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Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Review of Midland Responses to NRC 10 CFR 50.54 Request Dated
October 25, 1979

Dear Dr. Speis:

Per our discussions at the meeting on June 12, 1980 in your office, we have reviewed the Midland Project's recommendations for mitigation of the potential for overcooling events in their plants. These recommendations were contained in two (2) letters from Stephen H. Howell (CPCo) to Harold R. Denton (NRC) dated December 4, 1979 and April 1, 1980. In this memo, the specific plant modifications have been outlined and some studies being conducted by Consumers Power Company which may result in future plant modifications or in revised operating procedures are also described. Some of the proposed plant modifications would in fact reduce the frequency of overcooling events, while other proposals are inadequately defined and additional information from the Midland Project will be required in order to perform analysis of their effectiveness.

The following design modifications were proposed by Consumers Power Company to reduce the potential for severe overcooling events in the Midland Project (B&W) reactors:

- 1) Upgrade pressurizer heaters and controls to safety grade classification;
- 2) addition of two-channel Class 1E auxiliary feedwater control system to reliably establish a preset steam generator water level to preclude an overcooling event due to auxiliary feedwater overfeed;
- 3) additional logic in the feedwater control system to limit the rate of primary system cool-down by limiting the rate of increase of the water level in the steam generators;

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- 4) increase pressurizer level range to 400 inches;
- 5) new control system hardware which uses dual auctioneered power supplies instead of individual power supplies for each module; and
- 6) control logic to shutoff main feedwater at a preset level in the steam generator to provide overfeed protection.

With regard to the proposed additional logic in the feedwater control system (item 3 above) which would be based upon steam generator water level, per discussions with Dr. Jensen (NRR) we agree that there is a substantial question regarding the use of SG downcomer water level to control primary loop cool-down rate when AFW is injected onto the top of the SG tubes. Since the objective is to control primary loop cool-down rate by controlling AFW, one must be assured that this control is based on a parameter which will in fact vary proportionately with the cool-down rate. It is felt that much of AFW spray will simply boil off and provide cooling without ever running down to the level where water accumulates (and is measured as a gravitational head) in the lower portion of the SG downcomer. Furthermore the two-phase flow problems associated with upper injection are difficult enough that it is not clear that a definite analysis could be performed. We therefore suggest that CPCo should be requested to provide justification for that proposal and suggest alternate methods for detection of changes in primary loop cool-down. However, we agree that AFW rate control is desirable.

With regard to the other items;

- 1) Safety-grade pressurizer heaters and controls would appear to only impact the pressure in the primary loop. It is not clear how this would alter the path of an overcooling transient with respect to avoidance of either initiation of HPSI or prevention of pressurizer emptying.
- 2) Reliability of the AFW would be improved by the proposed addition of two-channel control systems and would definitely impact the probability of an overcooling transient. It would therefore reduce the "sensitivity" by reduction in the frequency of these events. Its impact on the course of such a transient, if it did occur, is not clear.
- 3) Increasing pressurizer level range could aid in detection of primary coolant volume changes due to cool-down, if the level were extended to include the lower portion of the pressurizer. However, improved range of detection would have no effect on the course of an overcooling transient unless setpoints were altered to take advantage of the improved ability to detect small remaining pressurizer inventories. Furthermore, a change in this setpoint could have an important impact on other accident scenarios (small-break LOCAs) and should not be made without investigation thereof.

- 4) Dual auctioneered instead of single power supplies for control systems hardware would again improve probabilities but not impact the course of any particular transient.

The following proposed modifications will impact on our analysis of the response of the Midland Project nuclear steam supply system to an overcooling event. Additional information on the proposed system changes is required before the final evaluation can be completed.

- (1) Auxiliary Feedwater Control System: Details of the auxiliary feedwater control program are needed, including control logic (e.g., setpoints for actuation and termination and the logic used to control the rate of water level increase in the steam generator). Furthermore, one would like to know why those setpoints and logic were chosen and why CPCo believes these to be improvements over the original plan. To do so requires review of the analyses conducted by the applicant in support of these design modifications.
- (2) Main Feedwater Control System: The setpoint for shutoff of the main feedwater on steam generator level is required for analysis of overcooling transients initiated and/or exacerbated by malfunctions in the main feedwater system.

In addition to the specific modifications discussed above, Consumers Power Company is undertaking a number of studies and design reviews which may eventually result in design or procedure changes. However, analysis of the consequences and/or potential benefits of any proposed changes which may result from these studies can only be evaluated once they are formalized. The studies and design reviews are:

- Consumers Power Company (CPCo) is reviewing the pressurizer heater interlocks to insure that the heaters can be re-energized after they have been turned off following uncover during an overcooling event.
- CPCo is reviewing the B&W Failure Modes and Effects Analysis (FMEA) of the Integrated Control System and intends to implement recommendations based on their evaluation of the B&W analysis.
- CPCo is reviewing plant operating experience to determine what are the root causes of overcooling events and to assess the effect of possible plant modifications.
- CPCo in cooperation with one of their consultants, EDS Nuclear, is conducting a review of selected transients and plant systems (safety and non-safety) to identify potential design inadequacies.

CPCo has developed a program called ATOG (Anticipat
Transients Operating Guidelines) which involves co ruction
of event trees, dynamic analyses and development operating
guidelines.

It would be useful for us to review the transient operating guidelines developed in the ATOG program. Furthermore, the results of the review of plant operating experience would be of interest and we would like to be kept abreast of progress of that study.

Finally, on reviewing the Midland Project responses to the 10CFR50.54 request, we discovered that we did not obtain Revision 2 to the original Midland Project response. For completeness, we should obtain a copy of this document and review their responses. We have reviewed all other Midland responses up to and including the letter of April 1, 1980.

Sincerely,

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