



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

December 9, 1980

Honorable John F. Ahearne  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555

SUBJECT: NEW SAFETY CONCEPTS FOR FUTURE CONSTRUCTION

Dear Dr. Ahearne:

In a memorandum dated September 11, 1980 you asked for ACRS suggestions concerning potential safety improvements which could be incorporated into any new design for nuclear power plants. You also forwarded a copy of a memorandum of the same date and subject to the Acting Executive Director for Operations (EDO). More recently, the ACRS received a copy of a memorandum dated October 24, 1980 from the EDO to you on the same subject.

The ACRS agrees with Mr. Dircks that, "It would not be fair to say that NRC has a major integrated program for examining potential safety improvements." In 1978, in response to a Congressional requirement, the NRC proposed a program of research to improve the safety of light-water reactors in NUREG-0438, "Plan for Research to Improve the Safety of Light-Water Nuclear Power Plants," but this program received very little financial support.

The ACRS believes that it is important for the NRC to address the subject of improved safety for future LWR designs and that it warrants a sufficient allocation of research and regulatory resources to address the matter in a timely fashion. The ACRS believes that, if necessary, lower priority topics should be identified for delay or cancellation, in order to permit the appropriate effort to be given to this subject.

The ACRS plans to have a subcommittee address this general subject, and hopes to have recommendations for you by the summer of 1981. However, a considerable number of candidates for consideration exist from previous ACRS reports and other sources. The following list includes several examples covering a wide range of potential safety items and approaches.

- The incorporation of a bunkered, dedicated system for shutdown heat removal (or otherwise improved shutdown heat removal system) into the design
- The use of probabilistic methodology in design to ascertain the means and the need, if any, to go beyond the single failure criterion
- The more effective use of separation to reduce the likelihood of certain common mode failures

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- Improvements in the reliability of AC and DC power supplies and in the capability of the plant to withstand an extended loss of power
- Design features to mitigate accidents involving severe core damage or core melt
- The inclusion of consideration of industrial sabotage in design
- Design measures to improve control system reliability and control room functionability

Consideration and evaluation of the general subject should include both regulatory and research perspectives, and a multi-pronged approach may be appropriate. One early avenue for pursuit is a reevaluation of the General Design Criteria to ascertain the extent that they can and should be reformulated to provide guidance for the design of future reactors. A second avenue might involve an attempt to develop general guidance for the use of probabilistic methodology in design. A third might involve an attempt to develop general guidance for a design approach for coping with accidents involving severe core damage and core melt.

It is not envisaged that such efforts by the ACRS and/or the NRC Staff would involve nuclear reactor design, per se. However, the NRC might be able to obtain useful design-related information if it had the ability to provide general direction and guidance for a timely, design-concept-oriented program performed under the auspices of the Department of Energy.

Sincerely,

*Milton S. Plesset*  
Milton S. Plesset  
Chairman