UNITED STATES
NUCLEAR REGULATORY COMMISSION
Nuclear Safety Research Review Committee
Washington, D.C. 20555

30 September 1993

Mr. Eric S. Beckjord
Director
Office of Nuclear Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Beckjord:

The Nuclear Safety Research Review Committee (NSRRC) met on 7 and 8 July 1993, at the Holiday Inn in Bethesda, MD, to review the current portfolio of projects in NRC's research program with the objective of discerning what projects had been brought to closure over the past several years, what new directions have been undertaken and are now underway, and what areas are planned for the future. During the afternoon of 8 July, the NSRRC met with the Nuclear Regulatory Commission to discuss the Committee's recent activities and present its findings and observations on the content, directions and accomplishments of the research program.

Because the entire research program was addressed during the NSRRC meeting, the time for discussion of individual topics was limited, but the information content was extremely useful to the Committee in setting its agenda and the context for future meetings. Thus the comments in this report are confined mainly to broad policy issues. Detailed comments on program content will be addressed in future meetings of the Committee principally through its deliberation on its continuing subcommittee activities.

Research Program Review

An overview of the research program by functional area in accordance with the budget structure was presented by Mr. Beckjord, Director, Office of Nuclear Regulatory Research (RES). It is apparent that there are many sources of research needs, including Congressional and Commission directives, public comments and petitions, user office requirements, ACRS and ACNW concerns, NSRRC questions and recommendations, and internal RES needs. It is also apparent that the resources in terms of internal manpower and finances are limited. From time to time, NSRRC has commented on resources devoted to certain specific programs, but NSRRC has not attempted to determine whether the aggregate level of funding is appropriate. The Committee plans to give more attention to this question during the next year. Iteration is required between resources and priorities.

The current distribution of funds is presently divided about equally among the major problems facing NRC and the industry it regulates, i.e., reactor aging and license renewal, reactor accident analysis (primarily to be the severe accident program), and advanced reactors. The nature of the activities is considerably different, ranging from analytical to experimental. As projects in these areas reach closure over the next few years and only maintenance funding is required, a decline in the overall budget level would be expected. The decline in funding will be exacerbated by the general need to reduce all federal expenditures, as well as the lack of growth in the nuclear industry. While some areas, such as human reliability and high-level waste, may need greater funding, it is unlikely that substantial, expensive experimental programs funded by NRC will be required. Reassessment of the situation as it evolves with regard to the mix of the budget and internal staffing, as well as the establishment of performance measures to assess the accountability and adequacy of the program and the establishment of a monitoring process will be a management priority within RES and a subject to be examined by the NSRRC.

The Committee notes with concern the potential impact on the research program of the decreases in authorized staffing levels within the research office, random retirements and the difficulties in replacement of skills. From the many presentations and discussions that we have had with the RES staff, it is very clear that they are well skilled and conversant in the technical and regulatory areas pertinent to nuclear safety. A significant reduction in the current in-house skill base could have a deleterious effect on NRC's research program. Since the subject of staffing is not a problem solely within RES, the Committee recommends that a coordinated agency-wide effort be made to identify and maintain critical skills.

Creative and concerted efforts throughout the NRC must be taken to ensure that the technical competence of the staff does not deteriorate, and the NSRRC applauds the support that the Commissioners have given to the goal of securing and enhancing the technical capability of the staff. Publication of technical papers is not, however, a necessary criterion to evaluate the capability of the staff. In fact, RES staff cannot be expected to have the time available to write original papers given their technical program management mandate. Moreover, joint authorship with contractors often can compromise the direction RES employees must give to these potential publication co-authors. Many examples exist in the area of government nuclear organizations (e.g., Naval Reactors, 1955-present; Reactor Development and Technology, 1965-1975) which attracted technically competent program managers who did not publish in the technical literature.

Most of NRC's research (approx. 70%) is done under contract to DOE's national laboratories. As the scope of the research shifts from accident phenomena to advanced reactor design evaluation, advanced instrumentation and control systems, aging

management, and computer code maintenance and development, RES must examine whether the best suited skills are within the national laboratories. In its subcommittee meetings over the next year, NSRRC will examine the question raised by the Commission on whether the skills of the contractor base are keeping up with NRC's interests.

The role of RES in rule making/policy positions is not always clear to the Committee. In this activity, the products of research should be used to focus the results into action. In two areas, the Source Term and Seismic Hazards, progress toward resolution of NRC's positions has been painfully slow. NSRRC plans to examine these topics to determine whether the technical program has been the source of the delay and, if so, what steps could be taken to speed the process.

Licensing renewal is effectively in limbo, in part because of the lack of effective NRC policy that can be depended upon by industry. NSRRC will examine in detail RES plans and schedules regarding effort in this area. As it has noted in the past, the Committee recommends that the subject of aging phenomena be separated from the considerations of license renewal. In addition, the Committee notes that closure of all aging research will be achieved by 1998.

The Committee was made aware of the enlistment of thermal hydraulic consultants to assist the staff in addressing technical issues related to advanced reactor designs. While NSRRC perceives the value of obtaining such advice, the role of these individuals should be clarified so that they do not function as an advisory committee or become confused with the role of the NSRRC.

Two important advances on resolving major severe accident issues have been achieved. First, the Mark I liner failure issue is to be resolved in a report, NUREG/CR-6025, which has undergone peer review and requires only that the comments be addressed by the authors of the report. The second major advance involves the direct containment heating (DCH) issue for Zion-like containments. NUREG/CR-6075 concludes that the pressure loads predicted by the models do not threaten the integrity of the containment in any significant way. The DCH reports are now in the process of undergoing a review by a panel of experts. For both of these issues, the risk-oriented accident assessment methodology (ROAAM) has been used. Further comments on these subjects will be made by the Committee in future reports.

The natural conclusion of the severe accident program lies in the development of appropriate accident management responses. From the limited discussion of this topic at our meeting it appears that industry's timetable for achieving this end goal is protracted. The NSRRC will seek assurance that the research program is not a cause for this delay, but rather that RES is accelerating closure of the severe accident program by addressing use of its results in accident management plans.

NSRRC was informed of the potential for core damage during low-power and shutdown conditions. Detailed PRA's are being performed for a PWR and a BWR. The Committee was asked to review these reports when completed, probably in mid-1994.

The question of adequate staffing in control rooms of current operating reactors was brought to the Committee's attention. Through its Human Factors subcommittee, NSRRC will follow the further investigation and resolution of this issue, especially the method that has been developed to address the question and impact of the findings on advanced control room designs and staffing. The safety benefits through the use of advanced instrumentation and control systems deserve attention as high priority items in the human factors program. The Committee was also invited to attend the September workshop on software reliability and safety in the context of digital instrumentation and control, the results of which may bear directly on staff and functional responsibilities in control rooms.

Meeting with the Commission

In accordance with the records of the Secretary, during its meeting with the Commission of 8 July 1993, the NSRRC agreed that it would:

1. Keep track of the broad questions such as: Is the research program doing the right things? Are there enough resources to do what is being done? Are the skills of the staff and the contractor base keeping up with changes in the Commission's needs? Is the program staying ahead of the problems or is it trying to catch-up to the problems? Are the skills of the Committee consistent with what the Commission is asking it to do?

2. Review the RES code program to determine if it is maintaining a "critical mass" of computer code experts at contractors and to look at the impact of spreading the limited funding among a number of contractors. The Committee should look at whether RES has identified the expertise required to maintain the codes, provide continuing world class codes, and the capability to respond to future safety issues as they arise.

3. Identify any "sacred cow" programs that should be closed out given limited budgets and higher priority needs, but keeping in mind the needs of maintaining expertise in unique NRC program areas.

4. Identify the technical disciplines the NRC needs to ensure that it is able to respond in a timely manner to present and future safety and licensing issues. These disciplines and the number of people required to provide a critical mass in-house and at the contractors should be compared with available resources.

The NSRRC intends to address these issues during its meetings over the next year and has identified several relevant activities in the summary of the research program previously presented.

Sincerely,

David L. Morrison
Chairman
Nuclear Safety Research Review Committee

DLM/drg