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DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

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PROPOSED RULE PR 50
45 FR 65474

Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

Reference: Advanced Notice of Proposed Rulemaking: Domestic Licensing of Production and Utilization Facilities; Consideration of Degraded or Melted Cores in Safety Regulation

Dear Sir:

The purpose of this letter is to submit Duke Power Company's comments on the referenced subject. The opportunity for public comment on this matter was afforded by the notice FR Doc. 80-30596 in the October 2, 1980 Federal Register. Our comments principally address general aspects of the notice and rulemaking process as opposed to providing answers to the 18 specific questions posed in the notice. However, a number of these questions, or the underlying issue prompting them, are addressed in our comments, which follow. Duke Power has been involved in the preparation of detailed comments to be submitted by the AIF and endorses the comments of that organization.

Comments on the Conduct of the Rulemaking

Duke Power Company supports the Commission's intentions to address and resolve the degraded core issue. However, we feel that it is vitally important that this effort proceed (1) with a logical structuring of all relevant and related issues, (2) by providing in the interim reasoned policies to prevent unwarranted disruption of licensing, and (3) by developing comprehensive technical bases to enable rational decisions on the need for and the scope of any licensing requirements for degraded core conditions.

We believe that the efforts now being initiated by the NRC in the areas of safety goals, plant siting and emergency planning in addition to the degraded cores are closely interrelated and, therefore, require treatment in an integrated and complementary manner.

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Acknowledged by card. 1/7/81

Clearly, a logically sequenced process requires the setting of safety goals as a first step. Subsequent decisions regarding other issues can then be made based on risk comparisons to the safety goal. We do not believe that useful rulemakings can be conducted on these issues without reference to such safety goals. In particular, we strongly believe that the degraded core rulemaking cannot be meaningfully concluded prior to the establishment of quantitative safety goals.

The role of probabilistic risk assessment (PRA) techniques in the degraded core rulemaking process should be clearly understood. Significant efforts are underway within the NRC and in the industry to refine and standardize the application of PRA methods and should be carried forward expeditiously. Establishment of a quantitative safety goal will permit meaningful comparisons between it and the results of PRA analyses of postulated degraded core accidents. The benefits obtained through risk reduction can then be compared realistically against the costs incurred.

Both the industry and the NRC are planning large scale efforts in research and analysis of degraded core phenomena. These efforts should be strongly supported and advanced. The knowledge gained from their performance will provide valuable insight into the mechanisms and results of degraded core behavior.

Recognizing that an amiable and technically appropriate resolution of the degraded core issue will take some time to achieve, it will be appropriate for the NRC to promulgate a policy statement, recognizing the improvement in safety achieved by the post-TMI endeavors and outlining the NRC's intention to treat the degraded core issues only in a generic rulemaking framework and not in individual licensing proceedings. We believe that the implementation of many of the NRC bulletins and orders and the recommendations of the "lessons learned studies" and the institutionalization of INPO and NSAC in response to the TMI-occurrence have contributed to a significant reduction in the likelihood of degraded core accidents. Accordingly, a sufficient basis exists for the NRC to conduct degraded core accident studies in an orderly manner without having to address this issue in the individual licensing reviews.

Comments on the Scope of the Degraded Core Rule

Some of the major considerations of the proposed degraded core rulemaking involve the manner in which degraded core accidents are to be analyzed and reviewed and the criteria by which they are judged to be acceptable. Although the extraordinary sequences of events which led to the severely damaged core at TMI-2 were outside the current design

basis concept, the "defense-in-depth" approach worked effectively in preventing serious damage to the public health and safety. Therefore, the impetus for nuclear power plant safety, as supported by the conclusions of the many investigations conducted in the aftermath of the TMI-2 accident, should be the development, implementation, practice, and enforcement of means to prevent accidents leading to severe core damage. The elements of such an effort should consist of (1) continued emphasis on the design safety; (2) improvement in operation safety that deals with the necessary quality of operations, embraces continuing evaluation of operating experiences, and assures the necessary performance of safety systems; and (3) a regulatory process oriented to discriminate and to deal with real safety issues. Much of what is necessary in these areas has been embarked upon during the last two years as a result of the industry's and the NRC's efforts. Thus the first and most important level of protection against degraded core accidents is the reinforcement in design, operational, and regulatory safety to preclude accidents involving degraded core conditions.

While, from the standpoint of regulatory criteria, it is sufficient to confirm the design adequacy of the plant for acceptably low likelihood of degraded core accidents, the capability of plants to cope with some degree of degraded core conditions can be examined to provide another level of safety. However, there is a large spectrum of accidents involving degraded core conditions, each characterized by a unique "hazard state" and a different likelihood, and therefore the traditional safety analysis methods are not suitable for the analysis of these accidents. What is necessary, then, is a systematic analysis of the plant utilizing the PRA techniques to identify the most likely accident sequences leading to degraded core conditions, to confirm in a quantitative manner that their likelihood is sufficiently small, and, if necessary, to identify areas of improvement. In addition, such a systematic analysis using PRA techniques would enable the characterization of the relevant phenomena (hydrogen generation, radioactivity, core coolability, etc.) associated with the set of most likely sequences. The capability of the plant to cope with a sufficient range of degraded core accidents can then be assessed by considering in a realistic manner the actual design capability of the plant to cope with these relevant phenomena instead of evaluating the plant design by using conservative assumptions and presupposed non-mechanistic phenomena.

The degraded core rule, when it is ultimately expressed, should specify criteria and objectives rather than definitions of specific mitigation systems or approaches. Many of the questions posed in the advanced notice concern specific hardware requirements (such as filtered vented containments, hydrogen control measures, containment inerting, core retention devices, etc.) which are inappropriate in an advanced notice

of rulemaking. The logical approach to resolving this issue suggests beginning with probabilistic plant analyses to identify the highest probability accident sequences which lead to degraded core conditions. This approach would identify and characterize the relevant phenomena associated with particular accident scenarios. The need for additional mitigative design features and their realistic contribution to overall safety can then be assessed and the most appropriate system/component designs selected. Furthermore, the selection of specific systems for accident mitigation is an option resting with the plant owner and should not be dictated by regulatory requirements.

The advanced notice raises a question of the extent to which engineered safety features should be assumed not to work at all, not work well, or be defeated by the operator, and thus lead to a severely damaged core. Considering that the viable pathways to degraded core conditions dictate failure of the engineered safety features and that successful operation of the safeguards will preclude a degraded core, the answer to this question is moot. The logical approach to answering this question involves the use of PRA techniques to realistically assess failure modes and probabilities for these systems.

In summary, our recommended approach for dealing with the degraded core accidents is to rely upon the existing framework of design basis accident ground rules and "defense-in-depth" philosophy, including the recent changes in the area of design safety and operation safety to preclude the occurrence of degraded core accidents. However, to assure an extra measure of safety, we recommend (1) the formulation of a safety goal, (2) using the PRA techniques to confirm quantitatively that accident sequences characterized by severe consequences are of acceptably low probability or to identify relevant phenomena of accident sequences of interest, (3) employing realistic analysis to assess the ability of the plant to cope with these phenomena and (4) considering practical additional measures based on due credit for changes already implemented, departure from an established safety goal, and quantitative cost benefit information.

Duke Power Company will be pleased to respond to any question the Commission may have and appreciates the opportunity to respond to the advanced notice of proposed rulemaking. We hope that the Commission will give our comments due consideration.

Very truly yours,

William O. Parker, Jr.

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