



DEPARTMENT OF NUCLEAR ENGINEERING  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

77 Massachusetts Avenue

Cambridge, Massachusetts 02139

Room: 38-174

May 24, 1985

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Hon. Nunzio J. Palladino  
Chairman,  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

and

Secretary of the Commission  
Attn: Docketing and Service Branch

SUBJECT: Proposed Policy for Regulation of Advanced Nuclear Power  
Reactors by the Nuclear Regulatory Commission under 10 CFR  
Part 50

Dear Sirs:

We agree that it is desirable for the NRC to establish an Advanced Reactor Group, in the office of Nuclear Reactor Regulation, that will "prepare a plan for the development of regulatory criteria for licensing proposed advanced reactors ..." as described on page 10 of the subject Policy Statement. We believe that the policy statement establishing the Advanced Reactor Group should be issued as soon as possible, to assure potential vendors and users that a stable regulatory environment will be provided. In addition to the establishment of the Advanced Reactor Group, the policy statement should call for establishment of safety goals, independent of reactor type, that will be used for guidance of the Advanced Reactor Group in their development of regulatory criteria.

Because it is important that regulation for Advanced Reactors be visibly and firmly protected from the historical causes of instabilities in power reactor regulation, we believe the following framework should be instituted:

1. Primary Safety Responsibility must be placed in the hands of the owner-operator.
2. In order to assure the NRC that such responsibility is met, the owner-operator must:

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add Dennis K. Rathbun, H-1013  
James G. Beckley, H-1013

Acknowledged by card..... JUN 3 1985



Page Two  
Hon. N.J. Palladino  
May 24, 1985

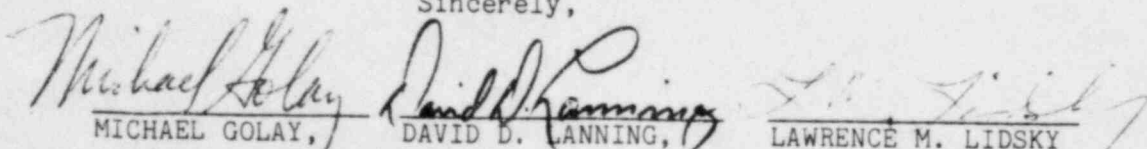
- a. prove that the design and operation can meet the safety goals;
- b. prove that the plant is constructed with the quality required to meet the design safety goals;
- c. prove that the operation of the reactor is within the quality required to meet the operational safety goals.

The current regulatory policy has often been unsatisfactory with respect to the first principle; the prescriptive method of regulation and backfitting is a disincentive to responsible safety. The owner-operator often waits for an NRC mandate, even when fully aware of the need to improve a system, because independent action, no matter how rational, is liable to be reversed. Thus, the owner-operator, who is most closely related to the need and who possesses plant-specific understanding, is left feeling less than fully responsible for safety.

In order to move the safety responsibility back to the owner-operator, the NRC must set quantitative safety goals. Proof that the design meets the goals must be provided to the NRC through mutually agreed upon methods of analysis and testing. We believe that the analysis should, insofar as possible, follow the Integrated Approach recently developed for reactor system design. Proof that the plant is constructed and operated within the quality requirements established to meet the safety goals must be provided through quality assurance plans, technical specifications, and audits throughout construction and operation. Demonstration testing and type licensing, similar to the Aircraft Airworthiness Certification is a useful precedent in some cases for relating tests to safety goals. Further discussion of these concepts is given in Ref. 1.

The Advanced Reactor regulation policy provides the opportunity to make major advancements in clarification of safety responsibility and provision of regulatory stability. We strongly recommend that this opportunity be recognized and grasped with a firm, highly-visible commitment.

Sincerely,

  
MICHAEL GOLAY, DAVID D. CANNING, LAWRENCE M. LIDSKY  
Professors of Nuclear Engineering

LML/cal

1. "National Strategies for Nuclear Power Development," Richard Lester, et al, MITNPI PA-002, March 1985.



JOCAMS NUMBER

PROPOSED RULE

PR-50

(50 FR 11882)

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GENERAL ELECTRIC

NUCLEAR SYSTEMS TECHNOLOGY OPERATION

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May 24, 1985

MFN# 078-85

DOCKETED  
USNRC

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

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Attention: Docketing and Service Branch

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

SUBJECT: COMMENTS ON PROPOSED POLICY FOR REGULATION  
OF ADVANCED NUCLEAR POWER PLANTS

Herewith are the General Electric Company comments on the Proposed Policy for Regulation of Advanced Nuclear Power Plants which was noticed in the Federal Register, Volume 50, No. 58, March 26, 1985.

General Electric supports the proposed policy statement and urges its adoption by the Commission.

General Electric has long been a proponent of improving the licensing environment as evidenced by our active participation in the Commission's program for standardization of nuclear power plants, and by CE's endorsement of licensing reform legislation which is currently before Congress. The proposed policy certainly forms a basis for improving the licensing environment for the future generation of nuclear power reactors.

While General Electric supports the proposed policy statement, the attached general comments and answers to the six questions are offered.

Very truly yours,

*Glenn G. Sherwood*

Glenn G. Sherwood, Manager  
Nuclear Safety & Licensing Operation

D310  
add: Dennis K. Rathbun, H-1013  
James G. Beckley, H-1013

JUN 3 1985  
Acknowledged by card.....  
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GENERAL ELECTRIC COMMENTS AND ANSWERS TO QUESTIONS  
ON PROPOSED POLICY FOR REGULATION OF ADVANCED  
NUCLEAR POWER PLANTS

GENERAL COMMENTS

Clarification of Scope

The scope of the policy needs clarification. The summary of the policy defines advanced reactors as reactor designs which are significantly different from the present generation light water reactors (LWRs). This implies that any non-LWR automatically qualifies as an advanced reactor. It also implies that an applicant must demonstrate that his design is significantly different from the present generation LWR, before it would qualify as a advanced reactor. The body of the proposed policy suggests that an advanced reactor is a reactor design with some or all of the five listed general characteristics.

We do not consider that these "definitions" are adequate for this policy. The scope of the policy must be clarified by appropriately defining an advanced reactor.



### Alternate Approach to Obtain Regulatory Approvals

The policy should make provisions for obtaining regulatory approval of an advanced reactor by demonstrating its performance as substitution for the current practice of reviewing it against regulatory criteria. The scope and data requirements for testing to demonstrate performance would be developed by the NRC as part of its review of a specific application. Such an alternate review procedure would go a long way toward the policy goal of minimizing complexity and adding stability and predictability in the licensing of advanced reactors.

Further, the option of demonstrating performance by testing would encourage applicants to utilize most of the five general characteristics, which the Commission believes are desirable for advanced reactors.

### RESPONSES TO QUESTIONS POSED BY NRC

#### NRC Question 1

Should NRC's regulatory approach be revised to reduce dependence on prescriptive regulations and, instead, establish less prescriptive design objectives, such as performance standards? If so, in what aspects of nuclear power plant design (for example, reactor core power density, reactor core heat removal, containment, and siting) might the performance standards approach be applied most effectively? How could implementation of these performance standards be verified.



#### Answer to NRC Question 1

The NRC's regulatory approach should be revised to reduce dependence on prescription regulations. More emphasis should be placed on a prescriptive regulatory process. It is generally held that currently the NRC practice is too prescriptive and that the practices are also in need of change. The logical consequence is to suggest that less prescriptive regulations should be developed. In contrast, plant standardization is being pursued to ease the regulatory burden and this tends to make the process more prescriptive. Prescriptive regulations versus non-prescriptive regulations may not be the right question to ask when focusing regulatory revisions. We believe efficiency and consistency in the quality of the review can be improved by developing a prescriptive process for regulation. We also believe it is desirable to establish quantified safety goals, such as those published in the trial safety goals. There are other top-level requirements such as radiation dose to workers that should be prescribed. Similarly there is a need to specify the information required for review and to assure that the safety goals are being achieved. In summary, we are supportive of a prescriptive regulatory process and do not support the NRC prescribing design requirements.

#### NRC Question 2

Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be in providing features that permit more time for operator response to off-normal



conditions, or should the emphasis be in providing systems that are capable of functioning under conditions that exceed the design basis?

Answer to NRC Question 2

We believe that reactor designs which incorporate inherently safe responses to accidents should be encouraged. However, the term "inherent safety margin" is not defined in the policy statement and can be misinterpreted. Use of the more common terminology, "safety margins," would be better. We do not believe that more emphasis on "safety margins," is the best way to characterize the improvements we are seeking. It may be better to direct our attention to reducing uncertainty in the safety assessments.

We consider that providing time for operator response to off-normal conditions is more desirable than providing systems that are capable of functioning under conditions that exceed the design basis. However, neither appear to be appropriate candidates for high level regulatory requirements. Recent assessments of the current generation of LWRs emphasizes the importance of these characteristics. However, these characteristics may be less significant in advanced systems designed to require little or no operator attention during accidents. It is therefore recommended that a higher level objective that delays or avoids the necessity for operator action and simplicity of design to reduce the opportunity for operator error should be encouraged. Requirements for providing margins for events beyond the design basis should be part of the evaluation of risk. Decisions related to specific features should



be dependent on the importance such features have in reducing controlling risk . These should not be arbitrarily emphasized by a policy statement.

### NRC Question 3

Should licensing regulations for advanced reactors mandate simplified designs which require the fewest operator actions, and the minimum number of components needed for achieving and maintaining safe shutdown conditions, thereby facilitating operator comprehension and reliable system function for off-normal conditions?

### Answer to NRC Question 3

We do not believe that the NRC should mandate design characteristics such as simplified designs. We do believe that it is appropriate for the policy to encourage design simplification which would place less demand on the operator under emergency conditions. Reduction in the number of systems and components required to maintain safe shutdown conditions is also a good objective from both a cost and a simplification viewpoint. It would not be effective to mandate these characteristics since such mandates may produce both uneconomical design and could carry premature commitments of regulatory acceptance. While the policy is moving in the proper direction it should avoid solution jumping in design specific areas.



#### NRC Question 4

Should the NRC develop general design criteria for advanced reactors by modifying the existing regulations, which were developed for the current generation of light water reactors, or by developing a new set of general design criteria applicable to specific concepts which are brought before the Commission?

#### Answer to NRC Question 4

We believe that the NRC should develop a new set of general design criteria and requirements for this class of nuclear reactors. Some of the current LWR problems have resulted from proceeding to codify or document requirements prematurely to solve an immediate singular problem and thereby have established a permanent precedent which is exceedingly difficult to revise. The NRC should require that the advanced reactor designer provide the detailed requirements they are using. These may be different depending on the design approach but would provide and assure adequate safety. We would recommend that NRC consider what criteria or regulatory process might be used to judge the adequacy of advanced reactor designs.

#### NRC Question 5

Should the NRC favor advanced reactor design that concentrate the primary safety functions in very few large systems (rather than in multiple subsystems), thereby minimizing the need for complex benefit



and cost balancing in the engineering of safe reactors?

Answer to NRC Question 5

We do not believe that the NRC should favor designs which focus safety in very few large systems. Whether single large safety features or many subsystems are used, the requirements should be based on economics as well as safety. The NRC should concentrate on establishing how to judge the safety adequacy of a design as opposed to attempting to prescribe design solutions. A concept which is designed so that the safety can be demonstrated with a high level of confidence should be judged more favorably.

NRC Question 6

What degree of proof would be sufficient for the NRC to find that a new design is based on technology which is either proven or can be demonstrated by a satisfactory technology development program? For example, is it necessary or advisable to require a prototypical demonstration of an advanced reactor concept prior to final licensing of a commercial facility?

Answer to Question 6

We believe the policy should encourage the development of the regulatory requirements and procedures to which allow the actual demonstration of safety performance as a substitute to the regulatory process. As



previously mentioned, we believe that a viable approach to improving the regulatory process would be one which allows the use of testing to demonstrate performance characteristics rather than the current practice of reviewing the design against regulatory criteria. The degree of proof and the specific technology development program required will be dependent on the concept but at a minimum, we believe that inherent features should be fully demonstrated prior to issuing regulatory approvals.