Southern California Edison Company

23 PARKER STREET

IRVINE, CALIFORNIA 92718

January 3, 1991

F. R. NANDY
MANAGER, NUCLEAR LICENSING

TELEPHONE
(714) 454-4504

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

Gentlemen:

Subject: **Docket No. 50-206**
Inservice Testing of Auxiliary Feedwater Pumps G10 and G10S
San Onofre Nuclear Generating Station, Unit 1

This letter requests your approval of certain changes to the inservice testing (IST) program for pumps at San Onofre Unit 1. These changes affect the testing of the steam-driven auxiliary feedwater (AFW) pump G10 and are described in the enclosed pump relief request (PRR) No. 6. They have been discussed by telephone with our former NRC project manager, Mr. J. E. Tatum.

Since pump G10 must complete its required testing and be in operable status when Unit 1 resumes operation at the end of this outage, we request your approval of the enclosed PRR No. 6 by January 30, 1991.

Background

Section XI of the ASME Code requires flowrate through safety-related pumps to be measured once every three months. Generic Letter 89-04 requires the measurement to be taken at full flow or substantial flow. The AFW pumps G10, G10S and G10W have been classified as safety-related pumps in the IST program. G10W was recently installed and has provisions for measuring flow. Pumps G10 and G10S are original plant equipment and have no provisions for measuring flow.

The only path through pumps G10 and G10S that has flow metering capabilities to satisfy Section XI requirements as interpreted by Generic Letter 89-04 is the emergency discharge path. The minimum flow recirculation lines for these pumps do not have a flow meter and are also not designed for the rated flow. In the past, we did not consider it advisable to conduct a quarterly substantial flow test on these pumps using the emergency path because of a potential for thermal shock to the AFW to main feedwater transition nozzle and the steam generator nozzles. Because of this concern, substantial flow testing using the emergency path has been conducted only during or following Mode 5 outages that last more than 30 days, unless the pump has been tested during the previous 18 months. For each test, the pump flow rate and differential pressure are measured, recorded and trended at the rated speed. For pump G10S, which is motor-driven, this test is conducted in Mode 5. For pump G10, which is steam-driven, it has been found necessary to do the test

A047
1/1

in Mode 1, since required steam is not available in Modes 3, 4 and 5. In addition, both pumps are tested once every month on minimum flow, except that flow measurements cannot be taken. The tests just described are in addition to the various periodic tests required by Section 4.1.9 of the Technical Specifications (TS). These TS tests are designed to ensure the reliability of the AFW system, including the pumps.

NRC Safety Evaluation of Previous Revision of PRR No. 6

On November 30, 1989, we submitted Revision 3 to PRR No. 6 as part of our response to Generic Letter 89-04. The PRR covered IST for the AFW pumps G10 and G10S, the two safety injection pumps and the two refueling water pumps. The PRR proposed doing the substantial flow test on both pumps G10 and G10S in Modes 3, 4 or 5. The PRR did not propose, as it should have, that substantial flow testing of pump G10 be conducted in Mode 1 as opposed to any of the other modes.

On May 18, 1990, the NRC issued its safety evaluation concerning PRR No 6, as applicable to the two AFW pumps. The safety evaluation approved Mode 3, 4 or 5 testing for these pumps but increased the test frequency by requiring that the flow test be conducted during each Mode 3, 4 or 5 entry following power operation unless the test has been performed during the previous 90 days.

SCE's Re-evaluation of AFW Pump Testing

As the result of evaluating the increased test frequency specified in your safety evaluation, we have concluded that this increased frequency is acceptable. It represents a good compromise between the reduced test frequency proposed in our November 30, 1989, submittal and the quarterly test frequency required by the ASME Code. Stress analyses demonstrate the capability of the piping system to withstand thermal shock and the number of thermal cycles anticipated through the life of the plant. Notwithstanding this capability, quarterly substantial flow testing of the AFW pumps remains undesirable from the point of view of minimizing the incidence of thermohydraulic transients in the feedwater lines. An increased propensity for these transients is created by the introduction of subcooled water into the AFW System during pump testing. Consequently, the test frequency for pump G10 should be that specified in your safety evaluation.

We have also concluded that the substantial flow test on the steam driven pump G10 should be conducted in Mode 1 at about 20% reactor power instead of Mode 3. (The enclosed PRR discusses this conclusion in more detail.)

Proposed Alternate Testing

Pump G10 will be tested as described in the enclosed PRR. The PRR testing differs from that specified in your safety evaluation in the following respects:

- Substantial flow testing will be conducted in Mode 1 at about 20% reactor power, instead of Mode 3, 4 or 5.

- The interval for substantial flow testing will be before or during return from each Mode 3, 4 or 5 entry following power operation unless this testing has been performed during the previous 92 days (rather than 90 days as indicated in your Safety Evaluation Report).

On September 28, 1990, we discussed the above changes with Mr. J. E. Tatum, our NRC project manager at that time. As the result of that discussion, the safety injection pumps and the refueling water pumps are no longer addressed in PRR No. 6. These pumps have been addressed separately in our letter to you dated October 29, 1990.

We request your approval of the enclosed PRR by January 30, 1991, to support SONGS 1 restart as currently scheduled. As requested in your May 18, 1990, letter forwarding the safety evaluation, we will notify you within 30 days of revising our IST program after your approval of this PRR has been received.

If you have any questions, please call me.

Very truly yours,

J. Rainsberry / for F. R. Dandy

Enclosure

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

PUMP RELIEF REQUEST NO. 6

Enclosure

Revision 4
(12/90)

SYSTEM: Auxiliary Feedwater (AFW) System

COMPONENT: Steam Driven AFW Pump G10
(AFW pump G10W complies with the ASME Code Section XI testing requirements. AFW pump G10S is covered by an approved relief request.)

CLASS: 3[1]

FUNCTION: To provide feedwater to the steam generators during various accident conditions.

TEST REQUIREMENT:

Article IWP-3000 of ASME Code Section XI, requires pump flow rate to be measured every three months as part of periodic inservice testing (IST) during normal plant operation.

BASIS FOR RELIEF:

Pump G10 is designed such that no satisfactory path exists for the measurement of flow through the pump on a quarterly basis. As provided in Paragraph IWP-1400 of Section XI of the ASME Code, a bypass loop consisting of the miniflow return line is used for periodic inservice testing. Although this test loop does not have flow measuring provisions, it has a fixed resistance. During normal plant operation, the operational readiness of the pump is verified by monitoring pump differential pressure along with vibration and comparing these parameters with the reference values. This is consistent with Paragraph IWP-3100 of ASME Code Section XI, which allows the use of differential pressure as the reference value for inservice testing.

Generic Letter 89-04 (Reference A below) requires that the pump be tested as much as practical under full or substantial flow conditions. To satisfy this requirement, alternate paths that might permit substantial flow testing were investigated. These alternate paths are discussed below.

Alternate 1

The first alternate test path exists from pump G-10 to the steam generators. Referring to P&ID 5178220 (copy attached), this path is through manual valve S1-AFW-346 and ties into the main feedwater line upstream of the first point heater. This line has no instrumentation to measure flow. It is also not suitable for substantial flow testing, as explained below:

---

[1] The previous revisions to this relief request incorrectly described pumps G10 and G10S, as Class 2. Actually all three AFW pumps are Class 3.

The AFW system design bases limit the flow to each steam generator to less than 150 gpm to minimize the potential for water hammer upon automatic AFW system actuation with a drained steam generator feedring. To implement this limit without relying on operator action, flow limiting venturis were installed in the emergency discharge path to the steam generators during the Cycle 10 refueling outage. However, there are no flow limiting venturis in the test path through the first point heater. Therefore, although the feedring is not expected to be uncovered during substantial flow testing, the injection of subcooled water into the system would create an increased propensity for undesirable thermohydraulic transients if this path were used to conduct the test.

Alternate 2

The second alternate path investigated is the emergency discharge path. This path permits a substantial flow test and is equipped with a flow meter. Stress analyses have been performed which demonstrate the ability of the piping system to withstand thermal shock and the number of thermal cycles anticipated through the life of the plant. However, it is not desirable to test the pump every quarter at substantial flow using this path since this would significantly increase the incidence of thermohydraulic transients in the feedwater lines as discussed under Alternate 1. Performing the substantial flow test at the reduced frequency required by the safety evaluation (see "Alternate Testing"), is acceptable.

ALTERNATE TESTING:

Generic Letter 89-04 (see Reference A below) provides guidance on developing acceptable inservice testing programs for pumps and valves. Position 9 in Attachment 1 of this generic letter states:

> "Certain safety-related systems are designed such that the minimum-flow return lines are the only flow paths that can be utilized for quarterly pump testing. Furthermore, some of these systems, do not have any flow path that can be utilized for pump testing during any plant operating mode except the minimum-flow return lines. In these cases, pumping through the path designed for fulfilling the intended system safety function could result in damage to plant equipment. Minimum-flow lines are not designed for pump testing purposes and few have installed flow measuring devices."
>
> "In cases where flow can only be established through a non-instrumented minimum-flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the staff has determined that the increased interval is an acceptable alternative to the Code requirements provided that pump differential pressure, flow rate, and bearing vibration are taken during this testing and that quarterly testing also measuring at least pump differential pressure and vibration is continued."

Using this guidance, the only suitable path for substantial flow testing of pump G10 is the emergency discharge path. To minimize the propensity for thermohydraulic transients, this test should be conducted at the frequency stated in the NRC's safety evaluation (Reference B below).

Substantial flow testing of Pump G10S should only be conducted in Mode 1. Pump operation at this flow creates a considerable steam demand on the secondary side of the steam generators. Because of this steam demand, the pump cannot be tested in Modes 4 and 5. If the testing is performed in Mode 3, then the steam demand, in addition to the introduction of cold feedwater from the AFW tank into the steam generators, makes control of RCS temperature and steam generator level difficult. As discussed earlier in Reference C, pump operation in Mode 1 at 15% to 20% reactor power level is optimal for conducting the test. The reactor is then in a stable condition and the plant automatic control systems can quickly respond to sudden changes in AFW flow.

Based on the above, the following alternate testing is proposed for pump G10:

1. Test the pump once every quarter, i.e., once every 92 days, on minimum-flow in accordance with ASME Code Section XI requirements (except for the measurement of flow rate) whenever the pump is required to be operable by the plant Technical Specifications.

2. Test the pump at substantial flow conditions in Mode 1 (at about 20% reactor power) before or during return from each Mode 3, 4 or 5 entry following power operation unless this testing has been performed during the previous 92 days. This test will be conducted using the emergency path. It will serve to provide additional assurance of pump operability before the plant resumes its normal power.

Item 2 deviates from the test method given in the NRC's safety evaluation in two respects. The proposed test mode is Mode 1 instead of Mode 3, 4 or 5 and the proposed test frequency is once every 92 days instead of once every 90 days.

NOTE: A quarterly test interval of 92 days is currently used throughout the IST Programs for SONGS Units 1, 2 and 3 as well as all other quarterly surveillances at the Site. This interval is consistent with the definition of a "quarter" in the Technical Specifications, Section 1.0, Definitions, Table 1.1, Frequency Notation. The difference between 92 days and 90 days (specified in the NRC's Safety Evaluation) is insignificant for surveillance purposes. Also, paragraph IWP-3400 of the ASME Code requires the pump inservice test to be conducted "nominally every 3 months".

APPROVAL STATUS:

In accordance with Reference D below, this relief request requires NRC approval prior to implementation. NRC approval is requested by January 30, 1991, so that the proposed flow testing of pump G10 may be completed prior to plant resumption of full power.

REFERENCES:

A. NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, April 3, 1989

B. Letter, James E. Tatum (NRC) to Harold B. Ray (SCE), Inservice Testing Pump Relief Request No. 6, San Onofre Nuclear Generating Station, Unit No. 1 (TAC No. 74792), May 18, 1990 and its enclosed NRC Safety Evaluation Report (SER)

C. Attachment 4 of SCE to NRC letter dated August 22, 1990, Supplement to Amendment Application No. 185.

D. NRC's Minutes of the Public Meetings on Generic Letter 89-04, October 25, 1989.

NRC-PRR6.AA2

OVERSIZE DOCUMENT PAGE PULLED

SEE APERTURE CARDS

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARDS 1

APERTURE CARD/HARD COPY AVAILABLE FROM

RECORDS AND REPORTS MANAGEMENT BRANCH