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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Subject: Docket No. 50-206
ATWS Mitigation System: ATWS Rule, 10 CFR 50.62
San Onofre Nuclear Generating Station, Unit 1

This letter provides information you requested in a letter dated February 13, 1990, to ensure the SONGS 1 ATWS Mitigation System satisfies the intent of the ATWS rule, 10 CFR 50.62. The requested information consisted of (1) the results of the Westinghouse site-specific analysis to establish the auxiliary feedwater (AFW) flow requirements, and (2) identification of generic design assumptions relative to the ATWS rule that do not apply to SONGS 1 and our resolution of any discrepancies. We are also providing an updated design description of the diverse turbine trip (DTT) circuitry.

SONGS 1 Plant-Specific Analyses Results

Enclosure 1 provides the plant-specific ATWS analyses performed by Westinghouse for the three reactor coolant system (RCS) pressure limiting events to establish the acceptability of the SONGS 1 ATWS Mitigation System. These transients were the loss of normal feedwater without scram (LONF/ATWS), loss of offsite power without scram (LOP/ATWS), and loss of load without scram (LOL/ATWS). The limiting ATWS transient was LONF/ATWS with nominal average RCS temperature. The limiting peak pressure in the LONF/ATWS was less than the RCS allowable pressure.

Since the ATWS rule requires a diverse and independent AFW system from the Reactor Protection System (RPS), the LOP/ATWS event was analyzed both with and without AFW flow. In the event of the Loss of Offsite Power, the motor-driven Train B AFWS pump, G-10W, is not automatically initiated because the diesel generators do not automatically re-energize the 4160 volt and 480 volt buses. The turbine-driven pump, G-10, would actuate following a three-minute warmup cycle after the receipt of an actuation signal. However, the control power for G-10 is on Train A, which also powers the RPS. Since the rule requires a diverse and independent AFW actuation, the analysis conservatively assumed no AFW flow for one of the LOP/ATWS cases. The results show that the peak RCS pressure is the same for the LOP/ATWS with and without AFW flow.

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Generic Design Assumptions Not Applicable to SONGS 1

We have identified in Enclosure 2 generic plant design features and analyses assumptions relative to the ATWS rule that are not applicable to SONGS 1. The SONGS 1 design features which differ from the generic plant consist of:

- lower auxiliary feedwater flow,
- coastdown of reactor coolant pumps (RCPs) following a turbine trip in contrast to continuous operation of RCPs in generic plants, and
- 5% main feedwater flow in the LOL/ATWS case in contrast to zero main feedwater flow for all ATWS events in generic plants.

The analyses assumptions which differ from the generic analyses assumptions are:

- no steam dump,
- no heat transfer for uncovered steam generator tubes, and
- plant-specific reactivity feedback.

These differences were included in the plant-specific analyses discussed in Enclosure 1.

Further, we determined that: (1) the generic ATWS acceptance criterion for the allowable RCS pressure of 3,200 psig was not applicable since SONGS 1 was designed to ASME Code Section VIII rather than ASME Code Section III; and (2) additional plant-specific analyses are necessary for certain potential DNBR limiting ATWS events. These issues are addressed as follows.

1. Results of Stress Analyses to Establish Acceptance

Westinghouse performed a conservative RCS pressure boundary evaluation to show all RCS components are acceptable for the peak pressure condition in the limiting ATWS event. The evaluation identified a sample line and the reactor coolant pumps (RCPs) with allowable pressures less than the peak RCS pressure in the limiting ATWS event. A stress calculation for the sample line piping and a further evaluation of the RCPs were necessary to demonstrate these components were acceptable assuming the most limiting ATWS pressure. The allowable pressures for all other RCS components were greater than the peak RCS pressure in the limiting event. The Westinghouse evaluations are discussed in Enclosure 3.

2. DNBR Analyses

We indicated in our letter dated May 2, 1990, that additional Westinghouse plant-specific analyses are necessary for certain potential DNBR limiting ATWS events to confirm that SONGS 1 ATWS response is



acceptable with respect to DNBR. In all cases presented in Enclosure 1, the ATWS analysis code, LOFTRAN, predicted the onset of bulk boiling in the RCS after the peak pressure occurs due to the low auxiliary feedwater flow rate. The LOFTRAN results after the onset of bulk boiling may not be valid, since LOFTRAN allows limited boiling only in the hot leg. Since the peak RCS pressures occurred before any significant boiling in the RCS, the peak RCS pressure results are considered valid for demonstrating the adequacy of the DTT response time and AFW flow.

Additional analyses will be required to address potential DNB as a result of the predicted saturation conditions in the RCS. The additional effort to analyze DNBR limiting ATWS events for SONGS 1 may result in modifications beyond the requirements of the rule for Westinghouse plants. Our letter dated October 2, 1989, which identified the schedule for completion of the Full Term Operating License (FTOL) open items, did not include this additional ATWS work. We will, of course, complete installation of the DTT during the Cycle 11 outage satisfying our existing commitments.

These Cycle 11 modifications do provide significant improvement in the ATWS response capability, although the specific requirements of the rule for Westinghouse plants to add the DTT and diverse AFW may not be sufficient for SONGS 1. Since the DNBR analyses and potential modifications were not anticipated, we believe an independent schedule for this additional effort is necessary. Based on the current Cycle 11 and Cycle 12 FTOL schedules and associated workloads, we will complete the additional ATWS analysis prior to restart from the Cycle 12 refueling outage and complete any necessary modifications before the restart from the Cycle 13 refueling outage.

Description of Redesign of SONGS 1 Diverse Turbine Trip Circuitry

We indicated in our March 26, 1990, letter that Consolidated Controls Corporation (CCC) relays were no longer required as a result of redesigning the diverse turbine trip (DTT) circuitry. In the preliminary design, the DTT circuitry was designated to be safety-related (SR/ATWS), though not required by the ATWS rule, and used the CCC relays as isolation devices.

We have since redesigned the DTT circuitry to be nonsafety-related (NSR/ATWS) consistent with the ATWS rule and eliminated the CCC relays. Enclosure 4 provides a description of the ATWS Mitigation System, logic diagrams, and an elementary of the DTT circuitry.



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Conclusion

The ATWS Mitigation System consists of automatic actuation of Train B Auxiliary Feedwater System and diverse turbine trip that are independent from the Reactor Protection System. In addition, by installation of the DTT circuitry during the Cycle 11 outage, we will comply with the schedule of the FTOL work order published in the NRC letter dated January 2, 1990, "Order Confirming Licensee Commitments on Full-Term Operating License Open Items." Plant-specific analyses have shown that the resulting peak pressures for all ATWS cases were less than the RCS allowable pressure. We will complete the additional ATWS analysis to determine if DNBR is a concern for any ATWS events prior to restart from the Cycle 12 refueling outage and complete any necessary modifications before the restart from the Cycle 13 refueling outage.

If you have any questions regarding this issue, please let me know.

Sincerely,

Enclosures

cc: J. B. Martin, Regional Administrator, NRC Region V
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3