

March 8, 1996

The Honorable Shirley Ann Jackson  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: USE OF INDIVIDUAL PLANT EXAMINATIONS IN THE REGULATORY  
PROCESS

During the 428th and 429th meetings of the Advisory Committee on Reactor Safeguards, February 8-10 and March 7-9, 1996, respectively, we discussed the Individual Plant Examination (IPE) review process and findings with the NRC staff. Our Subcommittee on IPEs also met with the staff and its contractors on January 26, 1996, to review this matter. We also had the benefit of the documents referenced. This report is in response to the December 27, 1995 Staff Requirements Memorandum (SRM).

In the SRM, the Commission requested "the ACRS views on the extent to which the current spectrum of IPEs can be used in the regulatory process." We interpret this request as referring to potential regulatory uses of the IPEs that were not delineated in Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." This report includes comments on both the Generic Letter goals and the Commission request.

Goals of Generic Letter 88-20

The purpose of the IPE program, as stated in Generic Letter 88-20, was for each licensee:

- (1) to develop an appreciation of severe accident behavior
- (2) to understand the most likely severe accident sequences that could occur at its plant
- (3) to gain a more quantitative understanding of the overall probabilities of core damage and fission product releases
- (4) to reduce, if necessary, the overall probabilities of core damage and fission product releases by modifying, where appropriate, hardware and proce-

dures that would help prevent or mitigate severe accidents.

We note that the IPEs were to be limited to the examination of internal initiating events and internal floods with the reactor at power and that individual and societal risks were not to be estimated. Other programs deal with external events and shutdown risk.

The IPE program has been successful at most utilities in meeting goal (1) and, to a lesser extent, goals (2) and (3) of the Generic Letter. Goal (4) of the Generic Letter also appears to have been achieved. We were told that most licensees discovered weaknesses and took corrective actions. In addition, this program has been beneficial in educating a broader segment of the NRC staff about the issues related to these goals.

We were told by the staff that all licensees submitted a Level-1 probabilistic risk assessment (PRA). Most licensees also submitted a Level-2 PRA, although some addressed Level-2 phenomena in a rudimentary manner. The methods and data sources used by different licensees varied widely. In some cases, the choices appeared to be arbitrary. Some licensees chose to include common-cause failures only for major components, while others chose to ignore them completely.

It is difficult to determine the extent to which the variability in IPE results for similar classes of plants is due to actual plant differences or to modeling assumptions. Although some of the causes for this variability may be immediately apparent, others are not. The latter include assumptions made about success criteria, the assumed dependencies between operator actions, and the level of decomposition in fault-tree analyses. (We note that the fault trees were not requested as part of the IPE submittals.)

An example of a potentially significant impact of modeling differences is the range of core-damage frequencies (CDFs) for BWR 3/4s that the staff has compiled. This range is from about  $10^{-7}$  to about  $10^{-4}$  per reactor-year. Although the staff has stated that such differences are primarily due to plant differences, this range of results seems unrealistic given the similarity among BWR 3/4s.

#### Use of IPEs in the Regulatory Process

As discussed above, the quality and consistency of the IPEs vary and the impact of assumptions and analytical models is difficult to assess. On a case-by-case basis, however, additional and extended use of these IPEs is possible. As specific regulatory issues arise, the PRA Standard Review Plan now being developed by the staff can serve as a template for judging the quality and acceptability of the individual plant PRA for the proposed application.

As the agency moves toward risk-informed regulation, there will be an increasing need for full-scope PRAs that incorporate fire risk, external events, other modes of operation, and site-specific consequences. When requests for risk-informed regulatory action arise, the NRC staff should make it clear that a relevant PRA

should be used.

To achieve these goals, especially consistency, some degree of standardization will be required. Standardizing PRA models and methods has been a controversial subject. Proponents argue that it would create a basis for comparison of PRA results, while opponents fear that it would inhibit methodological developments. We recommend that IPEs be reviewed to identify acceptable and unacceptable assumptions and/or models. Codification of assumptions and models ought not inhibit the continued development of PRA methods. These activities would be a significant first step toward addressing the Commission's statement in the SRM dated June 16, 1995, "that more meaningful plant-to-plant or scenario-to-scenario comparisons based on risk could be achieved if PRAs were done on a more standardized, replicable basis."

We believe that the NRC could make additional use of the present IPEs (except those that the staff has found to use unacceptable methods or models) for a limited number of applications (e.g., regulatory analyses and prioritization of generic issues).

The staff stated that the CDFs for several PWRs are greater than  $10^{-4}$  per reactor-year. Several BWRs have CDFs that are very close to  $10^{-4}$  per reactor-year and the conditional containment failure probabilities for BWR Mark I containments range from about 0.02 to about 0.6. Although the PRAs have limitations as discussed above, these numbers suggest that an investigation would be warranted to reassess their validity and to verify that the very low numbers reported by some other plants reflect actual plant differences.

Our conclusion is that the IPE program has met successfully the objectives of Generic Letter 88-20. This program has developed a risk awareness, both in the utilities and the NRC, that will contribute significantly to efforts to establish a risk-informed and performance-oriented regulatory system. The plant-specific

IPEs are an extremely valuable asset that should not be permitted to languish unimproved and unused.

Sincerely,

/s/

T. S. Kress  
Chairman

References:

1. Staff Requirements Memorandum dated June 16, 1995, from Andrew L. Bates, Acting Secretary, NRC, to the File regarding Meeting with ACRS on June 8, 1995
2. Staff Requirements Memorandum dated December 27, 1995, from John C. Hoyle, Secretary, NRC, to John T. Larkins, ACRS regarding Meeting with ACRS on December 8, 1995
3. Generic Letter 88-20, dated November 23, 1988, to All Licensees Holding Operating Licenses and Construction Permits for Nuclear Power Reactor Facilities, Subject: Individual Plant Examination for Severe Accident Vulnerabilities - 10 CFR <sup>1</sup>50.54(f)

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