



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO NATURAL CIRCULATION COOLDOWN

FACILITY OPERATING LICENSE NO. NPF-38

WATERFORD STEAM ELECTRIC STATION, UNIT 3

LOUISIANA POWER AND LIGHT COMPANY

DOCKET NO. 50-382

1.0 INTRODUCTION

Branch Technical Position RSB 5-1 (BTP RSB 5-1), "Design Requirements of the Residual Heat Removal (RHR) System", requires that test programs for PWRs shall include tests with supporting analysis to (a) confirm that adequate mixing of borated water added prior to or during cooldown can be achieved under natural circulation conditions and permit estimation of the times required to achieve such mixing, and (b) confirm that the cooldown under natural circulation conditions can be achieved within the limits specified in the emergency operating procedures. In addition, the plant design is to be such that the reactor can be taken from normal operating conditions to cold shutdown using only safety-grade systems. Comparison with performance of previously tested plants of similar design may be substituted for these tests.

In Supplement 5 to NUREG-0787, "Safety Evaluation Report related to the operation of Waterford Steam Electric Station, Unit No. 3", it was noted that the licensee had referenced the boron mixing tests to be performed at San Onofre Nuclear Generating Station, Unit 2 (SONGS). This was found acceptable. The licensee, however, was required to review the SONGS tests and demonstrate the acceptability and applicability of the results to the Waterford 3 plant.

In Supplement 1 it was stated that in the original SER, to place the plant into shutdown cooling, an operator had to leave the control room to close the safety injection tank (SIT) isolation valves and prevent injection during depressurization. It was the staff's position that the plant be capable of being placed into shutdown cooling with no need for an operator to leave the control room. In response to staff question 211.94, the licensee demonstrated that the SITs can be depressurized and the plant placed into shutdown cooling through the use of the SIT vent valves. The vent valves can be operated from the control room and the issue of an operator leaving the control room during shutdown cooling was satisfactorily resolved.

In NUREG-0712, "Safety Evaluation Report for San Onofre, Units 2 and 3", that licensee was required to perform a natural circulation test at SONGS 2 to demonstrate compliance with BTP RSB 5-1. SONGS 2 natural circulation cooldown testing was performed on July 27, 1983. The shutdown cooling system testing for SONGS 3 was performed on September 16 and 17, 1985. The staff was assisted by its contractor, Brookhaven National Laboratory (BNL) in evaluation of the natural circulation cooldown test and the remote initiation of shutdown cooling test which were performed. The results of that review were given in a Technical Evaluation Report (TER). The staff on January 25, 1988 provided a review of the SONGS TER which concluded that SONGS 2 & 3 has demonstrated full compliance with the requirements of BTP RSB 5-1.

By letter dated February 29, 1984, the licensee for Waterford 3 submitted a copy of the report CEN-259 which evaluates the SONGS natural circulation cooldown test. The licensee stated that the report provides an evaluation of the acceptability and applicability of the cooldown results to Waterford 3. By letter dated July 7, 1987, LP&L provided additional information for our review.

2.0 EVALUATION

The staff was assisted by its contractor, BNL in the evaluation of Waterford 3 with regard to conforming to BTP RSB 5-1. The applicability of the SONGS test results to Waterford 3 depends on their similarity. The results of that review is given in the attached TER. BNL stated that these units are virtually identical and that the conclusions developed for SONGS on the test results appear to apply to Waterford 3 with the exception of the supplies of cooling water and nitrogen. With regard to these items at Waterford 3 the following was stated:

Cooling water - The supply of safety grade cooling water is much greater than the maximum estimated usage for a prolonged upper head cooling period.

Nitrogen - The supply of safety grade nitrogen for the atmospheric dump valves (ADVs) is not quite sufficient for the longest possible cooldown period. However, the ADVs are manually operable via handwheels.

BNL also stated that the capability to cooldown to cold shutdown condition, from shutdown cooling system (SCS) entry conditions had not been evaluated, but based on SONGS 3 testing, would be prolonged. However, since the SCS has an unlimited heat sink no safety concerns are expected to arise due to the prolonged operation.

BNL further concluded that the RCS could be depressurized to the SCS initiation pressure. However, without letdown or pressurizer heaters, pressure control could be difficult and a strategy to depressurize utilizing the reactor head vents may have to be considered.

With respect to a strategy for depressurization, the licensee should review the TER and consider the need to include the use of the reactor head vents as a supplementary method of cooldown. This backup depressurization method would be an appropriate alternative in the emergency operating procedures. The licensee's position on RCS depressurization, however, is acceptable.

3.0 SUMMARY

The major conclusion of the TER is that Waterford 3 is in compliance with the requirements with BTP RSB 5-1 with the exception of demonstrating remote initiation of the SCS.

We find that the remote SCS demonstration is not required, since it was addressed, and found acceptable in the Supplement 1 to the original SER. With the items discussed above, we are in agreement with the BNL conclusions. We therefore conclude that Waterford 3 has demonstrated conformance with BTP RSB 5-1.

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Date: April 8, 1988

Attachment:
TER