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QA

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

Subject: Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38  
Trip of RCPs

- Reference: 1) NRC Generic Letter 86-06 dated 5/29/86,  
subject: Implementation of TMI Action Item II.K.3.5,  
"Automatic Trip of Reactor Coolant Pumps".
- 2) LP&L letter W3P86-1929 dated July 25, 1986,  
J.H. Wilson (NRC-NRR) from K.W. Cook, subject: Automatic  
Trip of RCPs.

This is in reply to the referenced Generic Letter which requests additional information for plant specific reviews relative to automatic trip of reactor coolant pumps. As discussed in the Generic Letter, the Combustion Engineering Owners Group (CEOG) generic submittal proposed a manual trip sequence to satisfy the referenced TMI Action Item. This approach was found acceptable by the NRC Staff and has been adopted by Waterford 3.

Previous correspondence on the plant specific review (reference 2) indicated that discussion between the CEOG and NRC Staff was necessary to define the ultimate scope and schedule for Question 3 of the NRC Safety Evaluation presented in the referenced Generic Letter. It is our understanding that the anticipated discussions between CEOG and NRC Staff on this matter have not taken place to date. The information in Attachment 1 to this letter is being submitted on the basis of the LP&L current understanding of the plant specific information needed by the staff to complete their reviews relative to the GL 86-06 items.

Very truly yours,

K.W. Cook  
Nuclear Safety and  
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*Handwritten initials:* A046  
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Additional Plant Specific Information  
Requested by Generic Letter 86-06

Question 1:

Identify the instrumentation to be used to determine the RCP trip setpoints, including the degree of redundancy of each parameter signal needed for the criteria chosen.

Response:

The instrumentation required to determine when the first set of reactor coolant pumps (RCPs) should be manually tripped involves only pressurizer pressure. Wide range pressurizer pressure (0 to 3000 psia) is available from 4 loops of safety-grade pressurizer pressure instrumentation; and, since Waterford 3 uses 1621 psia as the setpoint at which the first set of RCPs are tripped, 4 loops of safety-grade narrow range pressurizer pressure (1500 to 2500 psia) are also available.

Once the operator has completed the standard post-trip actions (which includes tripping 2 RCPs in opposite loops, if required), he enters a series of diagnostic steps that have been developed in accordance with Revision 2 of the Combustion Engineering Emergency Procedure Guidelines (CEN-152). If he determines the event is a LOCA (see the attached Figure 5-2 of CEN-152 for the actual decision making process) or if he enters OP-902-008, Safety Function Recovery Procedure, the remaining 2 RCPs are tripped. The instrumentation required to make this determination involves steam generator pressure and secondary system activity.

Steam generator pressure (0 to 1200 psia) is available from 4 loops of safety-grade pressure instrumentation per steam generator. Secondary system activity is available from two channels which monitor the exhaust activity from the condenser vacuum pump, from two channels which monitor activity in the main steam lines and from a single channel which can monitor blowdown from either steam generator.

Question 2:

Identify the instrument uncertainties for both normal and adverse containment conditions. Describe the basis for the selection of the adverse containment parameters. Address, as appropriate, local conditions such as fluid jets or pipe whip which might influence the instrumentation reliability.

Response:

The RCP trip criteria are implemented to accommodate a very specific set of small break LOCA sizes, specifically 0.1 ft<sup>2</sup> to 0.02 ft<sup>2</sup>. The maximum time to reach the criteria of low RCS pressure, and loss of subcooling margin is based on the smallest size break (0.02 ft<sup>2</sup>) in the relevant spectrum and has been shown in CEN-268 to be less than two minutes. These small breaks create adverse containment conditions very slowly. The largest of the small break LOCAs considered (0.1 ft<sup>2</sup>) would create adverse containment conditions more quickly; however, CEN-268 has shown that the RCP trip criteria will be satisfied in less than half the time of the smallest breaks.

Additional Plant Specific Information  
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Question 2:

Response (Cont'd.):

The emergency operating procedures are arranged in such a way that the subject parameters will not only meet the criteria in a short period of time but will be noticed by the control room operator in this short period of time as well. In this time period and for these small break sizes, containment environmental conditions would be, at worst, only slightly more adverse than normal. Finally, because the instrumentation necessary to determine the RCP trip criteria is only required to function for a short period of time (less than two minutes) and it takes a finite time for containment conditions to have an effect on the equipment, it is unlikely that the required instrumentation will be adversely affected.

LP&L has performed an analysis to determine the uncertainties in process instrumentation for use in the Waterford-3 Emergency Operating Procedures. Under nominal containment conditions, the maximum uncertainty in pressurizer pressure varies from approximately  $\pm 50$  psia for narrow range pressurizer pressure to approximately  $\pm 100$  psia for wide range pressurizer pressure. Under the same containment conditions, the uncertainty in steam generator pressure has been calculated to be no greater than  $\pm 50$  psia.

These uncertainties have been more than compensated for in the appropriate Waterford 3 Emergency Operating Procedures (EOPs). CEN-268 recommends tripping the first set of RCPs when the pressurizer pressure reaches a value of 1361 psia (for 3410 class plants) plus uncertainties. The actual criteria used in the Waterford 3 EOPs is 1621 psia (in conjunction with an SIAS) thereby accounting for an uncertainty of over 250 psia. This exceeds the uncertainty which would be expected under the aforementioned containment conditions. Uncertainties in steam generator pressure are insignificant when viewed in terms of differentiating a small break LOCA from a steam line break. That is, a steam line break large enough to cause a substantial decrease in RCS pressure would also result in substantial decrease in steam generator pressure much greater than the associated instrument uncertainty. Similarly, steam generator tube ruptures, of a size large enough to cause the RCP trip criteria to be reached, would cause increases in the normally very low secondary activity significantly greater than the instrument uncertainty. In addition, since the pressure transmitters of interest are mounted on the outside of the secondary shield wall in containment, they are not in an area subject to local conditions such as fluid jets or pipe whips.

Question 3:

In addressing the selection of the criterion, consideration of uncertainties associated with the CEOG supplied analyses values must be provided. These uncertainties include both the uncertainties in the computer program results and uncertainties resulting from plant specific features not representative of the CEOG generic data group.

Additional Plant Specific Information  
Requested by Generic Letter 86-06

Question 3:

Response:

LP&L feels that the information requested is adequately presented in CEN-268 and CEN-268 Supplement 1-NP which were previously submitted to the Commission in March 1984 and November 1984, respectively. These two documents, along with the response to question 2 (above), should provide sufficient discussion of the uncertainties assumed in the CEOG analyses and how these uncertainties are applied to Waterford.

By letter dated July 25, 1986 (W3P86-1929), LP&L indicated that the Analysis Subcommittee of the CE Owners Group was holding discussions with the NRC staff in order to define the specific information that was being sought by the question. This information is still under evaluation by the NRC.

Question 4:

Identify all plant procedures (except for those concerning normal operations such as normal cooldown) which require RCP trip guidelines. Reference to the CEOG EPGs is acceptable if endorsed by the licensee. Include training and procedures which provide direction for use of individual steam generators with and without operating RCPs.

Response:

The RCP trip guidelines incorporated into Revision 2 of the CEOG EPGs (CEN-152) have been implemented in the Waterford-3 Emergency Operating Procedures. Specifically, these guidelines are contained in OP-902-000, Emergency Entry Procedure; OP-902-002, LOCA Recovery; OP-902-004, Excess Steam Demand Event Recovery; OP-902-007, Steam Generator Tube Rupture Recovery; and OP-902-008, Safety Function Recovery.

# COMBUSTION ENGINEERING EMERGENCY PROCEDURE GUIDELINES

**TITLE** Loss of Coolant  
Accident Recovery

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## BREAK IDENTIFICATION CHART

FIGURE 5-2

