INTERNATIONAL
ENERGY
ASSOCIATES
LIMITED

May 16, 1985

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

ATTN: Docketing and Services Branch

Dear Sirs:

This letter is to transmit comments on the NRC's Proposed Policy for Regulation of Advanced Nuclear Power Plants, Federal Register, Vol. 50, No. 58, March 26, 1985. The comments are those of the ASEA-ATOM company, designer of the PIUS reactor, which we represent in the United States.

ASEA-ATOM perceives the statement as an excellent paper that serves to broaden the discussion of objectives for advanced reactors. They are pleased to find that the Commission's general intentions and objectives are so closely matched to what ASEA-ATOM has envisioned for PIUS.

The ASEA-ATOM comments that are enclosed are phrased in response to the six specific questions raised by the Commission in the Proposed Policy. They are offered with the hope that the next version of the Policy will serve to address additional issues, thus stabilizing further the future regulatory outlook for the designers of new concepts.

Thank you for this opportunity to comment.

Sincerely,

John C. Young
President

enclosure: as stated
/zs

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add: Dennis K. Rathbun, H-1013
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ASEA-ATOM RESPONSE TO NRC PROPOSED POLICY FOR REGULATION OF ADVANCED NUCLEAR POWER PLANTS

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?

Response: The NRC general design criteria and regulatory guides are written for the existing types of LWR plants and, if applied to advanced reactor designs, would severely limit the designer's possibilities to attain the goals which the NRC describes for advanced reactors. Most NRC staff members with whom we have discussed PIUS plant design features have not been overly prescriptive and have taken an approach which is oriented towards performance standards. It would of course be easier for the designer of advanced nuclear reactor plants if the design criteria could be made performance related.

The most important matter to note in our mind is that inherent safety features can seldom if ever be made redundant. Added engineered safety systems may jeopardize the inherent feature rather than supplement it.

NRC can stimulate innovation, while controlling the overall level of safety to be achieved in future plants, by relying more on performance standards and less on prescriptive requirements. NRC will still have access to and approve the details of a particular design through NRC's certificaton of each standard design by rulemaking. The performance standards could well serve to address siting, containment, and emergency planning, perhaps through the establishment of *de minimus* risk criteria. These subjects will be especially appropriate for advanced reactors where designers endeavor to improve the inherent safety

of their concepts and reduce reliance on engineered safety features or consequence mitigation schemes. The roles of NRC's safety goal and of probabilistic risk assessment should also be addressed in establishing such performance standards.

The question raised about verification of performance standards is very important indeed, and testability should possibly be given an equal status with simplicity in the formulation of desirable characteristics of advanced reactors. Implementation of performance standards can be verified in ways other than testing, including the following: (1) NRC review of design quality assurance and of procedural details in the process of certifying standard design, construction, and manufacturing activities; (2) NRC review of the results of safety tests of first-of-a-kind plants or special non-nuclear test facilities to demonstrate their inherent safety for design basis events; and (3) NRC licensing of individual utilities that reference the certified designs in applications for site permits or operating licenses for specific plants.

Question 2: Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Response: Yes, NRC regulation of advanced reactors should require more inherent safety margin in design. For example, no heroic measures should be expected of operators to protect either the capital investment or public safety. The goals should be to achieve passive safety characteristics in the design and the inherent progression of the plant from unstable to stable shutdown and cooling under all upset conditions and for all credible external hazards. If these goals are contained within the design basis and if the risk from extreme phenomena that lie outside the design envelope is less than some de

minimus value, then there is no need to require or to provide systems capable of functioning under conditions that exceed the design basis.

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?

Response: We believe that such mandates are important, not only in order to attain a higher level of plant safety but also in order to achieve public acceptance of the plants. However, it is unnecessary for NRC to require simplicity. Rather, inherent safety will yield simplicity. Inherent safety characteristics that assure the basic safety functions for the plant whenever it is in an unstable state cannot depend on operator action or complex, add-on safety features. Thus, NRC should mandate performance standards implied in question one and leave the design details to the designers. If the result is too complex to be workable, NRC will see it in the details of its certification review or in lead plant test results. In fact, LWRs weren't so complex in the beginning. Only after years of changes in designs, safety objectives, licensing reviews, inspections, etc. did the situation become too complex. Starting anew with a design certified to meet a specified, acceptable safety goal would do much to achieve the desirable characteristic of design simplicity, especially if the design is inherently safe, which of course it should be. Beyond this, the NRC should consider a goal for advanced reactors that have "walk away" safety. That is, perhaps the plants should inherently revert to safe, long-term, cold shutdown conditions with assured core cooling even if the reactor operators "walk away" for any of the design basis events.

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?

Response: As we have said under question 1, new criteria would be an advantage, and we believe that the performance standards approach suggested there is the way the NRC should proceed. Such criteria may well develop into prescriptive regulation through design certification for a new type of reactor, once it has proved itself and found a market.

If resources do not permit NRC to proceed with new criteria at this time, then NRC might encourage the proponents of advanced reactor designs to propose General Design Criteria (GDC) applicable to their individual situations. These can be analyzed with respect to or evolved from the existing criteria of 10 CFR 50 Appendix A to help assure completeness. These new design criteria would be reviewed and approved by NRC, but they need not be established as general rules of NRC. Rather, they could be formally approved as specifically applicable design criteria for a particular design when that design is certified by NRC rulemaking. This should give the criteria the same status and enforcability as the current GDC. Asking the proponents to propose criteria for NRC review and approval provides an incentive for designers to build safety into their reactor concepts while permitting NRC to maintain regulatory oversight of the end result.

Question 5: Should the NRC favor advanced reactor designs 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?

Response: PIUS designers are in favor of concentration of the primary functions in a few systems. We have found the approach effective.

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?

Response: The answer depends on how far the new design deviates from existing proven designs. One alternative is a large program of separate effects research. Another is a prototypical demonstration. In the case of PIUS, a non-nuclear demonstration plant should suffice to prove the safety and viability of the concept.

A feature of a demonstration facility, either nuclear or non-nuclear, might be special instrumentation to permit the verification of design codes and accident analysis codes. This would remove the need for much detailed licensing review on subsequent plants, thus saving NRC resources and helping the manufacturer use subsequent sales to pay back its initial investment.

SDG&E

San Diego Gas & Electric

May 17, 1985

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

Attn: Docketing and Service Branch

Dear Sir:

The San Diego Gas & Electric Company is pleased to respond to the request for comments of the NRC on the Proposed Policy for Regulation of Advanced Nuclear Power Plants published n the Federal Register notice, Vol. 50, No. 58, March 26, 1985. SDG&E is co-owner and co-licensee of the 3-unit San Onofre Nuclear Generating Station and actively supports nuclear R&D via its association with EPRI, GCRA, etc. We are supportive of the position that the United States urgently needs to assure the viability of the nuclear option to satisfy future electric generation requirements. In this light, we support the NRC's initiative in examining the licensing and regulatory framework that should be in place for advanced nuclear reactor concepts.

General Comments on Proposed Policy Statement

The policy statement seems to require emphasis (for new concepts) on "an enhanced margin of safety." We are concerned that, by implication, such emphasis denigrates the safety of current designs, and raises needlessly expectations for new designs. Neither implications are accurate, nor desirable. Since quantification of "enhanced margin" is difficult, the NRC should avoid speculative and subjective judgments such as these, for it is precisely the imprecision of such a requirement that has contributed so disastrously to the current licensing framework, i.e. retrospective searches for enhanced safety margins. The NRC should strive to state, as in the safety goals effort, what is adequate and "stick to it"!

The summary statement says: " -- the Commission will keep the public informed of its judgment on the known and unknown safety aspects of advanced reactor designs as they come before the Commission," and then, "-- policy is to encourage the earliest possible interaction of applicants, vendors, other government agencies nd the NRC ---". These "motherhood" statements are antithetical, since premature disclosure of design details, before being fully analyzed and verified, raises expectations, which

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add Dennis K. Rathbun, H-1013
James G. Keppler, H-1013
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subsequently may require substantial modification to be viewed by the regulators and the anti-nuclear activists as equivocation. Also, early interaction invites critical assessment before all design features are fully coordinated into a defensible, validated whole. The NRC should take care to minimize opportunities for demagoguery and the fostering of misconceptions.

The proposed policy notes the desire of the NRC "to minimize complexity and add stability and predictability in the licensing and regulation of advanced reactors." These are highly desirable aims! Then, the NRC lists a number of general characteristics of new concepts that may be beneficial. However, the NRC then suggests that "combination of some or all of them may help obtain early licensing or standardized design approval with minimum regulatory burden and should be more readily understood by the NRC, the utilities and the general public." Why would these only "may help"? What inducements are there for applicants to apply such characteristics if demonstrable benefits cannot be assured? And, what does "should be more readily understood" mean? Specifically, the NRC should be prepared to describe how it proposes to "minimize complexity and add stability and predictability" in a convincing way. Current practice (and prior experience) is not very comforting.

"An advanced reactors group has been established -- and, will prepare a plan for the development of regulatory criteria for licensing proposed advanced reactors." The NRC should permit participation in this plan preparation by knowledgeable groups such as EPRI, INPO, NSAC, ACRS, AIF, etc. lest "the group" emulate current regulatory complexity. The Commissioners should provide firm guidelines for assuring a "better mousetrap"!

Response to Specific Questions

1. Yes. The new regulatory framework should eschew prescriptive provisions. Basic performance criteria should be defined, such as compliance with NRC Safety Goals and dose criteria of 10CFR 20 and 100. All other criteria (if any) should be concept-specific permitting credit to be taken for its inherent characteristics.

2. The emphasis on "more inherent safety margins" is misdirected and counterproductive. The entire reliance on the design basis is undermined if additional margin is required for events "beyond the design basis." An adequate design basis, i.e. one that meets the Safety Goals and dose regulations, should be established and then, adhered to! Utility executives will not again subject their organizations to the uncertainties of an open-ended regulatory scheme.

3. No. The NRC acknowledges that it is not a design

organization. Therefore, it is counterproductive for it (NRC) to "mandate simplified designs" since it is not equipped to know -- on an overall concept design basis -- what feature is actually a simplified design feature. One can simplify one system, but frequently only at the expense of added complexity in other systems! NRC should seek "systems engineering" solution to overall performance.

4. A new set of general design criteria should be developed, not solely by NRC (as noted above), and should permit concept-specific characteristics to apply.

5. No. As noted in Response 3, above, the NRC should leave design to the designers. If a given design meets the NRC general criteria, then the NRC need not "prompt" the designers to achieve other pre-conceived design objectives, since it is unlikely that consensus can be achieved even within the NRC Staff on the most desirable solution to a perceived need for improvement.

6. How does NRC define the term "proof"? In whose judgment has "sufficient proof" been demonstrated by what sequence of analysis and testing activities? The NRC must remain as the judge of concept compliance with its regulations. If the NRC were to "require" demonstration, would they also require that the prototype plant be subjected to all the design basis accidents as "proof", even if the plant is destroyed in the process (although having no impact on public health and safety)? Would the NRC co-fund such "proof demonstration"? The term "proof" is totally inappropriate.

We continue to support the NRC in this effort and look forward to the evolution of a sound, balanced policy.

Thomas E. Philips

for: L. Bernath
Manager - Nuclear Dept.

PROPOSED RULE PR-50 (11)
(50 FR 11882)

STONE & WEBSTER ENGINEERING CORPORATION

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May 24, 1985

Secretary of the Commission
U.S. Nuclear Regulatory Commision
Washington, D.C. 20555
Attn: Docketing and Service Branch

PROPOSED POLICY FOR REGULATION OF
ADVANCE NUCLEAR POWER PLANTS 50FR11882

This letter is in response to the Commission request for comments on the subject proposed policy statement, published in the Federal Register March 26, 1985.

Stone & Webster Engineering Corporation (SWEC) is currently involved in the development of advanced reactor designs. We also were involved in HTGR designs which the NRC reviewed in the early 1970's. Accordingly, we are keenly interested in the Commission's policy for advanced reactors and we endorse the Commission's intentions to improve the licensing environment for advanced reactors and to minimize complexity and uncertainty in the regulatory process. To this end we specifically welcome the Commission's formation of an advanced reactors group, its encouragement of early interaction between applicants, vendors, other government agencies, and the NRC and its intention to maintain the capability to provide a timely assessment and response to advanced designs presented to the NRC for review. It is this process for interaction which we believe should be the primary focal point for the Commission's Policy Statement for Regulation of Advanced Nuclear Power Plants.

In addition to its proposed policy statement, the Commission identifies and requests public comment regarding several general characteristics of an advanced reactor design which it believes would be desirable and could help in obtaining early licensing approvals and greater understanding by the public. Ostensibly, these characteristics, including simplified designs, greater inherent safety margin, and more reliable and maintainable plants are desirable goals which the designers of advanced reactors would no doubt strive for. However, we believe, as does the Commission, "that regulatory guidance must be sufficiently general to avoid placing unnecessary constraints on the development of new design concepts." This is especially true in the early stages of innovative or advanced concepts. At this time, to specify particular attributes of advanced reactors may eliminate concepts which could otherwise provide a better balance between safety, reliability and cost.

We believe that the process for interaction between designers and the NRC that the Commission is proposing is the best means for evaluating the design characteristics most important to regulation of advanced reactors.

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

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In this context we have attached our responses to the six questions and several specific comments on the proposed policy statement.

We would be pleased to meet with the Commission to discuss comments on the proposed policy statement.

R. B. Bradbury

R. E. Bradbury
Chief Engineer
Nuclear Technology and Licensing Division

Enclosure

DRJ:amg

SWEC'S SPECIFIC COMMENTS ON NRC'S PROPOSED POLICY FOR REGULATION OF ADVANCED NUCLEAR POWER PLANTS

1. SWEC believes that the last sentence of the summary, beginning "As the agency..." and ending before "...the Commission will keep" should be deleted or expressed in terms of the NRC statutory mandate to protect public health and safety. The language used is imprecise and misleading when it speaks of potential hazards of nuclear power plants. The remainder of the sentence is unclear as to how the NRC will keep the public informed of "unknown safety aspects."

2. The Commission indicates that it is preparing a separate policy statement on standardization which will apply to future reactors. It is in this separate policy statement that the Commission's goals on standardization should be expressed and the advanced reactor policy statement should only focus on advanced reactor policy. Accordingly, we believe that under Current Commission Policy the discussion on standardization, including the statement from the 1985 Policy and Planning Guidance should be deleted. We also believe the sentence "The Commission's ultimate goal is the approval of essentially complete standard plant designs" under Proposed Policy should be deleted.

3. The Commission expresses its goals to add stability and predictability in licensing and regulation of advanced reactors. To achieve this the Commission must do more than is outlined in this policy statement. It also must streamline and rationalize its administrative licensing process.

4. We believe that drastic departure from current designs should not be a pre-requisite for applying any streamlined licensing approach which evolves.

5. The early interaction discussed in the policy statement must carry with it the obligation by NRC and industry to stand by the agreements reached during this process.

NRC Question No. 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 Question 1

We believe that NRC's regulatory approach should reduce dependence on prescriptive regulations and instead establish other design objectives such as safety standards or goals. By moving away from prescriptive regulations, the NRC would be fostering more innovation in plant designs

and would allow plant designers to optimize design features which would contribute to safe, reliable and economical plants. Verification of implementation should be by applicant/licensee audits with appropriate NRC oversight.

NRC Question No. 2

Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Answer to Question 2

Designs to an appropriate design objective using acceptable methodology will result in an optimization of overall plant safety that can be developed through the plant designer/NRC interactions.

NRC Question No. 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 Question 3

Regulations should not arbitrarily mandate simplified designs. In many instances simplification results in a safer design, but this is not always true and each design must be evaluated on a case-by-case basis. Again we believe that the interactive process that the Commission is supporting will provide a better basis for answering this question. One concern though is how the Commission would mandate simplified designs or assess the degree of simplification required. This would involve establishing both a baseline and a standard by which to judge simplification. What if simplification of one system required another to be more complex? We believe appropriate safety standards or goals would better lend themselves to an optimization of plant design.

NRC Question No. 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 Question 4

One set of general design criteria (GDC) should apply to all reactor types. From these, type-specific safety standards or goals could be developed. We believe that the existing GDC, along with the experience already gained from the NRC's review of earlier advanced reactor designs, should form the basis from which the NRC should work.

NRC Question No. 5

Should the NRC favor advanced reactor designs 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 Question 5

The NRC should not be prescriptive and favor particular plant designs. The designer should have the flexibility to use the design philosophy that best achieves the goal of a safe, reliable, and economical nuclear power plant.

NRC Question No. 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 demontrated 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

The degree of design verification by the NRC, including the need for prototypical demonstration or test, depends on the extent of departure from demonstrated technology.

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DOCKET NUMBER
RULEMAKING PR-50
(50 FR 11882) (10)

POWER SYSTEMS

May 22, 1985
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BRANCH

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

Subject: Proposed Policy for Regulation of Advanced Nuclear Power Plants

Dear Sir:

Combustion Engineering (C-E) is pleased to offer its comments on the "Proposed Policy for Regulation of Advanced Nuclear Power Plants", as published in the Federal Register on March 26, 1985. In addition to our activities to improve upon the current generation of Light Water Reactors (LWRs), C-E is also involved in development programs for advanced reactor designs (e.g., High Temperature Gas-Cooled Reactors and Liquid Metal-Cooled Reactors). We are, therefore, pleased to see that the Commission is developing plans to review the new and innovative designs that are being developed by industry and the DOE.

C-E understands that the advanced reactor policy will apply only to truly different designs, i.e., designs with significantly different characteristics, and not to evolutionary changes in LWRs. While the ultimate safety objectives should be the same for LWRs as for advanced reactors, the methods, procedures and criteria for meeting the objectives are not necessarily the same. For the advanced nuclear reactor designs, there is increased emphasis on inherent safety margin. Such aspects as time for operator response, margins between normal operating conditions and failure points, simplicity of safety-related systems and the ability to actually demonstrate upset conditions should be taken into account.

C-E shares the Commission's expectation that "these reactor plants will have an enhanced margin of safety" and we agree that the five general characteristics listed in the proposed policy "would be desirable". We would go further to say that these goals are desirable for all future nuclear plants, including the next generation of LWRs. We caution the Commission, however, to keep these goals as desirable objectives and not develop them into new requirements. We believe that the level of safety found in current LWRs is more than adequate to protect the health and safety of the public. New plants, therefore, need not be held to a higher licensing standard. Recent events in the nuclear industry have demonsrated that nuclear power plants cannot remain economically viable if increased safety requirements are continually imposed without considering cost impacts. Designers of future nuclear plants already have financial incentive to provide improved safety, reliability and availability. The accident at

D510
add: Dennis K. Rathbun, H-1013
Jonnie G. Dickely, H-1013

Acknowledged by card. MAY 29 1985

Three Mile Island clearly demonstrated that a nuclear accident presents more of a threat to the financial health of the utility owning the plant than a threat to the health and safety of the public. The designers' goals, therefore, should be consistent with the NRC's stated goals, but the designers must have the flexibility that they need to keep nuclear plants economically viable. Futher, Congress has not amended the Atomic Energy Act to require a higher standard of safety for nuclear plants. For the Commission to do so on its own would seem to contradict the efforts of the Commission and the Congress to restore confidence and stability to the licensing process.

Our responses to the six questions asked in the Federal Register Notice are provided in the attachment to this letter. If you have any further questions, or would like to discuss our recommendations, please feel free to call me or Mr. G. A. Davis of my staff at (203) 285-5207.

Very truly yours,

COMBUSTION ENGINEERING, INC.

A. E. Scherer
Director
Nuclear Licensing

AES:las
Attach.

RESPONSES TO QUESTIONS IN PROPOSED POLICY FOR REGULATION OF ADVANCED NUCLEAR POWER PLANTS

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 remooval, containment and siting) might the performance standards approach be applied most effectively? How could implementation of these performance standards be verified?

Response

Yes, the NRC should reduce dependence on prescriptive regulations. This comment applies to the next generation of LWRs, as well as advanced reactor concepts. Although it is helpful for the NRC to use guidelines and standards, it is important that they allow for the flexibility that designers will need to develop new concepts which may maintain (or even improve) overall plant safety without increasing the uncertainty that the new concepts can be licensed simply because the new concept may not be covered by any of the "prescriptive" requirements of the NRC. Since it appears that future NRC review efforts will be devoted to a few standard designs, rather than a multitude of custom plant designs, prescriptive regulations should not be necessary.

The aspects of plant design that most influence public health and safety seem to center around decay heat removal (to avoid severe core damage) and offsite exposures resulting from postulated accidents. Implementation of performance standards are most readily verified by analyses (including probabilistic risk assessment) that are backed up by operational data, separate-effects tests and/or startup testing, where necessary.

QUESTION 2. Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Response

There should not be a requirement for more inherent safety margin in the design of advanced reactors. Designers should be allowed the flexibility necessary to keep nuclear plants viable. The inherent safety of the advanced reactor design, however, should be taken into consideration in the licensing process before requiring enhancement of the engineered safety features. We believe that designers should place emphasis on providing features that permit more time for operator response to off-normal conditions.

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?

Response

The characteristics listed in the proposed policy (e.g., simplified designs) should be desirable objectives, but are totally inappropriate to be mandated as new NRC requirements. Although the NRC should be concerned that a minimum level of safety is achieved, how it is achieved should be of concern to the designers and to the utilities that will own and operate the plants.

QUESTION 4. Should the NRC develop general 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?

Response

Current GDCs were written specifically for LWRs and are based on assumptions relevant to LWRs. Reactors not having features similar to LWRs should conform to a different set of GDCs while still achieving the same assurance of safety to the public. Naturally, in some areas, there may be overlap of applicable GDCs.

QUESTION 5. Should the NRC favor advanced reactor designs 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?

Response

If the safety of the reactor concept relies upon relatively few, simple and demonstrable characteristics, this will result in less uncertainty in the conclusions. This should certainly be taken into account.

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?

Response

Some advanced reactor designs are capable of performing realistic demonstrations (in lieu of analyses) of performance under accident conditions. Applicants, therefore, should be allowed the option of performing the tests in place of analyses. Prototypical demonstration, however, should not be required to license a new design. As noted in the response to Question 1, it should also be possible to verify the safety of a new design by analyses that are backed up by separate-effects tests and/or startup testing, where necessary. Only if the tests failed to substantiate the assumptions in the analyses should it be necessary to re-open the NRC approval of a new design.

GCRA
GAS-COOLED REACTOR ASSOCIATES
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May 24, 1985

Mr. Samuel J. Chilk
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Subject: Comments on Proposed Policy for Regulation of Advanced Nuclear Power Plants

Dear Mr. Chilk:

This letter provides Gas-Cooled Reactor Associates (GCRA) comments on the Commission's proposed policy statement on advanced nuclear power plants. GCRA is a utility/user organization that represents approximately one third of the U.S. generation capacity plus a number of potential industrial users who are interested in the development and commercialization of the gas-cooled reactor in this country. As such, the attached comments were developed by the GCRA staff with review and input from our member utilities.

We endorse and are encouraged by the overall intent of the Commission in preparing the proposed policy and feel that its issue, following resolution of comments, would aid the development of advanced reactor technologies, such as the HTGR. In particular, we strongly support the Commissions stated intent to consider factors "important for advanced reactor concepts in order to minimize complexity and uncertainty in the regulatory process," to leave regulatory guidance "sufficiently general to avoid placing unnecessary constraints on the development of new design concepts," and to encourage NRC staff interaction on advanced designs "as far in advance of application as practicable."

Our principal concern with the proposed policy, as elaborated on in the enclosed, is the implication that future power plants will be <u>required</u> to have "increased safety margins." Such a statement can be interpreted to imply that future reactors will be required to meet stricter safety criteria than current generation designs. Instead, we believe the objective of our advanced reactor design efforts is to attain comparable levels of safety in a simpler and more demonstrable fashion. We believe that the Commission's position on this issue needs to be clarified in the final policy statement.

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add: Dennis K Rathbun, H-1013
James G Beckerley, H-1013

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Consistent with the proposed policy statement, we look forward to the Commission's continued cooperation in the review of the HTGR concept and would be pleased to provide additional details on our comments if required.

Sincerely,

L. D. Mears

L. D. Mears
General Manager

APK:fd

cc: GCRA Management Committee
GCRA Technical Advisory Committee
Jerry Griffith, DOE/HQ
Ray Ng, DOE/HQ
Len Lanni, DOE/SAN
Dick Dean/Fred Silady, GA
Sam Armijo/Neil Brown, GE
Warren Chernock, CE
Sim Golan/Stan Lynch, BNI
Bill Sheridan/Lloyd Walker, SWEC

GCRA COMMENTS ON PROPOSED POLICY FOR REGULATION OF ADVANCED NUCLEAR POWER PLANTS

The following comments are in regard to the NRC Proposed Policy statement on advanced nuclear power reactors, as published on page 11882 of the Federal Register on Tuesday, March 26, 1985.

COMMENTS ON THE POLICY STATMENT

1. As identified in the "Licensing Plan for the Standard HTGR" which has been submitted to the NRC by the Department of Energy, we believe the NRC policy statement should focus on the following issues which are of importance to near term design activities:

a) Whether top-level licensing criteria (i.e. public dose and risk criteria) for advanced reactors should be different than for current generation reactors.

b) Whether the NRC should consider alternative proposed methods for deriving design specific lower-level criteria (e.g. General Design Criteria) from these top-level criteria which account for the unique safety characteristics of advanced reactors.

c) Whether the NRC should commit staff resources to review proposed advanced reactor designs prior to formal application for a construction permit.

As drafted, we believe the policy statement explicitly addresses both issues b) and c). The NRC appears to be favorably inclined to consider new design specific criteria for advanced reactors which account for unique safety characteristics and the policy definitely encourages early interaction on the evolving concept designs.

On issue a), the policy statement is not explicit. There, however, is a frequent use of terms like "increased safety margins" which could be interpreted to imply that future reactors will be required to meet stricter safety criteria than current generation reactors. We believe that this would be most undesirable. The focus of advanced reactor design efforts should be to, instead, attain comparable levels of safety in a simpler and more demonstrable fashion which may ultimately result in a more economical product.

Consistent with the above, we believe that regulatory uncertainty will continue to plague the industry until clearly defined safety goals are adopted by the NRC for all reactors. Before design level criteria can be specified for a given reactor concept, it is essential that the regulator be able to define the acceptable level of risk the designer or manufacturer must achieve.

2. The policy statement does not provide details on the format and procedure for submittal of technical information on proposed conceptual designs as far in advance as possible. Can it be assumed that guidance provided from the advanced reactor group will, in fact, be applied later if an applicant submits a PSAR using the new concept? Will meetings, question and answer exchanges, and SER's be

used in a similar way to the PSAR stage? Must a single entity submit information on a concept or could a group of interested parties pursue licensing collectively? What form would early approvals/judgments take?

3. The NRC provides a specific list of features it would like to see in advanced designs, but gives no specifics as to how these features will "help obtain early licensing or standardized design approval with minimum regulatory burden." Some examples should be listed to clarify how these design features might result in such regulatory benefits.

4. In the summary it is stated that, "It is anticipated that these designs will reflect the benefits of significant research and development work, and include the experience gained in operating the many power and developmental reactors both in the United States and throughout the world". In order for the designs to reflect experience from outside the United States, it will be necessary for the NRC to accept data generated in other countries. Thus, the policy should include a statement to the effect that the NRC will actively pursue the development of mechanisms for the timely and effective incorporation of data from other countries into the licensing process.

RESPONSES TO QUESTIONS

1. Question:

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?

Response:

Yes, the NRC's regulatory approach should be revised to reduce dependence on prescriptive regulations. Performance standards are preferable to the current regulatory regime.

These standards should be expressed in terms that are independent of current technology. For example, limits on parameters like power density should be avoided, since they are based on limits of systems and materials which may, in the future, be improved.

Most important, the standards should avoid prescription for the performance of subsystems in order to permit the maximum flexibility in achieving the standards through integrated plant design. For example, a core heat removal standard should be expressed in terms of the overall design's core heat removal capability, not performance of a designated core heat removal sub-system.

It is essential that the Commission avoid the temptation to subdivide the performance standards by subsystem or event. These subdivided standards drastically reduce the ability of the designer to optimize the safety prformance of the overall plant system.

The performance standards adopted must be consistent with other aspects of regulatory policy. It is essential that they be consistent with the safety goal, and the establishment of performance standards offers the opportunity to either reinforce the existing defense-in-depth approach or to enhance it by adopting a functional approach. Extension of the existing approach to defense-in-depth would establish separate performance standards for the independent systems. (These are, loosely, the core protection, containment, siting, and emergency response program systems.) The functional alternative, for example, in the case of containment performance, would be to establish a criterion for non-release of radionuclides and allow the designer to demonstrate the adequacy of any proposed alternative to a containment building for meeting the criterion.

Implementation of performance standards can be verified in two ways: review of the design by the NRC staff and technical qualification of the vendor/AE/applicant team. Demonstrating technical capability has been under utilized as a means of ensuring quality control. Dependence on the ability to produce written QA programs has weakened the overall performance of quality work.

2. Question:

Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Response:

No. Current safety margins are demonstrably adequate to assure public health and safety, which is as far as the design purview of the NRC extends. Neither should regulation prescribe the methods to be used for achieving safety margin. Future plant owners/operators can be expected to demand more forgiving systems for purely economic reasons if the use of inherent features in the design is allowed to offset the need for other engineered features.

Requiring that systems be designed to perform under conditions "exceeding the design basis" is a contradiction in terms.

3. Question:

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?

Response:

No. As noted in the previous responses, the design methods of achieving safety should be left to the designer to establish. The designer also bears the burden of demonstrating, in a manner acceptable to the regulator, that the methods will be effective.

However, it is strongly suggested that the Commission, through regulatory guidance and by offsetting the need for detailed technical specifications and operational procedures, encourage the use of simplicity to achieve safe, reliable operation. Additional hardware complexity should be avoided where increased operator understanding can achieve a comparable net gain in safety.

4. Question:

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?

Response:

A new set of design criteria should be established for each advanced concept through the cooperative involvement of the NRC and industry as the concept evolves. These criteria should emphasize a philosophy of achieving acceptable risk rather than additional safety at any cost, and, as such, could be significantly different in format and content than the GDC's currently in 10CFR50.

5. Question:

Should the NRC favor advanced reactor designs 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?

Response:

No. It should not be the Commission's role to favor, a priori, a particular design approach. It is the Commission's responsibility to determine whether or not a proposed design provides the necessary elements to protect the public health and safety. That would

establish the licensability of a design. Whether or not a license is granted will depend, of course, on other factors, including the standardization policy.

Included in the Commission's selection criteria for choosing a particular standardized plant design would, presumably, be such factors as the level of confidence that a design goal for safety had been achieved and the ease with which regulatory decisions could be made. Since only standardized designs are to be considered, the "complex benefit and cost balancing in the engineering of the reactor" are clearly outside of the purview of the NRC -- which is "precluded from designing reactors ... for the purpose of establishing or developing their commercial potential." If non-standardized designs are to be permitted, then this objection would not apply.

6. Question:

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?

Response:

The term "proof" is not appropriate. The Commission must determine, before granting a final license, that the public health and safety are adequately assured -- a much more reasonable standard.

Demonstration of a concept as an additional requirement for advanced reactors needs to be considered in the context of a review of a specific design. However, a demonstration by prototype test should be acknowledged as a possible alternative means of licensing, which could allow the use of more realistic, rather than conservative, commercial plant limits.

DOCKET NUMBER
PROPOSED RULE PR-50 (8)
(50 FR 11882)

GA Technologies

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May 24, 1985

DOCKETED
USNRC

'85 MAY 28 A11:18

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

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

Attention: Docketing and Service Branch

Subject: Proposed Policy for Regulation of Advanced Nuclear Power Plants

Gentlemen:

The subject policy statement provides welcome recognition of many issues relevant to the regulation of advanced nuclear power plants. GA Technologies supports the major thrusts of this proposal. We endorse the Commission's stated intent of improving the licensing environment for advanced reactors in order to "minimize complexity and add stability and predictability" in their regulatory process. We further support the NRC's definition of advanced reactors as "reactor designs which are significantly different from present generation light water reactors." Finally, we agree with the Commission that early interaction between the designer and the NRC Reactor Group would be advantageous.

The primary shortcoming GA sees in the proposed statement is its tendency to mix policy with discussion of desirable advanced reactors design features. GA believes that the policy would be more effective if it emphasized high level policy guidelines. Specifically, GA recommends that the NRC's advanced reactor policy should:

1) Explicitly recognize that, while advanced reactors should strive for and provide increased safety margins, the minimum degree of safety required should be the same as that required of existing licensed plants;

2) Recognize that any safety margin beyond that minimum required level should, if provided, accrue compensating benefits in the licensing process;

3) Acknowledge that supportive criteria should be directly responsive to top level goals specified for all plants.

4) Reaffirm the NRC commitment to early review of advanced reactor concepts prior to a formal license application.

D 510
add: Dennis K Rathbun, H-1013
James J Pickelly, H-1013

MAY 29 1985
Acknowledged by card.....

Specific comments in response to the questions raised by the Commission are attached.

Thank you for this opportunity to comment on this significant proposed policy statement.

Sincerely,

T. E. Northup
General Manager
Power Reactor Programs

Attachment

Comments on Questions Identified by the Commission

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?

Response to Question 1

Prescriptive regulations can exact a heavy penalty in terms of discouraging innovation and obscuring what is really to be achieved (i.e., protection of the public's health and safety). GA recommends that, instead of relying on prescriptive regulations, the Commission adopt quantified, measurable dose/risk goals which provide the bases for judging reactor licensability. Verification of compliance could be accomplished through risk assessment analyses, tests, and/or any combination of appropriate analytical or demonstration techniques.

If performance standards are chosen as a method of verifying goal compliance, they should be applied only to those aspects of the design which are necessary to meeting the goals described above. Since various concepts are likely to choose different approaches to meeting this goal, it would be expected that the application of performance criteria would remain design specific. GA does not support the premature imposition of standards that may unnecessarily restrict the design approach used by presupposing what may be important for the safety of advanced concepts.

Question 2

Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Response to Question 2

The regulations should not require more margin in the design. However, GA believes that advanced reactor designers should strive for more passive safety in their designs. We believe that to the extent advanced reactor designers provide features, such as long response times or other margins, they should be given credit for this in the development of a safe yet cost effective design. That is to say, the safety margin provided by these types of features should be recognized and accrue some compensating benefit within the licensing process such that the designer has the flexibility to seek designs that may not otherwise have been allowed. The sort of benefits which GA would expect

to see include fewer required safety class systems, substantial modification of the requirement for containment and exemption from the need for offsite sheltering and evacuation. We further believe that such designs should be more easily licensed to the extent that passive safety margins simplify the task of demonstrating compliance with quantitative safety goals as described above in response to Question 1.

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 maintain safe shutdown conditions, thereby facilitating operator comprehension and reliable system function for off-normal conditions?

Response to Question 3

The NRC should avoid the type of design prescriptive regulation suggested in Question 3. As in the answer to Question 2, regulations should be kept directly responsive to safety goals. GA does not support regulations which mandate the means by which these goals are to be achieved. The designer should be left free to optimize (or balance) his design so long as goals are met.

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?

Response to Question 4

The NRC should not modify the existing LWR regulations for use in advanced reactor reviews but should instead develop a new set. The current GDC are excessively design prescriptive with no clear traceability to the higher level safety goal of protecting the public health and safety. We would support a complete review of the General Design Criteria leading to revision in not only their content but also their structure, such that they become directly responsive to a quantified dose/risk goal as described above.

Question 5

Should the NRC favor advanced reactor designs 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?

Response to Question 5

The NRC should not favor any particular reactor characteristics as an end in themselves. Rather, they should be evaluating all reactor concepts against the quantitative safety goals that are aimed at protecting the public. If certain features allow a particular reactor to meet these goals with greater margin or greater certainty the NRC should view this with favor and should allow credit to be given for this in the licensing process. This credit or compensating benefit is discussed further in the response to Question 2.

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?

Response to Question 6

There is an extensive base of regulatory precedence regarding the level of data required to substantiate compliance with regulatory requirements. For example, the prioritization and resolution of the NRC's unresolved issues gives evidence to methods within the NRC for judging what constitutes a sufficient "degree of proof." Component and systems-level testing of certain advanced features might be required but should be considered on a case-by-case bases, dependent upon the design. However, GA does not believe that it is necessary or desirable to create a blanket requirement for plant-level prototypical demonstrations for advanced reactor concepts.

DOCKET NUMBER
PROPOSED RULE PR-50 (1)
(50 FR 11882)

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
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May 24, 1985

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OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

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

Attention: Docketing and Service Branch

Gentlemen:

Comments on the U.S. Nuclear Regulatory Commission's 10 CFR Part 50, "Proposed Policy for Regulation of Advanced Nuclear Power Plants," by The Oak Ridge National Laboratory (FR Doc. 85-7136)

In response to the request for comments on the subject "Proposed Policy for Regulation of Advanced Nuclear Power Plants," the Oak Ridge National Laboratory submits the enclosed comments and recommendations. Please call Don Trauger (FTS 626-6730) if you have questions or need additional information.

Sincerely,

Herman Postma
Director

HP:js

Enclosure

cc: D. F. Bunch, DOE/HQ
D. F. Giessing, DOE/HQ
J. S. Herrington, DOE/HQ
K. Jarmolow
J. A. Lenhard, DOE/ORO
N. J. Palladino, NRC
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File – RC

D210
add: Dennis K Rathbun, H-1013
Jane J Beckley, H-1013

MAY 29 1985

Acknowledged by card.....

COMMENTS ON THE U.S. NUCLEAR REGULATORY COMMISSION 10 CFR PART 50, "PROPOSED POLICY FOR REGULATION OF ADVANCED NUCLEAR POWER PLANTS," BY THE OAK RIDGE NATIONAL LABORATORY

We commend the proposed policy as an appropriate and helpful step toward the regulation of advanced reactors. Clarification of the licensing advantages and potential problems for simplified designs and passive safety features should be addressed early through informal review. Simplification of the licensing process while retaining full assurance of public safety is a desirable goal which should be undertaken with appropriate consultation by the NRC staff with the DOE staff and contractors, utility representatives, and the nuclear industry. We see the current effort by the advanced reactors group within Nuclear Reactor Regulation as an initial step toward these objectives.

It is apparent that the design safety of reactors in the future can substantially exceed the NRC's proposed safety goals. Designs such as Sizewell-B or the advanced BWR are likely to have predicted core melt probabilities of the order of 10^{-6}/year, 100 times better than the goal. Such a large margin of safety is desirable to cover uncertainties in the analysis, especially for reactors that depend on active safety systems. Reactors depending primarily on passive safety features are likely to be able to achieve comparable or larger predicted safety margins.

The industry also is likely to change for the better in respect to safety. We do not anticipate any weak utility organizations in the U.S. to undertake new reactor programs. The presence of the Institute of Nuclear Power Operations (INPO) provides additional assurance that advanced reactors will be built and operated by competent entities.

Given the current upgrading of nuclear plant technology and related factors, NRC's efforts to reduce prescriptiveness should find public and political acceptance. We believe these efforts should focus on the plant as a whole rather than on specific subsystems. Once a standard design is referenced for construction, we could envision step-wise NRC review and approval of the siting, completed subsystems (civil-works, equipment supports, controls, primary cooling system, etc.), and of a staffing and operating plan. The granting of an operating license should be automatic if the plant systems are completed according to specification and the operating staff satisfies NRC (and INPO) criteria.

In response to the questions posed, we offer the following comments:

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?

Response

NRC should maintain adoption of less prescriptive regulations as a long-term goal. Suitable performance standards are preferred to prescriptive design objectives for the following reasons:

a. The industry is familiar with designing to standards.

b. In general, performance standards allow more flexibility in design. This can be very important to safety, where the combination of component systems into an overall nuclear plant design must be closely coordinated. The responsibility to achieve this integration is placed on the designer rather than the regulator.

c. Standards have served well in protecting the public for many industries.

Performance standards should be applied to essentially all aspects of the nuclear steam system design and should extend to all safety-related systems which determine the safety of the public. Achieving such a goal requires improvement in reactors and in the industry, as well as structural changes in NRC. It is most likely that such a goal could be achieved in steps. Several kinds of steps can be envisioned:

a. Adoption of passive safety systems to replace or supplement active safety systems. The use of passive systems makes verification simpler in that safety becomes more deterministic and less probabilistic.

b. Performance standards can be applied to the plant's response to certain accident initiators such as an earthquake of a specified intensity, or a particular pipe break. A combination of test and analysis can then be used to determine that a severe accident will not result.

c. As experience is gained with the application of performance standards of limited scope and in the use of probabilistic risk assessment, greater weight can be placed on the use of PRA to verify the achievement of safety goals on an overall basis.

d. The response of plants to actual challenges to safety systems (Licensee Event Reports) can be analyzed to verify that the PRA is soundly based.

To the extent possible, performance standards should be supplemented by standards provided by technical societies and other standards organizations. These would include materials, design, configuration, and other features to achieve both safety and standardization. Although standardization is not neeessarily an NRC safety requirement, it must surely reduce the licensing effort and should be encouraged by the NRC policies.

2. Should the regulations for advanced reactors require more inherent safety margin in their design? If so, should the emphasis be on providing features that permit more time for operator response to off-normal conditions, or should the emphasis be on providing systems that are capable of functioning under conditions that exceed the design basis?

Response

It is self-evident that inherent or passive safety, additional time for operator action, and wide margins of capability beyond design are desirable for safety. Unfortunately, each of these involves tradeoffs in performance and cost. These features should be encouraged but not required and should be viewed as mechanisms for meeting the performance requirements of the standards referred to in Question No. 1.

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?

Response

We believe that simpler designs are likely to make safety more predictable and verifiable and reduce burdens on both the operator and the regulator. NRC should therefore encourage but not require simplicity.

Facilities to enhance operator comprehension and understanding and to achieve reliable system functions for both normal and off-normal conditions should be required. However, these may be achieved by the simplification of design to require fewer operator actions or, for example, by providing the operator with automated assistance, improved information display, and more extensive analytical systems.

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?

Response

General design criteria should not be modified until it is clear that the industry wishes to build plants of a new type. Frequent hearings on the subject would tend to reduce public confidence in the NRC's objectivity. Once it has been established that there will be advanced reactors of a type substantially different from LWRs, it would be desirable and appropriate to develop a set of criteria for that reactor type. However, it would be prudent to develop preliminary plans and concepts for licensing concurrently with the corresponding state of development for advanced reactors. This could be beneficial both to regulators and designers.

5. Should the NRC favor advanced reactor designs 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?

Response

We believe that concentrating primary safety functions in a few large systems is likely to make safety more predictable and verifiable. However, the principle of redundancy has served well and must be sufficient to meet all requirements.

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?

Response

It is necessary that all safety design features be supported by analysis which has been validated by experimentation and testing. To the extent that such validation can be achieved in a prototype or demonstration reactor, this is obviously desirable. The prototype reactor not only provides for the demonstration, but also the opportunity for discovering inadequacies or inconsistencies in the design or construction practices. However, many off-design features cannot be tested economically (or even safely) in a demonstration reactor. For example, there is no way to subject a demonstration reactor to natural disasters such as seismic events, and it certainly would not be subjected to fire, to sabotage, or to the impact of an

aircraft crash. However, many features, such as the total loss of off-site power and modest off-design conditions, can be included in the test program of a demonstration reactor.

May 16, 1985

DOCKET NUMBER
PROPOSED RULE PR-50
(50 FR 11882)

(6)

Public Service

Public Service
Company of Colorado

2420 W. 26th Avenue, Suite 100D, Denver, Colorado 80211

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May 24, 1985
Fort St. Vrain
Unit No. 1
P-85182

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

Attn: Docketing and Service Branch

Docket No. 50-267

SUBJECT: Comments on Proposed Policy for Regulation of Advanced Nuclear Power Plants (10 CFR Part 50)

Gentlemen:

Public Service Company of Colorado (PSC) has reviewed the proposed Policy for Regulation of Advanced Nuclear Power Plants as published in the Federal Register (Vol. 50, No. 58, dated Tuesday, March 26, 1985) and has prepared responses to the six questions posed by the NRC. The responses are contained in the Attachment to this letter.

As a general comment, PSC supports the Commission's 1985 Policy and Planning Guidance statement that encourages industry to pursue standardization of the current generation of nuclear power reactors. However, the immediate application of this policy to advanced nuclear reactors may be inappropriate, since advanced reactors, by definition, are reactor designs which are significantly different from the present generation of light water reactors and the various advanced reactor concepts ordinarily differ in many ways from one another. Until a particular advanced reactor develops into a proven design that is capable of giving rise to a new family of nuclear power plants, it would be premature to think in terms of standardization for such units.

D210
Add: James K. Rathbun, H-1013
James G. Beckley, H-1013

MAY 29 1985

Acknowledged by card.....

If there are any questions, please contact Mr. M. H. Holmes at (303) 571-8409.

Very truly yours,

M. H. Holmes

for H. L. Brey, Manager
Nuclear Licensing & Fuels Division

HLB/SLG:pa

Attachment

Attachment
to P-85182

Responses to Questions

Question 1 - The NRC should be mindful that the regulatory approach adopted for advanced reactors should have, as a primary goal, the encouragement of design innovation and creativity. By reducing its dependence upon prescriptive regulations for advanced reactors, the NRC would be taking a positive step in furtherance of that objective. Even the imposition of performance standards should be considered carefully since they too could impose sufficient restrictions on the industry to where they have a counter-productive impact on advanced reactor design. The use of prescriptive regulations and performance standards should be held to a minimum (1) as long as the NRC is kept informed of new design concepts that are under consideration by the nuclear industry, (2) as long as prospective applicants have the responsibility for supporting confirmatory research and for providing technical evidence of the feasibility and safety of new design concepts and (3) as long as the NRC develops the capability for timely, appropriate assessment and response to innovative and advanced designs presented for review. Any performance standards established for advanced reactors should be drafted in such a way that they are capable of being implemented and verified without the need for subjective interpretation.

Question 2 - It is the NRC's responsibility to assure adequate protection of the public health and safety in connection with all nuclear power plants. If a particular level of safety is deemed adequate by the NRC for the light water reactors, it would appear to be inconsistent and even discriminatory for the NRC to mandate more inherent safety margin in the design of advanced reactors. The NRC requires a prospective applicant for an advanced reactor to identify and solve technical problems, to support confirmatory research on new design concepts and to provide sufficient evidence that a particular new design concept incorporates fundamental safety characteristics. PSC believes that each situation involving an advanced reactor should be judged on its own merits. Since light water reactors as well as various advanced reactor designs react differently to off-normal conditions, the NRC should reorganize such distinctions and avoid slavishly mandating the same amount of time for operator response to off-normal conditions. Otherwise, there would be no incentive for industry to develop advanced reactors with inherent safety characteristics.

Question 3 - PSC believes that licensing regulations issued by the NRC should avoid mandating any aspect of the advanced reactor design. This PSC position is consistent with the NRC's proposed policy of avoiding the placement of unnecessary constraints on

the development of new design concepts. The term "simplified designs" can hardly be applied with accuracy to any nuclear reactor, whether it be a light water reactor or an advanced reactor, except in a relative connotation. This comment is especially relevant in those cases where the defense-in-depth design concept has to be utilized. The proposed language (simplified designs, fewest operator actions, minimum number of components) is highly subjective and subject to interpretation even if some reference standard could be established with which a proposed design could be compared. It would seem that economic considerations would prompt industry to achieve these design objectives on its own.

Question 4 - It has been PSC's experience that design criteria and regulations developed primarily for the current generation of light water reactors have been difficult to apply to an advanced reactor such as PSC's Fort St. Vrain power plant. Rather than modifying existing regulations to reflect advanced reactor concepts, PSC believes that it would be better to develop a new set of general design criteria and regulations for specific advanced reactor concepts. For best results, this kind of effort should be undertaken in the form of a joint NRC/Industry collaboration as is typically done in the case of codes and standards.

Question 5 - PSC believes that the NRC should not concern itself with alternate design concepts when the issue involves choosing between two designs in order to minimize the need for complex benefit and cost balancing in the engineering of safe reactors. The term "favoring" one design over another is meaningless unless the NRC is prepared to mandate advanced reactor designs that concentrate the primary safety functions in very few large systems rather than in multiple subsystems. For the NRC to mandate one design concept over another for essentially economic reasons would be contrary to the NRC's proposed policy of avoiding the placement of unnecessary constraints on the development of new design concepts (See Question 3).

Question 6 - As long as an applicant is able to satisfy the NRC that a new design is based on technology which is either proven or can be demonstrated by a satisfactory technology development program, it should not be necessary for the NRC to require a prototypical demonstration of an advanced reactor concept prior to final licensing of a commercial facility. If, for reasons of economic prudence, an applicant deems it advisable to proceed with a prototypical demonstration of an advanced concept, that decision should rest solely with the applicant.