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

June 10, 1981

Honorable Alan K. Simpson
Chairman, Subcommittee on
Nuclear Regulation
Committee on Environment and
Public Works
United States Senate
Washington, DC 20510

Dear Chairman Simpson:

The Advisory Committee on Reactor Safeguards has prepared the attached response to the Subcommittee's questions forwarded by your letter of May 5, 1981. It is important for the Subcommittee to be aware that we do not believe that all of the initiatives identified by the ACRS are applicable to the activities of the NRC Office of Nuclear Regulatory Research, but that some are expected to be included in the programs for improved reactor safety of the Office of Nuclear Reactor Regulation.

Sincerely,

J. Carson Mark
Chairman

Attachment:
ACRS Response to Questions In Senator Alan K.
Simpson's Letter dated 5/5/81

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS' RESPONSE TO QUESTIONS IN SENATOR ALAN K. SIMPSON'S LETTER OF MAY 5, 1981

QUESTION 1: Are new initiatives, identified by the Advisory Committee, given adequate consideration in developing and managing the NRC research program?

ANSWER: We believe that the new initiatives for research and related NRC activities identified by the ACRS in its reports to the Commission and to the Congress have, for the most part, been considered by the NRC Office of Nuclear Regulatory Research (RES). The response in terms of implementation, however, has varied considerably. Some recommendations have been implemented on a timely basis, others have been implemented only after repeated recommendations by the ACRS, and some have been implemented only in a token fashion or not at all. There are various reasons for this spectrum of response. In some cases, the NRC Staff has disagreed with or has not understood our recommendations; in other cases higher priority for funding has been assigned to research requested by user offices. In few, if any, cases has the NRC Staff received significant guidance from the Commissioners regarding actions to be taken on new initiatives identified by the ACRS.

QUESTION 2: In your report to Congress, the Advisory Committee on Reactor Safeguards recommended that the Commissioners provide prompt policy guidance on the major open safety issues. Would you please explain this recommendation? Is this a long standing problem? What specific changes would you suggest here?

ANSWER: We are aware of only limited policy guidance from the Commissioners that would be helpful to establish research priorities. In general, most of the guidance is provided during the budgetary review. Last year the Commission issued a document on policy, planning, and program guidance but it contained little guidance on the major open safety issues. We believe that it will be helpful in establishing research priorities if the Commissioners would address questions such as:

- How should resources be allocated among safety of (or risk from) plants now operating, plants already designed but not yet reviewed for construction permits (not yet built), and plants not yet designed?
- How should resources be allocated between research on accident prevention and accident mitigation?
- How should resources be allocated between research to reduce real risk and research to reduce perceived risk, if these should be different?

- How should resources be allocated between research to convince the NRC Staff that a plant is "safe" and research to convince the Atomic Safety and Licensing Board or the public that a plant is "safe"?

- When should research be done by NRC, when by Department of Energy (DOE), when by industry, and when and how by a combination of these?

QUESTION 3: In your report to Congress, the Advisory Committee on Reactor Safeguards recommended that the Research Office reevaluate its current and proposed programs in terms of risk reduction potential and major regulatory needs.

A. What is the current role of risk reduction potential in establishing priorities and is this role being expanded to accommodate the Advisory Committee's recommendation?

B. Hasn't NRC always based its research program on major regulatory needs? What changes are needed here?

ANSWER: (3A) In March of 1978 the ACRS endorsed a proposed program for the improvement of methodology for evaluating research topics. In July of 1979, the ACRS stated that this methodology can be used in determining the potential value of research programs. In March of 1981, RES stated it was evaluating the use of risk-assessment techniques as an aid in the development of research priorities. Granting that a significant part of this time has been preempted by the TMI event, this still seems to us to be rather too long a time to evaluate a methodology that may have such a potential benefit.

(3B) The NRC research program has been primarily based on responding to user office requests. These requests, in general, tend to be directed toward resolution of current issues. To the individual user office these may have paramount importance. However, Commission-wide perspective is needed. We believe that the guidance from the Commissioners proposed in our answer to Question 2 and the use of risk-assessment techniques as discussed in our answer to Question 3A will do much to improve the research program.

QUESTION 4: In the Advisory Committee on Reactor Safeguards Review and Evaluation of the NRC Safety Research Program for FY 1982 you recommend that higher priority be given to:

(1) The role of control systems in safety;

(2) Plant operational safety, including design-dependent systems behavior;

(3) Reliability analysis for existing plants;

(4) Improved shutdown heat removal systems;

(5) Studies of degraded core and core melt accidents;

(6) Fission product behavior; and

(7) Development of a supplemental or replacement approach to the single failure criteria.

Based on what you heard in NRC's testimony or have seen in the Long-Range Plan, do you believe that the Research Office is being sufficiently responsive to the Advisory Committee's recommendations? Do you believe that the distribution of funds in the Research Office is appropriate?

ANSWER: Based on what we have heard in NRC testimony and seen in the Long-Range Research Plan, the research program has been partially redirected in response to our comments in NUREG-0751. We continue to believe that our recommendations in NUREG-0751 for the distribution of funds are appropriate.

QUESTION 5: Would the Advisory Committee on Reactor Safeguards recommend procedures different from those now used by NRC for establishing research needs, setting Research Office priorities, and for monitoring research programs and using and evaluating research results?

ANSWER: It is difficult to answer this question because the procedures now being used by the NRC have been and still are evolving, and the current procedures have not been in use long enough to judge their effectiveness.

Previous commitments before the NRC was established have had a major influence on current practice. Prior to 1973, all Atomic Energy Commission (AEC) reactor safety research was carried out by the Division of Reactor Development and Technology (DRDT) under the General Manager. In May 1973, safety-related research in the AEC was transferred to a new Division of Reactor Safety Research (DRSR), separate from DRDT but still under the AEC General Manager. When the NRC was established in 1975, the functions of DRSR were transferred essentially without change to the NRC Office of Nuclear Regulatory Research.

Many of the current reactor safety research programs were defined and begun under DRDT or DRSR in the AEC. The large test facilities (LOFT, Semiscale, PBF) were begun under the DRDT program. The major thrust of the programs under DRSR was toward questions raised or commitments made as a result of the Rulemaking Proceedings on Emergency Core Cooling Systems (ECCS). All of these programs related to reactor safety and were therefore inherited in whole or in part by RES when the NRC was formed.

Although reactor safety research still comprises the major portion of the NRC safety research program, research was also begun on problems relating to waste management, fuel cycle safety, safeguards and security, environmental and socio-economic concerns, and systems and reliability analysis.

When the NRC was established in 1975, the Congress limited its activity to "confirmatory research," a concept that has never been defined clearly. The "user need" concept was instituted by the NRC, at least in part, in response to the "confirmatory research" requirement.

Under the "user need" concept, research was to be undertaken only when requested or endorsed by a "user" office; that is a line office in the licensing/regulatory process. An exception to this rule was made for the work in risk assessment carried out by the Probabilistic Analysis Staff; this program was initially quite small. Another exception was the program for Research to Improve Safety, presumably because of user office participation in the preparation of NUREG-0438, "NRC Plans for Research Directed Toward Improving The Safety of Light-Water Nuclear Power Plants."

More recently, the NRC has given RES the authority to use a maximum of 15 percent of the funds provided for safety research for items which have not received user-need endorsement.

The foregoing discussion is intended to show that the current program has been developed as a result of research needs generated or defined over a period of time by several different groups and by several different procedures. The "confirmatory research" concept and the "user need" procedures, as applied, have not been well suited to developing a comprehensive and coherent research program.

Although there are still no clearly defined and effectively functioning procedures for establishing research needs and priorities, there have been changes in recent years that provide some basis for cautious optimism about the future. One change has resulted from the annual reviews and reports by the ACRS. These reports have led to careful review of the programs by RES and, more recently, by the user offices. Where the ACRS has made specific recommendations for programs or priorities, they have been addressed, and in some cases followed. Another more recent change is the preparation of a Long Range Research Plan (LRRP) by RES as a basis for planning over a 5-year period. This plan has been reviewed with some care by the user offices for their concurrence with the broad aspects of the program. These user-office reviews have involved management at the highest level and thus differ markedly from the user-need requests which usually originated at a much lower level and were not coordinated or prioritized by top-level office management.

It is our judgment that these most recent procedures have the potential to improve greatly the definition of research needs and the setting of priorities. However, two important elements are still missing. One is guidance from the Commission at the policy level, along the lines indicated in our answer to Question No. 2. Although the recently implemented Policy and Program Planning Guidance (PPPG) promulgated by the Commission is an attempt to provide guidance from the Commission level, it does not yet adequately address the research program. The other element is the evaluation of research needs and research programs in the light of their potential to reduce risk. If these two elements are added, we believe that the effectiveness of the NRC's safety research program will be increased significantly.

With regard to procedures for monitoring research programs, we have looked at this only selectively. Our impressions have varied, and we have reached no generally applicable conclusion. In several instances we have recommended use, or greater use, of peer review, by panels or other means, as a way of both monitoring programs and evaluating results.

In general, we have found no problems in the way research results are evaluated and used. If good research is done to answer good questions, the results usually will be used. Unusable results are more likely to be the result of bad questions than of bad research. We believe that improvements in the procedures for defining needs will take care of many past or current problems in these areas.