February 13, 1997

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: HUMAN PERFORMANCE PROGRAM PLAN

During the 438th meeting of the Advisory Committee on Reactor Safeguards, February 6-8, 1997, we completed our review of the NRC activities identified in the Human Performance Program Plan (HPPP). Our Subcommittee on Human Factors met on September 20 and December 3, 1996, to review these activities. During these reviews, we had the benefit of discussions with representatives of the staff.

In your remarks of December 2, 1996, to all NRC employees, you stated:

> As we move to an era of nuclear power industry restructuring and declining NRC and industry resources, it is imperative that we are able to diagnose potentially declining licensee performance as early as possible.

We agree with your assessment. We believe that an appropriate HPPP would contribute significantly to the development of such diagnostic tools.

Conclusions and Recommendations

1. The HPPP is not a plan. It is, instead, an inventory of human performance projects within the agency. The HPPP should state explicitly what its goals are, what research efforts will be required to achieve these goals, and when and how it will be known that they have been achieved. The ownership of the present plan is diffuse. The success of such a plan as well as its dynamic nature require that ownership of the entire plan be clearly assigned.

2. A well-planned research effort in human performance is urgently needed to support both the regulation of plant operations and the transition to risk-informed and performance-based regulation. The overall perspective

that can be provided by high-level models of human performance would be helpful in the planning of this research effort. A number of such models are reviewed in NUREG/CR-6350.

3. The development of indicators of a good safety culture, the design of a meaningful human performance reporting system, and the impact of downsizing and deregulation on human performance should be major elements of the research effort.

Discussion

Operational experience has shown that human performance is a major factor in the safe operation of nuclear power plants. Understanding what can go wrong at a plant requires an integrated evaluation of both hardware and human performance; i.e., the plant must be viewed as a sociotechnical system. In particular, the term "human error," which carries the implication that the operators are to be blamed, is inaccurate in many instances and one must investigate and understand the context within which plant personnel function. This context is determined by both the design and the physical conditions of the plant, as well as by the prevailing safety culture.

The development of a plan for research on human factors is certainly not a simple task. This task would be made easier and the recommendations more convincing if the task were guided by a high-level model that identifies the important elements that influence the likelihood of unsafe human acts. Various models and taxonomies have been proposed in the literature and some are beginning to receive wide acceptance. Human performance models and error classifications that could be suitable guides for developing a research plan are being used in other projects in the Office of Nuclear Regulatory Research. The models discussed in NUREG/CR-6350, along with insights from operational experience, could serve to guide the development of an HPPP.

One specific element we would like to see addressed in the HPPP is the impact of situational assessment on compliance with procedures. Investigations of actual incidents and simulator exercises from nuclear and other industries have demonstrated the importance of what Professor James Reason of the University of Manchester calls "intended violations" (circumventions) of procedures by plant

personnel. The researchers who collected data from simulator exercises point out that these were not necessarily errors; the operators simply did what they felt was the optimal response to the evolving accident. We believe there is a need to understand the reasons for such deviations and how training, procedures, and the plant safety culture could be modified to eliminate "circumventions" to the extent possible.

The present HPPP contains elements that are worth pursuing. Other elements that should be contained in the HPPP include activities to gain a better understanding of the concept of safety culture and to develop indicators of a good safety culture. The human reliability analysis research project should also be part of the HPPP. We will continue to work with the staff in developing an effective HPPP.

Sincerely,

/s/

R. L. Seale
Chairman

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