

D860416

Mr. Victor Stello, Jr.
Executive Director for Operations
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stello:

SUBJECT: PROPOSAL BY DUKE POWER COMPANY TO OPERATE THE MCGUIRE NUCLEAR STATION, UNITS 1 AND 2, WITHOUT UPPER HEAD INJECTION SYSTEMS

During its 312th meeting, April 10-12, 1986, the Advisory Committee on Reactor Safeguards reviewed the proposal by the Duke Power Company to operate the McGuire Nuclear Station, Units 1 and 2, without the upper head injection system (UHS) portions of the emergency core cooling systems. The ECCS Subcommittee met to review this proposal on February 21, 1985 and March 26, 1986. We heard presentations by the NRR Staff, which endorses the proposal, by Duke Power Company, and by Westinghouse Electric Corporation, the designer of the McGuire Nuclear Steam Supply System. The NRC Staff provided a preliminary Safety Evaluation Report on this topic. Their review bases were augmented during discussion with us at this meeting.

The UHS was added to the McGuire units and later added to most PWRs with ice condenser containments to improve core cooling during hypothetical large break LOCAs. The UHS includes a pressurized accumulator which provides a high volume flow of water directly into the upper head if the reactor coolant pressure decreases below approximately 1000 psig as would be expected in an LB-LOCA. This system supplements the ECCS accumulator, which provides high volume flow to the cold leg at lower pressure in most PWRs. Thus, following an LB-LOCA, the core will be refilled from top and bottom as opposed to only from the bottom as in most PWRs without the UHS.

At the time of the McGuire operating license review, analyses of ECCS performance, using available "evaluation model" (EM) codes, indicated that the more rapid reflooding provided by UHS was necessary to reduce calculated peak clad temperatures (PCTs). The higher PCTs were the result of steam binding in parts of the reactor coolant system brought on by the lower containment back pressure typical of ice condenser containment performance during a hypothetical LB-LOCA. Without the UHS, it would have been necessary to operate the McGuire units with restrictions on core power or core power peaking. With the UHS, permissible peaking factors were similar to those in other Westinghouse plants.

Duke Power's experience with the UHS at McGuire has not been entirely

satisfactory. While there has been no indication that the system would not perform its function should an LB-LOCA occur, it has resulted in increased occupational radiation exposures and added to the complexity of plant operation and maintenance. There is strong incentive for its removal if it can be shown to be unnecessary.

Since the time of McGuire's operating licensing review, codes used for analysis of ECCS performance have been improved. This includes both EM codes and those used to make (more nearly) best estimate (BE) analyses.

Recent analyses, using the improved codes, by both the licensee and its contractors and the NRC Staff and its contractors, indicate that the performance of the McGuire ECCS, without the UHIS, is better than was predicted by the codes of a decade ago. The licensee claims, and the NRC Staff concurs, that the calculated performance is enough improved that the McGuire units can safely be operated without the UHIS and with normal core power limitations.

Using the improved EM codes has shown that licensing requirements can be met without the UHIS. There is also evidence, from the rather sketchy BE analyses completed, that the UHIS does provide some benefit and that operation without UHIS will reduce real PCT margins. However, we are persuaded that there are certain safety benefits in removing the UHIS, chiefly by reducing both the complexity of plant operation and its vulnerability to certain reactor upsets. We agree that the Duke Power Company proposal can be accepted. However, we suggest that they consider maintaining the removal and disconnection of the UHIS on a reversible basis until further calculations show that the core operating conservatisms of McGuire without UHIS are similar to non-UHIS units.

We believe our review of this matter points up the need to expedite revision of both 10 CFR 50.46 and Appendix K. The reliance on overly conservative evaluation models as mandated by the above regulations adversely impacts nuclear power plant safety.

Mr. C. J. Wylie did not participate in the Committee's review of this matter.

Sincerely,

David A. Ward
Chairman

Reference:

Memorandum dated March 18, 1986 from C. H. Berlinger, NRR, to P. Boehnert, ACRS Staff, Subject: Draft SER for the Proposed Operation of McGuire Units 1 and 2 Without Upper Head Injection, with enclosures

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