "failed" or "in-test" mode without having been declared inoperable by the plant operator (the CEAC inoperable flag is not set to 3*). Under these conditions, the CPC Functional Design Specification states that a large Departure from Nucleate Boiling Ratio (DNBR) PF and a large LPD PF should be applied. These large penalty factors would compensate for the lack of CEA Deviation PFs that would normally be provided by the CEAC if a CEA deviation occurred. In the current ANO-2 CPC software, only the DNBR PF is applied under these conditions. However, this error does not represent a safety concern because the DNBR PF is sufficiently large to cause an immediate reactor trip under all operating conditions.

*CEAC inoperable flag can be set to one of four values: 0 = both CEAC's are operable; 1 = CEAC1 is considered inoperable; 2 = CEAC2 is considered inoperable; 3 = both CEAC's are considered inoperable.

A001
1/0

The reasons for this are:

1. The minimum power used by the CPC's in the DNBR and LPD calculations is 20% of rated power;

2. The value of the DNBR PF as applied by the CPC's is 13.44;

3. The DNBR PF is multiplicatively applied to the CPC calculated power to yield an equivalent power level of 268.8% at 20% power or below and up to 1344.0% at 100% power. This equivalent power level is then used as the power input to the DNBR algorithms.

4. This equivalent power level is well above the power level needed to generate a DNBR trip in all four CPC channels.

To substantiate the preceding conclusion, a worst case calculation was performed for ANO-2 by Combustion Engineering using the COLSS/CPC Simulator. After the introduction of the DNBR PF (13.44), the maximum possible value for DNBR for any postulated plant operating condition is 0.3 which is well below the DNBR trip setpoint of 1.24. Therefore, the application of such a large DNBR PF to each channel will result in an immediate reactor trip on DNBR. Application of a large LPD PF, causing immediate CPC LPD channel trips, is thus not necessary.

As noted in our letter of April 14, even a minor software change must go through a lengthy and costly development, verification, implementation and testing program. Specifically, we have estimated that a minimum of approximately 1000 manhours at an estimated cost of $57,000 would be required over a two month period to implement the software change. Since the implementation of the proposed LPD PF software modification does not constitute a safety concern, the expense and effort associated with an immediate implementation is not warranted. Therefore, we propose to combine this modification with other changes which are being considered. Accomplishment of all software changes together, by the end of the fourth refueling outage, will significantly decrease the overall verification and review efforts on the part of the vendor, the Commission and ourselves.

Very truly yours,

John R. Marshall

John R. Marshall
Manager, Licensing

JRM:WAR:sl