D870609

The Honorable Lando W. Zech, Jr.
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Zech:

SUBJECT: ACRS REPORT ON PROPOSED GENERIC LETTER ON INDIVIDUAL PLANT EXAMINATIONS FOR SEVERE ACCIDENT VULNERABILITIES

During the 326th meeting of the Advisory Committee on Reactor Safeguards, June 4-6, 1987, we discussed a draft Generic Letter prepared by the NRC Staff as guidance for individual plant examinations (IPEs) for severe accident vulnerabilities. The IPEs are a part of an implementation plan for the Severe Accident Policy Statement. The ACRS Subcommittee on Severe Accidents considered this matter during meetings on December 19, 1986 and on May 28, 1987. In our review, we had the benefit of discussions with the NRC Staff and with representatives of the Industry Degraded Core Rulemaking (IDCOR) Program. We also had the benefit of the documents referenced.

The letter in its final form, accompanied by a panoply of supporting documents, is intended to provide guidance to nuclear power plant licensees in their performance of the individual plant examinations referred to in the Commission's Severe Accident Policy Statement (50 FR 32138, August 8, 1985). Specifically, the Policy Statement states:

> Accordingly, when NRC and Industry interactions on severe accident issues have progressed sufficiently to define the methods of analysis, the Commission plans to formulate an integrated systematic approach to an examination of each nuclear power plant now operating or under construction for possible significant risk contributors (sometimes called "outliers") that might be plant specific and might be missed absent a systematic search.

The NRC Staff finds that the following five options could satisfy the examination requirements, if appropriately supplemented:

(1) A PRA may be utilized, provided it is at least at Level II or Level III and it uses current methods and data.

(2) The IDCOR Individual Plant Evaluation Methodologies (IPEMs) may be used, provided the enhancements in the NRC Staff evaluation are applied. (The NRC Staff evaluation of the applicable IDCOR IPEM is included as an attachment to the generic letter.)

(3) A Level I PRA supplemented by an appropriately evaluated source term method may be applied.

(4) A simplified PRA which uses reduced systems models for the core damage analysis and sequence grouping for the containment performance analysis may be applied with an appropriate NRC approval.

(5) Another systematic examination method may be applied with prior NRC approval.

The NRC Staff requests documentation of the examination results, as follows:

(1) Certification that an IPE has been completed and documented as requested by the provisions contained in the generic letter.

(2) A listing of the dominant sequences leading either to core damage or to significant releases from containment and their frequencies for the plant, together with the screening criteria used to identify the sequences.

(3) Identification and listing of the main drivers, or leading contributors, to the predicted core damage frequency.

(4) Identification and listing of the main contributors to any predicted containment failure.

(5) A discussion of the potential areas of improvement identified in the plant examination which could reduce either the probability of severe accidents or the probability of large releases from severe accidents.

(6) A list of the most cost-effective potential improvements, including hardware changes as well as changes in procedures and training programs.

(7) An evaluation of the most promising improvements, disposition of those improvements, and an implementation schedule.

(8) Consistent with the assumptions made in the IPE, a description of organizational responsibilities related to severe accidents together with the steps taken to assure that personnel are properly trained, appropriate procedures are in place, and diagnostic instruments and essential equipment will be available and will function where needed.

The PRA methods are relatively well specified from recent experience, at least for internal events up to the core damage stage. With regard to the IDCOR IPEMs, the NRC Staff has provided evaluations which lead to a large number of recommended modifications and additions that are needed to make the IDCOR IPEM option acceptable. The ACRS generally supports the NRC Staff's evaluations of the IDCOR IPEMs.

We recognize that formulating guidance for an individual plant examination is a formidable task. We commend the NRC Staff for the

progress that has been made, and for the cooperation with industry, through the IDCOR program, that has produced a significant contribution to the effort. However, we believe that the proposed guidance that has been prepared is deficient in a number of areas, and that unless it is improved before licensees are required to design a program and perform an examination, a number of important objectives of the program are unlikely to be achieved.

The suggested approach to plant analysis is divided into two segments called "front end" (i.e., the description of an hypothesized sequence from initiation to the beginning of severe core damage) and "back end" (i.e., from the onset of severe core damage to release of radioactive material from containment). The guidance emphasizes that the two segments are not altogether independent. However, because the onset of severe core damage or core melt has become something of a milestone in many PRAs, this is probably a reasonable division. The guidance given for the front end analysis in the current draft is much more detailed, and would be much easier for an inexperienced group to follow, than is the guidance for the back end which deals primarily with post-core-melt severe accident progression and containment performance. We believe that the guidance given, and the methods suggested, can provide a reasonable basis for a search for vulnerabilities in the pre-core-melt or preventive part of postulated sequences. However, the so-called guidance on containment system performance analysis, especially that part that deals with PWRs, appears to be a rather hurriedly assembled discussion of some of the problems and uncertainties likely to be encountered in the analysis of containment performance, with very little guidance on how to perform a search for vulnerabilities.

We recognize and support the NRC Staff's effort not to be overly prescriptive. Furthermore, the contrast between the guidance given for the front end and the back end analyses reflects, to some extent, the relative state of development of information needed to perform an analysis of reactor system performance, compared to that needed to describe containment system performance. Nevertheless, it is our judgment that if licensees, especially those with limited PRA experience, are faced with guidance on containment performance analysis as ambiguous as that in the current draft, they will be so mystified that they will have no recourse but to retain an outside group to carry out the analysis. They will thereby miss one of the more important benefits of the IPE, that of becoming familiar enough with system performance to be able to recognize vulnerabilities in their plants, and of becoming aware of expected system performance in a severe accident. The guidance on containment analysis should be improved before the letter is released.

We also believe that not enough guidance is given as to goals and objectives of the examination. The draft letter, in describing the Commission's Policy Statement, identifies the "overall goals of the policy" as "(1) to reduce the probability of a severe accident, and (2) should a severe accident occur, to mitigate, to the extent possible, its consequences to the public." It identifies the purpose of the examination as providing "the basis for a utility's appreciation of severe accident behavior, recognition of the role of prevention and mitigation systems and procedures, and the development of an accident management scheme." A licensee must also, having discovered

possible vulnerabilities, identify potential areas for improvement, suggest corrective actions to achieve improvement, decide which improvements he thinks should be implemented (if any), discuss the decision not to make those judged inappropriate, and give a schedule for effecting those changes that are planned: all of this before the examination has been reviewed by the NRC Staff. The licensee is also asked to develop an organized approach, including training to deal with many severe core damage accidents.

Vulnerabilities are not defined, either qualitatively or quantitatively (except perhaps by inference from some of the material referenced in the letter), nor is there guidance as to the amount and kind of improvement that the NRC Staff will find acceptable. The reason given for not providing further guidance is that there are no objective standards, that each licensee must make a decision for himself as to the changes that are appropriate. However, the reviewing NRC Staff will need to have some criteria to provide a basis for review. It would save everyone a considerable amount of thrashing about if more guidance could be given as to criteria to be used in determining the adequacy of the IPEs.

From our discussions with the NRC Staff, we have concluded that the projected scope of the review described by the draft letter may be too ambitious. Based on our earlier discussions with the NRC Staff, we had concluded that the IPEs were to be performed to look for "outlier" plants, i.e. plants with features, procedures or other operating characteristics which produced risks unexpectedly high compared with those of the general population. It appears, however, that the program currently envisioned is one which attempts to establish a profile of core melt frequency and containment performance (described at least semi-quantitatively, if not quantitatively) for each operating plant, and then (possibly) attempts to reduce plant risk to some unspecified level, not necessarily the same for each plant, by requiring plant or other modifications which reduce the contribution from some selected population of risk contributors. It would also lead to the beginning of a risk management program at each plant. Although there may be merit in this approach, we question whether many of these tasks are suitable for individual initiatives; rather they would need the efforts of appropriate new owners' groups, and NRC Staff guidance would have to be improved.

The guidance provided makes it clear that analyses of severe accident sequences initiated by external events and by sabotage are not requested at this time. Analyses for external initiators will be required later. Nevertheless, it would be helpful to give at least some guidance at this time as to what is likely to be asked for later on, especially since one option given a licensee is to perform a PRA which considers external events.

In light of both the difficulty and the importance of the IPEs, we recommend that instead of the approach proposed in the draft letter, which has all operating plants begin the review immediately, the NRC Staff arrange trial reviews of several plants to be carried out cooperatively with licensees in somewhat the same way that the Systematic Evaluation Program (SEP) reviews were performed. Although part of the the review process developed by IDCOR has been exercised by them on several plants, the NRC Staff's view is that IDCOR's

treatment of containment performance does not consider several important safety-related questions. Furthermore, for most of the plants reviewed by IDCOR, a more extensive PRA existed. Such reviews provide a useful reference. However, it would be valuable to perform reviews for a few plants that do not have PRAs. If this were done cooperatively by the NRC Staff and the licensees, it could provide additional information on the application of non-PRA approaches, and could also serve as a tool for development of more sharply focused guidance for later IPEs.

Sincerely,

William Kerr
Chairman

References:

1. Letter from T. P. Speis, NRC, to W. Kerr, ACRS, Subject: Documentation Necessary for the Initiation of the Severe Accident Policy Implementation, dated May 15, 1987.
2. Letter from T. P. Speis, NRC, to W. Kerr, ACRS, Subject: Documentation Necessary for the Initiation of the Severe Accident Policy Implementation, dated May 22, 1987.
3. U.S. Nuclear Regulatory Commission, "NRC Policy on Future Reactor Designs - Decisions on Severe Accident Issues in Nuclear Power Plant Regulation," USNRC Report, NUREG-1070, dated July 1985.
4. IDCOR Program Reports (IDCOR-IPEMs):
   (a) Technical Report 86.3A1, "Individual Plant Evaluation Methodology for Pressurized Water Reactors," April 1987,
   (b) Technical Report 86.3A2, "IPE Source Term Methodology for PWRs," March 1987,
   (c) Technical Report 86.3B1, "Individual Plant Evaluation Methodology for Boiling Water Reactors," Volumes I and II, April 1987,
   (d) Technical Report 86.3B2, "IPE Source Term Methodology for BWRs," March 1987.
5. Brookhaven National Laboratory Reports (Draft), "Prevention and Mitigation of Severe Accidents," NUREG/CR-4920, dated March 1987
   (a) Volume 1, "BWR, Mark I Design,"
   (b) Volume 2, "BWR, Mark II Design,"
   (c) Volume 3, "BWR, Mark III Design,"
   (d) Volume 4, "PWR, Large Volume Containment Design," and
   (e) Volume 5, "PWR, Ice Condenser Containment Design."

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