



DEPARTMENT OF HEALTH & HUMAN SERVICES

Memorandum

Date February 9, 2004

From Principal Engineer, OEP, NIOSH

Subject Final Progress Report for entry into NIOSHTIC2/NTIS for  
NIOSH Training Grant No. T42 CCT 110421

To Vern P. Anderson, Chief, IRB, EID (C-18)

The enclosed report has been received from the Center Director to document work performed during the specified grant project period. The following information applies to the designated Education and Research Center (ERC):

Title: Harvard Education and Research Center

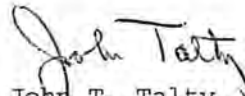
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Grant No.: T42 CCT 110421

Project Period: 7/1/98 - 6/30/2003

Please place the report in DIDS and I also recommend it for entry into NIOSHTIC2 and submission to NTIS.

Thanks for your assistance.

  
John T. Talty, P.E., DEE

Enclosure

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# HARVARD EDUCATION AND RESEARCH CENTER

## FINAL REPORT

September 23, 2003

**Institution:** Harvard School of Public Health  
665 Huntington Avenue  
Boston, MA 02115

**Project Title:** Occupational Safety and Health  
Education and Research Center

**Project Period:** 7/01/98 – 6/30/03

**Project Director:** David C. Christiani, MD, MPH  
Professor

**Grant Award Number:** T42/CCT110421

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## **ABSTRACT**

The Harvard Educational Resource Center for Occupational Safety and Health (renamed Harvard Education and Research Center in 1997) holds as its primary objective the training of leaders in occupational medicine, industrial hygiene, occupational health nursing, occupational health safety, and occupational epidemiology. Through a combination of practical and research-oriented coursework and field experiences, graduate students at the Center examine current problems relating to the workplace to learn methods and approaches to establish and healthy and safe work environments. The Master's Program in Industrial Hygiene enables graduates to move rapidly into positions of responsibility and industry. Graduates from the Program in Occupational Health Nursing, by virtue of a didactic program grounded in research methodology, have been able to expand the role of occupational health nursing in various settings. The Occupational Health Nursing Core exists in collaboration with Simmons College and provides two Master's-level options: a one-year practitioner track and a two-year dual-degree program as an occupational-health nursing practitioner with advanced interdisciplinary course of study in occupational health. Physicians training in the Occupational Medicine Core receive a Master's degree in a residency meeting the American Council for Graduate Medical Education and American Board of Preventive Medicine requirements for certification in Occupational Preventive Medicine. Finally, doctoral students are trained in occupational health, occupational epidemiology, industrial hygiene and occupational molecular epidemiology. Students in doctoral training are recruited from the very specialties related to occupational safety and health including occupational medicine, industrial hygiene, occupational-health nursing, and related fields such as biology, ergonomics, engineering, and environmental health. The programs in continuing education and outreach are dynamic and create efforts at serving the occupational safety and health needs of New England and the nation. They provide an integrative force linking to the community. Traditional advanced short-courses, offered in collaboration with the School's Center for Continuing Professional Education, are aimed at a national audience. There is also a separate slate of courses that focus on regional needs and audiences. The Outreach Program has been extremely successful in establishing a network of professionals in New England who are interested in occupational safety and health. That network has become stronger each year. While the ERC continues to serve the administrative and intellectual focus of the Outreach Program, much of the creative energy now stems from program participants.

## **SIGNIFICANT FINDINGS**

The Harvard ERC has grown significantly over the past five years. Within our traditional core programs, recruitment of high quality trainees remains a priority, and we continue to attract top-rate students.

In the Occupational Epidemiology special component, we have expanded significantly, and now have the largest number of doctoral trainees in the ERC. Two new components have been added since 1998 (off-cycle), including Occupational Health Services Research (co-directed by Dr. Eileen McNeely of the Harvard School of Public Health and Dr. Allard Dembe of U-Mass Medical Center in Worcester) and Injury Prevention Research Training (co-directed by Dr. Jack Dennerlein and Dr. Melissa Perry of the Harvard School of Public Health). These programs are up and running successfully. Finally, faculty additions and promotions have allowed the ERC to maintain its quality of research and training in its traditionally strong CORE components, while expanding into new areas of relevance to NORA.

## **INDUSTRIAL HYGIENE CORE**

A two-year, 80-credit-unit Master of Science program is offered, with the option of a six-month internship in the second year. Subscription to the program may be on a full-time or half-time basis. The training prepares students for career in industry, insurance, labor, government, healthcare settings, consulting, research, and teaching. The industrial hygiene program is based in the new Exposure, Epidemiology and Risk Program (formerly the Environmental Science and Engineering Program) within the Department of Environmental Health. The training provides a unique opportunity to be instructed by and work with professionals in industrial hygiene as well as other disciplines in the fields of occupational and environmental health, such as environmental chemists, ergonomists, nurses, physicians, risk assessors, safety engineers, and toxicologists.

The curriculum addresses assessment and control of chemical, physical, and microbiological hazards. In addition to the School required basic courses in biostatistics, epidemiology, and physiology, all Occupational Health students begin with two core courses that (1) introduce industrial hygiene concepts of exposure and its evaluation and control, and (2) introduce occupational hazards and their recognition in the field. These are followed by a series of specialty courses: ventilation, physical stresses in the workplace, safety and ergonomics, occupational health policy and law, radiological health, risk assessment, and administration. Students may cross register for courses offered by other Harvard graduate schools and the Massachusetts Institute of Technology (MIT). Didactic training is enhanced by visits to a variety of workplaces to learn survey techniques and methods of identifying hazardous processes.

In addition to training in the comprehensive practice of industrial hygiene, Harvard offers two sub-specialty training programs in hazardous substances and in occupational ergonomics and safety. The goal of these specialty tracks is to help fill the growing need for industrial hygienists who are trained in the evaluation and control of health and safety problems at hazardous waste sites, and in the rapidly evolving field of ergonomics. Students who elect either of these options select a six-month internship (described below) that places them in an apprenticeship in this specialty.

### **Conclusions and Future Plans**

There are no plans for significant modification of the IH program in the near future. We are developing a program in occupational ergonomics and safety, which are now optional areas of concentration within the IH program. We plan to add a third faculty member in IH, but that will await additional funding. We have also made substantial progress in expanding our office and laboratory space.

We are expanding our efforts to attract more students. As with other IH programs we have observed a decline in the number of applicants. We have filled our available slots but the pool of applications is smaller. We have also worked with our new students to understand what might be most effective in attracting new students. We are upgrading our Web site with more detailed faculty and program information, and more extensive connections to Harvard's broad resources, which we are developing. Recently we have found that recruiting Research Assistants, who have an interest in going to graduate school, also can lead to new students.

Research training is a high priority for IH. Drs. Smith, Herrick, Rudnick, and Dennerlein are training doctoral students on their research projects.

## **OCCUPATIONAL HEALTH NURSING CORE**

The cooperative occupational health nursing program with Harvard School of Public Health and Simmons College Graduate School for Health Studies is a unique interdisciplinary program

which combines the expertise of two internationally recognized teaching institutions. The program is designed to prepare students in the areas of research methodologies, primary care, clinical practice and management of occupational health programs. The curriculum offers students courses in the core areas of study: theory, research, primary care, leadership, toxicology, safety, industrial hygiene, policy development, management and advanced practice in occupational/environmental health. The program requires 426 hours of didactic teaching and the clinical experience consists of 680 clinical hours. Emphasis is placed on student education in the areas of occupational health, toxicology, ergonomics, labor relations, legislation, scholarly inquiry, primary care of the employee, health promotion, injury and illness prevention, the epidemiology of workplace illness, and research methods appropriate for the study of work related illnesses and injuries. The program provides the student with the essential content needed to sit for the adult nurse practitioner and the occupational health nurse specialist certification exams.

The core faculty of the occupational health nursing (OHN) program has remained stable since the inception of the program with Simmons College. Dr. Carol Love, R.N., Ph.D., the Director of the program, is an experienced administrator, teacher and researcher in the field of occupational health nursing. In 2003 she was recognized by her peers and elected as a Fellow of the American Association of Occupational Health Nurses.

Dr. Carol A. Somers, R.N., M.S.N., M.S.O.H., Sc.D. resigned her position at Simmons and at the Harvard School of Public Health. Janet Rico, M.S.N., MBA, an experienced educator and occupational health nurse was appointed as Assistant Director. Susan Duty, RN, ScD, a recent graduate of the Harvard School of Public Health, was appointed to the faculty at Simmons College and has responsibility for integrating occupational and environmental health content into the undergraduate and graduate programs. Her responsibilities include program development, curriculum design, research supervision, recruitment and teaching.

Four additional core faculty develop the curriculum, administer the program, and teach. They include Judy Beal, RN, D.N.Sc., Susan Neary, RN Ph.D, Patricia White, RN, MSN, and Marlene Freeley, M.S.N. Dr. Duty, Ms. Rico and Ms. Freeley are certified nurse practitioners. In addition to their teaching responsibilities, each of these nurses maintain a clinical practice in occupational health, primary care, or sub-acute care or community sites.

The nursing program is a major collaborator with the New England Occupational Health Nursing constituents of the American Association of Occupational Health Nurses (AAOHN). The faculty of the ERC continue to participate in the joint conference of MAOHN and NECOEM (New England College of Occupational and Environmental Health). Over two hundred OH professionals attended this annual conference.

The Nursing Faculty of the ERC continues to be involved in international outreach for occupational environmental health nurses. Currently the faculty are working with nurses in Japan and South Korea to develop occupational health program within their universities.

The Harvard School of Public Health ERC and Simmons College is a cooperative nursing program that has several distinctive features. First, the collaboration between the faculty of a school of nursing and a school of public health for the purpose of developing, implementing and evaluating an interdisciplinary program in occupational and environmental health. There is no similar arrangement in any school in New England. Both schools have the mission and philosophy ascribing to an interdisciplinary approach to health promotion and education. Second, this program offers many options to nurses wishing to advance their careers in occupational health. Full time and part-time study is available during the day or in the evening. Plans for the upcoming year are directed toward developing continuing education programs and certificate programs that are WEB based and will

provide educational opportunities for practicing occupational environmental health nurses. Surveys were conducted which revealed that these nurses have access to the WEB and would participate in WEB based courses. A pilot project using the ERC seminars was implemented and received very favorable evaluations. A WEB based certificate program for occupational environmental health nurses in Administration and Management is planned for the Spring semester.

### **Conclusions**

Throughout the program, research is a major focus. All students complete a research study and present these studies in a formal research symposium to which faculty members, preceptors and nurses from the community are invited. In addition to Research Day at Simmons College, occupational health nursing students present their research during Research seminar to an interdisciplinary group of students and faculty at the Harvard School of Public Health. Students also have the opportunity to present their research findings at professional conferences. These presentations and projects have generated interest in occupational health issues by other students who have then identified occupational projects within their own area of specialization.

### **OCCUPATIONAL MEDICINE CORE**

During these last 5 years, the Occupational Medicine Core has continued to recruit and train physicians in the specialty of Occupational Medicine through the Harvard Occupational/Environmental Medicine Residency (OEMR). During the 7/1/98-6/30/03 period a total of 4 who had matriculated into the program in the previous period continued in the program and a total of 19 new physicians matriculated into the program. By 6/30/03, a total of 15 of these physicians had completed the program, 1 is awaiting final results from a research project to complete the program, 1 transferred to another program, 1 has taken a leave of absence, and 4 are continuing into the next period as scheduled. Only 1 physician was discontinued from the program. The OEMR maintained full ACGME accreditation during this period while evolving to respond to recommendations made by our last NIOSH site visit team, our Residency Advisory Committee, and the ACGME. Amongst the most important changes and improvements have been an accelerated recruitment and admissions process; an earlier start date for 1<sup>st</sup> year Residents, beginning now with the Clinical Effectiveness Program in July, which allows Residents to start their research project earlier and increases their clinical time in the 2<sup>nd</sup> year; new didactic offerings in Occupational Health Services; new Resident-driven activities (journal club, board-review sessions); new practicum year rotations with corporate community-level Occupational Health Service providers and the Massachusetts Department of Public Health; the initiation of Individualized Educational Plans (IEPs) and semi-annual IEP reviews for Residents; the re-structuring of our educational aims to conform to ACGME-required competencies; and the recruitment of institutional scholarships and corporate gifts to bolster the Residency's funding base. These kinds of changes have been instrumental in maintaining our OEMR as one of the best in the country with a recruitment yield of 70+% and several of our nation's best scholars. In the last year alone, we recruited 3 of the 8 national Occupational Physician Scholarship Fund awardees.

### **Conclusions**

A significant component of the Occupational Medicine professional training that we conduct is proficiency in research. Each OEM Resident is required to perform a hypothesis-driven research project under the mentorship of one of our faculty. Thus, in this reporting period, a total of 15 research projects were completed. These projects have shed light on, for example, risk factors for occupational low back pain using an insurance data base; risk factors for upper extremity trauma amongst meat-packers; risk factors for lead exposure in a developing country automobile battery plant; risk factors for lead exposure in a developing country's automotive radiator repair shop; and determinants of narcotics use in workers compensation cases.

## OCCUPATIONAL EPIDEMIOLOGY (1998-2003)

Teaching and research are the principal commitments of the program faculty. During the past 5 years, curriculum time devoted to occupational and environmental epidemiology has increased. Moreover, an increasing number of pre-doctoral and post-doctoral applicants have identified occupational epidemiology as their focus. A number of these individuals are pursuing joint degrees in Epidemiology and Occupational Health. With four core faculty members (Monson, Christiani, Hauser and Xu) having joint appointments in Epidemiology, a core faculty member (Hauser) assuming the lead in the Occupational and Environmental Epidemiology spring term and summer course, and a new faculty member in injury epidemiology (Perry) curriculum development and administration has become easier to accommodate the demand.

The core faculty and associated faculty from the Departments of Biostatistics, Epidemiology, Environmental Health, Toxicology, and Health and Social Behavior, cover the entire gamut in research disciplines: from methodology to applied-field research. Indeed, the HSPH faculty is one of the most productive in epidemiologic and biostatistical research in the world today.

The activities of the faculty in research presentation, scholarly papers, scientific committee and peer-review work and journal editorship have contributed substantially to the national importance of occupational epidemiology. For example, Dr. Monson is the author of an internationally acclaimed textbook on Occupational Epidemiology. Dr. Christiani has over 220 publications, most dealing with Occupational Epidemiology. Dr. Dockery, a leader in respiratory epidemiology, has assumed directorship of the Environmental Epidemiology Program.

These accomplishments demonstrate that each faculty member has proven ability to attract peer-reviewed grant support, an indication of their stature in the scientific community. Moreover, all faculty members have taken active roles in national, professional organizations such as ACOEM, ICOH, APHA, ACGIH, ATS, ACCP, SOH and SER, further increasing the viability of occupational health in general and occupational epidemiology in particular.

The training program in occupational epidemiology is part of the overall research-training program of the Occupational Health Program and the Department of Epidemiology. Within these academic units, Dr. Christiani (PI) and Drs. Monson and Dockery (Co-PI's) lead an Environmental Epidemiology training program (NRSA) funded by NIEHS and focused on research training in epidemiologic methods for environmental health. In addition, Dr. Louise Ryan leads an NIEHS-funded NRSA training program in Environmental Biostatistics.

Our curriculum and objectives are oriented towards training professionals to conduct independent epidemiologic research in occupational health. Pre-doctoral students are supported only if they intend to complete the doctoral degree (ScD or DrPH) in Occupational Epidemiology or Occupational Health. In addition, some occupational physicians enroll in a 3-year doctoral program leading to the degree of Doctor of Science in Occupational Epidemiology or a joint-doctoral degree in Occupational Health and Epidemiology.

Doctoral and post-MD-doctoral trainees participate closely with faculty members in the conduct of their thesis research. Because of the considerable time needed to conduct an epidemiologic study from start to finish, it is unusual for a trainee to conduct a research project entirely on his/her own. Furthermore, because of the considerable expense involved in epidemiologic research, financial support for the conduct of research is dependent upon resources identified by the faculty advisor.

Several members of the program faculty teach most courses, and many are joint offerings of

the Departments of Environmental Health and Epidemiology. In addition, all participating faculty have a strong tradition of collaboration with each other and with student trainees. The best evidence for this cooperation can be seen from the list of authors noted in the Faculty Biographical Sketches, in the information provided on student trainees, and in the list of student publications.

There have been *no changes* in curriculum over the past 5 years. Students admitted are either be recent college graduates in biology, natural science or mathematics, or are students with a Master's degree in one of these disciplines. Persons accepted must have an outstanding record in science courses and a high quantitative GRE score. Preference is given to students with a prior Master's degree who have experience in fields relevant to epidemiology and occupational health. Usually, these students enroll directly in the doctoral program.

Students without a prior Master's degree spend most of their first two years in formal courses in epidemiology, biostatistics, occupational health, industrial hygiene and exposure assessment, toxicology and biostatistics. Students with a Master's degree generally take formal courses for 1.5 years. In their third or fourth semester at HSPH, pre-doctoral students identify a thesis topic and work on that until completion of the doctoral degree. Generally, the total time in training at HSPH is four or five years.

### **Conclusions**

The Occupational Epidemiology Special Component has had an extremely successful 5 years. The program is rigorous, diverse in topics relevant to NORA as well as international occupational health research, and is facilitated by a very well-funded extramural research program led by a talented and committed ERC faculty. Leaders in occupational epidemiology research are being produced. Finally, ERC training resources have been key in recruiting epidemiologic talent into occupational health.

### **OUTREACH PROGRAM (1998-2003)**

Over the past five years the outreach program has consisted of the Visiting Scholars Program, Earl Dotter Exhibits, conferences, the Harvard ERC Web site, the *Stolen Dreams* Web Gallery featuring photographs by occupational health physician, David Parker, MD, MPH and individual faculty efforts. New efforts within the last five years have centered around describing and addressing the hazards of the commercial fishing industry in New England. In addition, for three years, the Outreach Program and Continuing Education have teamed up and worked with the medical director of Occupational Health and Rehabilitation (OH+R), to help produce and evaluate an educational Providers' Meeting for the medical staff of OH+R. Through the Visiting Scholars Program and our activity in the community we retain our ability to understand and respond to the needs of the New England Region.

**The Visiting Scholars Program:** The purpose of the Visiting Scholars Program is to increase the ability of faculty and other professionals throughout the New England area to incorporate into their daily teaching and work activities, the concepts, principles, and issues associated with teaching and research in the field of occupational health and safety. The program, initiated in 1988, has included over 70 professionals from the New England region. As of 2003, there are 24 active scholars from the six New England states and Maryland: Maine 4, New Hampshire 3, Vermont 3, Massachusetts 8, Connecticut 3, Rhode Island 2, and Maryland 1.

Over the five year period, the visiting scholar roster has been very stable. One of the scholars added since 1998 is a nurse who has been sponsored by the American Association of Occupational Health Nurses to develop an environmental health curriculum for baccalaureate undergraduate nursing programs. The occupational health projects of other scholars include major overhaul of an

associates degree nursing curriculum to include occupational and environmental issues and total redesign of the the working/training environment for student nurses; the creation of a CD-Rom library for training employees at Sprague Energy that resulted in a 0.364 recordable injuries/100 FTE in 2003; the development of a web-based, real-time "near miss" reporting system; and an \$80 million commitment from the Maine state legislature to replace temporary school buildings with permanent structures. Perhaps the most unique scholar project was the development of a mechanical lead-paint stripper that permits the military to de-construct old barracks and reclaim the wooden siding while safely disposing of the lead paint fraction. The unit has been designed to be safe for workers and the environment.

The details of the scholars' projects are available in a bound booklet that has been produced annually since 1998.

**Earl Dotter Exhibits:** Earl Dotter is our Visiting Scholar from Maryland. In 2003 his exhibit, *The Quiet Sickness, A Photographic Chronicle of Hazardous Work in America*, toured to the Bott Mill in Lowell Massachusetts, an historical mill town and was "held over" because of the strong interest in the exhibit. In 2000, after Dr. David Christiani and Ann Backus supported Mr. Dotter's application to the Alicia Patterson Foundation, Mr. Dotter was awarded a major Patterson fellowship to chronicle the hazards of the fishing industry in the Northeast. This difficult assignment which included 7 grueling days at sea in December 2001, resulted in the development of an exhibit called *The Price of Fish* which opened at Maine Occupational Research Agenda (MORA) conference in May 2003 and subsequently was on public display at offices of the Maine Employers Mutual Insurance Company (MEMIC) in Portland, Maine.

**FISH SAFE in Commercial Fisheries News and other fishing related activities:** In February 2000, Ann Backus began writing a monthly column entitled FISH SAFE for Commercial Fisheries News (CFN), a paper that serves the commercial fishing industry along the eastern seaboard. The column has appeared monthly since February 2000 and covered topics critical to the commercial fishermen such as confined space, stability, life rafts, sun exposure, tripping hazards, survival suits, wind chill, bilge pumps, hoses, fire extinguishers, right of way regulations, etc.

In 1999, with NIOSH pilot project money, Ann Backus teamed up with the NIOSH Alaska field station in Anchorage to develop a survey tool for use on the east coast with lobstermen and in Alaska with crab fishers. A risk communication poster based on the results of the east coast survey was developed and distributed to over 5500 lobstermen on the coast of Maine. Ms. Backus appeared at the Fishermen's Forum for three years and talked with lobstermen and other fishermen about the hazards of their work. In 2003, again with NIOSH pilot project funds, Ann Backus and Visiting Scholar Richard Donahue, MD designed and implemented a pilot study to determine the indoor exposures of lobstermen to particulates, PAHs, and endotoxin. This descriptive study showed that the indoor exposures of lobstermen are significant and could be associated with increased incidence of the chronic cough lobstermen report in the winter months.

In October of 2000, The Harvard-NIOSH ERC and the NIOSH Alaska Field Station jointly sponsored the International Fishing Industry Safety and Health Conference (IFISH pronounced "I Fish") at Woodshole, MA. It was attended by 140 people from all over the globe who have a vested interest in fishing safety. The proceedings of the conference were published by NIOSH. IFISH II is scheduled for September 21-24 in Sitka, Alaska.

Ann Backus served on the Maine Governor's Task Force on Commercial Fishing Safety during 2002; the task force developed legislation that passed the Maine State Legislature to establish a permanent Advisory Council on Commercial Fishing Safety.

**Harvard ERC Web Site:** The web site covering all cores and aspects of the NIOSH-funded Harvard ERC was developed and put on-line in the summer of 1998. It has been periodically updated and still features photographs by Earl Dotter in the left hand margin. These photographs reinforce the purpose and importance of work in the field of occupational safety and health. The URL is <[www.hsph.harvard.edu/erc](http://www.hsph.harvard.edu/erc)>.

**Stolen Dreams Web Gallery of photographs by David Parker, MD, MPH:** This gallery is a microversion of Dr. Parker's book, *Stolen Dreams*. It consists of 21 photographs of children in countries around the world engaged in hazardous work and mistreated in work environments. The development of this gallery was a joint effort of David Parker, ERC outreach, and the HSPH Office of Academic Communications. The site is now the 12<sup>th</sup> most visited site at the Harvard School of Public Health. Two years ago, a Spanish version was added.

**Regional Needs:** Our programs are designed to continually assess and respond to regional needs. Both the Visiting Scholars Program and the Earl Dotter exhibit/conference format have this capability.

**Faculty Outreach and ERC Seminars.** The faculty is constantly active as speakers, consultants, and committee members at local, state, and national levels with all types of organizations. They also serve as reviewers for federal funding agencies. Even as they go out to the field, experts from the field are invited to HSPH to present semi-monthly seminars known as the Harvard-NIOSH ERC Seminars.

## **CONTINUING EDUCATION**

The Continuing Education program at the Harvard Education and Research Center within the Department of Occupational Health is housed within Harvard School of Public Health's (HSPH) Center for Continuing Professional Education. The primary mission of the Center is to provide professional education and training with emphasis in the New England Region for occupational physicians, occupational health nurses, industrial hygienists, occupational safety engineers, and other occupational safety and health professionals.

From 1998-2001 (2002 data is not compiled as of this date), the Center has offered or collaborated on 177 programs training 3,315 professionals in the curriculum areas noted below:

### **Core Curriculum and Enrollment by Specialty Area\*:**

#### **Occupational Medicine\*\***

- Occupational and Environmental Health Grand Rounds
- Occupational Health + Rehabilitation Providers Annual Meeting
- New England College of Occupational and Environmental Medicine (Annual Conference)

#### **Occupational Health Nursing**

- Certification Review for Occupational Health Nurses
- Occupational Health Physical Assessment Skills for Nurses
- Spirometry Testing in the Workplace
- ERC Online Seminars in Occupational Health Nursing (2 Pilot Programs)
  - Acute hand Injuries: Risk Factors for Women in the Workplace
  - Police Officer and Firefighter Medical Examinations

## Industrial Hygiene

- Comprehensive Industrial Hygiene Review
- Fundamentals of Industrial Hygiene
- Hands-On Measurement and Diagnostics: Evaluating the Indoor Environment
- In-Place Filter Testing Workshop
- The Indoor Environment: Interpreting Data, Implementing Control Strategies, and Communicating Risk
- Occupational and Environmental Radiation Protection
- Orientation to Indoor Air Quality

## Hazardous Substance Training

- Basic CAMEO FM Training
- Advanced CAMEO FM Training
- Respiratory Protection
- Assessment and Control of Dermal Hazards
- Radioactivity in the Environment
- Emergency Medical Services Response
- Chemical Terrorism & Public Health: Recognize, Prepare, Respond

## Occupational Safety

- Atmospheric Science and Risk Projections
- Certified Safety Professional Review
- Nuclear Emergency Planning
- Ergonomic Guidelines for Computer Use
- Testing and Certification of Biological Safety Cabinets

## Other

- Analyzing Risk: Science, Assessment, and Management
- Analyzing Regulations: Health, Safety and the Environment (*formerly Benefit-Cost Analysis for Environmental, Health and Safety Regulation*)
- Guidelines for Laboratory Design: Health and Safety Considerations
- Leadership and Management Skills Essential for Health and Safety Professionals
- Risk Management and Liability Issues in Occupational Safety and Health
- Ergonomic Guidelines for Computer Use
- Ergonomics and Human Factors: Applications in Occupational Safety and Health (*formerly Industrial Ergonomics: Human Factors in Occupational Health and Safety*)
- The Risk Communication Challenge
- Probabilistic Risk Analysis: Assessment, Management and Communication
- Occupational & Environmental Health Research Seminars
- Seminars in Occupational Health, Monday ERC Seminars

**Total: 1,009 participants**

\*Enrollment figures reflect numbers from CCPE since 1996

\*\* Enrollment not available

The Center for Continuing Professional Education has developed a full range of services to ensure faculty and participant needs are met on every level. Two advisory committees provide critical programming review and continuous quality improvement: The Advisory Committee on Continuing Medical Education, and The Advisory Committee for the Center for Continuing Professional Education, with specific oversight for the ERC courses. Courses come to the committees for annual review and once every three years a full review and renewal is conducted. In addition, a third

committee was formed in 2002 to oversee CCPE's financial and reporting structure and practices. CCPE's database and participant evaluations capture essential programming information that aid in post-course analysis and debriefing meetings. Within 60 days post-course, a meeting is held between the program directors and CCPE staff to examine the enrollment, marketing, competitive programming data, participant evaluation, and financial performance of the course. The data from prior years is also compared with current performance to identify trends.

CCPE has enhanced its website to include programming calendars, registration information, detailed course descriptions, faculty listings with links to faculty biographies, as well as related links within the school, Occupational Health, and NIOSH affiliations.

CCPE has launched an online pilot program with ERC Outreach and Occupational Health Nursing. Two ERC Seminars were videotaped and placed on the HSPH website to reach a broader occupational healthcare audience. The pilot successfully provided continuing education credit for more than 125 nurses who completed one or both of the programs.

## **HAZARDOUS SUBSTANCE ACADEMIC TRAINING**

The HSAT Program has been directed by Stephen Rudnick, ScD, CIH, since its inception in 1993. Dr. Rudnick has also been director of the Hazardous Substance Training (HST) Program since 1995. The synergism resulting from having the same director for both hazardous substance programs has been very beneficial to the HSAT Program. The joint HST/HSAT Advisory Committee would not have been available to the Program if not for this collaboration. Much of the help that the Program has received from government and private companies resulted from relationships developed through our Advisory Committee.

In order to graduate from the HSAT Program with a MS degree, a student must take 80 credits, which includes 20 credits for a six-month internship. Required coursework amounts to 77.5 credits. Thus, there is little room for electives, although many of our students carry a course overload in order to be able to take more electives.

Starting in 2002, we increased the number of hazardous substance related courses that HSAT Program students are required to take. In addition to the four courses that had been required previously (Protecting Workers and Communities from Hazardous Substances; Regulation of Chemicals, Radiation, and Biotechnology; Industrial Hygiene Internship; Industrial Hygiene Internship Seminar), "The Radiation Environment: Its Identification, Evaluation, & Control" is now required. In addition, a new course, "Properties of Environmental Contaminants and Transport Media" is also now a requirement for HSAT Program students (as well as for IH students). The hazardous substance related content of another required course taken by all IH students, "Analytical Methodology & Exposure Assessment," was also increased by requiring HSAT Program students to choose a hazardous substance related topic as their special project.

The core course for the HSAT Program since its inception has been "Protecting Workers and Communities from Hazardous Substances." This course covers important topics concerned with hazardous substances not well covered in any of the courses offered at the School. It deals primarily with the protection of workers during remediation of hazardous waste sites, emergency response activities, and related operations. This course has changed somewhat over the years, but has kept its original focus and has been well-received since its inception. Students have consistently given "the course overall?" and "its usefulness to you for your profession?" a median rating of 6.0 (where 1.0 is the lowest score and 7.0 is the highest score).

During the five-year project period that extends from July 1, 1998 to June 30, 2003, the HSAT Program has graduated six masters-level students. Four of these graduates entered the doctoral program at Harvard. Without financial support from NIEHS through NIOSH, we would not have been able to attract the high quality students who have enrolled in the Program.

## **Conclusions**

The Harvard Hazardous Substance Academic Training (HSAT) Program is a subspecialty concentration within the Industrial Hygiene Program. The primary objective of the HSAT Program is to train competent masters-level industrial hygienists who are knowledgeable about the health of workers involved with hazardous substances and have the training to become leaders in their field. The Program is directed by Stephen Rudnick, ScD, CIH, who has directed the Program since its inception in 1993. From July 1, 1998 to June 30, 2003, the HSAT Program has graduated six masters-level students. Four of these graduates entered the doctoral program at Harvard.

## **HAZARDOUS SUBSTANCE TRAINING PROGRAM**

The Harvard Hazardous Substance Training (HST) Program, which is directed by Stephen Rudnick, ScD, CIH, offers continuing-education courses focusing primarily on hazardous substance related topics for professionals. We have not offered OSHA-mandated courses, such as a 40-hour Hazwoper course, because the University of Massachusetts at Lowell, which is funded by NIEHS, provides worker-training courses related to hazardous substances. During the five-year project period from 1998 - 2003, we offered a total of 30 classes in which 718 participants were trained. Nearly all of those participants representing state or local governments were given scholarships. The 30 classes that were offered were composed of eleven different courses.

Since 1995, the HST Program has been directed by Stephen Rudnick, ScD, CIH. Dr. Rudnick has also been director of the Hazardous Substance Training (HST) Program since 1995. The synergism resulting from having the same director for both hazardous substance programs has been very beneficial to the HST Program. We have relied heavily on the committee to provide the needs assessment necessary to guide our program offerings. This committee includes representatives from state and federal agencies, consulting firms, hazardous waste cleanup operators, industry, and academia. Through the committee we have forged relationships with key agencies and end users.

From July 1, 1998 to June 2003, we have given a total of 30 classes in which 718 students were trained. Eleven different courses were offered:

1. Advanced Hands-On CAMEO Training
2. Assessment & Management of Hazardous & Toxic Materials
3. Assessment and Control of Dermal Hazards
4. Atmospheric Science & Risk Projections for Hazardous & Radioactive Material Releases to the Environment
5. Basic Hands-On CAMEO Training
6. Bioterrorism & the Transportation Industry Workshop
7. Chemical Terrorism and Public Health: Recognize, Prepare, Respond
8. Emergency Medical Services Response to an Act of Terrorism or a Hazardous Materials Incident
9. Nuclear Emergency Planning
10. Radioactivity in the Environment: Risk, Assessment & Measurement
11. Respiratory Protection

Seven of these courses were developed during the project period. Another three courses are in the planning stage; agendas have been prepared and the feasibility of offering these courses is being determined.

Funding from NIEHS though NIOSH has been critical to our HST Program in a number of ways. It has provided funding for development of new courses. It has allowed us to keep the price of tuition for HSAT Program courses low. (For example, tuition for the HSAT Program courses "Assessment and Control of Dermal Hazards" and "Respiratory Protection" was less than \$200 per day, and for the basic and advanced CAMEO courses, tuition was less than \$120 per day. It has also provided funds that we used to offer scholarships to qualified applicants. The availability of student financial support allowed many local and state government workers attend classes from which they otherwise would have been excluded.

## **ADMINISTRATION**

The ERC is situated administratively within the Department of Environmental Health at the Harvard School of Public Health. Dr. Barry Bloom is the Dean, and Dr. James Ware is the Dean for Academic Affairs. Dr. Joseph Brain is the Chair of the Department of Environmental Health that contains five programs: Dr. David Christiani is the Head of the Occupational Program and the ERC Director; Dr. Jeff Fredberg is Head of the Physiology Program; and Dr. Petros Koutrakis is the Head of the Exposure, Epidemiology, and Risk Program.

The Executive Committee that consists of the Center Director, Deputy Director, Administrator and the Academic Core Directors. Bi-weekly meetings of the ERC faculty, including members of the Executive Committee, are held throughout the academic year to discuss student progress and assure continuity in the Center's long-standing interdisciplinary curricula. Financial management is centralized under the Director and Administrator. Meetings between the Center Director, Administrator and each Core Director are held four times a year to evaluate the progress of the trainees, review use of training funds, and set plans for the coming year.

The Executive Committee meets annually with the ERC Board of Advisors. Progress over the past years presented and problems are discussed. Written advice from the Board is transmitted to the Executive Committee and the Dean. A response from the Dean is composed and discussed with the ERC Center Director and transmitted to all Core Directors and Advisors. The Industrial Hygiene Core receives additional review and assistance from the Guild of Harvard Industrial Hygienists. The Residency Advisory Committee meets twice per year to advise the Residency Director, faculty, and administrator on selection and evaluation of the residency and on the training program as a whole.

Since the last renewal, research training at the Center remains under the overall directorship of Dr. Christiani who has chaired and participated in over 20 doctoral research committees over the past fifteen years. As of July 1, 1996, Dr. Christiani assumed directorship of the ERC.

Faculty changes since 1998 have included the following:

Dr. Russ Hauser was promoted to Associate Professor of Occupational Health, with a secondary appointment in the Department of Epidemiology.

Dr. Howard Hu was promoted to Professor of Occupational and Environmental Medicine in 2002.

Dr. Robert Herrick was promoted to Senior Lecturer in Industrial Hygiene.

Dr. Murray Mittleman joined the faculty in 2000 as an (secondary) Assistant Professor of Epidemiology.

Dr. Jeff Katz of Harvard Medical School joined the faculty as an Associate Professor of Occupational Medicine.

Dr. Jack Dennerlein joined the faculty in 1999 as an Assistant Professor in Ergonomics and Safety.

Dr. Melissa Perry joined the faculty in 2003 as an Assistant Professor of Occupational Health.

Dr. Ellen Eisen joined the faculty in 1999 as an adjunct Professor of Occupational Health.

Our primary goal in conducting research is to prevent occupational illness and injury. We approach this goal by attempting to improve measures of exposure and disease as well as improving methods of analysis of data relating to occupational disease and injury.

The Harvard ERC has accomplished its aims and goals from 1998 up to the present time. We have expanded our mission to include new academic training cores, the Injury Prevention and Control (2002) and Occupational Health Services (2001) Special Components. In addition, we received Pilot Project Research Training (PPRT) funds (2002). Also, we have expanded the Visiting Scholars Program in outreach activities as a whole and integrated these outreach activities into the academic life of the Center.

We have expanded interdisciplinary interaction at the didactic level and in research training. Research projects in which students work together and obtain doctoral-level training in industrial hygiene and occupational epidemiology as well as occupational safety and health have been expanded and are very successful. Didactic and practicum experiences have included students from all over the academic cores working together on a common problem. Collaboration and research endeavors have also marked relationships between the Center and the TPG's in the region such as that at the University of Massachusetts at Lowell and the University of Massachusetts Medical Center in Worcester.

Finally, outreach activities have been integrated into the academic mainstream of the Center and have helped recruit graduate students for the Center and place graduates into jobs.

The Center has met its regional and national needs by training multidisciplinary teams of professionals to identify and prevent occupational disease and injury. We have also expanded minority recruitment to careers in occupational medicine, industrial hygiene, nursing and occupational epidemiology.

## **PUBLICATIONS**

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### **OHN Publications and Presentations**

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Love, C. (1999, May 24). Legislative initiatives in occupational health. University of Trnava, Trnava, Slovakia.

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Somers, C.A. (1999, May 25) Management and Financing of Occupational Health in the United States. University of Trnava, Trnava, Slovakia.

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