YALE UNIVERSITY
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OFFICE OF THE DIRECTOR

November 18, 2004

Dr. Raymond Orbach
Director
Office of Science
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dr. Michael S. Turner
Assistant Director
Directorate for Mathematical & Physical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Drs. Orbach and Turner:

Your letter of November 2003 charged NSAC to assess NSF and DOE educational investments in Nuclear Science and to identify key strategies for educating future nuclear scientists. Your charge asked NSAC to take account of the essential qualifications of nuclear scientists, both in the public and private sectors, to determine the number of Ph.D. degrees now awarded and the projected needs so that the U.S. can maintain a leadership role in the field, and meet national needs in applied and national security areas, public outreach, and K-12 education. You asked that an important focus be put on demographics and the participation of women and minorities in nuclear science and nuclear science careers.

NSAC formed a sub-committee, chaired by Joe Cerny of Lawrence Berkeley National Laboratory and the University of California (Berkeley) to prepare a response to this charge. This sub-committee has completed its work and presented its Report to NSAC at a meeting on November 18, 2004.

The sub-committee's work, extending over a year and a half, included very extensive web surveys of undergraduates, graduate students, post docs and scientists in the career period 5-10 years after Ph.D. These surveys, which returned high percentages of responses, form the underpinning for the demographic analysis in the Report, which documents educational and job-related issues for prospective and young scientists. This analysis was also used to study the status, needs, and opportunities for women and minorities.

The Report concludes that science education is critical at all levels from K-12 through graduate school and the post-doctoral years and for effective public outreach. Better science education is critical for training the next generation of scientists for both

basic and applied work, just as different forms of science education are needed in the K-12 years to reverse the stunning loss of early interest in science-oriented career decisions through middle and high school levels. Enhanced science education outreach is needed to build an improved public awareness of science which is crucial in a democratic society where many issues of public interest require an appreciation of technological issues. This is particularly important in the area of nuclear science with its vast applications to energy, medicine, and national security. Both fundamental research and the nation's capacity for continued technological innovation, with the well-attested economic benefits, are at stake.

The Report makes a number of recommendations, both specific and generic. These address public outreach efforts, the highest priority in the Report, as well as efforts to enhance the annual Ph.D. production in nuclear science, the attractiveness of science in general in the K-12 period, and of nuclear science and nuclear science careers up through the undergraduate years. The Report also stresses the importance of reducing the median time to the Ph.D. degree. For graduate students and early career Ph.D.'s, it recommends prestigious fellowship programs and enhanced mentoring, including ensuring an increased awareness early on in graduate school of the wide variety of post-Ph.D. career paths.

Taken as a whole, these recommendations form a coherent, balanced, and cost-effective portfolio of actions and policies that can assure continued US world leadership in basic nuclear science research, and enable the nation to meet its needs in applied nuclear science. Further, they encourage the Agencies and the nuclear science community to work towards greater public awareness of science. A better public comprehension of technical issues will help dispel numerous popular myths concerning radiation and things nuclear that impede informed public consensus on scientific and technological issues of profound importance to the long term stature and prosperity of the nation.

NSAC unanimously accepted the Report and a copy is enclosed with this letter. NSAC would like to specifically laud the sub-committee for the excellent quality and depth of its work, for their careful methodology, and for a clear and comprehensive final Report.

Sincerely,

Richard F. Casten
Chair, NSAC

cc: Kovar
Schroeder
Dehmer
Keister
NSAC members