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

April 12, 1976

Mr. George F. Murphy, Jr.
Executive Director
Joint Committee on Atomic Energy
Congress of the United States
Washington, DC 20510

Dear Mr. Murphy:

The information attached is provided in response to your request of March 15, 1976, regarding the testimony of the ACRS during the JCAE hearings on the safety of the commercial nuclear power program.

Sincerely,

Dade W. Moeller

Dade W. Moeller
Chairman

Attachment:
Response to Questions Regarding
ACRS Testimony Before the Joint
Committee on Atomic Energy

RESPONSE TO QUESTIONS REGARDING ACRS TESTIMONY
BEFORE THE JOINT COMMITTEE ON ATOMIC ENERGY

1. Q. Is there any limit on the number or type of unresolved safety issues that should be permitted to remain unresolved at any one time before nuclear power plant operation should be curtailed?

A. The important word in the preceding question is type rather than number. Most unresolved safety issues may be classified into the following categories of increasing significance beginning with those of low consequence;

(1) Conditions with potential for degrading system safety but for which it is judged that further theoretical and/or experimental evaluation will demonstrate no safety significance;

(2) Conditions of minor safety significance resulting from marginal engineering practice;

(3) Conditions having known safety significance but which have a low probability of occurrence and marginally acceptable consequences (approaching but less than 10 CFR 100 limits);

(4) Conditions that could lead to low probability accidents of serious consequences whose correction would require extensive evaluation or possibly substantial plant modifications, but where the delay in implementing correction can be justified on grounds of improbability for a limited period of delay;

(5) Conditions leading to events having a high probability of occurrence and possibly serious consequences whose correction should occur prior to plant operation but where consequences can be acceptably mitigated by a decrease in power or other operational restrictions until corrective modifications are completed or where the occurrence likelihood is reduced by other means.

Instances of conditions falling into the first three categories can be numerous without creating significant jeopardy to public safety.

Only a few items in Category 4 would be tolerable at any one time because the cumulative effect would be unacceptable.

A limited number of items in Category 5 might be tolerable for varying periods of time depending upon the degree to which (a) operational restrictions can effect a reduction in the event probability to a tolerable level or (b) surveillance can provide an acceptable means of mitigating risk.

A fully quantitative basis for making judgments regarding the type and number of unresolved safety issues which are acceptable is difficult to develop but should be pursued. In the current approach, major dependence is placed upon reaching a conclusion through engineering judgment that the overall risk from the plant would not be significantly increased by the existence of the unresolved safety issues in question.

2. Q. On Page 1 of the testimony, it was indicated that the safety issues raised by the four engineers are, "for the most part", not new to the ACRS. Why was this statement so qualified? Which of the issues raised, if any, are new to the ACRS?

A. This statement was qualified because certain of the issues raised had not previously been brought to the attention of or considered by the ACRS. The issues in this category are listed below:

(1) Reactor pedestal acceleration;

(2) Thermal shock of the concrete reactor pedestal;

(3) Potential for criticality of new fuel in storage during fire fighting;

(4) Need for updating of training simulators;

(5) Standardization of control rooms;

(6) Recent experiments on core spray distribution.

The first four of these items had been considered by the NRC Staff, had been found not to be a problem, and, therefore, had neither been called to the attention of the ACRS nor included in the NRC Staff's Safety Evaluation Reports. There have undoubtedly been other similar questions relating to details of analysis or design that have not been brought to our attention. The ACRS believes that the NRC Staff has attempted to alert the Committee to all significant unresolved questions.

The fifth item was new to the ACRS only in the special context in which it was raised. Matters relating to the arrangement of control rooms have been considered by the ACRS in numerous license reviews, but the question of complete standardization as a means of reducing or eliminating human error had not been considered specifically.

The sixth item which refers to a European core spray test was new to the ACRS as were recent tests by GE on core spray distribution. A check of the ACRS records revealed that the September 24, 1974 minutes of a prior discussion between the Regulatory Staff and GE had not been received. Review of this matter by the NRC Staff indicates that the new core spray effects do not introduce significant safety concerns although some additional study is in progress by GE for the very early reactors.

3. Q. Is the ACRS aware of any instances where NRC Staff, in its presentations or written reports to the Committee, has toned down the significance of unresolved safety issues, or any other matter relating to safety?

   A. To the knowledge of the ACRS, the NRC Staff has generally presented safety matters to the ACRS in an identifiable and timely manner. A few exceptions can be recalled where the ACRS believes specific matters could have been identified more clearly at an earlier time in the review of individual projects. At times, the ACRS has advised the NRC Staff that certain information of a generic nature would better have been called to the attention of the ACRS earlier. The ACRS recognizes that the desire on the part of some members of the NRC Staff to be able to present the near-resolution of a new safety question at the time it is identified as of potential safety concern may influence the NRC Staff decisions concerning the timing of safety issue reports.

4. Q. Why is it necessary for the ACRS to conduct any of its meetings in closed sessions? Wouldn't the public have greater faith in your decisions if they were reached completely in the open?

   A. During closed executive sessions, preliminary observations and opinions are exchanged among the members. Alternate conclusions and recommendations are also discussed. These preliminary views and alternate conclusions in open session could be misunderstood, misinterpreted and even misused by persons or groups outside the ACRS. Members of the ACRS frequently test their own tentative views and philosophies as well as those of their fellow members using "devil's advocate" techniques for reaching a decision. The give and take involved in such exchanges would be inhibited

if conducted in open session, and the quality of the decision making process would be impaired.

During its regular meetings, the ACRS must, from time to time, have closed portions to discuss national security information, industrial security, trade secrets and proprietary information in evaluating proposed projects. The ACRS also has a need for reactor safety information possessed by foreign governments. Such information is often supplied only after assurances that the information will be treated confidentially. Information is also discussed in closed session regarding proposed new consultants, and new members which would represent an undue invasion of privacy if discussed in open session.

The results of ACRS deliberations in executive session are embodied in written reports that are made public. In order to keep the public informed of substantive differences of opinion on safety issues, members not in agreement with the majority are free to include their conclusions as added comments to the ACRS report.

5. Q. What do you view as the functions and responsibilities of the ACRS vis-a-vis the NRC Staff, the Safety Licensing Board, and the Appeals Panel:

A. The ACRS believes its role is defined in Section 29 and Section 182b of the Atomic Energy Act of 1954, as amended in 1957, quoted below:

From Section 29

"...The Committee shall review safety studies and facility license applications referred to it and shall make reports thereon, shall advise the Commission with regard to the hazards of proposed or existing reactor facilities and the adequacy of proposed reactor safety standards, and shall perform such other duties as the Commission may request".

Section 182b

"b. The Advisory Committee on Reactor Safeguards shall review each application under Section 103 or Section 104 b. for a construction permit or an operating license for a facility, any application under Section 104 c. for a construction permit or an operating license for a testing facility, any application under Section 104 a. or c. specifically referred to it by the Commission, and any application for an amendment to a construction permit or an amendment to an operating license under Section 103 or 104 a., b., or c. specifically referred to it by the Commission, and shall submit a report thereon".

This requires the ACRS to assess the technological safety basis used in licensing nuclear power reactors and the related fuel cycle. To this purpose the ACRS is obligated to assess safety engineering premises used in design, construction and operation; supporting scientific and technological data; safety philosophy; the potential for safety enhancement through plant modifications; research and development; and operational performance verification.

The NRC Staff has an obligation to develop and implement the safety evaluation basis for licensing nuclear installations using similar information. The ultimate licensing basis is usually developed from an interactive relationship between the NRC Staff and the ACRS, the latter often acting as a sounding board to test the Staff position and as a monitor on the adequacy of NRC safety evaluation bases.

The ACRS report is provided to both the Atomic Safety and Licensing Board and the Atomic Safety and Licensing Appeal Panel as part of the record considered in the licensing of a nuclear plant.

The reviews conducted by the ACRS are independent technical evaluations. The ACRS concentrates on the safety aspects of proposed nuclear installations and brings to bear its opinion and experience as an independent group of specialists knowledgeable in nuclear safety matters. Although the ACRS takes into account NRC regulations and guides, the ACRS is free to, and frequently does, recommend additional safety features, tests, or other requirements considered necessary to adequately protect the public health and safety.

In addition to the review of proposed nuclear facilities, the ACRS provides advice and recommendations related to generic safety matters and to proposed criteria and standards. The ACRS also reviews the reactor safety research program sponsored by the NRC, ERDA, and the nuclear industry.

6. Q. Please comment on the safety margins in the assumptions with regard to design basis accidents. Can a double-ended pipe rupture actually occur in an instantaneous manner? If it were not instantaneous, how would this affect the resulting consequences?

A. The ACRS believes that the double-ended break of a large pipe is very improbable, and that its abrupt, sudden complete rupture (in several milliseconds) is still less probable. The full spectrum of break sizes up to and including the sudden, double-ended pipe break, nevertheless, is used in establishing the acceptability of emergency core cooling systems.

If the pipe-break were not sudden (or nearly instantaneous) some questions concerning blowdown forces on structures would be less important.

7. Q. Do you have any comments on the effectiveness of the regulatory program for nuclear power reactors? For example, what confidence level do you believe that the American Public can have in the quality of the review conducted by the Regulatory Staff?

   A. The ACRS believes that the technical depth and effectiveness of the review conducted by the NRC Staff have increased through the years and that the American public can have confidence in the dedication of the Staff to public health and safety and to the quality of their review. The NRC Staff, including many seasoned engineers having a wide range of experience, supported by the extensive technical assistance programs at the ERDA National Laboratories and similar institutions, and by the broad use of consultants, provides a safety review which is comprehensive and on a sound technical footing. The ACRS expects that improvements will continue as regulatory experience is gained.

   In large part because of the philosophy of multiple, concurrent approaches to safety, the health and safety of the public has been well protected, despite the occurrence of specific errors or anomalous events.

   The ACRS notes that extensive efforts have been made to include large safety margins and diverse and/or redundant safety features so that in the long-term, it may develop that the levels of safety in reactors have been more conservative than necessary when compared to risks accepted for comparable technological systems. Nevertheless, because safety improvements can be achieved in nuclear power plants, and because the public perception of risk from nuclear power has been particularly vivid as compared to their perception of other risks in society or even risks from alternate sources of energy, the ACRS believes that improvements in reactor safety should continue to be sought.

8. Q. Has the ACRS experienced a satisfactory relationship with the Nuclear Regulatory Commission since January 19, 1975? What changes would you suggest in this relationship or in methods of operation? Are any changes requiring legislative action necessary to improve the effectiveness of ACRS operations?

   A. The relationship of the ACRS with the Nuclear Regulatory Commission and the NRC Staff has been satisfactory.

The ACRS believes that it is still appropriate to implement the proposed nonmandatory review provisions of Section 29 of the Atomic Energy Act as noted in previous correspondence and testimony before the Joint Committee on Atomic Energy (Ref. - Letter to the Honorable John Pastore from Dr. C. P. Siess dated April 14, 1972).

In addition, it is suggested that Section 201 (g) (1) of the Energy Reorganization Act of 1974 (P.L. 93-438) be amended to read as follows:

"Section 201(g)

(1) The Advisory Committee on Reactor Safeguards

(2) The functions of the Atomic Safety and Licensing . . . ."

This change would correct the oversight in P.L. 93-438 noted by Senator Ribicoff (Congressional Record S. 19016 dated October 11, 1974).

9. Q. In hearings before this Committee on March 2, 1976, Commissioner Gilinsky stated the need for an explicit, quantitative safety standard. Please comment on whether the achievement of such a standard is a practical goal. What is a satisfactory alternative safety goal until a quantified standard is developed?

A. The ACRS believes that efforts should continue toward defining safety standards quantitatively. It is doubtful that in the immediate future it will be possible to make these standards entirely quantitative. The ACRS believes that among other considerations, those representatives of the public formulating such standards must consider risks both to individuals living near nuclear installations and to society in terms of statistical predictions of effects on public health and safety. Allowances should be included within standards for uncertainties in estimation. Account should also be taken of the benefits of the proposed plant and the risks and costs associated with alternate methods of producing power. In addition, standards should be established in the light of other societal risks and the level of safety that society can achieve without introducing other undesirable effects on the national well being.

The ACRS believes it will be difficult to establish such safety standards and that it will be impossible to apply them without considerable reliance on engineering and scientific judgment. The ACRS has endorsed the development of a simple probabilistic risk standard as a reasonable

starting point with full recognition that there are various degrees of seriousness in postulated accidents and that, for the long term, a relation between acceptable probability and consequence may be needed. Also, there does not currently exist a well-defined means for factoring uncertainties pertaining to the estimation of low probability events into decisions using a quantitative probabilistic safety standard.

The ACRS believes that, for reactors to be constructed in the next several years a probability of less than one in a million per reactor year for an accident having serious consequences to the public health and safety is suitable as an interim objective.

10. Q. At the hearing on this matter on February 24, 1976, the subject of comments of a Subcommittee of the ACRS in 1970 on the protection of electrical systems in Indian Point 2 was discussed. Dr. Moeller stated that the minutes of the ACRS meeting in question would have to be checked to determine the accuracy of certain statements. Does the ACRS now wish to supplement their testimony of February 24, 1976, with regard to the attitude of the Committee on this matter?

A. A detailed review of ACRS meeting minutes reporting the review of Indian Point Unit 2 does not indicate that either the ACRS Subcommittee or the full ACRS used the term "appalled" to characterize their attitude with respect to the Indian Point Plant. Although the Subcommittee and full ACRS were not satisfied with the design and physical arrangement of the electrical and control systems at Indian Point 2, several changes were subsequently incorporated by the applicant to provide an acceptable arrangement.