Southern California Edison Company

23 PARKER STREET

IRVINE, CALIFORNIA 92718

F. R. NANDY
MANAGER, NUCLEAR LICENSING

July 23, 1990

TELEPHONE
(714) 587-5400

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

Gentlemen:

Subject: **Docket No. 50-206**
**Additional Information Regarding**
**Reactor Coolant Pump Trip Requirements**
**San Onofre Nuclear Generating Station Unit 1**

References: A) Letter, Charles M. Trammell, NRC, to Harold B. Ray, SCE, dated August 30, 1989
B) Letter, F.R. Nandy, SCE, to NRC, dated November 16, 1989
C) Letter, M.O. Medford, SCE, to NRC, dated January 21, 1986
D) Letter, M.O. Medford, SCE, to NRC, dated October 10, 1985

This letter is intended to clarify the record regarding the Reactor Coolant Pump (RCP) trip function. The RCP trip function was installed as an interim post-TMI modification. Subsequently, an analysis was performed in response to regulatory guidance which showed the trip was not required for SONGS 1. We had planed to remove the trip function to restore the original plant configuration and had received a Safety Evaluation Report (SER) (Reference A) approving removal of the trip. During our detailed engineering review of the proposed modification we found it was beneficial to retain the trip, and notified the NRC in our letter of November, 1989 (Reference B).

Background

The RCP trip on actuation of Safety Injection (SI), was installed in 1980 as an interim modification. The RCP trip satisfied a post-TMI concern to prevent continued RCP operation during accident conditions. It was recognized at the time that this may not have been the ideal solution for all facilities. Consequently, Generic Letter (GL) No. 83-10D, "Resolution of TMI Action Item II.K.3.5, Automatic Trip of Reactor Coolant Pumps," dated February 8, 1983, recommended development of plant specific guidance for RCP operation. We performed an analysis of SONGS 1 which demonstrated an acceptable primary system response to the considered accident conditions regardless of the RCP status. We advised the NRC of the results of the analysis and our intent at that time to remove the RCP trip function (References C and D). The NRC staff then issued an SER approving the removal of the RCP trip function (Reference A).



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The generic letter and post-TMI requirements for the operation of the RCPs were issued to assure core parameters were adequately maintained during accident conditions. The focus of the analysis and review process, conducted in the period of the early 1980s, was the primary system. Therefore, the effect of the trip function on other plant systems was not considered. As part of our design review process in preparing the design change for removal of the trip circuitry, we assessed the effect the change would have on the electrical system. We determined that the continued operation of the RCPs would affect the auxiliary electrical system during the time safeguards components are being loaded, under certain conditions discussed below. Although the operation of the auxiliary electrical system under these conditions is acceptable, it is preferable to retain the trip function.

Operation of the RCP Trip Function

The RCPs are normally powered from the output of the main generator. Following a reactor trip the generator output voltage decreases and the undervoltage relays open the RCP circuit breakers. The RCP trip function, therefore, is not needed to ensure the RCPs will trip during power operating conditions. During start-up or shutdown operation, when the RCPs are not aligned to the main generator, the RCPs are powered from offsite power. Under this alignment the RCP trip function automatically opens the circuit breakers on a safety injection signal.

Discussion

In our review of the design change to remove the RCP trip function, we concluded that the RCP trip function is beneficial during unit startup, or shutdown. Without the RCP trip, following a safety injection actuation, the RCPs would continue to operate at the same time the accident mitigation loads are being sequenced to the auxiliary electrical system. Continued operation of the RCPs would reduce the available margin in the auxiliary electrical system under these accident conditions; therefore, we have decided to leave the RCP trip function in place.

In order to credit the trip for accident conditions, we evaluated the trip design to determine if it meets the single failure criteria. We evaluated the consequences of a single failure of either the control power to the RCP breakers, or the common RCP trip lockout relay. These failures would render the RCP trip inoperable and result in continued operation of the RCPs during the safeguards loading sequence. Since the trip was determined not to meet the single failure criterion, we analyzed the plant electrical response without RCP trip during accident conditions as the design basis condition.

Our analysis utilized conservative assumptions regarding the source of offsite power, and operation of the auxiliary electrical system. A dynamic computer simulation of the auxiliary electrical system was performed for the existing three bus configuration. Following the current Cycle 11 refueling outage, the auxiliary electrical system will consist of four busses, which will improve the operation under degraded voltage conditions. Our analysis assumed the offsite power grid was degraded from 230 KV to 217.8 KV.

The results of the simulation demonstrated that all of the required safeguard motors and critical components operated within acceptable time periods. Additionally, the terminal voltage for the motors, except for a few, recovered to 90 percent of the rated value after starting. For those few motors that did not recover to 90 percent of the rated voltage, normal operator action to trip the RCPs or reduce loads within a few hours, or the eventual recovery of the grid voltage, would prevent motor loss of life due to reduced voltage conditions.

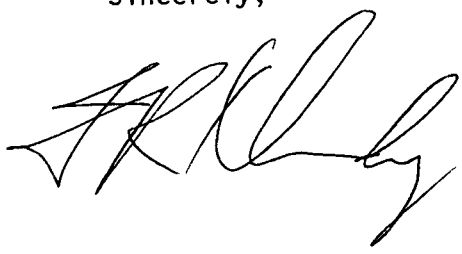
Although continued operation of the RCPs during a safeguards loading sequence is acceptable, the design margins in the electrical system during unit startup or shutdown would be reduced. As a result, we have decided to retain the RCP trip function because of the margin it provides for operation of the electrical systems during safeguards sequencing, but will not credit the trip for design calculations.

Summary

The RCP trip function was added following TMI. Analysis has since shown that the reactor coolant system response is not significantly affected by the operation or tripping of the pumps during design basis events requiring safety injection. While we had intended to remove the trip function during the upcoming Cycle 11 refueling outage, our design review of the auxiliary electrical system has demonstrated the trip increases the design margin of the electrical system. Therefore, we have decided to retain the RCP trip function. Because the RCP trip is not single failure proof, we will continue to conservatively assume continued operation of the RCPs in our safety analysis.

If you have any questions or require additional information, please contact me.

Sincerely,



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