ARKANSAS POWER & LIGHT COMPANY
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May 3, 1982

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Energy Supply

2CAN058202

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

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Technical Specification Change
Request for RTD Response Time
(File: 2-1510.4)

Gentlemen:

Attached is a Technical Specification change request for your review and approval.

For those design basis events (DBEs) which impact the Core Protection Calculator System (CPCS) trips when RTD response times degrade, the plant is also protected by other PPS trip functions such as high pressurizer pressure and low steam generator water level. However, in the development of this proposed Technical Specification change, the approach has been to determine the DNBR and LPD penalties which may be applied that will insure that the CPCS trip functions will not be degraded (will provide the same degree of protection) if the input RTD response times degrade beyond the value assumed in the current software of the CPCS. Consequently, the margin of safety provided by the CPCS trips is clearly unchanged by this proposed Technical Specification.

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The impact of degraded RTD response times on the reactor protection system has been evaluated by analyzing design basis events which induce significant primary coolant temperature transients. The objective of these analyses was to determine the magnitude of any degraded system responses resulting from degraded RTDs and to specify the additional penalties which are sufficient to negate this degradation. Application of the resulting penalties will assure that DNBR, LPD and asymmetric steam generator trip functions are unimpaired by degraded RTD response characteristics.

The events analyzed to evaluate the impact of degraded RTD response times were:

- Loss of load
- Single CEA withdrawal
- CEA bank withdrawal
- Excess load
- Single CEA drop
- Loss of feedwater
- Asymmetric steam generator transient

Those events which were limiting in the analyses were the loss of load, single CEA withdrawal and asymmetric steam generator load transient.

The loss of load event was analyzed to determine the impact of degraded RTD response characteristics on the core inlet temperature calculated by the CPCS. The event was analyzed assuming 90 and 120 percent core flow and low and high secondary pressures. Analyses were conducted incorporating RTD response times of 8, 10 and 13 seconds. Those analyses concluded that an increase in the CPC DNBR penalties of 1.5 percent, 3.0 percent and 5.5 percent will assure conservative CPC calculations for RTD response times of 8, 10 and 13 seconds respectively. Linear interpolation between these values was used to produce the proposed Technical Specification Figure 3.3-1.

The single CEA withdrawal event from one percent power was analyzed to determine the impact on the thermal power calculation performed by the CPCS. For single rod deviation events, neutron flux power is not credited in the analysis to determine CPCS response. Since the thermal power calculation uses the hot leg and cold leg temperatures, changes in RTD response times have a signficant impact on this portion of the CPCS calculations. Degraded RTD response times will cause the CPC to calculate a non-conservatively low core inlet temperature, a conservatively low temperature to be used in the temperature shadowing factor and a non-conservatively low core average power. However, this analysis further concluded that the penalties necessary to restore a conservative DNBR calculation throughout this event are less than those resulting from equivalent RTD time constant extensions in the loss of load analysis. Consequently, no additional DNBR penalty is necessary for this transient. This event was also analyzed to determine the impact on the power used in the determination of LPD by CPC. The results indicate that the LPD penalty should be increased 4.0 percent for RTD response times of 8 seconds, 8 percent for RTD response times of 10 seconds and 15 percent for RTD response times of 13 seconds. Linear interpolation was again utilized to produce Figure 3.3-1.

Asymmetric steam generator transient protection was originally provided by the low steam generator water level trip. During cycle 1, the CPCS software was modified to provide protection for asymmetric transients. The intention was then to reduce the low steam generator water level trip setpoint. However, that change has not been made. In order to insure that CPCS protective functions are not degraded, the limiting asymmetric steam generator transient event was re-analyzed for degraded RTD time constants. The asymmetric steam generator trip function monitors the

temperature difference between cold legs and will initiate a reactor trip when the monitored temperature difference between cold legs and will initiate a reactor trip when the monitored temperature difference exceeds 14F.

An analysis of the Instantaneous Closure of a Single MSIV event was performed to determine the additional DNBR required overpower margin (ROPM) needed to assure that the fixed CPC asymmetric steam generator trip setpoint provides adequate protection. The additional ROPM for 8, 10 and 13 second RTD time constants was determined to be 4%, 5% and 9% power, respectively. This additional ROPM can be maintained either by applying the penalties to the power operating limit in the Core Operating Limit Supervisory System (COLSS) or, with COLSS out of service, by applying the penalties to CPC channel(s) being used for monitoring the DNBR LCO.

Through application of additional CPC DNBR and LPD penalties and by reducing the power operating limit values, the protective features of the CPCS are maintained uncompromised in the event that CPC input RTD response times are degraded. This method has been analyzed for RTD effective time constant values up to and including 13.0 seconds.

Pursuant to the requirement of 10 CFR 170.22, we have determined this request to be a Class III amendment as it is a single safety issue. Accordingly, a check in the amount of $4,000 is remitted.

Very truly yours,

William Cavanaugh III

WC:SLG:sl

Attachment

STATE OF ARKANSAS)
) SS
COUNTY OF PULASKI)

I, William Cavanaugh III, being duly sworn, subscribe to and say that I am Senior Vice President, Energy Supply, for Arkansas Power & Light Company; that I have full authority to execute this oath; that I have read the document numbered 2CAN058202 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

William Cavanaugh III

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 3 day of May, 1982.

Sharon Kaye Hendrix
Notary Public

My Commission Expires:
7-19-89