



Portland General Electric Company

April 22, 1983

Bart D. Withers Vice President

Trojan Nuclear Plant  
Docket 50-344  
Licence NPF-1

Mr. Darrell Eisenhut, Director  
Division of Licensing  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington DC 20555

Dear Sir:

TROJAN NUCLEAR PLANT  
NRC Generic Letter 83-10d  
NUREG-0737, Item II.K.3.5

The criteria for resolution of TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" were stated in letters from Mr. Darrel G. Eisenhut of the Nuclear Regulatory Commission to all Applicants and Licensees with Westinghouse-designed Nuclear Steam Supply Systems (Generic Letters 83-10 c and d) dated February 8, 1983. Portland General Electric (PGE) received Generic Letter 83-10d on February 22, 1983. Attachment 1 represents the Westinghouse Owners Group Program for demonstrating compliance with those criteria. Attachment 2 addresses each section of the attachment to NRC Generic Letter 83-10.

Sincerely,

Bart D. Withers  
Vice President  
Nuclear

Subscribed and sworn to before me this 22nd day of April 1983.

Notary Public of Oregon

B304280214 B30422  
PDR ADOCK 05000344  
P PDR

My Commission Expires: July 5, 1984

c: Mr. Lynn Frank, Director  
State of Oregon  
Department of Energy

Mr. Robert A. Clark, Chief  
Operating Reactors Branch No. 3  
Division of Licensing  
U. S. Nuclear Regulatory Commission

A046

DETAILED RESPONSE TO NRC GENERIC LETTER 83-10d

Each of the requirements stated in the attachment to NRC Generic Letter 83-10d is discussed below, indicating clearly how they will be addressed. The organization of this section of the report parallels the attachment to NRC Generic Letter 83-10d.

I. Pump Operation Criteria Which Can Result in RCP Trip During Transients and Accidents

1. Setpoints for RCP Trip

The Westinghouse Owners Group response to this section of requirements will be contained in Revision 1 to the Emergency Response Guidelines scheduled for July 31, 1983. PGE implementation of Revision 1 of the Emergency Response Guidelines in the Trojan procedures is projected for the third quarter of 1984.

a. As stated in Attachment 1, Westinghouse and the Westinghouse Owners Group are developing revised RCP trip criteria which will assure that the need to trip the RCPs will be indicated to the operator for LOCAs where RCP trip is considered necessary. The criteria will also ensure continued forced RCS flow for:

- (1) Steam Generator Tube Rupture (SGTR) up to the design basis double-ended tube rupture.
- (2) The other more likely non-LOCA transients where forced circulation is desirable (ie, steam line breaks equal or smaller than one stuck-open relief valve).

NOTE: Event diagnosis will not be used. The criteria developed will be symptom-based.

The criteria being considered for RCP trip are:

- (1) RCS wide-range pressure < constant
- (2) RCS subcooling < constant
- (3) Wide-range RCS pressure < function of secondary pressure

Instrument uncertainties will be accounted for. Environmental uncertainty will be included where appropriate.

- b. The RCP trip criteria selected will be such that the operator will be instructed to trip the RCPs before voiding occurs at the RCP.
  - c. The criteria developed in Item 1a above is not expected to lead to RCP trip for the more likely non-LOCA and SGTR transients. However, since continued RCP operation cannot be guaranteed, the Emergency Response Guidelines provide guidance for the use of alternate methods for depressurization.
  - d. The Emergency Response Guidelines contain specific guidance for detecting, managing, and removing coolant voids that result from flashing. The symptoms of such a situation are described in these guidelines and in detail in the background document for the guidelines. Additionally, explicit guidance for operating the Plant with a vaporous void in the reactor vessel head is provided in certain cases where such operation is needed. The Trojan Emergency Instructions have provisions designed for the mitigation of system voiding. Operator training stresses the mitigation of reactor core damage under natural circulation and forced convection conditions.
  - e. Resetting of Containment isolation signal which secures component cooling water and seal cooling flow to the RCPs is stressed in the pertinent Trojan procedures. The operators were trained to secure pumps in the unlikely event that RCP auxiliary water services could not be restored. Component cooling water to the RCP bearings and thermal barrier now isolates on all safety injection signals. Plans are being made to change valve circuitry to isolate only on Containment Hi-Hi pressure or manual action.
  - f. Discussed in 1a and 1c.
2. Guidance for Justification of Manual RCP Trip

The Westinghouse Owners Group response to this section of requirements will be submitted towards the end of 1983. PGE intends to implement their guidance in Trojan EOPs by the third quarter of 1984.

- a. A significant number of analyses have been performed by Westinghouse for the Westinghouse Owners Group using the currently approved Westinghouse Appendix K Evaluation Model for small break LOCA. This Evaluation Model uses the WFLASH Code. These

analyses demonstrate for small break LOCAs of concern, if the RCPs are tripped 2 minutes following the onset of reactor conditions corresponding to the RCP trip setpoint, the predicted transient is nearly identical to those presented in the Safety Analysis Reports for all Westinghouse plants. Thus, the Safety Analysis Report for Trojan demonstrates compliance with requirement 2a. The analyses performed for the Westinghouse Owners Group will be used to demonstrate the validity of this approach.

- b. Better estimate analyses will be performed for a limiting Westinghouse-designed plant using the WFLASH computer code with better estimate assumptions. These analyses will be used to determine the minimum time available for operator action for a range of break sizes such that the ECCS acceptance criteria of 10 CFR 50.46 are not exceeded. It is expected that the minimum time available for manual RCP trip will exceed the guidance contained in ANSI Standard N660. This will justify manual RCP trip for Trojan.

### 3. Other Considerations

- a. The wide-range pressure transmitters (PT-403 and -405) are now used to provide indication of system pressure for manual RCP trip at a decreasing pressure of 1550 psig.
  - (1) These transmitters are included in the Environmental Qualification Program required by 10 CFR 50.49.
  - (2) The transmitters are Class 1E and comply with the seismic requirements contained in IEEE-344-1971.
  - (3) The transmitters are powered from battery-backed Class 1E power sources.
  - (4) The pressure transmitters' instrument loops are of separate trains but are both powered by Train B (Y22 and Y24). A design change is being processed to power these transmitters from separate trains of emergency power.
  - (5) The transmitters have a range of 0-3,000 psig and provide indication in the Control Room at Panel C12 on indicators and a dedicated recorder.

Additional indication provided by the above transmitters are at the following locations:

- (1) PT-403 provides input to the Plant computer.
  - (2) PT-403 and -405 provide input to the subcooling margin monitor where pressure indication is also available.
- b. The Emergency Response Guidelines contain guidance for the timely restart of the RCPs when conditions which will support safe pump startup and operation are established. The current Trojan Emergency Procedures include provisions to guide the operators when the system conditions permit RCP operation.
- c. The training of the operators emphasizes the RCP trip criteria in the Emergency Operating Procedures. Current criteria are outlined below:
- (1) Trip any RCP if component cooling water to that pump is lost for greater than 5 minutes.
  - (2) Trip all RCPs if all of the conditions below are met:
    - . Safety injection is turned on.
    - . Centrifugal charging or safety injection flow is verified.
    - . RCS pressure is 1550 psig or less.

During accidents when the RCPs are not tripped, motor current fluctuations, as well as temperature from the wide-range RTDs (0-700°F range) also may be consulted as they are indicative of void formation and saturation margin in the RCS.

The above criteria will be revised upon implementation of Revision 1 of the Emergency Response Guidelines in the Trojan Emergency Instructions. Operator training will also emphasize the latest operating criteria for the RCPs.

## II. Pump Operation Criteria Which Will Not Result in RCP Trip During Transient and Accidents.

The preferred and safest method of operation following a small break LOCA is to manually trip the RCPs. Therefore, there is no need to address the criteria contained in this section.

Trojan Nuclear Plant  
Docket 50-344  
License NPF-1

Mr. Darrell Eisenhut  
April 22, 1983  
Attachment 1  
Page 1 of 3

PROGRAM FOR RESOLUTION OF TMI ACTION ITEM II.K.3.5  
"AUTOMATIC TRIP OF REACTOR COOLANT PUMPS"

BACKGROUND

In the four years that have passed since the event at Three Mile Island, Westinghouse and the Westinghouse Owners Group have held steadfastly to several positions relative to post-accident reactor coolant pump (RCP) operation. First, there are small break LOCAs for which delayed RCP trip can result in higher fuel cladding temperatures and a greater extent of zircalloy-water reaction. Using the conservative evaluation model, analyses for these LOCAs result in a violation of the Emergency Core Cooling System (ECCS) Acceptance Criteria as stated in 10 CFR 50.46. The currently approved Westinghouse Evaluation Model for small break LOCAs was used to perform these analyses and found acceptable for use by the NRC in Generic Letters 83-10c and d. Therefore, to be consistent with the conservative analyses performed, the RCPs should be tripped if indications of a small break LOCA exist.

Secondly, Westinghouse and the Westinghouse Owners Group have always felt that the RCPs should remain operational for certain non-LOCA transients and accidents where their operation is beneficial to accident mitigation and recovery. This position was taken even though a design basis for the Plant is a loss of offsite power. Plant safety is demonstrated in the Final Safety Analysis Reports for all plants for all transients and accidents using the most conservative assumption for RCP operation.

In keeping with these two positions, a low RCS pressure (symptom-based) RCP trip criterion was developed that provided an indication to the operator to trip the RCPs for small break LOCA, but would not indicate a need to trip the RCPs for the more likely non-LOCA transients and accidents where continued RCP operation is desirable. The basis for this criterion is included in the generic Emergency Response Guideline (ERG) Background Document (E-O Basic Revision, Appendix A). Relevant information regarding the expected results of using this RCP trip criterion can be derived from the transients which resulted from the stuck open steam dump valve at North Anna in 1979, the steam generator tube rupture at Prairie Island in 1980, and the steam generator tube rupture at Ginna in 1982. The RCPs were tripped in all three cases. However, a study of the North Anna and Prairie Island transients indicated that RCP trip would not have been needed based on the application of the ERG trip criterion.

Trojan Nuclear Plant  
Docket 50-344  
License NPF-1

Mr. Darrell Eisenhut  
April 22, 1983  
Attachment 1  
Page 2 of 3

Thirdly, it has always been the position of Westinghouse and the Westinghouse Owners Group that if there is doubt as to what type of transient or accident is in progress, the RCPs should be tripped. Again, the plants are designed to mitigate the effects of all transients and accidents even without RCP operation while maintaining a large margin of safety. The existing emergency operating procedures reflect this design approach.

Lastly, it remains the position of Westinghouse and the Westinghouse Owners Group that RCP trip can be achieved safely and reliably by the operator when required. An adequate amount of time exists for operator action for the small break LOCAs of interest. The operators have been trained on the need for RCP trip, and the emergency operating procedures give clear instructions on this matter. In fact, one of the initial operator activities is to check if indications exist that warrant RCP trip.

#### OVERALL PROGRAM

Westinghouse and the Westinghouse Owners Group will undertake a two-part program to address the requirements of NRC Generic Letters 83-10c and d based on the aforementioned positions for the purpose of providing more uniform RCP trip criteria and methods of determining those criteria. In the first part of the program, revised RCP trip criteria will be developed which provide an indication to the operator to trip the RCPs for small break LOCAs requiring such action, but will allow continued RCP operation for steam generator tube ruptures less than or equal to a double-ended tube rupture. The revised RCP trip criteria will also be evaluated against other more likely non-LOCA transients and accidents where continued RCP operation is desirable in order to demonstrate that a need to trip the RCPs will not be indicated to the operator. Since this study is to be utilized for Emergency Response Guideline development, better estimate assumptions will be applied in the consideration of these scenarios. The first part of the program will be completed and incorporated into Revision 1 of the Emergency Response Guidelines developed by Westinghouse for the Westinghouse Owners Group. The Westinghouse Owners Group schedule for completion of Revision 1 is July 31, 1983.

The second part of the program is intended to provide the required justification for manual RCP trip. This part of the program must necessarily be done after the completion of the first part of the program. The schedule for completion of the second part of the program is the end of 1983.

The preferred and safest method of pump operation following a small break LOCA is to manually trip the RCPs before significant system voiding occurs.

Trojan Nuclear Plant  
Docket 50-344  
License NPF-1

Mr. Darrell Eisenhut  
April 22, 1983  
Attachment 1  
Page 3 of 3

No attempt will be made in this program to demonstrate the acceptability of continued RCP operation during a small break LOCA. Further, no request for an exemption to 10 CFR 50.46 will be made to allow continued RCP operation during a small break LOCA.