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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REGULATION

REGARDING CONFIRMATORY TESTS OF THE AUXILIARY PRESSURIZER SPRAY SYSTEM

LOUISIANA POWER AND LIGHT COMPANY

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

Paragraph 2.C.12 of Facility Operating License NPF-38 states the following:

> By June 18, 1985, the licensee shall submit the results of confirmatory tests regarding the depressurization capability of the auxiliary pressurizer spray (APS) system. This information must demonstrate that the APS system can perform the necessary depressurization to meet the steam generator single-tube rupture accident acceptance criteria (SRP 15.6.3) with loop charging isolation valve failed open. Should the test results fail to demonstrate that the acceptance criteria are met, the licensee must provide for staff review and approval, justification for interim operation, and a schedule for corrective actions.

2.0 EVALUATION

In letters dated June 13, 1985 and March 11, 1986, Louisiana Power and Light (LP&L) provided the results of a test performed at Waterford Unit 3 and the associated analysis. This information demonstrated the capability of the APS system to perform its safety-related functions (e.g., primary coolant depressurization for mitigation of a steam generator tube rupture and achieving plant cold shutdown per the requirements of BTP RSB 5-1). The test and analysis were performed assuming the most limiting single failure of a charging loop isolation valve fully open. The test was initiated by starting auxiliary spray flow from two charging pumps (88 gpm) with both loop charging isolation valves closed. After the pressure decreased about 100 psi, the charging loop isolation valve (CVC-218 B) associated with lower back pressure was opened. The depressurization with the degraded APS flow continued until the pressurizer pressure decreased to 2000 psia. The test data show that the initial depressurization rate with full APS flow from two charging pumps (88 gpm) was about 60 psi/min. When a charging loop isolation valve was opened, the depressurization rate dropped to 24 psi/min and the APS flow dropped to 37 gpm. The licensee used a thermal hydraulic computer code to perform a calculation of reactor coolant system (RCS) depressurization relative to the APS flow rate. The results of its calculation match the above test data. In a letter dated

June 13, 1985, the licensee provided the results of a reanalysis of the steam generator tube rupture (SGTR) that incorporated the operator actions defined in "Combustion Engineering Emergency Procedure Guidelines", CEN-152. The purpose of this reanalysis was to demonstrate that an APS flow rate of 10 gpm would be sufficient for mitigation of the SGTR accident. However, many of the assumptions used in the reanalysis were not consistent with those made in the original licensing basis SGTR analysis. The staff requested that the licensee verify that the results of the APS flow test satisfy the assumptions made in the licensing analysis of SGTR documented in FSAR.

In a letter dated March 11, 1986, the licensee stated that the depressurization rate assumed in the FSAR for the SGTR analysis was about 7.7 psi/min which is substantially less than the test result of 24 psi/min with a limiting single failure.

The staff has noted that Table 6-3 of "An Evaluation of the Natural Circulation Cooldown Tests Performed at the San Onofre Nuclear Generating Station-Compliance With the Test Requirements of Branch Technical Position, RSB 5-1"(CEN-259) indicated that the RCS depressurization rate using APS varies with the RCS pressure. This Table was developed for a 3400 MWt class plant. Based on the ratio between the RCS depressurization rate and the initial RCS pressure for a fixed APS flow rate, the staff estimated that a minimum RCS depressurization rate of 12 psi/min could be achieved by the Waterford design assuming an average initial RCS pressure of 750 psia. From Figure 15.6-33 of Waterford FSAR, the staff also estimated a required RCS depressurization rate of 7.8 psi/min during the SGTR transient.

3.0 CONCLUSION

Based on the above, the staff concludes that the APSS design of Waterford 3 could satisfy its safety-related design function of SGTR mitigation with a single failure of a charging loop isolation valve.

With regard to the depressurization capability for plant cooldown relative to the requirements of BTP RSB 5-1, the licensee stated in its letter dated March 11, 1986 that the depressurization rate inherent in the Waterford plant cooldown analysis was less than 5 psi/min. Based on the ratio between the RCS depressurization rate and the initial RCS pressure developed from Table 6-3 of CEN-259, the staff again estimated a minimum RCS depressurization rate of 18 psi/min that could be achieved by the Waterfored design assuming the average initial RCS pressure of 1300 psia. This depressurization capability is much greater than the required RCS depressurization rate assumed in the Waterford cooldown analysis documented in the FSAR. Therefore, the staff concluded that the APSS design of Waterford 3 could satisfy the requirements of BTP RSB 5-1 with the single failure of a charging loop isolation valve.

Based on the above evaluation, the staff concludes that the licensee's responses have satisfied Paragraph 2.C.12 of Facility Operating License NPF-38.