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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO CONTROL SYSTEM SINGLE FAILURE STUDY

LOUISIANA POWER AND LIGHT COMPANY

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 BACKGROUND

In SSER #1 Section 7.7 and SSER #8 Section 7.7.6 the staff requested that the licensee conduct a review to identify any power sources or sensors which provide power or signals to two or more control systems and to demonstrate that failures or malfunctions of these power sources or sensors will not result in consequences outside the bounds of the Chapter 15 analysis or beyond the capability of operations of safety systems.

The licensee submitted the Control Systems Single Failure Study for staff review and approval July 2, 1986. In response to staff questions, the licensee submitted additional information on April 28, 1987 and July 8, 1987.

2.0 DISCUSSSION AND EVALUATION

The Waterford Control Systems Single Failure Study documented the analysis of postulated failures on any single power source, sensor or impulse line to determine if any such failure could cause multiple control systems malfunctions that may lead to transients not bounded by the FSAR Chapter 15 analyses. The licensee concluded that all single power sources, sensor, or impulse line failures result in plant conditions that are clearly bounded by the existing FSAR Chapter 15 analyses. An independent review performed for the staff examined the fault trees and system analyses and concluded that there were no single failures which had not been included in the results of the single failure study. The staff reviewed the analyses of the licensee identified single failures and found in all cases that the postulated failures were bounded by the Chapter 15 analyses. Single failures caused by operator action were not included in the scope of the request or the study.

The systems included in the study and review are the Control Element Drive Mechanism Control System (CEDMCS), the Reactor Power Cutback System (RPCS), the Pressurizer Level Control System (PLCS), the Pressurizer Pressure Control System (PPCS), the System Bypass Control System (SBCS), the Feedwater Control System (FWCS), the Reactor Regulating System (RRS), the Turbine Control System (TCS), the Main Steam Atmospheric Dump Valve Control System (MSADVCS), the Chemical and Volume Control System (CVCS), the Plant Protection System (PPS), the Instrument Air System (IAS) and the Electric Power Distribution System (EPDS).

Several of the postulated single failures in the PLCS were documented in the study as potentially causing damage to the pressurizer heaters. The pressurizer heaters at Waterford Unit 3 are non safety related equipment and therefore are not relied upon to support any cooldown capability for any Chapter 15 analyzed events. Damage to safety equipment from a moderate frequency event would be unacceptable but since the only damage does not constitute a safety issue either directly or indirectly (challenge to a safety system) it is acceptable. Damage to the pressurizer heaters could delay restart of the reactor following a moderate frequency event.

3.0 CONCLUSION

The staff concurrs with the findings of the licensee's study that no single failure of power source, sensors or impulse lines could cause multiple control systems malfunctions that may lead to transients not bounded by the FSAR Chapter 15 analyses. The staff finds that the open issue of SSER #1 section 7.7 and SSER #8 section 7.7.6 has been adequately addressed by the licensee and therefore those items are considered closed.

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Dated: July 21, 1988