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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO SAFETY EVALUATION LINE BREAK

ALABAMA POWER AND LIGHT COMPANY

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

In December 1987, Joseph M. Farley Nuclear Plant, Unit 2, (Farley 2) experienced a crack in a safety injection line attached to the reactor coolant system (RCS) cold leg. As part of subsequent staff reviews of this event, the staff inquired whether a break of the safety injection line was analyzed as part of the Farley Units 1 and 2 plant small break loss of coolant accident (LOCA) analyses. Of specific concern was the assumption regarding safety injection flow in the analysis. Unlike other cold leg breaks, a break of the safety injection line results in direct spillage of the safety injection flow to the containment and a decreased fraction of the injection flow is delivered to the intact cold legs.

In a letter dated January 14, 1988, the licensee responded to staff's concerns regarding a break in the safety injection line. The staff's evaluation of the licensee's response follows.

2.0 EVALUATION

In its letter, the licensee stated that the small break LOCA evaluation for Farley, Units 1 and 2, were performed for breaks in the cold leg piping. The review of the analysis showed that the broken loop safety injection flow was assumed to spill to RCS backpressure, not containment backpressure. Thus, the licensee concluded that the small break LOCA for the Final Safety Analysis Report (FSAR) did not bound a doube-ended severance of the safety injection line.

An evaluation was performed by the licensee to assess the effect of spilling the broken loop safety injection flow to containment backpressure for a double-ended severance of the safety injection line. Since the diameter of the safety injection line is 6 inches, the licensee used the small break LOCA analysis results for a 6-inch equivalent diameter break at the bottom of the cold leg. It should be noted that the 6-inch small break is also the limiting small break LOCA for Farley.

The licensee estimated the effect of the decreased safety injection flow on the start of core uncovery and the additional time it would take to recover the core. These estimates assumed that the overall RCS behavior would not be

significantly affected by the decreased safety injection flow. Using the maximum core heating rate for the 6-inch line break, the licensee estimated that the additional core uncovery time (about 4 seconds) would result in an increased peak cladding temperature of 46°F.

Based upon its assessment, the licensee concluded that the peak cladding temperature for the safety injection line break would be 1875°F for Unit 1 and 1758°F for Unit 2. These temperatures are less than the 2200°F criteria of 10 CFR 50.46 and are also bounded by the calculated 2013°F peak cladding temperatures for a large break LOCA for Farley, Units 1 and 2.

The staff has reviewed the licensee's estimates and believes that the methods employed and conclusions reached are reasonable. As a result, the staff concludes that Farley, Units 1 and 2, satisfy the performance requirements of 10 CFR 50.46 for a safety injection line break.

Section 1.C.1 of Appendix K requires that a break spectrum analysis be performed to determine the break size and location which result in the maximum cladding temperature. In the Farley FSAR, both large break and small break spectrum evaluations, using different LOCA evaluation models, are reported. For the small break LOCA analysis, the Farley FSAR shows the 6-inch line break to be the worst case break. However, as noted above, the licensee now estimates that the safety injection line break results in a higher peak cladding temperature. The staff concludes that failure to properly model the safety injection line break constitutes an error in the application of an acceptable LOCA evaluation model to Farley, Units 1 and 2. However, since the estimated effect of this error is less than 50°F, it is not a significant change in the calculated peak fuel cladding temperature as defined in 10 CFR 50.46(3)(i). Thus, no calculations are required. Since this is an increase in the limiting small break LOCA transient, the licensee should monitor this error, and any subsequent changes and errors, and report them annually to the Commission as specified in 10 CFR 50.46(3)(ii).

3.0 CONCLUSIONS

The staff concludes that the licensee's evaluations demonstrate that Farley, Units 1 and 2, satisfy the performance requirements of 10 CFR 50.46. Thus, the staff concludes that continued operation of Farley, Units 1 and 2, pose no undue risk to the public health and safety.

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Dated: November 9, 1989