UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 82 TO

FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letters dated October 28, 1987 (2CAN108704 and 2CAN108705), Arkansas Power and Light Company (AP&L or the licensee) requested amendments to the Technical Specifications (TSs) appended to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2). The proposed amendments would change the boron concentration in certain tanks. Specifically the licensee requested approval to increase the refueling water concentration (from between 1731 ppm and 2250 ppm to between 2500 and 3,000 ppm), and the corresponding concentrations in the refueling water tank (RWT) and the safety injection tanks (SITs). Concurrently, the licensee requested approval to decrease the boron concentration in the Boric Acid Makeup Tank (BAMT) from between 5 wt% and 12 wt% to between 2.5 wt% and 3.5 wt%. Supplemental information on the boron dilution event was provided with licensee letter of January 19, 1988 (2CAN013801).

2.0 EVALUATION

2.1 Increased Boron Concentration in RWT and SIT

The licensee has evaluated the impact of increasing the minimum refueling water boron concentration and the boron concentration in the RWT and the SIT on the Safety Analysis Report (SAR) Chapter 15 events as well as on long term boric acid buildup calculations and post-LOCA containment pH values reported in SAR Chapter 6. In particular, the effect of an increase in RWT and SIT boron concentration on the boron dilution event was evaluated since this event could be the one most adversely affected by the increase. The effects on the steam line break and steam generator tube rupture events were also evaluated.

The results of the boron dilution event reanalyses verified that the calculated time from an alarm to the loss of shutdown margin for a boron dilution event initiated from Modes 3, 4, 5, or 6 satisfy the respective acceptance criteria of SRP 15.4.6. Since a boron dilution event during power operation (Modes 1 and 2) would cause the reactor to be rapidly shutdown by the reactor protection system,

a Mode 1 and 2 reanalysis was not performed. The staff concludes that the results of any postulated boron dilution event occurring with the proposed increase in RWT and SIT boron concentration are acceptable.

Since the steam line break event is partially mitigated by the addition of borated water from the high pressure safety injection pumps and the SIT to the reactor coolant system, the proposed increased boron concentration will enhance the mitigation of the reactivity increase portion of this event. Therefore, since the proposed boron concentration increase would essentially increase the margin of safety for the steam line break event, the staff finds the proposed changes acceptable with respect to postulated steam line break events.

For the steam generator tube rupture event, the high pressure injection pumps inject borated water from the RWT into the reactor coolant system. Because the reactor will be scrammed, the increase in RWT and SIT boron concentration increases the shutdown margin and, therefore, makes the proposed changes acceptable with respect to a postulated steam generator tube rupture event.

2.2 Reduced Boron Concentration in the BAMT

The licensee has evaluated the impact of reducing the BAMT boron concentration on the ability to maintain required shutdown margins during a cooldown without letdown, the long term boric acid buildup, and the post-LOCA containment pH value. Safety Analysis Report (SAR) Chapter 15 transients and accidents were not reevaluated since addition of borated water from the BAMTs to the reactor coolant system for reactivity control were not credited in any of these events.

The original cooldown without letdown analysis assumed that all the boron necessary to achieve the required shutdown margin during the cooldown was provided by the BAMT during the initial stages of the event. The reanalysis also credits the boron contribution of the refueling water tank (RWT) thereby allowing the total boron inventory of the BAMTs to be reduced. Since the new analysis includes a detailed evaluation of shutdown margin requirements, which are satisfied throughout the event, the staff finds the crediting of both the BAMT and the RWT borated water sources acceptable.

Since the proposed revision would allow the boron concentration in the BAMTs to be as low as 2.5 weight percent, the minimum BAMT volume of approximately 13,150 gallons required by TS Figure 3.1-1 as a function of BAMT and RWT concentration would not be met with only one BAMT. Therefore, the proposed revision would provide an option for combining the contents of both BAMTs at low concentrations. When both BAMTs are required, two independent flow

paths from each tank must be operable. This has been incorporated into the proposed Technical Specifications and the staff finds this acceptable.

Chemical analyses have shown that a 3.5 weight percent solution of boric acid will not precipitate at solution tempertures above 50°F. Since the revised minimum flow path temperture would be 55°F, the staff considers the 5°F margin over the maximum precipitation temperature to be sufficient to permit the proposed elimination of heat tracing operability requirements.

2.3 Combined Effect of all changes in the Boron Concentrations

The effect of the proposed changes on the long term boric acid buildup calculations previously reported in Chapter 6 of the SAR have been evaluated by the licensee. Since the change involves decreasing the boron concentration in the BAMT, the potential for boric acid precipitation during long term ECCS operation will be likewise reduced. However, the increase the boron concentration in the RWT and the SIT essentially offsets the BAMT inventory reduction with respect to post LOCA reactor coolant system boron concentration. Consequently there is no change in the potential for boric acid precipitation and no impact on the time requirement for initiation of the core flush flow.

The effects of the proposed changes on the post LOCA containment pH value calculations reported in SAR Chapter 6 have also been evaluated by the licensee. The result of a decrease in the BAMT boron concentration and an increase in the RWT and SIT boron concentration is a slight reduction in the calculated spray and sump pH values. The maximum spray pH of 11.0 remains bounding while the minimum equilibrium sump value of 8.9 decreases to 8.8. Since the original decontamination factors for iodine remain valid with the reduced pH value, the change has no significant impact on iodine removal capabilities. Also, since the solution is still basic, there is no significant impact on containment corrosion characteristics.

3.0 SUMMARY

Based on the above evaluation, the staff concludes that the proposed changes in the refueling water boron concentration and the corresponding concentration changes in the RWT, SIT and the BAMTs are acceptable.

Further, the elimination of heat tracing operability requirements associated with the change in the BAMT boron concentration is also acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The NRC staff has considered the environmental impact of the proposed changes to the TS. An "Environmental Assessment and Finding of No Significant Impact was published in the Federal Register on March 7, 1988 (53 FR 7268).

5.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: March 11, 1988

Principal Contributors: L. Kopp