



HEALTH  
PHYSICS  
SOCIETY

## HUMAN CAPITAL CRISIS IN RADIATION SAFETY

### POSITION STATEMENT OF THE HEALTH PHYSICS SOCIETY\*

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Radiation is used for many beneficial purposes to support this country's energy, medical, and security needs. Radiation protection (health physics) is one of the science and engineering disciplines in which a shortfall of sufficiently trained and educated individuals is projected in this country over the next 5 to 10 years. In 2002 the Health Physics Society (HPS) established a task force to review the current and future needs for radiation protection professionals working in the energy, health, and security sectors. Results of the Task Force Report are available on the HPS website (HPS 2004), have been published in the HPS newsletter *Health Physics News* (Nelson 2004), and have been used to develop this position statement.

**The Health Physics Society advocates that significant financial commitment by the Congress and federal agencies be made to support education of**

**scientists and engineers, educators in math and science, research associated with these programs (including health physics), equipment and supplies for science teaching in secondary schools, and scholarships and financial support to colleges and universities in science and technology.** This is necessary to ensure an adequate supply of qualified scientists and engineers, including radiation safety professionals.

The National Science Foundation (NSF 2001, NSF 2008) indicated that the number of U.S. citizens and permanent residents enrolling in science and technology graduate degree programs has increased slightly from 1993 to 2006, although the percentage of U.S. citizens and permanent residents compared to all science and engineering graduate students had decreased from 76 percent to 71 percent. A low point was reached in 2000, where the greatest declines occurred in graduate mathematical sciences, engineering, and physical sciences programs, 31 percent, 27 percent, and 19 percent respectively, when compared to 1993 levels. Although improving, enrollment in these important programs in 2006 had not yet recovered to 1993 levels.

In health physics the number of students graduating with either a bachelor's, master's, or doctorate degree declined 36 percent from 270 students in 1995 to 173 in 2006. (ORISE 2003, ORISE 2007). In addition, the number of health physics programs graduating at least five students annually decreased from 20 programs in 1995 to 7 programs in 2002. Zumeta and Raveling (2003) identified "very modest compensation for graduate students and postdoctoral appointees" as one reason that science and technology careers are considered less attractive. Support for research and teaching has historically come from the federal government, but recently this support has dwindled. Federal support is needed because scientific and engineering education is in the national interest and promotes the common good and national security. Between 1999 and 2006, federal support for graduate-level science and engineering students was running consistently at 20 percent, although this level of support varied by field; e.g., mathematical sciences graduates received 9 percent federal support while physical sciences graduates received 35 percent federal support (NSF 2008). In this same time frame, the primary mechanisms for support of full-time science and engineering graduate students were fellowships, research assistantships, and teaching assistantships, approximately 10 percent, 31 percent, and 21 percent respectively. *However, the*

*total number of federally funded fellowships for health physics students for the period 1999 to 2006 has been zero.*

The human capital crisis continues to deepen; while needed enrollments and focused academic and training programs are declining, the need for well-educated and trained graduates is intensifying. In the federal government alone, human capital issues were felt in all agencies, according to a Government Accountability Office (GAO) report (Walker 2001). In addition, the GAO recently held a forum to address engaging and retaining older workers, in part, to help address the human capital crisis (GAO 2007). Well-educated people in science and technology are needed to meet growing needs in industry, government (NRC, EPA, DOE, etc.), medicine, and homeland defense and in order for the United States to continue to be a world leader in science and technology.

Strong, healthy academic programs are needed to continue to provide a meaningful succession of scientists and engineers, and this includes radiation protection professionals working in the energy, regulatory/security, and health sectors of our nation.

Furthermore, with expanding uses of radiation in diagnostic and therapeutic medical applications and the potential expansion of nuclear technology to meet the nation's future energy needs, it is clear to the radiation safety community that the current imbalance between supply and demand will significantly worsen in the near term, after which it will soon become untenable. The shortage of qualified radiation safety professionals will compromise the rigorous oversight necessary for the continued safe use of radiation for the benefit of the citizens of the United States.

A conservative total of approximately 6,700 radiation protection professionals from all employment sectors combined has been identified in the Task Force Report. This value does not include, for example, part-time or consulting radiation protection professionals. Strong, healthy academic programs are necessary to ensure a continuing supply of radiation protection professionals working in these critical employment sectors.

Although the remaining health physics academic programs have the potential to expand and meet the current demand for graduates in health physics, this

potential cannot be realized without rapid and substantial new investment. The HPS has, for many years, provided support to students in health physics and encouraged standardization and accreditation in health physics education and training. Many members of the Society donate time and effort to health physics academic programs, in addition to their substantial effort in providing radiation fundamentals training to science teachers. The HPS has also explored private sources of funding for health physics academic programs and actively encourages students to become interested in health physics programs. However, the critical human capital shortage in radiation safety is overwhelming the Society's efforts to help respond to this crisis.

## **REFERENCES**

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\* The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has grown to nearly 5,000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.