



Consumers
Power
Company

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July 21, 1983

Mr Darrell G Eisenhut, Director
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

MIDLAND ENERGY CENTER PROJECT -
RESOLUTION OF ACTION ITEM II.K.3.5
"AUTOMATIC TRIP OF REACTOR COOLANT PUMPS"
GENERIC LETTER 83-10e -
FILE 0926.2 SERIAL 24080

Attached is Consumers Power Company's response to your letter of February 8, 1983 concerning TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps." As a member of the B&W Owners Group (BWOG) we will be participating in a generic submittal to resolve this issue.

The attached plan and schedule is submitted in accordance with
10 CFR 50.54(f).

James W. Cook

JWC/JRW/mfm

CC RJCook, Midland Resident Inspector
JGKeppler, Administrator, NRC Region III

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Plan for Resolution of TMI

Action Item II.K.3.5

"Automatic Trip of Reactor Coolant Pumps"

INTRODUCTION

The criteria for resolution of NUREG-0737, Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps", are provided in letters from D G Eisenhut (NRC) to all applicants and licensees with B&W designed Nuclear Steam Supply Systems (83-10 e and f), dated February 8, 1983. The B&W Owners Group has been formulating a plan to demonstrate compliance with those criteria. The following represents this overall position and plan.

PLAN FOR TREATMENT OF RC PUMP OPERATION

The treatment of reactor coolant pumps during accidents and transients has received extensive attention over the past several years. The B&W Owners Group has performed analyses evaluating the effect of a delayed RC pump trip using Appendix K assumptions during the course of a small break LOCA accident and has determined that an early trip of RC pumps is required to show conformance to 10 CFR 50.46 for a range of break sizes. Therefore, to be consistent with the conservative analyses performed, it is our position that the reactor coolant pumps should be tripped if indications of a small break LOCA exist.

The B&W Owners Group and B&W maintain that it is highly desirable to maintain RC pump operation during non-LOCA events, as an aid in the mitigation of the transient. Consistent with this philosophy, the concept of subcooling margin was chosen as an indicator for the need to trip RC pumps in 177FA plants. It is our intention to demonstrate that this concept is consistent with our philosophy for handling RC pumps during transient conditions and complies with the intent of the criteria stated in Generic Letter 83-10. The symptom approach of subcooling margin, developed as part of the Abnormal Transient Operating Guidelines Program, is intended to replace the present guidelines of tripping solely on the presence of a low RC pressure ESFAS signal.

It is the position of the B&W Owners Group and B&W that reactor coolant pump trip can be achieved safely and reliably by the operator. It has been determined that a loss of subcooling margin will occur for those SBLOCAs where a pump trip is required to show compliance with 10 CFR 50.46.

The B&W Owners Group will undertake a program based on the above position to demonstrate that the concept of subcooling margin is an appropriate indicator of the need to trip RC pumps, yet still allows continued RCP operation for SGTRs less than or equal to a double ended rupture. The concept of subcooling margin will be examined for the more likely non-LOCA transients to demonstrate that under realistic conditions an indication requiring RC pump trip is unlikely.

This program is also intended to provide the required justification for manual RCP trip on indication of loss of subcooling margin. Tripping on loss of subcooling margin will assure pump trip prior to the development of significant system voids. No attempt will be made to demonstrate

acceptability of continued RCP operation during small break conditions. No request for an exemption of 10 CFR 50.46 will be made to allow continued RCP operation during SBLOCA.

The specific plan for resolution of the RC pump trip issue is structured to address the specific criteria stated in Generic Letter 83-10. A description of the plan, related to the criteria with which it is intended to comply, follows:

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

1. Setpoints for RCP Trip:

- a. The RCP trip criteria, based on loss of subcooling margin, was developed with the intent of assuring that an indication for RC pump trip would occur for those SBLOCAs where pump trip was required to meet the criteria of 10 CFR 50.46. A spectrum of analyses has been performed using Appendix K assumptions which demonstrate that a loss of subcooling will always occur for small breaks that have the potential to uncover the core and violate 10 CFR 50.46 criteria if the RCPs are tripped under certain two-phase conditions. Therefore, it is our position that loss of subcooling can be used as an indicator of the need for RCP trip. The actual value of the setpoint will be determined to ensure that this indicator will allow continued forced RCS flow during realistic SGTRs up to and including the design basis SGTR - a single double ended rupture. The setpoint will also be

determined to include consideration for minimizing the indication for need to trip RC pumps for more likely non-LOCA events such as a mild overcooling transient due to excessive steam flow.

- b. No partial or staggered RCP trip schemes will be considered except for the extreme case where mechanical damage to the pump is likely as this adds to increased decision making on the part of the operator during transient conditions.
- c. The RCP trip criteria based on subcooling margin precludes operation of the RC pumps in a highly voided system.
- d. A primary objective of the parameter and setpoint selection is the avoidance of reactor coolant pump trip for non-LOCA events particularly SGTR. Realistic operator actions in accordance with the ATOG procedures are expected to avoid loss of subcooling and the need to trip the reactor coolant pumps for the STGR event. Furthermore, since subcooling margin would be quickly regained following makeup or HPI initiation, without loss of natural circulation even if the operator failed to take actions to prevent RCP tripping and ESFAS actuation, restart of the pumps would be allowed. Consequently, reliance on the PORV for depressurization is unlikely.
- e. The significance of primary system voiding due to flashing of hot coolant is discussed as part of operator training. The subject of void treatment in the Abnormal Transient Operating Guidelines (ATOG) is being supplemented by additional guidance on

prevention, detection, and mitigation of voids. This is considered to be a post Emergency Operating Procedure implementation issue.

- f. Actions following containment isolation signals will be reviewed to ensure consistency in the treatment of availability of cooling water and seal injection to prevent pump damage. Instructions for pump trip are provided in the ATOG guidelines in the event of likely mechanical pump damage. Criteria for restart of RC pumps include assuring that cooling water and seal injection are available.
- g. Instructions for maintaining or reinitiating forced RC flow are contained in ATOG for ICC conditions.

2. Guidance for Justification of Manual RCP Trip

- a. A spectrum of small break LOCAs has been analyzed for 177 FA plant type using the CRAFT2 code. Using the Appendix K evaluation techniques, there exists a combination of break sizes and RC pump trip times which result in a violation of 10 CFR 50.46 limits. For the worst break size, ie, that size which requires the quickest pump trip, trip must occur within two minutes of the indication of need for pump trip. As break size decreases, longer time is available for operator action. The critical time period of high void formation (>70%) when RC pump trip is not recommended has also been determined. The critical time period for the break requiring the quickest operation action

time is short (five minutes) when pump trip could result in violation of 10 CFR 50.46 criteria.

- b. A best estimate SBLOCA analysis will be performed for each general plant type, over the spectrum of sizes determined by the conservative analyses to determine (a) the time available for a required RC pump trip, and the period of time when RC pump trip is not recommended or (b) the lack of indication for a required pump trip. If it is determined that a need for RC pump trip exists, the time for operator action will be determined and justified by comparison to ANSI standards and operating experience. An indication of reasonable operator action time is expected to justify manual RCP trip.

3. Other Considerations

- a. The level of quality of instrumentation, as described in the enclosure of Generic Letter 83-10, used to produce the signal indicating the need for RC pump trip, will be provided by Consumers Power Company to supplement the BWOOG generic submittal for treatment of RC pumps during transients.
- b. The ATOG guidelines and plant specific Emergency Operating Procedures contain criteria for the timely restart of reactor coolant pumps when conditions which will support safe pump operation exist. Table 6 in Part II, Volume 1 of ATOG provides the conditions when RC pumps can be restarted. The Plant Limits and Precautions document provide further instruction.

- c. Plant operators have been trained in their responsibility for performing RCP trip in the event of a small break LOCA.

Instructions for plant operation are reinforced by regular requalification class and simulator training. Operators will be trained on the concept of RC pump trip on subcooling margin and appropriate priorities as the plant implements the ATOG philosophy.

The B&W Owners Group's response to this section of requirements will be reported by the end of 1983.

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

Since it is the position of the BWOG and B&W that the safest method for RC pump operation following SBLOCA is manual trip, the criteria stated in this section will not be addressed.

CONSUMERS POWER COMPANY
Midland Units 1 and 2
Docket No 50-329, 50-330

Letter Serial 24080 Dated July 21, 1983

At the request of the Commission and pursuant to the Atomic Energy Act of 1954, and the Energy Reorganization Act of 1974, as amended and the Commission's Rules and Regulations thereunder, Consumers Power Company submits the proposed plan and schedule for resolution of II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" (Generic Letter 83-10)

CONSUMERS POWER COMPANY

By J W Cook
J W Cook, Vice President
Projects, Engineering and Construction

Sworn and subscribed before me this 21st day of July 1983.

Beverly A. Avery
Notary Public
Jackson County, Michigan

My Commission Expires January 16, 1985