(1)

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

April 27, 1993

The Honorable Ivan Selin
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Selin:

SUBJECT: REVIEW OF ORGANIZATIONAL FACTORS RESEARCH PROGRAM

During the 392nd, 394th, 395th and 396th meetings of the Advisory Committee on Reactor Safeguards, December 9-11, 1992, February 11-13, March 11-12, and April 15-17, 1993, respectively, we discussed the Office of Nuclear Regulatory Research (RES) budget for the human factors research program and SECY-93-020, "Review of Organizational Factors Research." In addition, during our February 11-13, 1993 meeting, representatives of the NRC staff and two of the contractors involved in the organizational factors research program (Brookhaven National Laboratory and University of California at Los Angeles) discussed their work. (The other contractors are the Pennsylvania State University and the Accident Prevention Group, Inc.) We also had the benefit of the document referenced.

Members of our Human Factors Subcommittee and two subcommittee consultants attended the November 12, 1992, senior staff management workshop on the organizational factors research program.

ACRS has followed this program since it was revived in 1987. SECY-93-020 provides the results of the comprehensive review performed by RES of its organizational factors research program and a description of changes to be made to the program as a result of this review. In the Summary Section of this SECY document, RES concludes that

> there is a relatively low cost-effectiveness in continuing regulatory research beyond FY 1993, until it is determined that organizational factors can be reliably integrated into PRA models. RES is meeting with NRR to coordinate further development of human reliability analysis modeling of organizational factors for PRA. It is possible that this further effort will continue at a low level of funding in FY 1994.

We were told that RES does not, at this time, propose to fund additional organizational factors research beyond FY 1993. We also learned from our discussions with RES representatives that its

Nuclear Safety Research Review Committee had not reviewed and provided comments on the need for continuing this program prior to the issuance of SECY-93-020.

After extensive deliberations, we have been unable to arrive at a consensus with respect to the continuation of this research activity. We plan to take this matter up again when NRR completes its user needs evaluation with respect to organizational factors research.

Additional comments by ACRS Members James C. Carroll, Ivan Catton, Peter R. Davis, and Robert L. Seale are presented below.

Sincerely,

Paul Shewmon

Paul Shewmon
Chairman

Additional Comments by ACRS Members James C. Carroll, Ivan Catton, Peter R. Davis, and Robert L. Seale

We believe that the present organizational factors research effort should be continued to the point where a set of useful products becomes available for trial use by the staff and the nuclear utilities. Our reasons for this view are summarized below.

The Relationship Between Organizational Performance and Safety - The Historical Perspective Section of SECY-93-020 states that "poor organizational performance can be a major contributor to safety significant events and that there is a need for an improved technical base for determining the impact of organizational performance on safety." We agree and further believe that this is one of the most important safety issues presently facing the nuclear power industry. The industry knows how to design extremely safe plants from a hardware point of view. However, operating experience indicates that there are many outstanding questions with respect to the ability of the nuclear utilities in the U.S. (and worldwide) to safely manage the operation and maintenance of both operating and future nuclear power plants. The organizational performance of the NRC staff is also of concern to us in that it can have an impact on the safety of the regulated industry.

We note that the SECY paper describes the organizational factors research programs being carried out by the regulatory authorities in Sweden, the UK, and France. This raises the obvious question as to why RES has concluded that its program is not cost-effective while other nations' regulatory authorities are actively pursuing this issue. We believe that it is of interest that none of these

foreign programs are attempting to integrate organizaitonal factors into PRAs.

It is our view that management science is a real and sophisticated academic field that needs to be tapped if the industry is to continue to make progress in dealing with organizational performance issues. There appears to be a lack of communication between the management science academic community and most policy-makers out in the "real world" of nuclear power plant regulation and operations. We believe that the Commission should encourage the involvement of the management science community in helping to improve the organizational performance of both the staff and the nuclear utilities.

RES Arguments for Terminating Organizational Factors Research - In SECY-93-020, RES makes the point that "the gathering of organizational factors data is resource intensive," but does not attempt to quantify this term. The presentations made to the Committee by the current contractors suggest that much less resource intensive approaches, relative to those used in the early phases of this work, are possible. The real test will be in the application of the products of this research when the benefits obtained can be compared to the resources invested.

RES also states that "there is a relatively low cost-effectiveness in continuing regulatory research beyond FY 1993, until it can be determined that organizational factors can be reliably integrated into PRA models." We were told by the contractors that the development and validation of these measurement tools are necessary before the integration of organizational factors into PRA models can be properly demonstrated. RES appears to have created a classic catch 22 situation in the position it has taken.

The Implications of Terminating Organizational Factors Research - RES states in the SECY paper that "the research products developed to date will be integrated by the end of FY 1993 for possible use in inspection and diagnostics evaluations." Based on our discussions with the contractors, we have concluded that the program to develop and verify organizational factors measurement tools is far from being completed. It appears to us that there is a major risk in exporting the present products to the field, since their almost certain unsuccessful application will bring this work into disrepute and create a significant obstacle to future developments in this field.

The Cost of Completing the Present Organizational Factors Research Program - The contractors were asked for their estimates of the time and cost to carry the present research to the point where a set of useful products (both organizational factors measurement tools and PRA modeling techniques) would become available for trial use by the staff and the nuclear utilities. They indicated that

this would require an additional three years of effort at an annual funding of about $0.5 million (a small fraction of the current research program support budget). This additional $1.5 million expenditure is to be contrasted with the $3.8 million that has been expended on organizational factors research since 1987.

Our Reasons for Supporting Continuation of the Present Organizational Factors Research Effort - We believe that there is a reasonable expectation that products useful to both the NRC and the industry will be developed if the present program is completed. We further believe that completion of this program meets the benefit/cost test when compared with the expected benefits of many other research activities that have been, and are continuing to be, supported by the staff.

We see a strong analogy between the present status of organizational factors research and the status of PRA methodology 20 years ago when the Reactor Safety Study, WASH-1400, was begun under the leadership of the AEC. There were many, both within the NRC and industry, who argued at the time that PRA was a nice theoretical exercise, but would never have practical uses. Today, PRA is employed as an extremely valuable, multi-use tool by both the NRC and the regulated industry. Without this initial leadership by the agency, it is doubtful that PRA would be at today's state of development.

We believe that it is likely that the organizational factors measurement tools that are currently under development and their possible integration into PRAs will play an important role in nuclear power plant safety technology in the years to come. We do expect that it will be necessary, just as it was with the development of PRA, for the NRC and industry to expend additional resources on organizational factors research.

There are considerable demands presently being placed on staff and licensee resources in such activities as the SALP Program and Diagnostic Team Inspections. For licensees, the periodic INPO evaluations create additional demands. If appropriately validated organizational factors measurement tools can be developed, it would be possible to optimize the use of staff and licensee resources in assessing licensee organizational performance. The present staff approach in assessing licensee organizational performance does not have an appropriately validated basis and is subject to legal challenge (such a challenge has already been made with respect to the SALP Program). Continuing this research program to provide validated organizational factors measurement tools has the potential of providing the staff with a much more defensible basis for its SALP Program and Diagnostic Team Inspections.

After organizational factors measurement tools become available, it will be possible to undertake completion of the next step; the

modeling of organizational factors into PRAs. If this modeling can be done in a credible manner, it would then be possible to assess how risk is apportioned between hardware and human performance. This would provide much needed insight into the manner in which NRC research efforts and inspection and enforcement resources should be allocated. It would also assist the staff and licensees in evaluating and correcting risk-significant weaknesses in their organizations.

We do not, however, believe that the integration of organizational factors into PRA should be the main focus of the present research program. Due to the complex, amorphous, and temporal nature of organizational performance, this objective may not be attainable. Rather, we believe that the emphasis should be on providing organizational effectiveness measurement tools to help the staff and the utilities better design and manage their organizations and to help the NRC make better judgments about the performance of licensee organizations. If the present integration efforts produce useful PRA input, so much the better. (We do believe that progress has been made by the researchers involved in this effort and recommend that this work be continued.)

Finally, we believe that the manner in which this research program has been carried out by the staff is representative of a serious generic problem that the staff has in dealing with complex issues that cut across staff organizational boundaries. We recommend that the EDO review the manner in which the various elements of the staff collaborated in developing the research objectives and in providing consistent guidance to the organizational factors research contractors. We expect such a review to lead to improved staff policy guidance on the coordination of future research efforts of this nature.

Reference:
SECY-93-020, dated February 1, 1993, for the Commissioners, from James M. Taylor, Executive Director for Operations, Subject: Review of Organizational Factors Research

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

MAY 11 98

$00.52

US NRC-ACRS
JAMES C CARROLL
ONE GREENWOOD CT
ORINDA CA 94563

PRINTED ON RECYCLED PAPER