



Northern States Power Company

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April 22, 1983

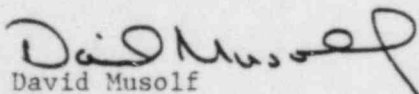
Director of Nuclear Reactor Regulation
Attn: Mr D G Eisenhut, Director
Division of Licensing
U S Nuclear Regulatory Commission
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Resolution of TMI Action Plant Item II.K.3.5,
Automatic Trip of Reactor Coolant Pumps

In a letter dated February 8, 1983, from Mr Darrell G Eisenhut, Director, Division of Licensing, USNRC (Generic Letter 33-10D) we were asked to provide pursuant to 10 CFR Part 50, Section 50.54(f), our plans and schedule for resolution of NUREG-0737, Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps." The purpose of this letter is to provide the required response.

Attached is the Westinghouse Owners' Group plan for Resolution of NUREG-0737, Item II.K.3.5. This plan has been endorsed by Northern States Power Company.


David Musolf
Manager - Nuclear Support Services

DM/bd

cc: Regional Administrator - III, NRC
NRR Project Manager, NRC
Resident Inspector, NRC
G Charnoff

Attachments

AOA

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PDR ADOCK 05000282
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UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Docket No. 50-282
50-306

LETTER DATED APRIL 22, 1983

Northern States Power Company, a Minnesota corporation, by this letter dated April 22, 1983 hereby submits information related to NUREG-0737, Item II.K.3.5, in response to a letter dated February 8, 1983 from Mr Darrel G Eisenhut, Director, Division of Licensing, USNRC (Generic Letter 82-10D).

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By David Musolf
David Musolf
Manager - Nuclear Support Services

On this 22nd day of April, 1983 before me a notary public in and for said County, personally appeared David Musolf, Manager - Nuclear Support Services, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof and that to the best of his knowledge, information and belief, the statements made in it are true and that it is not interposed for delay.

Betty J. Dean



Director of NRR
Attn: D G Eisenhut
April 22, 1983
Attachment

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. Eisenhut of the Nuclear Regulatory Commission to all Applicants and Licensees with Westinghouse designed Nuclear Steam Supply Systems (83-10 c 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 83-10 c and d will be addressed as to how the overall plan responds to each NRC criteria.

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 small break LOCAs was used to perform these analyses and was found acceptable for use by the NRC in letters 83-10 c 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 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 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 LOCA but would not indicate a need to trip the RCP 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 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 initial operator activities 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 83-10 c 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 rupture. The revised RCP trip criteria will also be evaluated against 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 more 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 scheduled date 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.

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 LETTERS 83-10 C AND D

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

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. Implementation of changes to the Generic Guidelines in Prairie Island specific procedures will be consistent with the EOP upgrade program outlined in our response to Generic Letter 82-33.

- 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 (up to the design bases, double-ended tube rupture)
 - 2) the other more 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 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 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.
- e) At Prairie Island, water services essential for RCP operation are not terminated on Containment Isolation. Containment Isolation with continued RCP operation will not lead to seal or pump damage or failure.
- 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. Once the Owners Group report is received, review will begin to provide technical justification of treatment of RCPs at Prairie Island based on that report.

- 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 Reports for all plants demonstrate compliance with requirements 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 LOCFR50.46 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) Once the Generic report is received an evaluation can be made of parameters to be employed at Prairie Island in the RCP trip setpoint.
- b) The Emergency Response Guidelines contain guidance for the timely restart of the reactor coolant pumps when conditions which will support safe pump start-up and operation are established.

- c) A training program is in place which does instruct the operators on their responsibility for performing the RCP trip function in a SBLOCA as well as what actions to take in the event of a ESF actuation.

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.