ANTICIPATED TRANSIENTS WITHOUT SCRAM - WILL IT EVER END?

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Summary

This issue has been under discussion for at least 10 years. Resolution, which has seemed assured several times, continues to elude our grasp. The purpose of this paper is to present the NRC staff's present views and plans. Although this summary is written in June, 1979, the paper will be updated for presentation in November, 1979.

An early assessment of ATWS risk was given in 1973 by the AEC staff in WASH-1270. In April, 1978, NUREG-0460 gave an updated staff view, taking into acccunt the industry work done in the meantime and including the insights then available from the Reactor Safety Study. Both staff studies concluded that improvements in ATWS probability and/or consequences are required for long-term protection of the public.

Since the issuance of NUREG-0460, new safety and cost information has become available on ATWS. Also, new insights have been developed on the general subject of quantitative risk assessment. Accordingly, Vol. 3 was issued in December, 1978 as a supplement to summarize the important additions to our information base and to propose a course of action from among a variety of alternatives for resolving the ATWS concern.

In the ACRS meetings conducted over the past few months, the nuclear industry maintained that the proposed requirements in NUREG-0460 are unnecessarily conservative and that the cost would be higher than the NRC estimates, particularly for plants under construction or in operation.

The report NUREG-0460 had also been undergoing review by the NRC Regulatory Requirements Review Committee. The Committee criticized the staff for heavy reliance on quantitative probabilistic assessments of ATWS. The Committee has encouraged caution in the derivation of regulatory criteria from operating data on the reliability of reactor scram systems because the common mode failures of interest have extremely low probabilities of occurrence that are subject to large uncertainties.

In the first volume of NUREG-0460, the staff proposed a numerical safety goal for ATWS. It was based in part on consideration of the overall core melt frequency, arising from all causes, that was reported in the Reactor Safety Study, WASH-1400. We acknowledged that the core melt frequencies of the Reactor Safety Study were subject to uncertainty. We did not use the specific ATWS core melt probabilities from the Reactor Safety Study; we went further by evaluating other LWR designs and in performing different analyses that generally contained more conservative assumptions.

In its recently published report to the NRC (NUREG/CR-0400), the Lewis Committee found, among other things,

> "We are unable to determine whether the absolute probabilities of accident sequences in WASH-1400 are high or low, but we believe that the error bounds on those estimates are, in general,

> greatly understated. This is true in part because there is in many cases an inadequate data base, in part because of an inability to quantify common cause failures, and in part because of some questionable methodological and statistical procedures." (Also see pages 46 and 47 of NUREG/CR-0400 for the Lewis Committee comments on ATWS).

On the basis of our reevaluation, the advice of the Lewis Committee and the Regulatory Requirements Review Committee, we now believe that a numerical safety objective is not satisfactory for use in nuclear regulatory decision making at the present time, in the manner suggested in the first two volumes of NUREG-0460. We continue to believe, however, that quantitative risk evaluations have provided a valuable input to our understanding of ATWS. We now believe that the resolution of ATWS concern should rest on engineering evaluation and judgment of the appropriateness of alternative plant modifications, rather than directly on quantitative risk analyses. Accordingly, the supplement discusses possible alternative plant modifications and the different degrees of assurance of safety they are judged to provide. The supplement also addresses the question of how ATWS should be resolved for new plants and plants under construction or in operation. The conclusion is that certain modifications should be required, that a rulemaking proceeding (not necessarily a hearing) should be initiated, and that generic verification information should be obtained to provide the necessary assurance of safety adequacy for the alternatives proposed. The industry was in the process of developing this information on March 28, 1979. The occurrence of the Three Mile Island accident on that date, and what we now know about it, have made us pause yet again in trying to resolve the ATWS problem. For PWRs at least, the adequacy of the modifications called for in Vol. 3 of NUREG-0460 needs to

be reconsidered in the light of our new knowledge. At the time of writing this summary, we are not ready to draw conclusions from the lessons of this severe accident. This will be updated at the November presentation.

For BWRs, however, the needed resolution seems to us to remain clear. Although the Three Mile Island accident has made evident lessons for BWR design and operation, they seem not to affect significantly our ATWS requirements. We therefore intend to pursue timely resolution of ATWS requirements for BWRs, even though some delay appears inevitable for PWRs. The different response of PWR and BWR plants to ATWS sequences, and the more severe calculated ATWS consequences in BWRs, also impel us to proceed with BWRs in spite of the PWR uncertainty.

In conclusion, it must be stated that at the time of writing "the ATWS problem" is still not resolved, progress toward resolution is still slow, and the NRC Staff is still convinced that, although the individual and societal risks from ATWS have been, and are today, acceptably small, the future likelihood of severe consequences arising from an ATWS event could become unacceptably large and measures should be taken to diminish it.