Omaha Public Power District
1623 Harney Omaha, Nebraska 68102
402/536-4000

June 30, 1983
LIC-83-157

Mr. Robert A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Clark:

Resolution of TMI Action Plan Item
II.K.3.5, "Automatic Trip of Reactor
Coolant Pumps" (Generic Letter 83-10b)

Omaha Public Power District's response to the subject Generic Letter on April 25, 1983 stated that the District would provide a description of the Combustion Engineering Owners Group (CEOG) program and schedule of plant-specific activities. The attached response has been prepared by the CEOG and the District. The District endorses the CEOG program and will continue to work closely with this group on the reactor coolant pump trip issue until it is resolved. The District intends to complete all activities necessary to implement the described reactor coolant pump trip strategy prior to the startup of Cycle 9, which is currently scheduled for May of 1984. The District's implementation schedule is dependent upon the completion of the CEOG program by December 31, 1983.

Sincerely,

W. C. Jones
Division Manager
Production Operations

WCJ/TLP:jmm

Attachment

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20555

Mr. E. G. Tourigny, Project Manager
Mr. L. A. Yandell, Senior Resident
Inspector

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Program Description for Resolving
TMI Action Plan Item II.K.3.5 -
"Automatic Trip of Reactor Coolant Pumps"

INTRODUCTION

In accordance with NRC Guidelines and Criteria provided in Generic Letters No. 83-10a and 83-10b (see Reference 1), the C-E Owners Group (CEOG) has developed a program which will close out TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" for participating utilities. The "trip two/leave two" Reactor Coolant Pump (RCP) trip strategy has been identified in the past as the preferred approach and forms the basis for the program which is described in the following section. This trip strategy is described in Appendix A in more detail and consists of manually tripping two RCPs initially and later on manually tripping the remaining two RCPs at the time a LOCA has been diagnosed.

It is recognized that the evaluation of pertinent plant parameters might lead to a selection of setpoints which could result in tripping of the second two RCPs a short time after tripping the first two RCPs. In this case, the practical difference between a trip two/leave two and a trip four strategy might become small enough from an operational point of view to result in a reassessment of the trip two/leave two strategy after the determination of the trip setpoints is completed.

Regardless of what trip strategy will be implemented, the objective is to avoid tripping the RCPs for non-LOCA and steam generator tube rupture accidents and to provide the appropriate justifications for the adopted trip scheme.

DESCRIPTION OF PROGRAM

The program will provide information which both meets the NRC guidelines stated in Reference 1 and provides the operational requirements for participating utilities to use in developing emergency operating procedures and conducting training. The program consists of selection of RCP trip setpoints, justification of the manual RCP trip relative to the NRC Guidelines and Criteria in Reference 1, and development of information for use in implementing the trip two/leave two scheme into emergency operating procedures.

The basic approach in selecting and justifying the trip setpoints is to determine on the basis of Conservative Best Estimate (CBE) considerations for small break LOCA and non-LOCA events the setpoints for manually tripping the first two RCPs and for tripping the second two RCPs. Thereafter, on the basis of ECCS Evaluation Model (EM) considerations, compliance with 10CFR50.46 limits for the LOCA events will be evaluated. If the limits are exceeded, the possibility of requesting an exemption from specific requirements of 10CFR50.46 will be considered. In addition, compliance with draft ANSI Standard N660 will be demonstrated for LOCA events.

The use of conservative best estimate methods for the determination of the setpoints includes the assumption of availability of only one high pressure safety injection pump, a 1.0 factor on the ANS decay heat curve, homogeneous equilibrium break flow model, and a best estimate pump head degradation model from C-E/EPRI Pump Tests. The 2700 Mwt Reference Plant selected for this program will conservatively bound the core cooling performance of plants of other participating utilities (e.g., 3410 Mwt and System 80 classes). This CBE approach provides setpoints for tripping the first two RCPs for depressurization transients. The second setpoints are selected so that the second two RCPs will not be tripped for non-LOCA depressurization events but will be tripped for LOCAs.

Justification of manual RCP trip is performed relative to the criteria in 10CFR50.46 and the draft ANSI Standard N660. Using the ECCS Evaluation Model (EM), it will be determined whether the limits of 10CFR50.46 are met if the RCPs are tripped according to the selected setpoint scheme. The EM methods are based on Appendix K groundrules which include flowrate of only one HPSI pump, 1.2 factor on the ANS decay heat curve, and use of the Moody break flow model. Compliance with the draft ANSI standard will be demonstrated relative to the version ANS 58.8/ANSI N 660, Rev. 2 of March 1981.

The justification of the RCP trip setpoints assumes that Section II of the NRC Guidelines and Criteria of Reference 1, "Pump Operation Criteria Which Will Not Result in RCP Trip", does not apply to the trip two/leave two strategy because the strategy will result in tripping of all RCPs for LOCAs.

To support implementation of the trip two/leave two scheme into operator guidance, applicable items from the Guidance and Criteria in Reference 1 will be addressed, e.g., challenges to PORV, reactor vessel head voiding. In addition,

instrumentation capabilities needed for implementation of the RCP trip scheme will be examined on a generic basis. This operations-related information will be applied toward the development of generic bases which can be used by participating utilities in modifying operator guidance.

The completion of the program is scheduled for the end of year 1983.

REFERENCE

1. NRC Letter from Darrell G. Eisenhut (Director of Licensing, NRC) to All Applicants [or Licensees] with Combustion Engineering Designed Nuclear Steam Supply Systems, Resolution of TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps", (Generic Letter No. 83-10a and 83-10b), February 8, 1983.

APPENDIX A

THE TRIP TWO/LEAVE TWO STRATEGY

Tripping the RCPs during a small break LOCA minimizes the loss of coolant from the primary system. Keeping the RCPs running during non-LOCA depressurization events, however, maximizes the margin to fuel failure or radiological releases. The trip two/leave two RCP operating strategy reconciles the conflicting preferences of RCP operation for small break LOCAs and non-LOCAs.

The trip two/leave two RCP strategy is shown schematically in Figure 1. The sequence of events during a depressurization which results in RCP trip begins with event initiation, t_1. This could be a small break LOCA, steam generator tube rupture, certain secondary breaks, or anticipated operational occurrences which result in primary system depressurization (e.g., increase in main or auxiliary feedwater flow, decrease in main feedwater temperature, etc). The reactor trip occurs, for example, on low primary system pressure, at t_2. At t_3*, the setpoint for trip of the first two RCPs is reached. The operator then trips two RCPs in opposing loops (to maintain pressurizer spray) at t_3. Tripping the second two RCPs depends on whether or not the second trip setpoint is reached. For a LOCA, the setpoint for trip of the second two RCPs occurs in Figure 1 at t_4*. The operator then trips the remaining two RCPS at t_4. For a non-LOCA, the second trip setpoint will not be reached and the remaining two RCPs will continue running.

FIGURE 1
PROPOSED RCP TRIP STRATEGY