

SNUPPS

Standardized Nuclear Unit
Power Plant System

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Executive Director

April 22, 1983

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SUBJ: Response to NRC Generic
Letter No. 83-10c

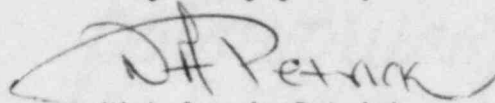
Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Docket Nos: STN 50-482 and STN 50-483

Dear Mr. Denton:

Enclosed is the SNUPPS response to NRC Generic Letter 83-10c regarding resolution of TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps".

Very truly yours,



Nicholas A. Petrick

MHF/nld3b17
Attachment

cc: D. F. Schnell	UE
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STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM
PLAN FOR RESOLUTION OF TMI ACTION ITEM II.K.3.5
AUTOMATIC TRIP OF REACTOR COOLANT PUMPS

INTRODUCTION

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. Eisenhower of the Nuclear Regulatory Commission to all Applicants and Licensees with Westinghouse designed Nuclear Steam Supply Systems (83-10c and d) dated February 8, 1983. The following represents the plan for demonstrating compliance with those criteria. In order to avoid confusion, the overall philosophy and plan will first be stated. Then, each section of the attachment to NRC letters 83-10c and d will be addressed as to how the overall plan responds to each NRC criteria. Although both generic letters 83-10c and d are addressed in this plan, only letter 83-10c is applicable to the Standard Nuclear Unit Power Plant System (SNUPPS) facilities, i.e. Callaway Plant Unit No.1 and Wolf Creek Generating Station Unit No.1.

OVERALL PLAN

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 10CFR50.46. The currently approved Westinghouse Evaluation Model for use for small break LOCAs was used to perform the analyses and found acceptable by the NRC in 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 believed that the RCPs should remain operational for non-LOCA transients and accidents where their operation is beneficial to accident mitigation and recovery. This position has been taken even though a design basis for the plant is a loss of off-site 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 reactor coolant pump 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 LOCAs but would not indicate the need to trip the RCP for the more likely non-LOCA transients and accidents where continued RCP operation is desired. The basis for this criterion is included in the generic Emergency Response Guideline (ERG) Background Document (E-0 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 the RCP trip would not have been needed based on the application of the ERG trip criterion. The Ginna event, however, indicated a need to review the basis for the RCP trip criterion to allow continued RCP operation for a steam generator tube rupture for low head SI plants.

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 to the public. 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 immediate operator actions is to check if indications exist that warrant RCP trip.

Westinghouse and the Westinghouse Owners Group will undertake a two part program to address the requirements of NRC 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 the other 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 for the most likely cases. Since this study is to be utilized for emergency response guideline development, better estimate assumptions will be applied in the consideration of the more likely 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 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 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. 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 10CFR50.46 will be made to allow continued RCP operation during a small break LOCA.

DETAILED RESPONSE TO NRC LETTER 83-10c AND d

Each of the requirements stated in the attachment to NRC letters 83-10c and d are discussed below indicating clearly how they will be addressed. The organization of this section of the report parallels the attachment to NRC letters 83-10c and d.

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

I. 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. These guidelines will be incorporated into the plant specific operating procedures for Callaway Plant and Wolf Creek Generating Station.

- a) As stated above, 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 most likely non-LOCA transients where forced circulation is desirable (e.g., steam line breaks equal to or smaller than 1 stuck open PORV)

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 if appropriate.

No partial or staggered RCP trip schemes will be considered. Such schemes are unnecessary and significantly increase the requirements for training, procedures and decision making by the operator during transients and accidents.

- 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 1.a above are 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 operator training programs at the SNUPPS facilities will address the significance of primary system voids under both LOCA and non-LOCA conditions.
- e) During the review of TMI Action Plan item II.E.4.2 the water services required for RCP operation were classified as "essential". These "essential" systems are required to have containment isolation valves remain open for either safe shutdown or mitigation of an accident. The NRC Staff review of this issue is documented in Chapter 22, Section II.E.4.2 of the SNUPPS plants' Safety Evaluation Reports. If auxiliary water services required for RCP operation are not available, the Emergency Response Guidelines require securing the RCPs. This requirement will be incorporated in the operating procedures for the SNUPPS facilities.
- 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 reported separately at the end of 1983. SNUPPS will review the report of justification for manual RCP trip, at that time, and implement necessary operating procedure changes prior to plant operation above 5% thermal power. Should backfitting of plant design changes be required, justification for interim plant operations will be provided to the NRC until the backfitting can be completed.

- a) Many 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 W FLASH Code. These analyses demonstrate that 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 Reports for all plants demonstrate compliance with requirement 2a. The analyses performed for the Westinghouse Owners Group will demonstrate the validity of this approach.

- b) Better estimate analyses will be performed for the most limiting Westinghouse designed plant using the W FLASH 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 10CFR50.46 are not exceeded. It is expected that the minimum time available for manual RCP trip will exceed the guidance contained in N660. This will justify manual RCP trip for all plants.

3. Other Considerations

- a) Based on the results of the RCP trip parameter selection (Section I.1.a of this report), the SNUPPS Utilities will review the degree of redundancy and design features of the instruments to be used (consistent with the instrumentation function, location, and environmental conditions) so that availability of the necessary RCP trip instrumentation is adequately assured for accident mitigation.
- b) The Emergency Response Guidelines contain guidance for the timely restart of the reactor coolant pumps when conditions which will support safe pump operation are established. Plant operating procedures will incorporate the RCP restart criteria as identified and included in the Emergency Response Guidelines.
- c) Operator training programs will employ lesson plans consistent with the results of the Westinghouse Owners Group evaluations described in this report so that operator actions regarding RCP operation in conjunction with other accident mitigating systems will support plant safety consistent with the SNUPPS Final Safety Analysis Reports.

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

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