



AEP:NRC:1065B

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
REVISED RESPONSE TO NRC BULLETIN 88-04;
POTENTIAL SAFETY-RELATED PUMP LOSS

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

Attn: T. E. Murley

December 11, 1989

Dear Dr. Murley:

The purpose of this letter is to supplement our response to NRC Bulletin 88-04, " Potential Safety-Related Pump Loss." In our original response, given in AEP:NRC:1065 dated July 8, 1988, it was determined that the concerns discussed in the subject bulletin only applied to the residual heat removal (RHR) pumps. However, it has been determined as a result of investigating a problem report that the potential for adverse pump-to-pump interaction for motor-driven auxiliary feed pumps (MDAFPs) exists during various operational modes. A detailed description of the concern as it relates to the MDAFPs, the proposed short-term and long-term actions and the schedule for implementing these actions, and justification for continued operation are provided in the attachment to this letter.

The response provided in our original submittal (AEP:NRC:1065) for the second concern identified in the bulletin involving the adequacy of miniflow or single pump operation is unchanged. Therefore, this concern will not be readdressed in the attachment.

This letter is submitted pursuant to 10 CFR 50.54(f) and, as such, an oath of affirmation is enclosed.

Sincerely,

A handwritten signature in cursive script, appearing to read 'M. P. Alexich'.

M. P. Alexich
Vice President

ldp

Attachment

Dr. T. E. Murley

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cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
R. C. Callen
G. Charnoff
A. B. Davis - Region III
NRC Resident Inspector - Bridgman
NFEM Section Chief

ATTACHMENT TO AEP:NRG:1065B

DESCRIPTION OF PROBLEM, PROPOSED ACTIONS,
AND JUSTIFICATION FOR CONTINUED OPERATION

The following is the Indiana Michigan Power Company's revised response to NRC Bulletin 88-04 as applicable to the Donald C. Cook Nuclear Plant. This supplements our previous letter by providing information on the motor-driven auxiliary fuel pump. In accordance with the requirements of the bulletin, we are herein providing a response that summarizes the problems and the systems affected, identifies the short-term and long-term modifications and the implementing schedule for each, and the justification for continued operation.

Problem

The investigation of Problem Report 89-951 identified the potential for adverse pump-to-pump interaction, such as dead heading the weaker pump, for the motor-driven auxiliary feed pumps (MDAFPs) when both pumps are operated through their common emergency leak-off (minimum flow) line. Each unit's auxiliary feedwater system includes two MDAFPs, each with a one-inch minimum flow circuit. The two pumps on a given unit have their minimum flow lines joined together in a common line back to the condensate storage tank.

The investigation revealed that pump-to-pump interaction of the two MDAFPs could occur during 1) crevice flushing operations, 2) startup or shutdown activities, or 3) emergency/abnormal conditions. The following details are provided on each of these:

- 1) Crevice Flushing - During crevice flushing, both MDAFPs are used to supply water to the steam generators. When levels have been established at approximately 5 percent, the feedwater motor-operated (FMO) valves are closed. At that point, steam generator water samples are taken, proper steam generator temperature and pressure are ensured, and then the water in the steam generators is allowed to rapidly boil off. During this cycle, which takes about two hours, the MDAFPs are typically operated through the common minimum flow, which could result in adverse pump-to-pump interaction. This cycle is continually repeated until crevice flushing is complete, typically about one and one-half to two days.
- 2) Startups and Shutdowns - During startups or shutdowns, the MDAFPs are used to supply feedwater to the steam generators; proper inventory is maintained by adjustment of the FMO valves. If no auxiliary feedwater flow is needed to maintain proper steam generator levels, operators could reasonably close the FMO valves, thereby leaving the two MDAFPs operating through the common minimum flow. This could result in adverse pump-to-pump interaction.
- 3) Emergency or Abnormal Conditions - During emergency or abnormal conditions, the MDAFPs provide water to the steam generators to remove core residual heat. The FMO valves

are positioned to provide the required auxiliary feedwater flow to maintain steam generator levels. If the FMOs are closed during this time in response to rising steam generator levels, both MDAFPs would be operated through the common minimum flow, thereby providing the potential for adverse pump-to-pump interaction.

Corrective Action

The short-term corrective action to prevent adverse pump-to-pump interaction is to revise the applicable auxiliary feedwater procedures to include a cautionary statement on the potential for adverse pump-to-pump interaction should the flow to the steam generators be terminated during startup, shutdown, and emergency/abnormal operations. These revisions are scheduled to be completed by March 1990.

The proposed long-term corrective action to prevent the adverse pump-to-pump interaction by the MDAFPs is to install a design modification which will provide separate minimum flow circuits for each MDAFP. The design modification is expected to be installed for both units during the refueling outages scheduled for 1992.

Justification for Continued Operation

The two MDAFPs can interact during miniflow operation, as outlined above, and could therefore potentially result in deadheading of one of the pumps. An analysis was made to determine if 10 percent degradation, the maximum allowed per ASME Section XI, would result in the weaker pump being deadheaded. This flow division analysis was performed using the actual piping and component resistances for the installed system and the MDAFP characteristic curves for a new pump and a hypothetical pump with 10 percent degraded performance. The analysis determined that operation of a new pump through the miniflow circuit will not deadhead a weaker pump, although flow from the weaker pump is close to shutoff and may not be adequate for long-term pump operation.

A comparison of monthly test data from 1980 to present for both Unit 1 and Unit 2 shows that the maximum deviation between two installed pumps on one unit has been 3.4 percent. Allowances for instrument and test reading errors in the data still result in a maximum deviation less than that assumed in our analysis. The MDAFPs installed on each unit are sufficiently close in performance to preclude significant adverse pump-to-pump interaction to justify continued operation.

Although the analysis shows that deadheading a MDAFP will not occur, the potential for pump-to-pump interaction could result in an allowably degraded pump being operated close to shutoff. The above corrective actions will be implemented to eliminate this potential problem.

STATE OF OHIO)
COUNTY OF FRANKLIN)

Milton P. Alexich, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the foregoing Response to NRC Bulletin 88-04, "Potential Safety Related Pump Loss," and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

Milton P. Alexich

Subscribed and sworn to before me this 11th
day of December, 1989.

Rita D. Hill
NOTARY PUBLIC

RITA D. HILL
NOTARY PUBLIC, STATE OF OHIO
MY COMMISSION EXPIRES 6-29-94