



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

July 8, 1982

8/10/82

William J. Dircks
Executive Director for Operations

Attn: T. Rehm

Subj: 264TH ACRS MEETING ACTIONS, RECOMMENDATIONS, AND REQUESTS

Based on discussions regarding methods for improved implementation and follow-up of ACRS recommendations, the Committee agreed that a summary of Actions, Agreements, Assignments, and Requests made during each full Committee meeting will be sent to the NRC Staff following each meeting.

Attached in response to this agreement is a list of the requests made at the 264th ACRS Meeting, April 1-2, 1982. This list has the concurrence of the ACRS Chairman and designated ACRS members as will all future items provided for follow up purposes.

Those items in the list "Actions, Agreements, Assignments, and Requests" dated May 12, 1982, that do not deal with requests made of the NRC Staff or that are not pertinent to NRC Staff activities have not been included in this follow-up list.

R. F. Fraley
R. F. Fraley
Executive Director

cc: C. Michelson, AEOD
H. Denton, NRR
R. B. Minogue, RES
R. DeYoung, I&E
J. G. Davis, NMSS
E. Case, NRR
ACRS Members

attachments:
As stated

ACTIONS, RECOMMENDATIONS, AND REQUESTS
264TH ACRS MEETING, APRIL 1-2, 1982

Report on the NRC Long-Range Research Plan, FY 1984-FY 1988

- Res
1. The Committee prepared a report to the Commissioners of its review of the draft of the Long-Range Research Plan, FY 1984-1988 (NUREG-0784) dated March 15, 1982. The Committee expressed the belief that the current Plan format represented a significant improvement as compared to the initial effort last year, however, the Plan is not a true long-range plan but only a projection of current programs and programs planned to answer current questions. The Plan has little effort devoted to anticipation of future questions beyond the CRBR, for example.

Report on Reliability of the Shutdown Heat Removal System on the System 80 Design

- NRR
2. The Committee prepared a report to the Commissioners regarding the reliability of the decay heat removal system on the Combustion Engineering, Inc. Standard Reference System 80 type plants (e.g. Palo Verde). ACRS comments addressed the lack of a capability for rapid, direct depressurization of the primary system to allow feed and bleed operations, and the heavy reliance placed upon the secondary system for heat removal capability. Recommendations/comments in the body of the report noted:
 - . Difficulty in demonstrating very high reliability of the feedwater systems and the integrity of the steam generators.
 - . Combustion Engineering and the NRC Staff should consider further the addition of valves of a size to facilitate rapid depressurization of the System 80 primary coolant system.
 - . A plan for addressing the issue of a capability for rapid direct depressurization of the primary system of the System 80 design should be formulated in the near future.

The Committee indicated the belief that resolution of this issue should not now be a condition for operation of System 80 plants at full power, or of other CE plants (e.g. Waterford and San Onofre 2-3) having similar features. The need for future hardware or procedural changes should be contingent upon results of this evaluation.

Report on Instrumentation for Monitoring Water Level or Inventory

- NRR
3. The Committee prepared a report to the Commissioners regarding integrated systems proposed and/or in use in PWRs to indicate the approach to or the existence of inadequate core cooling (ICC). Recommendations/comments in the body of the report addressed:

ACTIONS, RECOMMENDATIONS, AND REQUESTS
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- . NRC Staff development of an approach to integrate the installation and use of ICC systems with that of other new systems which are being installed in response to other post-TMI-2 requirements.
- . NRC Staff belief that use of the ICC monitoring system should be introduced into operating and emergency procedures very carefully and only after appropriate operator training, including simulator experience, where feasible.
- . Recognition that use and testing of these systems must take account of the probability that they are likely to be most useful in emergency situations. Operator understanding of both the capabilities and the limitations of the systems are important in order that they can be used with confidence when needed.
- . NRC Staff conclusion that the proposed Westinghouse system and proposed Combustion Engineering system are acceptable on a generic basis.
- . ACRS agreement with the following tentative conclusions of the NRC Staff:
 - 1) Core exit thermocouples and saturation margin monitors are not sufficient for an adequate ICC monitoring system for PWRs.
 - 2) Both the Westinghouse and Combustion Engineering vessel inventory monitoring systems correctly identified deficiencies in present ICC monitoring instrumentation.
 - 3) A multi-step review process remains to be completed to assure careful phasing-in and full integration of inventory monitors.

M. Bender appended additional comments suggesting that the feature of the inadequate core cooling monitoring system for PWRs, intended to show reactor vessel coolant level, has not been shown to have great operational value. His belief is that emphasis should be placed on being sure that operator actions regarding rapid primary system depressurization and reliable shutdown cooling are unambiguously permissible regardless of liquid level indicating devices. H. W. Lewis appended additional comments regarding recognition of the limitations of these instruments when dynamic effects are present and clarification of the NRC Staff position as to whether it is better to know partial inventory (Westinghouse) or void appearance (Combustion Engineering).

SER Supplements

- NRR*
4. W. Kerr expressed concern that significant substantive issues have surfaced in supplements to SERs after ACRS review of licensee applications for the operating license and issuance of an ACRS report. He suggested that the

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ACRS Staff examine several supplements for recent operating license reviews to check whether important issues are being raised after the ACRS review is complete.

SECY-82-111, Requirements for Emergency Response Capability

5. *DEDFGR* The Committee has agreed to comment on SECY-82-111, Requirements for Emergency Response Capability, taking account of reviews made by the NRC Office of Policy Evaluation as contained in a March 26, 1982 memorandum from F. J. Remick to the Commission entitled, Emergency Response Capabilities and Facilities and Regulatory Position on Human Factors Safety; OPE Evaluation of SECY-82-111, and the Human Factors Society in a letter of March 29, 1982 addressed to V. Stello, Jr. (Note: A subcommittee meeting in mid-June has been scheduled to discuss this matter and the NRC Chairman has been informed of the anticipated ACRS activity regarding this matter.)

Feed and Bleed Issue for CE Applicants

6. *Res* W. Kerr expressed interest in the final report and conclusions of F. H. Rowsome, Deputy Director of the Division of Risk Analysis, RES, concerning the probabilistic risk aspects of the use of pressurizer PORVs to assure the capability of "feed and bleed" core cooling. The original study was contained in a memorandum entitled, Feed and Bleed Issue for CE Applicants, dated January 29, 1982, to R. L. Tedesco, Assistant Director for Licensing, Division of Licensing, NRR, in response to ACRS reports on the CESSAR-80 Plant Design and the operating license review for the Palo Verde Nuclear Units 1, 2, and 3.

(Note: Copies will be provided to ACRS Members.)



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

April 5, 1982

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

SUBJECT: COMMENTS ON NRC LONG-RANGE RESEARCH PLAN, FY 1984 - FY 1988 (DRAFT
NUREG-0784)

Dear Dr. Palladino:

As requested by the Commission, the ACRS has reviewed the draft of the Long-Range Research Plan, FY 1984-1988 (NUREG-0784) dated March 15, 1982. This draft was discussed with the Safety Research Program Subcommittee on March 31, 1982 and with the full ACRS during its 264th meeting on April 1, 1982.

Our review has been limited in scope, for the following reasons:

- (a) The draft Plan was not received by the Committee in time for detailed review by the several cognizant subcommittees.
- (b) The user-office comments from NRR, dated March 25, 1982, have not yet been responded to by RES or incorporated into the Plan. The same is true for the NRR comments on the Nuclear Plant Severe Accident Research Plan (Draft NUREG-0900), dated February 4, 1982.
- (c) We have not yet seen comments from other user offices.

For these reasons, we are not able at this time to provide detailed comments on the nature and scope of the numerous program elements and subelements.

We will continue to review the proposed Long-Range Research Plan, and the final Plan when it becomes available, as the basis for our review of the NRC research program and budget for FY 1984 and FY 1985. These reviews by the several cognizant subcommittees, and eventually by the full ACRS, will provide the basis for our report to the Commission in connection with its action on the RES budget request for FY 1984 and FY 1985 in July of this year. That report will include comments on the programs proposed for the out-years FY 1986 through FY 1988, as appropriate.

At this time, we offer the following general comments on the Long-Range Research Plan. The current Plan format represents a significant improvement as compared to the initial effort last year. In this respect, it is

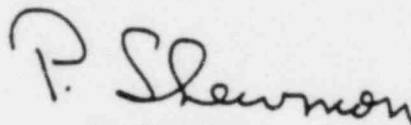
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responsive to several of the suggestions in the ACRS letter dated April 14, 1981. For example, although the format is still by Decision Units, numerous cross-cuts by problem areas are included. The Plan also reflects a considerable effort to identify research being done by others and its relation to the NRC's needs. Although progress has been made in better defining the objectives of the various research programs in terms of questions to be answered, much still remains to be done in identifying and assigning priorities to those problems that represent the greatest potential contributors to risk.

We repeat our previous comment that the Plan is not a true long-range plan but only a projection of current programs and programs planned to answer current questions. There has been little or no effort to anticipate future questions. For example, the Plan does not address research on LMFBRs or other advanced-reactor types beyond the CRBR. Although the scope of the Plan may be consistent with the Commission's desires and directives, it seems inappropriate to call it a Long-Range Research Plan.

We hope to continue discussions with the RES Staff, and perhaps also with the Commission, regarding the purpose, philosophy, scope, and effectiveness of a Long-Range Research Plan, and its usefulness to the Commission, to RES and the user offices, and to the ACRS. In addition, we would be happy to discuss further with you how the timing and content of our review and reports on the research program might be conducted in the future if the Long-Range Research Plan were to be made available to the ACRS in final or near final form in December of forthcoming years.

Sincerely,

A handwritten signature in cursive script that reads "P. Shewmon". The signature is written in dark ink and is positioned above the typed name and title.

P. Shewmon
Chairman



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April 5, 1982

Mr. William J. Dircks
Executive Director for Operations
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Dircks:

Subject: RELIABILITY OF THE SHUTDOWN HEAT REMOVAL SYSTEM ON THE
SYSTEM 80 DESIGN

The ACRS in its December 15, 1981 report to Chairman Palladino on the Combustion Engineering, Inc. Standard Reference System 80 commented on the reliability of the decay heat removal system. These comments addressed the lack of a capability for rapid, direct depressurization of the primary system to allow feed and bleed operations and the reliance placed upon the secondary system for heat removal capability. The ACRS Subcommittee on Decay Heat Removal Systems met with representatives of Combustion Engineering, Inc. and the NRC Staff on March 16, 1982 to discuss these issues. The ACRS discussed these issues further during its 264th meeting, April 1-2, 1982.

Representatives of Combustion Engineering have defended their design, stating that:

1. The System 80 NSSS will be coupled with highly reliable emergency feedwater systems (EFWS) by addition of an interface requirement that the EFWS have an unavailability in the range of 10^{-4} to 10^{-5} per demand.
2. The System 80 NSSS is capable of achieving cold shutdown conditions using only safety grade systems even without offsite power and with an added single failure.
3. The System 80 steam generator design includes many features that will assure adequate tube integrity, minimizing concerns associated with operating reactors.
4. Even if all auxiliary feedwater supply were somehow lost, the secondary side of the steam generators could be depressurized to allow use of low head pumps which might be aligned to provide water to the steam generators from a number of sources.
5. Probabilistic analyses have not shown that installing PORVs will result in a significant improvement in safety. The added costs are not justified.

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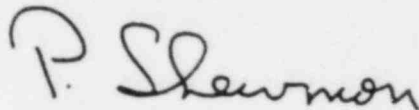
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Combustion Engineering has proposed that the issues associated with the Committee's comments on the System 80 design be resolved in a continuing dialogue among the ACRS, the NRC Staff, and Combustion Engineering. It is the NRC Staff's intention to address these issues on an expeditious schedule with all applicants requesting licenses for Combustion Engineering NSSS designs which do not have capability for rapid depressurization independent of the steam generator. We concur with this approach and wish to be kept informed.

The Combustion Engineering response to the Committee's comments on the System 80 design emphasizes the expected very high reliability of the feedwater systems and the integrity of the steam generators. We believe that these are necessary goals but note that past operating experience indicates that these goals are difficult to achieve. We believe that for this reason Combustion Engineering and the NRC Staff should consider further the addition of valves of a size to facilitate rapid depressurization of the System 80 primary coolant system as stated in the Committee's December 15, 1981 letter on the System 80 design. We believe that a plan for addressing this issue should be formulated in the near future. We wish to be kept informed and to discuss this further with Combustion Engineering and the NRC Staff.

We believe that, while this evaluation should be conducted expeditiously, its resolution should not now be a condition for operation of System 80 plants at full power, or of plants having similar features. The need for future hardware or procedural changes should be contingent upon results of this evaluation.

Sincerely,



P. Shewmon
Chairman



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WASHINGTON, D. C. 20555

April 6, 1982

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

SUBJECT: INSTRUMENTATION FOR MONITORING WATER LEVEL OR INVENTORY

Dear Dr. Palladino:

During its 264th meeting, April 1 and 2, 1982, the Advisory Committee on Reactor Safeguards met with representatives of Babcock and Wilcox Company, Combustion Engineering, Inc., and Westinghouse Electric Corporation to discuss several proposed systems designed to indicate the approach to or the existence of inadequate core cooling (ICC). The Committee also had the benefit of comments from the NRC Staff. A Subcommittee meeting was held on March 31, 1982 to discuss the design features of these systems and their use in the management of reactor transients.

We are pleased to observe that the NRC Staff has developed an approach which will integrate the installation and use of ICC systems with that of other new systems which are being installed in response to other post-TMI-2 requirements. We were told that the scheduling of installation and use of ICC monitoring systems is expected to be done on a plant-by-plant basis, and will take into account the commercial availability of these systems as well as the schedule for installation of other backfit items.

The NRC Staff has indicated that they believe that use of the ICC monitoring system should be introduced into operating and emergency procedures very carefully and only after appropriate operator training, including experience on simulators, if feasible. We support this approach. Both the use and the testing of these systems must take into account the probability they are likely to be most useful in emergency situations. It is important that operators understand both the capabilities and the limitations of the systems in order to use them with confidence when they are needed.

The NRC Staff has concluded that the proposed Westinghouse system and the proposed Combustion Engineering system are acceptable on a generic basis, subject to further exploration of a small number of unresolved issues. The approach being taken by the Staff seems reasonable.

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April 6, 1982

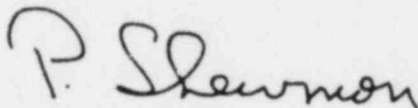
We agree with the following tentative conclusions of the NRC Staff:

1. Core exit thermocouples and saturation margin monitors are not sufficient for an adequate ICC monitoring system for PWRs.
2. Both the Westinghouse and Combustion Engineering vessel inventory monitoring systems correct identified deficiencies in present ICC monitoring instrumentation.
3. A multi-step review process remains to be completed to assure careful phasing-in and full integration of inventory monitors.

We believe that the current approach of the NRC Staff to dealing with the ICC problem has sufficient merit that it should continue in the proposed direction. We plan to continue our review of this area as further developments occur.

Additional comments by Members M. Bender and H. Lewis are presented below.

Sincerely,



P. Shewmon
Chairman

Additional Comments by ACRS Member M. Bender Concerning Reactor Vessel Level Indication System

Although a great deal of valuable study has clarified the use and application of the inadequate core cooling monitoring system for PWRs, the feature intended to show reactor vessel coolant level has not been shown to have great operational value. The proposed systems are not unambiguous in their response under all circumstances.

The Westinghouse RVLIS uses differential pressure to determine liquid level and measures differential pressures of 1 to 10 PSI against a background system pressure of 1500 to 2000 PSI. It must correct for density and dynamic head. The emergency operating procedures would need very thorough development to make RVLIS diagnostically useful. It would have been of doubtful value in the Ginna event or the TMI-2 accident.

The Combustion Engineering heated junction thermocouple system would be more effective under TMI-2 conditions and is less subject to ambiguity due to system operating conditions, but it, too, has some limitations.

The basic requirement is to provide guidance for operator action. The urgent need indicated by both Ginna and TMI-2 circumstances is rapid primary system depressurization and reliable shutdown cooling. I believe emphasis should be placed on being sure that such operator actions are unambiguously permissible regardless of liquid level indicating devices.

Additional Comments by ACRS Member H. Lewis Concerning "Water Level Indicators"

I see no reason to repeat all the comments I have previously made on this subject. In the interim, the Staff has commendably adopted a far more systematic and considered approach to this question, and that has mitigated but not extinguished my concerns. The remaining ones are:

1. To change the name from "water level indicators," which they are not to "inventory monitors," which they are also not, does little good. In the absence of dynamic effects, the Combustion Engineering system measures the mean void fraction in the upper plenum, no more and perhaps a bit less when dynamic effects are important. The Westinghouse system measures differential pressure, and, in the absence of dynamic effects, this is more closely but not precisely related to pressure vessel inventory. That they each give some information is indisputable.
2. Since the information they do provide depends upon many things such as pump status, flow problems and dynamic effects, etc., it is not clear to me that an operator dealing with an unfamiliar upset can know whether his upset is of such a nature that he can believe the instrument. I do wish the Staff would decide whether it is better to know partial inventory (Westinghouse) or void appearance (Combustion Engineering). This is scenario-dependent and I have not seen the issue clarified.