UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 22 1985

MEMORANDUM FOR: Commissioner Asselstine

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: PARTIAL FAILURES OF CONTROL ROD SYSTEMS TO SCRAM

This memorandum is in response to the questions in your memorandum dated March 26, 1985, regarding Generic Letter 83-28, "Required Actions Based on Generic Implications of the Salem ATWS Event," and Information Notice 85-18, "Failures of Undervoltage Output Circuit Boards in the Westinghouse-designed Solid State Protection System." Our responses are summarized below, and addressed in greater detail in the enclosure.

Regarding Generic Letter 83-28, you asked why the required actions have not been established already and when full compliance with them is expected. All required actions based on the generic implications of the Salem ATWS events were established by Generic Letter 83-28. The implementation dates for the required actions of Generic Letter 83-28 were tailored for each plant individually through NRC Project Managers negotiating plant-specific schedules.

With respect to completion of all the items, about half the operating reactors have installed the shunt trip modifications which add diversity within the reactor trip breakers. Implementation of this particular modification is presently scheduled to be completed at all facilities at their next refueling outage which, in all cases, is presently scheduled before December 1986.

Regarding Information Notice 85-18, you asked why the staff has chosen not to require licensees to do something about this issue, and whether the staff's previously proposed ATWS rulemaking would have alleviated this problem by requiring Westinghouse plants to install a diverse scram system. The staff is still considering the need to require licensees to take specific actions to address the failure of the UV output boards. NRR, in consultation with I&E, has determined that the issuance of the Information Notice is an appropriate and sufficient immediate regulatory action to alert licensees of these operating experiences and the safety implications. Our immediate-action determination is based upon consideration of several factors including: the fact that the failures that have occurred have affected only the automatic operation of a single train of a redundant two-train system; that such failures are readily detectable by required surveillance; manual scram capability was not affected; and the rate at which these failures seem to be occurring does not suggest that any plant is in danger of an ATWS event on an imminent basis.

Contact:
J. T. Beard, NRR
x27465

O/M-6
COMM-
+ RD-10-1A
ATWS

Notwithstanding the immediate-action determination, we are concerned that the rate of human-error induced failures of the output board may be greater than is desirable and that such failures could be a precursor to a common-mode failure that affects both redundant trains of the reactor protection system. The staff is currently preparing an evaluation report on this matter to serve as the basis for further consideration of the need for improvements. An example of such a potential improvement is a diverse design concept that might alleviate failures of the UV output board at a low cost compared to the cost of a whole new diverse scram system. Such a design concept has been proposed within the staff and is currently undergoing evaluation. If improvements are determined to be warranted, licensees will be required to take action. Any such actions will be developed using the established backfitting procedures.

A diverse scram system would not have been necessary for the specific events that have occurred to date, since they involved only a loss of redundancy and not a loss of system capability. Diverse systems are inherently less prone to common-mode failures than are redundant identical systems. If a common-mode failure were to affect both trains of the reactor trip system, a diverse scram system would likely prevent the occurrence of an ATWS event. Where cost considerations are not prohibitive, prevention of such an event is more desirable than reliance upon operator actions to mitigate the consequences.

(Signed) William J. Dircks
William J. Dircks
Executive Director for Operations

Enclosure:
Direct Responses to
Questions

cc: Chairman Palladino
Commissioner Roberts
Commissioner Bernthal
Commissioner Zech
SECY
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Executive Director for Operations

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NOTE: THIS RESPONSE WAS COORDINATED WITH DHFS. JTB.

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Please contact me if you need additional information on this subject.

William J. Dircks
Executive Director for Operations

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ENCLOSURE

RESPONSES TO QUESTIONS FROM COMMISSIONER ASSELSTINE

1. Generic Letter 83-28

Regarding Generic Letter 83-28, your questions were why have the required actions not been established already, and when is full compliance with them expected? All required actions based on the generic implications of the Salem ATWS events were established by Generic Letter (GL) 83-28. We have not found it necessary to establish any new requirements in this area beyond those defined in GL 83-28.

Regarding full compliance with GL 83-28, the staff has completed their review of most of the responses from operating reactors to provide automatic actuation of the breaker shunt trip attachment, and about half of the applicable operating reactors have already installed the shunt trip. The other half are expected to complete installation at their next refueling outage, which in all cases is before December 1986. Regarding full compliance with the remaining high priority items (as defined in GL 83-28), the staff is currently proposing to complete its review during the first quarter of FY 1986. Review completion of the other items is currently scheduled for the first quarter of FY 1987. Final implementation of all of the GL 83-28 items should therefore have been complete by December 31, 1986.

2. IE Information Notice 85-18

Regarding Information Notice 85-18, your questions were why has the staff chosen not to require licensees to do something about this, and would the staff's previously proposed rulemaking, requiring Westinghouse plants to have a diverse scram system, have alleviated this problem? As with all reactor operating events, NRR, (Operating Reactors Assessment Branch) and I&E, (Events Analysis Branch), conducted an initial, coordinated review of the failure at the Sequoyah plant and determined that the issuance of the Information Notice was an appropriate and sufficient immediate action. Further actions that could be taken will be considered within our system for prioritizing new generic safety issues.

The basis for this immediate-action determination included consideration of the following factors:

(1) In each of the failures at North Anna and Sequoyah, the failure occurred only in a single train of the reactor trip system. Since the redundant train remained operable in each case, this type of failure resulted only in a loss of redundancy, not a loss of safety function capability.

(2) The solid state protection system satisfies all current NRC regulations, including such matters as the single failure criterion and fail-safe design.

(3) The failures are detectable by the use of built-in testing equipment and testing is required to be conducted periodically by plant Technical Specifications. In fact, all the failures at North Anna were detected during such testing.

(4) If licensees are advised of these operating events and reminded of the importance of testing (especially post-maintenance testing), they are expected to take any corrective action they determine appropriate to fulfill their statutory requirement to assure the continued safe operation of their plants.

(5) The rate at which failures of these output boards seems to be occurring does not suggest that any plant is in an imminent danger of an ATWS event.

(6) The failures affected only the automatic functioning of the reactor trip system. The manual scram capability is unaffected and remained operable. Improved ATWS procedure and operator training have been initiated since the Salem ATWS event.

Notwithstanding the factors discussed above, we are concerned about the apparent reliability of the UV output board and especially its vulnerability to human-induced failures. We are evaluating these reactor operating events as precursors of a potential ATWS event due to the possibility of a common-mode failure mechanism affecting both trains of the reactor trip system. The actual experience in terms of failure rate suggests that the need for improvements should be well thought-out and evaluated and implemented, if warranted. NRR is currently preparing a report on this subject for the purposes of defining the safety issues, documenting the immediate-action evaluation, and serving as a basis for further consideration. This includes considering a staff-suggested diverse design concept that would allay concerns regarding failures of the UV output board. The concept appears to offer a significant system reliability improvement at a low cost compared to a whole new diverse scram system. This subject has been considered recently by the ACRS, especially during the meeting of the ATWS Subcommittee on March 15, 1985.

The staff's proposed ATWS rulemaking, which would have required Westinghouse-designed plants to have a diverse scram system, is relevant to the recent failures of the UV output boards. Since the actual events to date have involved the loss of a single train of the redundant two-train system, the presence of a diverse scram system would not be necessary. The study of the generic implications of the Salem ATWS event (NUREG-1000) suggests strongly that a lesson to be learned is that single failures of critical components should be evaluated as precursors to multiple failures. The

failures of the UV output boards to date suggests that human-error-induced failures occurring during maintenance or surveillance activities may be occurring at a rate that is higher than desirable and could become a mechanism for the common-mode failure of both redundant trains of the current reactor trip systems.

Diverse equipment, by its vary nature, would be less vulnerable to failures that affect other equipment. Therefore, a diverse scram system could very well prevent an ATWS event.

DL

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EDO PRINCIPAL CORRESPONDENCE CONTROL

FROM:

COMM. ASSELSTINE

DUE: 04/11/85

EDO CONTROL: 000493
DOC DT: 03/26/85
FINAL REPLY:

TO:

DIRCKS

FOR SIGNATURE OF:

** PRIORITY **

SECY NO:

EXECUTIVE DIRECTOR

DESC:

PARTIAL FAILURES OF CONTROL ROD SYSTEMS TO SCRAM

ROUTING:

DIRCKS
ROE
REHM
STELLO
TAYLOR
GCUNNINGHAM
HELTEMES

DATE: 03/29/85
ASSIGNED TO: NRR CONTACT: DENTON

SPECIAL INSTRUCTIONS OR REMARKS:

AEOD WROTE THE INITIAL MEMO (ATTACHED),
BUT I DO NOT SEE A NEED FOR THEM TO COORDINATE.
TAREHM

Received NRR: 3/29/85
contact: Thompson
Crutchfield
cc: Eisenhut/Denton
PPAS

Prio 11/2 GMT