



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

April 14, 1981

The Honorable Joseph M. Hendrie
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: COMMENTS ON NRC LONG RANGE RESEARCH PLAN, FY 1983-1987 (NUREG-0740)

Dear Dr. Hendrie:

As requested by the Commission, the ACRS has reviewed the proposed NRC Long Range Research Plan, FY 1983-1987, embodied in NUREG-0740. Our comments are of two kinds:

- (a) Comments relating to the objectives, uses, and usefulness of a documented long-range plan and the extent to which this report achieves its objectives, and recommendations for improving future versions.
- (b) Comments relating to the program itself with special attention to changes in objectives and emphasis over the five-year period.

The objectives of the Long Range Research Plan are stated as follows:

- "(1) To better coordinate NRC research planning with budget cycles.
- (2) To assist the Commission in establishing appropriate priorities and in ensuring effective utilization of NRC resources."

We recognize that NUREG-0740 is the first attempt to document a five-year plan. As such it is a commendable achievement, albeit far from perfect or even optimum. That it can and must be done better and differently in future years is recognized by the Office of Nuclear Regulatory Research (RES).

The existing report, nevertheless, represents major progress toward meeting the first objective. It is the result of extensive high-level interaction between RES and the research user offices and, in this respect alone, is a large step toward improved coordination and prioritization of the research program. Furthermore, we expect this report and those to follow in subsequent years to be a great help in our review and comments on the research program and budget for both the Commissioners and the Congress.

It must be pointed out, however, that the usefulness of this plan in the budget process, particularly with respect to the total research budget, extends only a year or two into the future, not the five years covered by the plan. The reason for this is simple. What is called a long-range plan is in reality only a five-year projection of current programs and programs planned for the solution of current problems. This is not in itself a

criticism since it is not possible to foresee all of the problems that may arise in the future. Nevertheless, we believe that neither RES nor the research user offices have been as diligent as they could have been in defining and delineating clearly in the report some "future" questions that can be perceived now and which may deserve attention within the time frame of the plan. Some of these may be related in whole or in part to programs described in the plan, but if so, the relationship is not easily found or clearly defined.

The extent to which the long-range plan will serve the second objective is less clear. In our perception, the report does not adequately present priority or policy alternatives in such a manner that the Commission can perceive clearly the areas in which choices must be made and policies formulated. Where Commission guidance is required, it usually will not involve choices between programs or between Decision Units, but choices between one "kind" of research or another. This involves such questions 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?

The report contains much information that could be useful in answering such questions, but the format by Decision Units, and the content and categorization of the Decision Units themselves, make this information difficult to find and use. We believe that this difficulty can best be overcome in future reports by changing the nature or format of the report rather than by reorganizing the Decision Units. This will require considerable effort by RES, but we believe it will be worthwhile.

We suggest that the long-range plan might be an appropriate medium for identifying and discussing the role that can or should be assumed by the

NRC in relation to needed safety research. In many instances, the needed research is being done or can be done in whole or in part by organizations other than the NRC. This includes research carried out by the industry, by other federal agencies such as DOE, Environmental Protection Agency, Health and Human Services, etc., by professional organizations, or by comparable groups in other countries.

Another deficiency of the report is that the objectives, either broad or narrow, of the various research programs are not defined in such a manner that one can determine whether the proposed programs can reasonably be expected to achieve them. Furthermore, without a clear statement of objectives, it is not possible to determine priorities on the basis of potential reduction in risk. In order to do this, two questions must be answered:

- (1) which problems represent the greatest potential contributors to risk?
- (2) which problems, if resolved, have the greatest potential for reducing risk by the research program which is planned?

For example, a potentially large contributor to risk, if reduced only a small amount, may be more worthy of attention than a potentially small contributor that could be eliminated entirely. More specifically, one might attempt to evaluate the reduction in risk that might be expected as a result of certain of the programs on fuel behavior. One might also carefully examine the specific programs to judge whether, if performed, they have a high likelihood of producing the information needed to meet a carefully defined objective.

An obvious deficiency of the report is its failure to provide a long-range plan for research related to advanced reactors such as the Liquid Metal Fast Breeder Reactor (LMFBR) and the High Temperature Gas-Cooled Reactor (HTGR). We have somewhat reluctantly accepted RES' categorization of this omission as "political" in that the initiative on such activity is being left to the Congress. We understand, however, that a supplement to the report will be issued to cover long-range plans in this area. We believe that contingency plans should be developed to cover a broad range of possible "political" actions including the Clinch River Breeder Reactor, a commercial-size LMFBR, and possible commercialization of the HTGR. Research programs in these areas will require important decisions about the allocation of safety research among the NRC, DOE and industry, use of probabilistic analysis in evaluating designs, the development of risk assessments comparable to those for Light-Water Reactors (LWRs), and the development of design and siting criteria rationally related to those for LWRs. We have cautioned repeatedly that advanced reactor safety research must be begun sooner rather than later as was the case in too many instances for LWRs.

The foregoing general comments on the report, as opposed to the program, can be summarized by saying that the report is useful, but it can be made more useful by addressing the deficiencies noted above, many of which are known to and fully appreciated by RES.

The changes in direction and emphasis among the various Decision Units and program elements can be perceived only in part from the long-range plan itself; they are most apparent in the funding requirements for FY 1983-1987, which have been developed and submitted separately by RES. We have reviewed the proposed funding levels for the various Decision Units but have not reviewed the levels for subelements within units; we will do this for the FY-1983 programs when we report to you in July on the FY 1983 NRC safety research program budget.

The directions indicated by the proposed levels of funding for the Decision Units are generally consistent with those recommended by the ACRS. Increased effort is proposed for programs in Decision Units 3, 4 and 8, areas which we have identified as containing high-priority programs. Decreased effort is proposed for programs in Decision Units 1 and 2, with a phase-out of LOFT within the five-year period and significant reductions in other areas of LOCA research that we have identified as being of lower priority. The increased effort on research related to high-level waste management and the decreased effort on safeguards research relating to materials control and accounting both seem to be in directions consistent with previous recommendations from the ACRS.

As we have pointed out previously, a number of the research programs are concerned with problems that are related intimately to the design of specific plants or systems. In many instances, these programs are being pursued without appropriate consideration of these relationships; that is, they are being carried out in the abstract rather than being planned and conducted within the framework of a specific design, existing or conceptual. This can lead to programs that are unnecessarily extensive and expensive, exploring phenomena in detail and in depth that may have little or no relationship to the real solution of the problem.

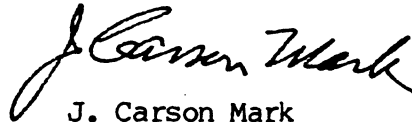
And finally, we call attention to the obvious fact that some programs are much more expensive than others per unit of results obtained. These include certain experiments and some projects relating to development of computer codes. Prudent management requires that the objectives, probability of success, and potential for risk reduction of each element of such programs be reviewed at a level and to an extent consistent with its high cost. This has not always been done.

We will comment further on the proposed programs for FY 1983 in our July report to you on the NRC safety research program budget. And it is expected that our report to the Congress on the FY 1983 NRC safety research program and budget will include further comments on direction and emphasis in future years.

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More detailed comments on the report and its contents have been developed by individual members and subcommittee chairmen. These will be transmitted, as appropriate, to the Executive Director for Operations and RES.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Carson Mark". The signature is fluid and cursive, with the first name "J." being small and the last name "Mark" being larger and more prominent.

J. Carson Mark
Chairman