



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REGARDING PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS 4.2.1 AND 4.2.3
SOUTHERN CALIFORNIA EDISON COMPANY AND SAN DIEGO GAS AND ELECTRIC COMPANY
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-206

1.0 INTRODUCTION

By letter dated November 21, 1985, as supplemented on June 25, 1986, Southern California Edison Company, et al. (the licensees) for San Onofre Nuclear Generating Station, Unit No. 1 (SONGS-1), submitted Proposed Change Number 156 to the SONGS-1 Technical Specifications (TS).

Proposed Change Number 156 would delete interim TS 4.2.3, "Safety Injection Hydraulic Valve Testing," which has already expired, and revise TS 4.2.1, "Safety Injection and Containment Spray System Periodic Testing."

2.0 BACKGROUND

Section 4.2.3 of the SONGS-1 TS included provisions for interim surveillance of the Safety Injection System (SIS). The surveillance program was instituted in order to verify the adequacy of the modifications made to the SIS as part of the interim solution to the September 3, 1981 failure of the SIS. The interim surveillance program required plant shutdown every 92 days in order to verify proper system operability of the modified SIS.

The licensees proposed a three phase solution to the September 3, 1981 failure. The interim solution (Phase 1) included venting the pressure in the valve body cavities and tripping the feedwater pumps upon receipt of a safety injection signal and then restarting the pumps after an eleven second delay. The trip/restart of the feedwater pumps allows for rapid pressure decay across the valves thus reducing the potential for excessive drag and galling. The second phase of the licensees' proposed solution was to replace both the valves and valve actuators of the 851, 852, 853, and 854 valves. The redesigned valves would eliminate the undesirable tripping/restarting of the feedwater pumps which forms the basis of the interim solution. Finally, for Phase 3 the licensees committed to perform an in-depth reevaluation of the entire safety injection system design.

A Safety Evaluation (SE) addressing the interim surveillance testing program, and other interim (Phase 1) modifications to the SIS was issued by letter dated November 5, 1981 from D.M. Crutchfield (NRC) to R. Dietch (SCE). That SE concluded that the proposed program, schedule, system modifications, and Technical Specifications were acceptable. That SE stated that upon completion of the fuel cycle which began in June 1981,

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the licensees should propose a long-term surveillance program for NRC approval. Due to a prolonged plant shutdown from February 1982 until November 1984, this fuel cycle did not end until November 1985. The licensees submitted the long-term program on November 21, 1985. On September 17, 1986, the NRC advised the licensees that although the staff's review of the long-term program was still ongoing, the 92 day surveillance test was not required since Interim Technical Specification 4.2.3 had expired with the completion of the last fuel cycle.

Phases 2 and 3 of the above program were subsequently modified by additional correspondence between SCE and NRC. On March 29, 1984, the NRC approved SCE's proposal to cancel the order for the Phase 2 replacement valves since the Phase 3 redesign analysis had resulted in the commitment to install a dedicated feedwater system. This modification would allow the existing system to be dedicated to the safety injection function so that SIS operability would not depend on the operation of the hydraulic valves. However, by submittals dated October 14, 1986 and December 22, 1986 the licensees stated that recent cost-benefit analyses had shown that installation of the new feedwater system could not be justified. The NRC's staff review of this position is ongoing.

Proposed Changes to Technical Specifications

The long-term surveillance program submitted by the licensee on November 21, 1985 did not include any hot function testing under operational conditions similar to the test conditions during the interim surveillance program. The interim surveillance test included measuring system pressures in order to calculate the forces required to open valves HV-851A and HV-851B and then determining the margin to available actuator force after the valve has been allowed to "set" in place. The "set" phenomenon results from the valve remaining closed against a high differential pressure and temperature. The frequency of this interim test was set at every 92 days. The plant was placed in Mode 3 or 4, and the Hot Functional SIS test was performed in order to meet the requirements of TS 4.2.3.

As a long-term replacement for the interim program carried out during Fuel Cycle VIII, the licensees have proposed surveillance testing of the SIS as a revision to TS 4.2.1. The proposed test only verifies the actuation of HV-851A and HV-851B under no-flow (non-operational) conditions in a required time of 3 to 5 seconds. The test is to be performed at refueling outage intervals while the plant is in Mode 5 (cold shutdown).

Basis for Proposed Changes

The licensees state that the results of six functional tests of the SIS, obtained over a four-year period, demonstrate that the causes of failure to

open of HV-851A and HV-851B experienced on September 3, 1981, have been adequately corrected. The required actuator opening forces were calculated based on a measurement of internal valve pressure and the upstream and downstream pressures. The test results show that the calculated opening forces never exceeded 21.8% of the available actuator force, and the average contact stresses were at most 42.2% below the galling threshold.

Based on these results, the licensees conclude that the modifications made to the components and to the system operation of the SIS have successfully remedied the causes that led to the operational failures of HV-851A and HV-851B. The licensees further conclude that additional functional tests of the SIS during power operation are not warranted and a verification that the above valves are capable of actuation under no-load, no-flow conditions is recommended as the long-term surveillance program.

3.0 EVALUATION

The interim surveillance tests which have been performed during the past four years demonstrate that after a three month set, valves HV-851A and HV-851B are capable of opening under actual operating conditions. The conclusion that the problems have been corrected, and that additional functional tests during power operation are not needed, is based on analysis and test data obtained at relatively short three month intervals.

The licensees have attempted a quantification of the force margin and contact stress margin available after a three month interval; however, these valves could remain closed under operational forces for as long as the entire fuel cycle. The force margin and contact stress margin available after 18 months could be much less than was calculated after three months. The information presented in the licensees' letter dated June 25, 1986, and in previous submittals does not address effects of long-term set on these valves. It is not clear that a test at 18 months under no-flow conditions could provide an adequate basis for determining the ability of the valves to function under operating conditions. The elimination of all testing under operational forces, lacking any hard evidence of proper valve operability after long-term set for periods of greater than three months, cannot be supported by the NRC staff.

4.0 CONCLUSION

The staff concludes that the licensees must continue to perform surveillance tests similar to those specified in interim TS 4.2.3. The intent of the test is to assure valve operability after long-term set and under operating conditions. Accordingly, the test is required to be performed upon reaching Mode 3 or 4 when the plant is coming down from power prior to entering cold shutdown. In cases of frequent cold shutdowns the test is not required to be performed more often than every nine months. If a cold shutdown does not occur within a fuel cycle, the test is to be performed while coming down from power for the normal refueling interval surveillance tests. The licensees must also establish and propose appropriate acceptance criteria for these hot functional tests.

As noted Section in 2.0, the staff is currently evaluating the licensees' proposed permanent solution to the SIS problem. The results of that evaluation and any impact it may have on these SIS valve tests will be addressed by separate correspondence.

5.0 ACKNOWLEDGEMENTS:

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