PDR-016

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

May 7, 1982

RECEIVED MAY 11 1982

Ms. Susan L. Hiatt
OCRE Interim Representative
8275 Munson Road
Mentor, OH 44060

IN RESPONSE REFER
TO FOIA-82-172

Dear Ms. Hiatt:

This is in response to your letter dated March 17, 1982, in which you requested, pursuant to the Freedom of Information Act, seven categories of documents which you described in your letter.

As agreed in a telephone conversation between you and Nina Toms of my staff, you will visit the NRC Local Public Document Room located in the Perry Public Library, 3753 Main Street, Perry, Ohio. The records subject to item 1 of your request are contained in the applicant's Final Safety Analysis Report (FSAR). Table 3.2-1, and sections describing the Service Water, Emergency Service Water Heat Exchanger and the Circulation Water Heat Exchanger should be of particular interest to you.

The documents listed on Appendix A are relevant to items 2, 3, 4 and 5 of your request. These documents are enclosed.

As you are aware, it is the Commission's decision to waive 75% of the reproduction costs for documents relating to contentions admitted by the Atomic Safety and Licensing Board in the Perry proceedings. Therefore, the charge for reproducing the enclosed 212 pages is $2.65. You will be billed directly by our Division of Accounting for this amount.

A copy of the document you requested in item 6 of your letter may be obtained by writing directly to the address listed below.

Energy Incorporated
P.O. Box 736
Idaho Falls, Idaho 83402
Telephone: (208) 529-1000

In regard to item 7 of your request, the Commission had determined to make a copy of the Reed Report available to the public. A copy of that decision and an addendum are enclosed for your information. The General Electric Company thereafter sued the NRC to enjoin disclosure of the Report and a federal district court in an October 31, 1980 order, (copy enclosed) barred disclosure of the Report and its contents by the NRC pending resolution of the various claims for them. Accordingly, the NRC cannot provide the information you seek. In this regard, see GTE Sylvania Inc. v Consumers Union of the United States, Inc., _____ U.S. _____ 63 L.Ed.2d 467(1980) (copy enclosed).

The NRC will keep you informed of the disposition of the lawsuit and may be able to respond fully to your request at a later date. For future information on the availability of the Reed Report, you may contact Ms. Carol Ann Reed at (301) 492-8133.

Sincerely,

John Phillips - for

J. M. Felton, Director
Division of Rules and Records
Office of Administration

Appendix A

1. Petition for Rulemaking on ATWS.* (44 pages)

2. Supplement to Petition for Rulemaking on ATWS.* (7 pages)

3. Advance Notice of Proposed Rulemaking.* (3 pages)

4. Memo for Roger Mattson, from Wayne Hodges, Summary of March 29, 1981, Meeting with General Electric on "Proposed ECCS Approach for BWR's," July 2, 1981.* (55 pages)

5. Memo for the Commissioners from Chairman Hendrie, "ATWS," June 9, 1981.* (31 pages)

6. Licensing Topical Report - Hydrogen Flammability and Burning Characteristics in BWR Containments, April 1973." (72 pages)

7. Commission's Decision on Reed Report.

8. Addendum to Reed Report.

9. Court Order, October 31, 1980.

*Relates to an ASLB Contention; charged 25% of cost.

#2

PRM-50-29

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FILE NO. 33899.000002

September 16, 1980

DIRECT DIAL NO. 804 788-8359

BY HAND

DOCKETED
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Office of the Secretary
Docketing & Service
Branch

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

Electric Utilities' Petition
for Rulemaking on ATWS

Dear Mr. Chilk:

Attached are the original and two copies of the Petition noted above. We would appreciate your docketing it. Copies have also been served on the following people:

John F. Ahearne
Peter A. Bradford
Victor Gilinsky
Joseph M. Hendrie
Leonard Bickwit, Jr.
Howard K. Shapar
Harold R. Denton
Milton S. Plesset

Very truly yours,

W. Taylor Reveley, III

79/290
Enclosure

8010010121
PDR

September 16, 1980

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	Docket No. _____
ANTICIPATED TRANSIENTS WITHOUT SCRAM	)	
(Unresolved Safety Issue TAP A-9)	)	

ELECTRIC UTILITIES'
PETITION FOR RULEMAKING
ON ATWS

Petitioners, a group of 20 electric utility companies[1/] (hereinafter "Utilities" or "Petitioners"), request in accordance with 10 CFR § 2.802[2/] that the NRC deal with the

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1/ Arkansas Power & Light Co., Baltimore Gas & Electric Co., Boston Edison Co., Commonwealth Edison Co., Connecticut Yankee Atomic Power Co., Consumers Power Co., The Detroit Edison Co., Duke Power Co., Florida Power Corp., Florida Power & Light Co., Long Island Lighting Co., Maine Yankee Atomic Power Co., Nebraska Public Power District, Northeast Nuclear Energy Co., Omaha Public Power District, Pacific Gas and Electric Co., Public Service Electric & Gas Co., The Toledo Edison Co., Vermont Yankee Nuclear Power Corp., and Washington Public Power Supply System.

Among them, these companies have over 60 B&W, CE, GE and Westinghouse reactors currently in operation, under construction or planned, all of which will be affected by the resolution of the ATWS issue.

2/ This Petition provides the information called for by 10 CFR § 2.802 (1980) as follows: Petitioners' "general

(footnote continued)

subject of Anticipated Transients Without Scram (ATWS) in the manner proposed in this Petition. ATWS, which has been designated Unresolved Safety Issue TAP A-9, is a type of event in which an abnormal operating condition ("anticipated transient") occurs at a nuclear power plant such that the reactor protection system should initiate a rapid shutdown ("scram") of the reactor but the reactor shutdown system fails to function.[3/]

This issue has proved troublesome. For some eleven years various utility companies, the Atomic Industrial Forum (AIF), the Electric Power Research Institute (EPRI) and, to a greater extent, the reactor vendors have engaged in a dialogue with the NRC Staff on ATWS. But these discussions have proved

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solution" to the problem (§ 2.802(c)(1)) is contained in Parts I.A and I.C, and alternatively in Part II. Petitioners' grounds for the Petition are stated in Parts I.B and II. The statement of Petitioners' interest is Part III (§ 2.802(c)(2)). The "statement in support of the Petition" (§ 2.802(c)(3)) is Part I.B and the whole of Part II.

3/ See U.S. Nuclear Regulatory Commission, Identification of Unresolved Safety Issues Relating to Nuclear Power Plants (Report to Congress), NUREG-0510 at A-8 (Jan. 1979); Regulatory Staff, U.S. Atomic Energy Commission, Technical Report on Anticipated Transients Without Scram for Water-Cooled Power Reactors, WASH-1270 at 1-2 (Sept. 1973).

relatively unfruitful for a variety of reasons, and no satisfactory resolution has emerged. Although the NRC Staff has recommended[4/] certain requirements aimed at resolving the ATWS issue, further analysis is required to assess their efficacy. The Utilities believe that the Staff recommendations raise profound and difficult questions of safety and regulatory policy that must be answered before these recommendations can be fully treated by the Commission, as we show in Part II below.

The Utilities believe the resulting difficulties can be overcome by the approach to ATWS set out in Part I of this Petition. It involves:

1. A proposal for existing plants[5/]

   A proposed rule that specifies certain plant modifications: These proposed modifications are designed to ensure that the present risk

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4/ Most recently the Staff has published a draft of volume 4 of NUREG-0460, Anticipated Transients Without Scram for Light Water Reactors (Mar. 1980). Volumes 1-3 were published earlier, and earlier still was WASH-1270, supra note 3. Petitioners are aware that the Staff has also prepared a set of recommendations for the Commission and a draft Regulatory Guide, but these have not yet been made public.

5/ In this Petition, the term "existing plants" means all nuclear power plants whose construction permit applications were filed as of the effective date of the rule. "New plants" are all plants whose construction permit applications are filed after that date.

of ATWS, which the NRC Staff has concluded is acceptable, will be further reduced so that there will clearly be reasonable assurance of protection to the public. This proposed rule can be adequately considered during a notice-and-comment rulemaking.

2. A proposal for new plants

A plan for generating an ATWS rule for those plants that are not covered by our proposed rule: This plan offers the opportunity to deal with ATWS for new plants after important NRC efforts such as the degraded core rulemaking, the definition of a safety goal and the further development of probabilistic analysis have been completed. This proposal for new plants will also allow more time to consider the safety implications of various staff ATWS resolutions. The Commission will then be in a position to decide whether additional requirements for new plants are needed and what type of rulemaking procedures are appropriate to define the requirements.

Alternatively, if the Commission decides now to propose ATWS requirements that go beyond what the Utilities recommend in Part I below, then this Petition requests essential relief of a different sort. That alternative relief, set out in Part II below, would be an ATWS rulemaking involving certain adjudicatory procedures designed to help ensure that all significant questions raised by any such requirements would be answered. As will be shown, these questions are not raised by the Utilities' proposed modifications for existing plants, and they will, in many cases, be answered for new plants by various

NRC efforts already planned or underway. But if the Commission goes beyond the approach to ATWS recommended in Part I below, then these questions will arise immediately, and any realistic prospect of answering them will require the use of selected adjudicatory procedures during an ATWS rulemaking.

I. THE UTILITIES' PROPOSAL

A. The Proposed Rule for Plants Whose Construction Permit Applications Were Filed as of the Effective Date of the Rule

The Utilities' proposed rule consists of three requirements, one for boiling water reactors (BWR's) manufactured by the General Electric Company, one for pressurized water reactors (PWR's) manufactured by Combustion Engineering, Inc. and the Babcock & Wilcox Company, and a third for PWR's manufactured by the Westinghouse Electric Corporation. These proposed requirements describe, with more specificity than is customary in regulations, certain plant modifications.[6/] They are:

6/ As a general matter the Utilities firmly oppose the practice of specifying particular design features in regulations. It is far preferable to specify by regulation the ends to be achieved (for example, the level of safety, whether such level be defined qualitatively, as with "reasonable assurance," or quantitatively, as with a risk no greater than a specific probability per reactor year), leaving it to individual licensees to meet these

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Proposed 10 CFR § 50.47: Standards for Reduction of Risk from Anticipated Transients Without Scram (ATWS)

Each boiling or pressurized light-water nuclear power reactor for which a construction permit application was filed as of the effective date of the rule shall, as provided in paragraphs (a) through (c) of this section, reduce the risk from Anticipated Transients Without Scram (ATWS). The modifications required by this rule must be completed as expeditiously as is feasible, taking into account the time needed for design development and approval, equipment availability and the regional demand for power.

a. For boiling water reactors manufactured by the General Electric Company, provide (1) a means to trip the recirculation pumps upon receipt of a signal indicative of an ATWS event; (2) an independent, redundant and diverse electrical means to initiate a reactor scram upon receipt of a signal indicative of an ATWS event; and (3) a scram discharge volume system designed and installed such that it will have sufficient

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criteria in the most imaginative and cost-effective ways available. In the single (and singular) case of ATWS, however, Utilities propose to depart from that principle, for these reasons: (1) The proposed rule would not remove the opportunity to seek other solutions for new plants. (2) Given the absence of a probabilistic safety goal, it is difficult to express a general design criterion for an extremely small risk like ATWS. (3) Because the Utilities themselves have proposed the modifications, the problem of placing the Staff in the position of both originating and reviewing particular designs does not arise. (4) Finally, the ATWS issue has proved so intractable over the past eleven years that the Utilites believe a fresh approach is needed, even an approach that imposes a cost in terms of reduced flexibility of design.

capacity to receive water exhausted by a full reactor scram.

b. For pressurized water reactors manufactured by Combustion Engineering, Inc. and the Babcock & Wilcox Company, provide (1) an alternate means to shut down the reactor that is diverse from and redundant to the electrical portion of the reactor protection system up to but not including the trip breakers, and (2) an automatic initiation of auxiliary feedwater independent of the reactor protection system.

c. For pressurized water reactors manufactured by the Westinghouse Electric Corporation, provide automatic initiation of turbine trip and auxiliary feedwater independent of the reactor protection system.

These proposed modifications are straightforward and well understood by the industry and the NRC Staff. Thus, they will not require great expenditures of resources for technical analysis, and they can be adopted in short order by a notice-and-comment rulemaking. Because a substantial portion of the industry is already willing to make these modifications <u>if</u> they will resolve the ATWS issue for existing plants, there is unlikely to be much regulatory effort required to impose them. Most important of all, the proposed modifications clearly decrease the risk of ATWS without simultaneously increasing other, competing risks. This is a very important consideration, as indicated below in Part II.

B. The Basis for the Proposed Rule

The proposed rule set out above is easily justified on the now-existing ATWS record. In WASH-1270, back in 1973, the NRC Staff said that it believed "the present chance of a severe ATWS event is acceptably small and that there is no undue risk to the public from ATWS at present." WASH-1270 at 70. But the Staff also felt that as more plants were built the overall chance of ATWS would increase and that design improvements were appropriate to maintain and improve further the safety margins. Id. at 7.

In volume 3 of NUREG-0460 the Staff said again that "the present likelihood of severe consequences arising from an ATWS event is acceptably small and presently there is no undue risk to the public from ATWS." NUREG-0460, vol. 3, at 42-43 (Dec. 1978); see also id. at Appendix B, 7-3. And again in volume 4 the Staff said that it had "seen no information to change its previous conclusion that the present likelihood of severe consequences arising from an ATWS event is acceptably small, but that the future likelihood of severe ATWS consequences could become unacceptably large . . . ." NUREG-0460, vol. 4, at 63 (Mar. 1980). Although the Staff may have retreated somewhat from these views,[7/] on the present record it is reasonable to conclude that the ATWS risk is now very small.

7/ At a January 25, 1980 meeting of the ACRS Subcommittee on Metal Components, the ATWS Task Manager answered a

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The Utilities' proposed rule will reduce this very small existing risk even further, as again the present record shows. According to the NRC Staff's own analysis, implementation of the Utilities' proposed rule will reduce the frequency of severe consequences from ATWS by at least a factor of two.[8/]

(footnote continued)

question about ATWS by stating "It is unacceptable to continue to proceed in the manner we are proceeding without any protection from ATWS for length of time still" Tr. at 65. It is not clear whether this indicates a shift in the Staff position.

8/ According to the Staff, improvements to the electrical portions of the scram system, required by the Utilities' proposed rule for existing B&W, CE and GE plants, will reduce the unreliability of the scram system by a factor of 2. NUREG-0460, vol. 4, at E-6 n.2, E-11 n.4. Other improvements required by the proposal will further reduce the risk of ATWS from these plants.

For Westinghouse PWR's, the Utilities' proposed rule will reduce the risk from ATWS by at least a factor of 40 for those plants that do not already have diverse actuation of auxiliary feedwater and turbine trip. NUREG-0460, vol. 3, at F-5, F-7. Although one of the Staff's assumptions was that half of the existing Westinghouse plants already have these features, the Utilities' proposal still represents a significant reduction of ATWS risk for Westinghouse plants.

An estimate of a collective reduction in risk of a factor of 2 is extremely conservative, even using the Staff's analysis. The improvement cited above for Westinghouse PWR's is but one example. Another illustration is provided by looking at one of the Staff's recommended ATWS solutions in volume 4 of NUREG-0460, so-called Alternative 2A, for BWR's. This Alternative, very similar to the Utilities' proposal for BWR's, requires a recirculation pump trip (RPT), a backup for the electrical portion of

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What is more, there is much evidence to show that this factor of two reduction in risk incorporates many conservatisms. For example, the NRC Staff has assumed that all ATWS events that could lead to core melt (the ultimate risk) will, in fact, lead to core melt. The resulting overestimation of risk is acknowledged by the Staff. NUREG-0460, vol. 3, at F-1. There are also a number of other assumptions made by the Staff in calculating the probability of an ATWS event that are overly conservative.9/

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the scram system (ARI), improvements to the scram discharge system (SD), and changes in the feedwater circuitry (LOGIC). At one point the NRC Staff stated that a recirculation pump trip reduces the probability of a core melt from ATWS by a factor of 4. NUREG-0460, vol. 3, Appendix B at 7-4. LOGIC was said to reduce the frequency of potentially severe ATWS transients by 20% (factor of 1.25). NUREG-0460, vol. 3, at F-7. Improvements in the electrical reliability of the scram system were deemed to yield an additional factor of 2. NUREG-0460, vol. 4, at E-6 n.2. And yet the total improvement for Alternative 2A for BWR's was said to be only a factor of 2.2. Id. at E-8. Despite the confusion created by these varying conclusions, it seems the Staff would agree that the Utilities' proposal cuts the risk from ATWS at least in half.

9/ The probability of an ATWS event per plant per year is the product of (1) the frequency of significant transient events and (2) the scram unavailability per demand. In calculating the first of these, the frequency, the Staff assumes five significant events per year per reactor for PWR's and eight for BWR's. By "significant" events, we mean ATWS initiators, which as the Staff postulates them, are transients that, when coupled with a failure to scram,

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Yet another conservatism is the lack of any credit for operator action in the first ten minutes of an ATWS. The assumption is unrealistic because this unambiguous event --

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would cause PWR's to exceed 3200 psia and BWR's to exceed 1500 psia or 160°F water temperature in the torus. The Staff assumes for the sake of analysis that every time these limits are exceeded, a core melt results, and that every time a core melt results the radiation dose limits of 10 CFR Part 100 are exceeded. These assumptions are overly conservative. They ignore the fact that in the real world exceeding 3200 psia in a PWR, or 1500 psia or 160°F in the torus in a BWR, does not inexorably lead to core melt, and core melt does not inexorably lead to exceeding the 10 CFR Part 100 limits. And they overestimate the number of significant transient events because: (a) below a certain power level, the consequences of an ATWS are not significant; (b) those events that do not isolate the reactor from the condenser and that occur on plants with a large condenser bypass capability are not significant; and (c) as the experience level rises with added years of operation, the number of significant events falls for certain categories of initiating events (the learning curve).

Similarly, the Staff has overestimated the scram unavailability per demand. The calculated scram failure rate decreases as the testing frequency for the scram system increases. The Staff assumes only twelve tests per year, disregarding additional tests that are conducted and failing to count actual scrams which, themselves, are tests of the scram system.

The Electric Power Research Institute has concluded that all of these factors result in the Staff's having significantly overestimated the risk from ATWS. See generally EPRI Comments on Draft Volume 4 of NUREG-0460, Letter from W. B. Lowenstein of EPRI to Ashok Thadani of NRC Staff, May 20, 1980, Attachment 1 (hereinafter "EPRI Comments").

alarms announcing a scram, but rods not inserted and reactor power not dropping as expected -- will result in immediate attempts to scram the reactor manually.[10/] There is also an intensive effort underway to improve operator licensing and training, which should further improve the operators' ability to handle an ATWS event.[11/]

It is also well to note that a number of modifications included by the Staff in its past ATWS recommendations are not included in the Utilities' proposed rule because they are being treated in other contexts now under active review. These modifications include work on containment isolation[12/] and instrumentation.[13/] We believe that these matters are best

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10/ See Comments of A. Thadani, March 26, 1980 ACRS Subcommittee on ATWS meeting, Tr. at 86-87.

11/ See, e.g., NUREG-0660, NRC Action Plan Developed as a Result of the TMI-2 Accident, Tasks I.A.1.1 (provide a shift technical advisor "with engineering expertise and special training in plant dynamic response"); I.A.2.1 ("upgrading of operator and senior operator training and qualifications"); I.A.3 ("upgrade the requirements and procedures for nuclear power plants operator and supervisor licensing to assure that safe and competent operators and senior operators are in charge"); I.C ("[i]mprove the quality of procedures to provide greater assurance that operator and staff actions are technically correct, explicit and easily understood for normal, transient, and accident conditions") (Aug. 1980) (hereinafter "NUREG-0660"). Moreover, IE Bulletin No. 80-17 (July 3, 1980) focuses directly on ATWS-related operator training, as do recent SER's, e.g., NUREG-0053, Supp. No. 11, at 7-2 to 7-3 (July 28, 1980) ("[e]mergency procedures . . . to train operators to recognize an anticipated transient without scram event" and "[o]perators . . . trained to take actions in the event of an [ATWS]").

12/ NUREG-0660, Task II.E.4.2.

13/ Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and

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viewed in a broader context than ATWS alone. Problems with conflicting requirements and duplicative efforts can then be more readily identified and minimized. Not only is this the most cost-effective way to proceed, but it also improves safety by taking into account system interactions. For example, multiple sensors for initiating containment isolation may increase the frequency of inadvertent transients, and duplicative instrumentation may have an adverse effect on the operator's ability to understand what is going on in the plant.

Accordingly, if the Utilities' proposed rule is adopted, it will provide reasonable assurance that the ATWS risk becomes lower than the present risk.[14/] Because this is demonstrable

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Following an Accident, Regulatory Guide 1.97, Rev. 2 (Draft, Dec. 1979).

14/ Making the Utilities' proposed rule applicable to all "existing" plants -- those plants whose construction permit applications were filed as of the effective date of the rule -- does not affect the validity of this conclusion. As already noted, the Staff considers the risk of ATWS acceptable from reactors now operating, approximately 70 of them. That risk will, at a minimum, be cut in half as soon as the Utilities' proposed rule is implemented. Taking into account reactor cancellations and retirements, it seems likely that there will be about twice the current number of reactors operating when all "existing" plants come on line. Accordingly, the risk from ATWS at that time will, at most, be approximately what it is today if the Utilities' proposed rule is adopted, since the rule will reduce the ATWS risk at least by a factor of 2. See note 8 above. Indeed, because of

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on the existing record and consistent with both Staff and industry data, a notice-and-comment rulemaking should be adequate to promulgate the proposed rule. Going further, on the other hand, would raise numerous hard questions and require a more elaborate search for the facts. See Part II below.

C. The Proposal for New Plants

On its face, the rule proposed above is not applicable to plants whose construction permit applications are filed after the effective date of the rule. Thus, additional ATWS rulemaking will be necessary. Of course, one way to meet this need would be to extend the Utilities' proposed rule to all new nuclear power plants.

The proposed rule, however, specifies particular design features rather than the ends to be achieved by regulation. As explained in note 6 above, the Utilities generally oppose specifying particular design features because this limits flexibility of design, discourages creative engineering solutions,15/ and tends to be cost-ineffective. While there

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the conservatism associated with assigning only a factor of 2 reduction in risk to the Utilities' proposed rule, the ATWS risk when all "existing" plants are operating will be less than the current risk. See note 9 above.

15/ For example, it may prove to be possible to eliminate the adverse impacts of an ATWS by changing the moderator

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are special circumstances that justify specifying certain ATWS design features for existing plants, these circumstances do not justify carrying the negative baggage of the approach over to an ATWS rule for new plants.

Moreover, the Utilities recognize that the NRC may wish to consider modifications for new plants that go beyond those contained in the Utilities' proposed rule. But neither the Staff nor the Utilities now know the answers to the complex questions that must be resolved before any such modifications could wisely be imposed. And these answers depend in large part upon what is learned from a number of ongoing Commission efforts.[16/]

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temperature coefficient through alternative fuel management strategies.

16/ In theory, the adoption of the Utilities' proposed rule without immediate provisions for new plants will leave a gap in the regulatory scheme. As a practical matter, though, it is unlikely that any applications for construction permits will be filed in the near future. The Commission will have ample time to develop an ATWS rule for new plants. In the unlikely event that some new plants do proceed to a point in construction that requires an ATWS decision prior to the promulgation of a new-plant rule, such plants could be treated on a case-by-case basis.

The first of these prerequisite efforts is the "degraded core" rulemaking, which has grown out of the Three Mile Island accident. It is to result in a rule that will amend 10 CFR Part 50 to require changes in plant design or procedures that will improve the capability of light water reactors to respond to and accommodate the effects of accidents resulting in a degraded reactor core. See Degraded Core Rulemaking, SECY No. 80-357 (1980); see also NRC "Statement of Interim Policy" on consideration of Class 9 accidents (which mentions "recommendations for rulemaking related to degraded core cooling and core melt accidents"), 45 Fed. Reg. 40101, 40104 (June 13, 1980); NUREG-0660 at II.B-10 to -12.

The Utilities do not believe that an ATWS rule for new plants should be developed until the results of the degraded core rulemaking are known. Because the same issues and facts are crucial to each, ATWS is simply a subpart of the degraded core matter; no one denies that the risk of ATWS, to the extent there is any significant risk, is one of degraded core. As the Staff said in one of its ATWS reports:

> The significance of ATWS in the evaluation of reactor safety is that some ATWS events could result in melting of the reactor fuel and the release of a large amount of radioactive fission products.

NUREG-0460, vol. 1, at i (Apr. 1978). Also, no one denies that ATWS is merely one relatively low-probability event among many that could conceivably lead to a degraded core. Accordingly, there seems to be no sound reason for seeking ATWS solutions for new plants in isolation from other degraded core events.[17/]

17/ To the extent there is an impulse to treat ATWS uniquely, it may be because the subject has been discussed for so long. Often the more an issue is examined, the more serious it seems to be. The Commission has pointed out this phenomenon in the comparative site context:

> Common sense teaches that the more closely a site is analyzed, the more adverse environmental impacts are likely to be discovered. It would, therefore, be mistaken to conclude that an alternative site which appeared marginally superior to the proposed site, would remain superior upon further investigation, considering all of the possible but unknown disadvantages of the alternative site.

Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 529 (1977). It is quite possible that eleven years of thought and debate about ATWS may have artificially inflated the significance of the issue in comparison to other, less intensely reviewed safety concerns.

Petitioners do not believe that the recent problem at Browns Ferry 3 changes these basic considerations. Browns Ferry showed that operators can recognize a failure to scram and take corrective action. It also showed that not all common mode failures lead to a complete failure to scram.

The second prerequisite for an ATWS rule for new plants is the definition, either by policy statement or rulemaking, of a safety goal for nuclear power plant regulation. See NUREG-0585, TMI-2 Lessons Learned Task Force Final Report, Recommendation 11, A-15 to A-17 (Oct. 1979); NUREG-0660, Tasks IV.E, V.1. ATWS involves the reduction of risks that are already small. Since it is impossible to reduce risks to zero, the philosophical question always remains "how safe is safe enough?" Although, of necessity, the lack of a safety goal has not precluded rulemaking in the past,[18/] it would be unwise to ignore safety goal guidance that should soon be available. Recent recognition that such guidance is essential suggests

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18/ This does not mean that interest in a safety goal is new. For example, in 1976, Commissioner Gilinsky discussed the need to develop an explicit safety goal:

> The nuclear regulatory system requirements in a sense grew by accretion. Responsible persons decided that more and more requirements were useful. The growth of requirements is limited to the recognition that safety like everything else costs money, and, that at some point you run into the law of diminishing returns.
>
> But there has never been an explicit safety goal, I believe. I think it would be useful to try to state such a goal.

Investigation of Charges Relating to Nuclear Reactor Safety: Hearings Before the Joint Committee on Atomic Energy, 94th Cong., 2d Sess. at 306 (1976).

that it will be available in time to guide a new-plant ATWS rule.[19/]

19/ Among other indications of work towards developing a safety goal, the Senate Environmental and Public Works Committee Report on the NRC's FY-81 authorization bill directed the NRC to hold safety goal hearings. S. Rep. No. 96-767 (to accompany S. 2358), 96th Cong., 2d Sess. at 9 (1980). See also Joseph M. Hendrie's views:

> [T]he Commission ought to enunciate a safety objective for nuclear power plants in as quantitative a set of terms as we are able to put it. This is a task that we have promised ourselves we would take up as part of the regulatory upgrading following Three Mile Island. I think the safety objective ought to include at least two levels; one to indicate the level of requirements for the design basis envelope and the other for events beyond the design basis, expressed in terms of the probability of serious radiation exposure to the public.
>
> . . . .
>
> My own rule of thumb for achieving the "adequate protection" and "no unreasonable risk" standards for nuclear plants -- these are phrases used, without further explanation, in the Atomic Energy Act -- is that the risk to individuals should be small compared to other risks in life and that nuclear plants should present no more societal risk than other methods available for providing the bulk electricity supply. I think that is the situation with regard to the plants now in operation. I also think that we should work to improve our assurance that it is the case for every plant and should take reasonable and cost-effective measures to lower the risk. The changes in the regulatory safety basis

(footnote continued)

A third and final prerequisite for a new-plant rule is further work on probabilistic analysis. The extent to which safety analyses should rely on this technique, and the methodology to be used when it is applied, must be more clearly defined. Efforts to these ends are already planned. See, e.g., NUREG-0660, Task II.C.2 (continuation of the IREP program); NUREG-0660, Task IV.E.1 (research on quantification of safety decision-making).

The Utilities recognize that, after the degraded core, safety goal and probabilistic analysis efforts have been completed, the Commission may see a need to augment the ATWS rule proposed for existing plants in Part I.A above. We do not believe that this will prove to be the case. But if the Commission lacks our confidence, it may prefer to adopt the Utilities' proposed rule as an "interim" measure, to be

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(footnote continued)

> that I suggest here would have that effect. These changes would not, to be sure, provide any absolute guarantee that nothing can ever go wrong with a nuclear power plant. But just as there is no free lunch, there are no zero-risk electricity supply technologies.

Address by Commissioner Hendrie, First Texas Symposium on Energy (July 9, 1980), printed in NRC News Releases, No. S-12-80, at 12-13.

finalized in the wake of these efforts, quite possibly at the same time that ATWS requirements are set for new plants.

II. THE UTILITIES' ALTERNATE REQUEST

If the Commission denies Part I of this Petition, then the Utilities request that there be an ATWS rulemaking involving the adjudicatory procedures described on pages 35-36 below. Petitioners believe this alternative is unavoidable if Part I is rejected, if the Commission still wants to act on ATWS now, and if an adequate record is to be developed for such action.

As shown in Part I, the risk of ATWS from existing plants will certainly be acceptable if the Utilities' proposed rule is adopted. If the Commission goes beyond that proposal and seeks to impose further ATWS modifications, it will be regulating risks below the levels that present standards require.[20/] More important, such attempts to lower the risk of ATWS may actually make the public less safe than otherwise.

20/ We note, without arguing, that there is doubt as to whether the NRC has the authority to impose ATWS fixes designed to reduce the risks below that which constitutes reasonable assurance of protection of the public health and safety. Certainly such fixes to the extent they require backfitting cannot be imposed absent the findings required by 10 CFR § 50.109.

Neither the NRC Staff nor the industry now has enough information to deal intelligently with ATWS modifications that go beyond those included in the Utilities' proposed rule for existing plants. The implications of moving beyond it are not adequately known. The NRC Staff, for instance, has failed to address comprehensively concerns about the negative safety implications of its recommended ATWS fixes.[21/] Identified below are some of the overriding issues that must be engaged and resolved during an ATWS rulemaking if modifications beyond those on pages 6-7 above are to be considered.

A. Quenching the fire by dynamiting the dam: Do some recommended "fixes" actually increase the risk to the public? There is evidence that some of the measures that have been recommended to decrease the ATWS risk may increase what are called "competing risks," thus lowering safety overall. The

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21/ For example, the Staff working on ATWS responded to an internal Staff criticism about the failure to consider the risk of adding relief valves with the following terse reply: "[E]ven though the addition of relief valves would increase the frequency of relief valve failure, this transient is analyzed for each plant and the inadvertent opening of these valves does not create a significant hazard." NUREG-0460, vol. 2, Appendix XIII at Response to Comment 1.4. Although the Staff elaborates on this position in volume 3 (NUREG-0460, vol. 3, Appendix B, at 9-1 to 9-3), there is no indication that this position has been evaluated in light of Three Mile Island. No other competing risks are discussed.

Staff has suggested, for example, that increasing the number of valves on B&W and CE plants will reduce the ATWS risk. But NUREG-0460 does not adequately consider that an increase in the number of relief and safety valves increases the likelihood of valves opening unexpectedly or failing to close during normal or abnormal plant conditions, and thus increases the likelihood of small LOCA's. Indeed, the Electric Power Research Institute has calculated that under certain circumstances the public risk is increased 1000 times the original ATWS risk by the addition of valves. EPRI Comments, Attachment 1, at 17. There are a number of issues of this type:

> (1) Associated with alternative ATWS resolutions is a range of risks. Where in the spectrum of alternatives is the decreased risk of ATWS counterbalanced by the increased risk imposed by the "fixes"?
>
> (2) NUREG-0460 does not contain an analysis of the impact of adding relief valves that reflects the experience gained from TMI-2.22/ Would increasing the number of relief valves increase the chances of a TMI-2 type accident? Has the Staff reevaluated its recommendations for more relief valves in light of the EPRI Comments?

22/ "TMI illustrated a situation where NRC emphasis on large breaks did not cover the effects observed in a smaller accident." Report of the President's Commission on the Accident at Three Mile Island at 30 (1979).

(3) One of the modifications to BWR's that would have to be made to use a high-capacity boron injection system is an inhibit of the Automatic Depressurization System (ADS). Have Staff reviewers working on TMI-2 analyzed the safety implications of such an ADS inhibit for small LOCA's or other transients?

(4) The Staff has recommended a requirement for feedwater logic. Would this impair the use of the feedwater systems for cooling and increase the demands on high pressure coolant injection systems?

(5) Automating the Standby Liquid Control System increases the probability of inadvertent initiation of that system. Doesn't this increase the number of transient initiators for potentially harmful accident sequences by placing more demands on systems required for decay heat removal?

(6) Automatic Containment Isolation also may increase the frequency of transient initiators. Doesn't this increase the risk from harmful event sequences?

(7) Certain alternatives described in volume 4 of NUREG-0460 would require extensive additions to safety-related electronic circuitry and piping systems. Many of the changes would have to be installed rapidly to meet the Staff's recommended deadlines. Has there been any analysis of the safety implications of such backfits? Has the adverse safety impact of increasingly complex designs been taken into account?

(8) One of the Staff's normal functions is to provide an independent review of designs submitted by industry. NUREG-0460 departs from this traditional role by prescribing specific ATWS design concepts. Is this switch permitted by the Energy Reorganization Act of 1974?23/

23/ The conference committee report for the Act expresses quite clearly a congressional intent that the NRC "should

(footnote continued)

Even if it is, is the role reversal appropriate? Regardless of whether it is appropriate, have these design concepts been independently reviewed by Staff members who have not been involved in developing them? And have the design concepts been sufficiently developed to determine whether they are really workable?

B. Robbing Peter to pay Paul: By concentrating resources disproportionately on this one small risk, is the regulatory process rendered less effective? The Utilities are also concerned that attempts to deal with ATWS will consume resources that should properly be expended on more important matters, such as those related to Three Mile Island. Attempts to implement ATWS modifications beyond those in the Utilities' proposed rule would require extensive efforts by NRC Staff and industry experts, and material resources for technical analysis and plant modifications. If these resources in expertise, equipment, and money were unlimited, it would be tempting to expend them lavishly on each and every health and safety risk, no matter how slight. But the resources are not unlimited, and here again there is a competing risk.

(footnote continued)

not perform process development, develop construction procedures or designs, or conduct quality control work. . . . The regulatory agency should not assume any part of the burden of the applicant to prove the adequacy of a license application." S. Rep. No. 93-1252, 93d Cong., 2d Sess. at 35 (1974).

The competing risk is that other, more serious safety problems, which demand the same resources, will be less than adequately treated while undue attention is given to ATWS. It is therefore important to consider the risk of ATWS along with the other issues facing the Commission in order to use the agency's resources most effectively.[24/] The level of effort must be somewhat proportionate to the risk. The problem of allocating limited resources raises serious safety questions:

> (9) Part of placing an unresolved safety issue in its proper perspective is to compare it with other unresolved safety issues. How does the current risk of core melt from ATWS compare to the total risk of core melt?[25/] How would the

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24/ The ACRS has expressed similar concerns. See ACRS letter of Apr. 16, 1980 (Report on NRC Staff Report on Anticipated Transients Without Scram, NUREG-0460) at 2-3.

25/ The Reactor Safety Study, WASH-1400, assigns ATWS less than 1% of the total risk of core meltdowns for PWR's and 23% of the total risk of core meltdowns for BWR's. This analysis assumes ten initiating transients -- an even more conservative assumption than the Staff's estimate of five for PWR's and eight for BWR's. The Utilities recognize, however, that there are problems with extrapolating the WASH-1400 probabilities for ATWS to all BWR's and PWR's. See NUREG/CR-0400, Risk Assessment Review Group Report at 46-47 (Sept. 1978). The NRC Staff was correct to recalculate ATWS probabilities (although the Utilities disagree with the results of the calculations), but the Staff went on to compare these probabilities with the non-ATWS probabilities in WASH-1400. See, e.g., NUREG-0460, vol. 3, at F-11 to F-14. The result is meaningless since some of the non-ATWS events may also have been underestimated. See, e.g., NUREG/CR-0400 at 37-38 (earthquakes). In other words, the present record fails to provide any useful information on the risk of ATWS relative to other accident events.

risk of core melt from ATWS compare to the total risk of core melt after the implementation of the Staff's Alternative 2A? 3A? 4A? Isn't it essential to consider the results of the Interim Reliability Evaluation Program (IREP) in estimating the percentage of the total risk attributable to ATWS? To what extent has the Probabilistic Analysis Staff been involved in the Staff's ATWS work?

(10) To a greater or lesser extent ATWS resolutions will require the expenditure of significant resources by utilities, vendors and the Staff. These resources involve not simply money but also, and perhaps more important, demands on the time and expertise of people skilled in design and engineering, analysis, operation and training. What priority should ATWS have on these finite resources in light of all that remains to be done under the TMI-2 Action Plan? How does the potential for risk reduction from ATWS compare with the potential for risk reduction in the TMI-2 Action Plan? In deciding how best to commit limited resources, have these varying potentials been taken into account?

(11) The NRC Staff has said in the past that the risk of ATWS is currently acceptable but that as more plants come on line the risk will become unacceptable. E.g., NUREG-0460, vol. 3, at 42-43; see page 8 above. How many plants need to come on line before the risk becomes unacceptable? When are they likely to come on line? How should this time frame affect the implementation schedule for ATWS modifications? Has volume 4 of NUREG-0460 taken into consideration the decrease in the total number of expected nuclear plants?

(12) The Kemeny Commission Report, the Rogovin Report, and the Hart Subcommittee Report[26/]

26/ U.S. Senate Subcommittee on Nuclear Regulation, Report, Nuclear Accident and Recovery at Three Mile Island, 96th Cong., 2d Sess., Serial No. 96-14, at 9, 56, 60-63 (June 1980).

criticized the NRC for emphasizing machines and equipment at the expense of operator training and other human factors. Are the ATWS recommendations in volume 4 of NUREG-0460[27/] susceptible to the same criticism? In fact, couldn't the already-low risk from ATWS be most effectively reduced by training the plant operators to respond to the obvious and unambiguous symptoms caused by failure to scram? TMI showed that our ability to anticipate every conceivable event is limited. Given this limitation, aren't our efforts best spent in preparing our most resourceful line of defense, the operator, to cope with the event rather than futilely attempting to design a fail-safe system?[28/]

(13) What is the degree of coordination between the Staff recommendations in NUREG-0460 and other Staff recommendations which call for, e.g., auto-initiation of auxiliary feedwater, additional accident monitoring instruments,[29/] and additional containment isolation?

27/ As stated in note 4 above, Petitioners are aware that, in addition to volume 4 of NUREG-0460, the Staff is preparing a position paper to present to the Commission.

28/ The Staff's tendency to try to design the operator out of the response of a nuclear power plant to abnormal or emergency events is in stark contrast to the Naval Nuclear Propulsion Program. In a letter to subordinate commanders, Admiral H. G. Rickover stated that plants should "[u]se simple system designs so that reliance is placed primarily on direct control by trained operators rather than on automatic control." H.G. Rickover letter of Aug. 16, 1979, at 7.

29/ The ACRS has indicated that it is desirable to cross-check Regulatory Guide 1.97 requirements against NUREG-0660 requirements and to clarify their relationship. ACRS letter of Aug. 13, 1980, at 1. If an ATWS modification includes additional instrumentation, the same clarification would seem to be necessary.

C. The Value-Impact Questions. The Nuclear Regulatory Commission has adopted a policy "that value-impact analysis be conducted for any proposed regulatory actions that might impose a significant burden on the public (where the term public is defined in its broadest sense)."[30/] Consistent with this policy, the NRC Staff has attempted to develop the required value-impact analysis for ATWS. The Staff's effort to date, however, has not been adequate. The major defects include (a) the failure to consider the increased risks associated with certain of the Staff's alternatives;[31/] (b) the failure to estimate incremental values and impacts;[32/] (c) the failure to consider the variation in consequences from different accident sequences leading to core melt;[33/] and (d) the failure to use realistic assumptions for the value-impact analysis.[34/]

30/ 43 Fed. Reg. 34358 (Aug. 3, 1978).

31/ See EPRI Comments, Attachment 2, at 10-11.

32/ See id. at 6. The Staff's value-impact statement gives the total value and the total impact of going from no ATWS modifications to each of the other Staff Alternatives (e.g., 1 to 2A, 1 to 3A and 1 to 4A). This approach is misleading, because some of the less extreme Alternatives, such as the modifications in the Utilities' proposed rule, yield large benefits with relatively small impacts. A better indicator of the relative merit of each Alternative is the incremental value and impact of going from one Alternative to the next higher one. See question 14 below.

33/ See EPRI Comments, Attachment 2, at 7-9.

34/ See id. at 12-16.

Additionally, the value-impact analysis is deficient because it does not include some of the impacts associated with the Staff's proposals. To the extent ATWS modifications require expenditures by utilities, they will increase the cost of electric power and decrease the attractiveness of nuclear generation as compared to fossil. Some of the fixes may also reduce system availability, both by requiring periods of downtime for backfitting and by making nuclear plants more complex and thus more subject to breakdown (e.g., inadvertent initiation of the automatic SLCS). The resulting increased cost of electricity will in turn affect the cost of goods and services that depend on electric power. The other impact, the increase in attractiveness of fossil fuels, may be more profound, since it seems likely that the environmental effects of coal and oil, and the impact on national security in the case of oil, far exceed those of nuclear power.[35/] A

35/ In his concurring opinion in the ECCS rulemaking, Commissioner Anders was concerned that this type of impact had not been factored into the Staff's cost-benefit balance in that case:

> [D]eratings also would force utilities to resort to alternate fuels to make up the lost energy. International conditions involving uncertain oil supplies strongly suggest the reduced availability of this fuel. To the extent that utilities must turn to coal, derating could cause some adverse environmental consequences. . . ;

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comprehensive value-impact assessment must address these costs.[36/] Answers are needed to questions such as the following:[37/]

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> Air pollution increases could result in adverse effects on the health of persons living in affected areas . . . .

In the Matter of Rulemaking Hearing RM-50-1, CLI 73-39, 6 AEC 1085, 1128 (1973).

36/ Petitioners do not suggest that these impacts will necessarily be large ones; that remains to be seen. But we do believe that, whatever the size of the impacts, they are unjustified unless they bear some reasonable relationship to the size of the risks they are designed to remedy. It is also precisely these types of impacts that must be weighed under the National Environmental Policy Act of 1969, and, in NRC proceedings, under the regulations in 10 CFR Part 51. The Utilities do not believe that their proposal in Part I of this Petition requires an environmental impact statement, because the requirements in it have been carefully chosen so as to get the greatest benefit with the least cost (in terms of competing risks and reduced availability). In fact, the proposal may not even require a negative declaration. See 10 CFR § 51.5(d). Given the scope of past NRC Staff recommendations, however, it is not clear that the environmental impacts of these recommendations could be dismissed as easily as those of the Utilities' proposal. The Utilities express no opinion about the need for an EIS if an ATWS rule more extensive than that in Part I above is adopted. We do maintain that, at a minimum, a negative declaration, 10 CFR § 51.7, should be prepared.

37/ The existing value-impact statement is adequate to support the Utilities' proposed rule because (a) the rule does not introduce significant competing risks; (b) the incremental value and impact for Alternative 2A have been adequately identified in the Staff's statement; and (c) the resulting value-impact balance does not preclude going forward with the proposal.

(14) After correcting the value-impact tables in volume 4 of NUREG-0460 for minor errors acknowledged by the Staff,[38] even these tables show that the impacts of going from certain of the Alternatives to the next higher Alternatives are greater than the values obtained (B&W/CE 2A to 3A; W 2A to 3A; W 3A to 4A; GE 3A to 4A). Is there any reason to take such an incremental step (that is, to move from one Alternative to the next higher Alternative) when the step's impact outweighs its value?

(15) A value-impact analysis must consider all relevant factors on both sides of the balance. Does the ATWS value-impact analysis adequately consider such things as the economic and health impacts of increased reliance on fossil fuel due to decreased nuclear availability? Does it adequately consider the economic and health effects of decreased electric system reliability due to the addition of more complex equipment? In short, for each of the Staff's ATWS Alternatives, has there been a comprehensive review of whether, for all the costs incurred, sufficient benefit is gained?

(16) While conservative assumptions (that is, the overstating of risks and harmful effects) may be appropriate for design purposes, isn't it true that they are inappropriate for value-impact analyses, where the overstatement of a particular risk may cause it to be emphasized at the expense of other risks that are more important? Isn't it true that unrealistic assumptions have been used in the Staff's ATWS value-impact analysis?

D. Unmuddying the Waters. The final set of questions focuses on issues that need clarification before an ATWS rule going beyond the Utilities' proposal could be adequately

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38/ See EPRI Comments, Attachment 2, at 4-5.

evaluated. Some are uncomplicated issues of fact that seem capable of equally uncomplicated resolution, yet they have not been resolved in the eleven years of discussion and volumes of analysis to date. Others are issues of law or policy that have yet to be addressed in any meaningful way. For instance:

> (17) There have been disagreements between the industry and the Staff over issues that appear to be relatively straightforward. For instance, the industry does not seem to understand the Staff's rationale for such things as the number of reactor-years of experience relevant to ATWS, the number of times per year the reactor protection system is tested (see EPRI Comments, Attachment 1, Appendix 1), and the number of anticipated transients of concern per year. These data shed significant light on the true risk from ATWS and will place it in proper perspective relative to other risks. Regardless of whose position is "correct," the existing ATWS record doesn't as yet include a clear and complete treatment of all important assumptions, methodologies, calculations and conclusions.
>
> (18) Volumes 1 to 3 of NUREG-0460 contain internal Staff comments on ATWS, some of which remain unresolved. For example, in volume 2 the Mechanical Engineering Branch was critical of the conclusions drawn in NUREG-0460 concerning the probability of common mode failure in the mechanical portions (i.e., control rods and rod drives) of the scram system (an area about which the MEB presumably has considerable expertise).39/ Has there been substantive

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39/ There are also other unresolved Staff conflicts evident on the record. Robert N. Bernaro, Director of the NRC's Probabilistic Analysis Staff, told an ACRS Reliability Subcommittee meeting on July 1, 1980, that risks on the order of 10^{-3} to 10^{-4} need only be "fixed" over a matter of years and that the NRC need only "consider", dealing

(footnote continued)

review of these disagreements by Staff members not directly involved with ATWS? Will the resolution of these disagreements be thoroughly explained in the public record?

(19) In the early stages of the ATWS resolution process the NRC Staff set a quantitative safety goal for ATWS, while in volumes 3 and 4 of NUREG-0460 the use of a quantitative goal was abandoned. But the Kemeny Commission Report, the Rogovin Report, and the TMI-2 Lessons Learned Task Force Final Report (NUREG-0585) recommend the development of a quantitative safety goal and the use of probabilistic analysis. What is the current Staff position on the use of a quantitative safety goal and probabilistic analysis? What is the appropriate impact of a safety goal and probabilistic analysis on ATWS resolution?

(20) The NRC's backfit regulation, 10 CFR § 50.109 (1980), says that "The Commission may, in accordance with the procedures specified in this chapter, require the backfitting of a facility if it finds that such action will provide substantial, additional protection which is required for the public health and

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with risks on the order of 10^{-4} to 10^{-5}. See Tr. at 108. This seems to be at odds with the ATWS Staff's philosophy, which would actually impose requirements for risks in the latter range on a rapid implementation schedule. See also April 10, 1980 ACRS Meeting, Tr. at 198:

> Mr. Kerr: Mr. Hanauer, I'd like to ask, is there any substantial difference in viewpoint among the staff concerning the proposed four [ATWS] solutions?
>
> Dr. Hanauer: I haven't canvassed the staff in a year. A year ago there was a spectrum of opinion in the staff.

safety . . . ." (Emphasis added.) Isn't it a fact that these § 50.109 findings have yet to be made in the ATWS context?

Petitioners do not believe these and related questions can be ignored if the Commission goes beyond the proposal in Part I of this Petition; the questions must then be answered. They are not adequately answered on the existing record.

E. Proposed Procedures. Extensive evidentiary procedures would be required for there to be any hope of developing the essential facts. The following procedures would be necessary, and Petitioners request that they be adopted, in the event the Commission does move beyond the proposal in Part I:

1. A hearing board to be appointed from the ASLB and ASLAB panels, composed of technically qualified experts who can bring a fresh approach to the evidence.

2. All relevant documents available to the NRC Staff, including internal memoranda and working papers, to be placed in a technical data bank and made available in one or more public document rooms.

3. A statement of issues to be prepared by the hearing board after statements of contentions are filed by parties and one or more prehearing conferences are held.

4. Written statements of position to be filed by all parties.

5. Written cross-statements to be filed by any party who wishes to respond to other parties.

6. A public hearing to be held, with all parties having an opportunity to present sworn witnesses and documentary evidence in support of their statements and cross-statements.

7. Questioning of witnesses to be conducted by the hearing board, with the parties allowed to submit suggested questions for the board to ask; cross-examination to be conducted by the parties if they specify the issues on which they wish to cross-examine and satisfy the board that cross-examination is needed to explore these issues adequately.

8. A proposed rule to be recommended by the hearing board to the Commission, along with a supporting discussion that explains the evidentiary basis for the rule.

9. Oral argument by the parties before the Commission.

A number of considerations recommend these procedures to the Commission. First, such procedures would be central to the development of essential ATWS facts. Without them, there would be inadequate opportunity for the interested public to understand, then analyze and finally comment on the proposed NRC requirements. For reasons already given, any such proposals would raise complex questions to which answers would not be immediately available and about which there could be sharp disagreement. Accordingly, the identification and narrowing of relevant issues, the testing of assumptions and conclusions, and time to think and respond would all be vital.

Second, the recommended procedures would help "see to it that the agency maintains a flexible and open-minded attitude towards its own [proposed] rules . . . ." National Tour Brokers Ass'n v. United States, 591 F.2d 896, 902 (D.C. Cir. 1978). In the absence of the recommended procedures, the Commission would, of necessity, have to rely heavily on the reaction of the Regulatory Staff to public comments on its ATWS proposal. The Staff, however, seems unusually tied to its own ATWS views and prone to dismiss questions about them. Thus, more than in most cases, it would be important for the Commission to hear from an independent hearing board as well as from the Staff -- a board that could scrutinize the views of the Staff along with those of others.

Finally, the proposed procedures would help ensure that the ATWS rule rests on a sufficient record to make the rule reasonably clear and complete from the outset, rather than in need of constant clarification and amplification as attempts are made to interpret it in practice. Predictable rules benefit everyone -- the regulated, the regulators and the public at large.

The NRC, of course, has often tailored rulemaking procedures to fit the needs of a particular proceeding. As the Commission stated in another context:

> The procedures must be designed to develop and illuminate the important matters of fact, policy and law that underlie the proposed rule. Also, provision for procedures to permit testing of information provided may be appropriate. Finally, the need for prompt and efficient decisionmaking must be considered.

Environmental Effects of the Uranium Fuel Cycle, RM-50-3, Notice of reopened hearing on interim rule, 42 Fed. Reg. 26987, 26988 (May 26, 1977). Procedures of the sort requested by the Utilities have been successfully used in a number of NRC rulemakings.[40/] Again, such procedures must be used -- and used successfully -- if the Commission proposes ATWS requirements beyond those in Part I above, lest the resulting rule reduce rather than enhance public safety.

Turning from procedure to substance for a moment, rules may of course be set aside if they are arbitrary and capricious. 5 U.S.C. § 706(2)(A) (1976). And while the courts will defer to agency expertise, § 706(2)(A) requires that the judges make a "substantial inquiry" into the administrative record. Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 415 (1971). It must be a "thorough, probing, in-depth review." Id.; see also Lead Industries Assoc. v. EPA,

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40/ See RM-50-1 (ECCS), RM-50-2 (Appendix I), RM-50-3 (S-3 and reopened S-3), RM-50-4 (Transportation), RM-50-5 (GESMO), RM-50-7 (Access), and PRM-50, -51 (Waste Confidence).

___ F.2d ___, No. 78-2220, slip op. at 26 (D.C. Cir. 1980); Ethyl Corp. v. EPA, 541 F.2d 1, 35 (D.C. Cir. 1976), cert. denied, 426 U.S. 941 (1976). The judicial review is to determine whether the arbitrary and capricious standard has been met. It follows that the agency decision must be based on a consideration of all relevant factors. Overton Park, supra, 401 U.S. at 416. It must be based on an adequate record.[41/] And above all, the decision must be rational. Ethyl, supra, 541 F.2d at 36.

Taking these criteria into account, the Utilities do not believe that the existing ATWS record could support a rule more severe than the proposal in Part I above. Nor do the Utilities believe that the present record could be materially improved during a typical notice-and-comment rulemaking. Rather, procedures of the sort described on pages 35-36 above would be crucial to develop the essential facts. In short, whether or not the recommended procedures were used would bear decisively on whether or not the resulting record and rule were substantively adequate, under the peculiar circumstances at

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41/ "It is not consonant with the purpose of a rule-making proceeding to promulgate rules on the basis of inadequate data . . . ." Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 393 (D.C. Cir. 1973), cert. denied, 417 U.S. 921 (1974); accord, e.g., Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 549 (1978).

hand. And while the Commission has great discretion to determine the adequacy of the procedures to be used in any particular rulemaking, and thus great leeway to pick procedures of its choice, it lacks similar discretion to determine the substantive adequacy of the resulting record and rule. They must meet the tests just stated, or be reversed and remanded on judicial review.

III. INTERESTS OF PETITIONERS

As previously indicated,[42/] Petitioners are a group of electric utility companies that own nuclear power plants. Among them, they have B&W, CE, GE, and Westinghouse reactors, all of which will be affected by the resolution of the ATWS issue.

The NRC Staff's estimate of the "impact" of various alternate solutions to ATWS ranges from $1.2 million per plant to $10.8 million per plant. These impacts may well be understated. In any event, the cost will be substantial, and it is Petitioners and their customers who will pay it. Moreover, it is Petitioners' plants that will become either more safe or less safe once ATWS modifications are made.

42/ See note 1 above.

Many of the Utilities individually have participated in past discussions of ATWS with the NRC Staff and the ACRS and have submitted comments on Staff technical documents dealing with ATWS. With the vendors, it is the Utilities that have the most data on and the most experience with the ATWS issue. Moreover, Petitioners have now formed a group to address the ATWS issue, have retained technical consultants and legal counsel, and are prepared to play a substantial role in any ATWS rulemaking,[43/] including the presentation of expert witnesses, if necessary.

43/ Petitioners are emphatically not interested in ATWS rulemaking for the sake of delay. The Utilities want to move forward with as rapid a resolution of the ATWS issue as is compatible with the public health and safety. We strongly believe that the plan outlined in Part I is a constructive and rational means to that end. It is significant that a number of Utilities are already working to implement some of the ATWS modifications proposed in Part I.A above. For example, as a result of Browns Ferry 3, several of the BWR owners have met to analyze that failure in relation to the existing scram discharge volume systems at their facilities. They have developed detailed functional criteria for use in evaluating all BWR scram discharge volume systems. They have sponsored these functional criteria in a presentation before all BWR owners, obtained their endorsement and subsequently arranged to present these criteria to the NRC Staff. As indicated, it is intended that these criteria be used by all BWR owners to implement certain aspects of the Utilities' proposed rule. This effort is indicative of Petitioners' strong desire to engage and resolve the ATWS issue as rapidly as is feasible.

IV. CONCLUSION

The Utilities have proposed in Part I of this Petition a straightforward rule that, if promulgated, will ensure that the ATWS risk from existing plants is reduced to a clearly acceptable level. Petitioners urge the Commission to adopt this rule after a notice-and-comment rulemaking. For new plants, the Utilities urge that the Commission promulgate a rule only after the incremental ATWS risk posed by these new plants has been put in perspective by NRC efforts in the degraded core, safety goal and probabilistic analysis contexts.

If, however, the Commission elects to propose ATWS modifications beyond those in Part I above, then all concerned will find themselves in a morass of unanswered questions demanding immediate answers. Chief among these questions will be whether the proposed modifications, if implemented, would leave the public more safe or less safe. Nothing short of an ATWS rulemaking involving the adjudicatory procedures described above could provide the answers. Petitioners urge that such a rulemaking be held if ATWS modifications beyond those in Part I are, in fact, to be considered now.

Respectfully submitted,

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DATED: September 16, 1980

CERTIFICATE OF SERVICE

On September 16, 1980, the "Electric Utilities' Petition for Rulemaking on ATWS" was served upon each of these people:

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Attention: Chief, Docketing and Service Section

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PETITIONER'S
SUPPLEMENT # 1 TO
DOCKET NUMBER
PETITION RULE PRM 50-29
45 FR 73080 January 5, 1981

United States of America
Nuclear Regulatory Commission

Before the Commission

In the Matter of	)	
	)	
ANTICIPATED TRANSIENTS	)	
WITHOUT SCRAM	)	Docket No. PRM-50-29
(Unresolved Safety Issue	)	
TAP A-9)	)	

CRITERIA FOR EVALUATION
OF SCRAM DISCHARGE
VOLUME SYSTEMS
FOR BOILING WATER REACTORS

On September 16, 1980, a group of twenty electric utilities ("Utilities")[1/] filed a petition for rulemaking in accordance with 10 CFR § 2.802 on the subject of anticipated transients without scram. See 45 Fed. Reg. 73080 (Nov. 4, 1980).

In the Petition, the Utilities proposed, among other things, that the Commission adopt a rule to reduce the risk from anticipated transients without scram. Part of the

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1/ The Group now has twenty-one members: Arkansas Power & Light Co., Baltimore Gas & Electric Co., Boston Edison Co., Commonwealth Edison Co., Connecticut Yankee Atomic Power Co., Consumers Power Co., The Detroit Edison Co., Duke Power Co., Florida Power Corp., Florida Power & Light Co., Gulf States Utilities Co., Long Island Lighting Co., Maine Yankee Atomic Power Co., Nebraska Public Power District, Northeast Nuclear Energy Co., Omaha Public Power District, Pacific Gas and Electric Co., Public Service Electric & Gas Co., The Toledo Edison Co., Vermont Yankee Nuclear Power Corp., and Washington Public Power Supply System.

Acknowledged by card 1/8/81

Utilities' proposed rule set requirements for the scram volume discharge system for boiling water reactors (BWR's):

> For boiling water reactors manufactured by the General Electric Company, provide . . . (3) a scram discharge volume system designed and installed such that it will have sufficient capacity to receive water exhausted by a full reactor scram.

Petition at 6-7. The proposed rule did not give any further guidance on how the above requirement could be met. But elsewhere in the Petition it was noted that a number of BWR owners, in the wake of the incident at Browns Ferry 3, were developing "detailed functional criteria for use in evaluating all BWR scram discharge volume systems." Petition at 41 n.43. The Petition indicated that these criteria would be used to implement the Utilities' proposed rule.

Since the submission of the Utilities' Petition, these criteria have been fully developed. And although they have been submitted to the NRC Staff through other channels, the Utilities believe that the rule proposed in the Petition should include the criteria as the following appendix to 10 CFR Part 50:

> Appendix _____: Criteria for Evaluation of Scram Discharge Volume Systems for Boiling Water Reactors
>
> The standards for reduction of risk from anticipated transients without scram, § 50.47, require, among other things, that the scram discharge volume system in boiling water reactors manufactured by the General Electric

Company be "designed and installed such that it will have sufficient capacity to receive water exhausted by a full reactor scram." 10 CFR § 50.47(a)(3). In order to meet this requirement the scram discharge volume system must meet the following criteria:

1. Functional Criterion

   The scram discharge volume shall have sufficient capacity to receive and contain water exhausted by a full reactor scram without adversely affecting control rod drive scram performance.

2. Safety Criteria

   (a) No single active failure of a component or service function shall prevent a reactor scram under the most degraded conditions that are operationally acceptable.

   (b) No single active failure shall permit uncontrolled loss of reactor coolant.

   (c) The scram discharge system instrumentation shall be designed to provide redundancy and to operate reliably under all conditions, and it shall not be adversely affected by hydrodynamic forces or flow characteristics.

   (d) System operating conditions that are required for scram shall be continuously monitored.

   (e) Repair, replacement, adjustment or surveillance of any system component shall not require the scram function to be bypassed.

3. Operational Criteria

   (a) Level instrumentation shall be designed to be maintained, tested or calibrated during plant operation without causing a scram.

   (b) The system shall include sufficient supervisory instrumentation and alarms to permit surveillance of system operation.

(c) The system shall be designed to minimize the exposure of operating personnel to radiation.

(d) Vent paths shall be provided to assure adequate drainage in preparation for scram reset.

(e) Vent and drain functions shall not be adversely affected by other system interfaces. The objective of this requirement is to preclude water backup in the scram instrument volume that could cause a spurious scram.

4. Design Criteria

(a) The scram discharge headers shall be sized in accordance with GE OER-52 and shall be hydraulically coupled to the instrumented volume(s) in a manner to permit operability of the scram level instrumentation prior to loss of system function. Each system shall be analyzed based on a plant-specific maximum inleakage to ensure that the system function is not lost prior to initiation of automatic scram. Maximum inleakage is the maximum flow rate through the scram discharge line without control rod motion summed over all control rods. The analysis shall show no need for vents or drains.

(b) Level instrumentation shall be provided for automatic scram initiation while sufficient volume exists in the scram discharge volume.

(c) Instrumentation taps shall be provided on the vertical instrument volume and not on the connected piping.

(d) The scram instrumentation shall be capable of detecting water accumulation in the instrumented volume(s) assuming a single active failure in the instrumentation system or the plugging of an instrument line.

(e) Structural and component design shall consider loads and conditions including those due to fluid dynamics, thermal expansion, internal pressure, seismic considerations and adverse environments.

(f) The power-operated vent and drain valves shall close under loss of air and/or electric power. Valve position indication shall be provided in the control room.

(g) Any reductions in the system piping flow path shall be analyzed to assure system reliability and operability under all modes of operation.

(h) System piping geometry (i.e., pitch, line size, orientation) shall be such that the system drains continuously during normal plant operation.

(i) Instrumentation shall be provided to aid the operator in the detection of water accumulation in the instrumented volume(s) prior to scram initiation.

(j) Vent and drain line valves shall be provided to contain the scram discharge water, with a single active failure and to minimize operational exposure.

5. Surveillance Criteria

(a) Vent and drain valves shall be periodically tested.

(b) Verifying and level detection instrumentation shall be periodically tested in place.

(c) The operability of the entire system as an integrated whole shall be demonstrated periodically and during each operating cycle by demonstrating scram instrument response and valve function at pressure and temperature at approximately 50% control rod density.

As used in this appendix, the term "scram discharge volume system" is meant to include all components downstream of the scram exhaust valves.

The Utilities are prepared to provide information in support of these scram discharge volume system criteria as necessary.

Respectfully submitted,

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Dated: January 5, 1981

CERTIFICATE OF SERVICE

On January 5, 1981, the "Criteria for Evaluation of Scram Discharge Volume Systems for Boiling Water Reactors" was served upon each of these people:

Secretary of the Commission
U.S. Nuclear Regulatory Commission
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Attention: Docketing and Service Branch

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