



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

May 13, 1981

Honorable Joseph M. Hendrie  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: RESPONSE TO INQUIRIES CONCERNING THE BROWNS FERRY NUCLEAR POWER  
STATION UNIT 3 PARTIAL-FAILURE-TO-SCRAM

Dear Dr. Hendrie:

In response to Commissioner Ahearne's letter of December 12, 1980, the Advisory Committee on Reactor Safeguards has reviewed the issues contained in Congressman Morris K. Udall's inquiries which were prompted by the June 28, 1980 Browns Ferry Unit 3 partial-failure-to-scrum. There appear to be four specific concerns expressed by Congressman Udall which include:

- (1) the level of confidence placed in the Staff's ability to calculate the consequences of an anticipated transient without scram (ATWS);
- (2) the level of confidence in the adequacy of actions taken subsequent to the Browns Ferry Unit 3 partial-failure-to-scrum;
- (3) the extent to which emergency procedures at operating plants contain instructions for the operator, given an ATWS; and
- (4) an assessment of the causes of the Browns Ferry Unit 3 partial-failure-to-scrum.

These matters, as related primarily to BWRs, were discussed during Subcommittee meetings with the NRC Staff held on March 10 and April 8, 1981 and during the 253rd ACRS meeting, May 7-9, 1981.

The Staff, through its contractor, Brookhaven National Laboratory (BNL), has the ability to calculate consequences of a full ATWS event. BNL's current capability to calculate consequences of a partial ATWS (where only a fraction of the control rods fail to insert) is not well developed. However, it is our belief that the consequences of a partial ATWS are bounded by those of a full ATWS. New, more sophisticated codes are being developed which should more accurately model both full and partial ATWS consequences. It is expected these codes will be completed by 1982.

Regarding the adequacy of actions taken subsequent to the Browns Ferry Unit 3 partial-failure-to-scram, we believe that the NRC Staff and the industry responded in a timely manner. The initial Bulletin resulting from this event (Bulletin 80-17) was issued on July 3, 1980 and was aimed at preventing the accumulation of water in the scram discharge volume (SDV), which was the probable cause of the Browns Ferry Unit 3 partial-failure-to-scram. We also take note of the ongoing effort by the NRC Staff to continue the review of BWR scram systems.

As a result of the Browns Ferry Unit 3 partial-failure-to-scram, the Commission directed the Office of Inspection and Enforcement to conduct a survey to determine the existence of adequate emergency procedures for coping with ATWS events at operating power reactors. Bulletins issued following the Browns Ferry Unit 3 partial-failure-to-scram required checks to assure adequate ATWS procedures were in place at BWRs. The results of the survey made after the Bulletins were issued, indicated that all utilities which were operating BWRs then had procedures for coping with ATWS which were acceptable to the NRC. In addition, steps have since been taken to ensure that PWRs as well as BWRs now have ATWS procedures acceptable to the NRC. It is expected that further improvements will be made in ATWS procedures as in-depth examination of the matter continues. We note that these procedures, of themselves, do not substitute adequately for design improvements to mitigate and reduce the probability of an ATWS.

Although we believe that the Browns Ferry Unit 3 incident was caused by water in the SDV, a complete explanation as to why the water was present is not available. The most plausible explanation is that some type of flow resistance existed in the drainage system for the SDV, which prevented adequate drainage. The cause of the failure to detect this condition was poor hydraulic coupling between the scram discharge volume and the instrumented volume. This design deficiency is common to a number of the older BWRs. Later designs of the BWR have an improved hydraulic coupling which reduces this concern. Among the long-term fixes for this problem will be a combination of the two volumes as in the newer system design. It is unclear why the scram discharge system design was changed without older plants having been subjected to a reexamination. Some mechanism should be formulated or a better system developed to ensure design improvements are reviewed for applicability to existing plants.

It is our opinion that the Commission's previous responses to Congressman Udall reflected the best information available at the time those responses were prepared and that those responses still represent a reasonable assessment of the situation.