



ARKANSAS POWER & LIGHT COMPANY

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March 30, 1984

1CAN038402

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Reactor Coolant Pump Trip (NUREG-0737
Item II.K.3.5) - Generic Letter 83-10f

Gentlemen:

Guidance for resolution of TMI Action Plan Item II.K.3.5 "Automatic Trip of Reactor Coolant Pumps" was provided by generic letter 83-10f dated February 8, 1983. The letter requested utilities to provide a submittal giving the technical justification for treatment of reactor coolant pumps (RCP's) during transients and accidents. AP&L provided a plan and schedule for ANO-1 by letter dated August 1, 1983 (1CAN088301). This letter completes AP&L's response to the subject letter.

In conjunction with other B&W owners, AP&L has participated in an effort to provide the information required by NRC for treatment of Reactor Coolant Pumps. The result is the attached report prepared by B&W which supports AP&L's choice of "Loss of Subcooling Margin" as an appropriate setpoint for tripping RCP's during transients and accidents. The major conclusions of the report are summarized below:

- A loss of subcooling margin will occur for those small break LOCA's where a pump trip is required to show compliance with 10CFR50.46.
- As a result of "best-estimate" SBLOCA analyses, it is concluded that as a minimum, times in excess of 10 minutes are available for manual operator action to trip the RCP's following indication of "loss of subcooling margin."

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- Adequate subcooling margin is maintained during Steam Generator Tube Rupture events (up to and including the double ended rupture of a single tube) to ensure forced circulation throughout the event, i.e., the operator is capable of handling the event based on ATOG guidelines without a RCP trip or an early reactor trip.
- Reducing the need to trip the RC pumps for more likely non-LOCA events (such as mild overcooling events) is ensured by a judicious determination of the subcooling margin setpoint. Procedures based on ATOG provide guidance for pump restart for those events where an unnecessary pump trip might occur. Consequently, reliance on the PORV for depressurization is unlikely.
- The RC pump trip criteria based on loss of subcooling margin precludes operation of the RC pumps in a highly voided system.

In reference to the specific guidelines provided in Section I of Generic Letter 83-10, the following is our specific item by item response:

1. Setpoints for RCP Trip

- a. We consider the guidance provided by this section to be fully addressed by the attached report.
- b. The trip setpoint of "loss of subcooling margin" excludes extended operation of RCP's in a voided system (except for inadequate core cooling conditions).
- c. As is apparent from ATOG analyses and guidance, the PORV's are typically not relied upon to accomplish depressurizing actions except for severe overheating events. However, those events are normally associated with a loss of all feedwater in which case continued RCP operation is of little benefit. Therefore, the setpoint of "Loss of subcooling margin" does not create the challenge to the PORV's by inadvertent pump trip.
- d. ANO-1's current emergency operating procedures (EOP's) are based on the ATOG guidelines developed in accordance with item I.C.1 of NUREG-0737. The procedures are considered fully adequate in their treatment of primary system voiding due to flashing of stagnant regions of hot coolant. In addition, they contain suitable guidance for detecting, managing, and removing these voids. ANO operator training programs specifically address the significance of primary system voids.
- e. Current AP&L EOP's also provide instructions for restoration of services to RCP's prior to restart. A containment isolation signal does not terminate seal injection to the RCP

seals. The EOP's provide that 3 of 4 RCP's be tripped upon containment isolation and that the bearing temperature and winding temperature be monitored for possible tripping of the 4th. This ensures maximum protection of the RCP's against damage while maintaining some forced core circulation.

- f. As described in the report, the loss of subcooling margin provides the best indicator for determination of pump trip criteria. It is based on the subcooling margin monitors installed as part of NUREG-0737 Item II.F.2 requirements, therefore, it is clear that inadequate core cooling instrumentation has been factored into our choice of setpoint parameters.

2. Guidance for Justification of Manual Trip

- a. The attached report provides the results of analyses which confirm that the limits set forth in 10CFR50.46 are not exceeded for the limiting break sizes and locations assuming the use of "loss of subcooling margin" as the RCP trip setpoint. AP&L's loss of subcooling margin criteria are conservative based on allowances for maximum expected errors.
- b. As described in the attached report, the "best estimate" analyses support a minimum of ten minutes available for the operator to trip the RCP's following a loss of subcooling margin. The current AP&L EOP's require operators to trip by two minutes, and provide detailed instructions for situations where the pumps are not tripped in two minutes. In addition, AP&L is pursuing additional "best-estimate" analysis which is expected to show that tripping RCP's at any time for any break size is acceptable, i.e. will not result in unacceptable peak clad temperatures. It is expected that such analysis will be completed by June 1, 1984.

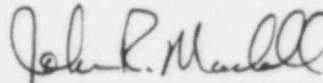
3. Other Considerations

- a. The instrumentation involved in determining a loss of subcooling margin has been previously described as part of AP&L's submittal on item II.F.2 of NUREG-0737 (item 2.1.3.b of NUREG-0578). Please see our letter dated January 18, 1980 (ØCANØ18Ø22). The subcooling margin monitors were environmentally qualified, and the temperature and pressure sensors which input to the monitors are included in the current environmental qualification program. The temperature signal is the RPS temperature input and the pressure signal is the ESAS pressure input.
- b. The current EOP's provide instructions for the timely restart of the RCP's when conditions which will support safe pump operation are established.

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- c. The ANO training program for use of the EOP's provides explicit operator instructions concerning their responsibility for performing RCP trip in the event of a SBLOCA following a loss of subcooling margin.

Very truly yours,

A handwritten signature in dark ink, appearing to read "John R. Marshall". The signature is fluid and cursive, with the first name "John" being the most prominent.

John R. Marshall
Manager, Licensing

JRM:CHT:sc

Attachment