NORTHERN CALIFORNIA EDUCATION AND RESEARCH CENTER FOR OCCUPATIONAL SAFETY AND HEALTH

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ANNUAL REPORT

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Northern California Education and Research Center
2007 Annual Report

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II. Introduction and Executive Summary

The Northern California Education and Research Center is part of the Center for Occupational and Environmental Health (COEH), a consortium of programs at three campuses of the University of California (UC) with institutionally committed funding to conduct research and provide clinical experiences, research training, and services to protect the health of workers in their workplaces and their communities. The NIOSH-funded programs include: UC Berkeley Industrial Hygiene (IH), joint UC Berkeley-UCSF Ergonomics, UCSF Occupational and Environmental Health Nursing (OEHN), UCSF Occupational and Environmental Medicine (OEM) Residency, and UC Berkeley Labor Occupational Health (LOHP), and Outreach and Continuing Education (CE) Programs. The Director and Deputy Director of the COEH, Drs. John Balmes and Marion Gillen, serve in these respective roles for the Northern California ERC and COEH. The administrative core for both the ERC and COEH are housed in the Division of Environmental Health Sciences of the School of Public Health at UC Berkeley. An Executive Committee of Program Directors governs them, and an External Advisory Committee provides guidance. A key feature of the COEH-ERC structure that has greatly contributed to the success of its programs is that designated university funds are available to support faculty and staff such that most of the NIOSH academic program funds can be used to support trainees.

The COEH and Northern California ERC serve government, industry, schools, health professionals, and the general public through programs and partnerships designed to deepen understanding of occupational and environmental hazards and to prevent disease, fatalities, and injuries. Activities are grounded in multi-campus, multidisciplinary teaching programs in medicine, nursing, public health, and related fields which educate future leaders in occupational and environmental health, conduct research to develop new knowledge, and translate that knowledge into information that can be used to improve worker and community health. The COEH-ERC helps address the shortage of health care professionals with expertise in occupational safety and health in the U.S. by training occupational and environmental health specialists for careers in industry, universities, labor, non-governmental organizations, and government.

Approximately 60 faculty, plus researchers and other professional staff from many schools and disciplines, are involved in COEH. Faculty conduct a wide range of research from basic laboratory studies to applied research to prevent injuries and disease in the workplace and to solve critical health problems in communities. Interdisciplinary collaboration has been a cornerstone of COEH research success. At its inception in 1978, COEH made a commitment to deliver university services directly to the public. This is accomplished through a labor and community education program, a continuing professional education program and clinical services. The University of California provides COEH with $2.8 million in annual funding, which provides a permanent infrastructure for the NIOSH-funded programs, and COEH faculty have been highly successful in obtaining extramural funding (over **$39** million in 2003-04).

A. Major Accomplishments

During the last academic year (July 1, 2006 – June 30, 2007), the Northern California ERC trained 36 student or residents, 31 of whom were either partially or fully funded by NIOSH. We trained 13 Industrial Hygiene students (10 MS or MPH and 3 PhD), as well as 7 Ergonomics (1 MS, and 5 PhD), 13 occupational and environmental health nursing (OEHN) students (5 MS and 8 PhD) and 3 occupational and environmental medicine (OEM) residents. Numbers in the

current academic (July 1, 1007 – June 30, 2008) year are similar to last year. We are currently training 36 students, 27 of whom have either full or partial funding (11 IH, 4 Ergonomics, 18 OEHN and 3 OEM). Funding for students not supported by NIOSH comes in the form of outside scholarships and fellowship, as well as personal support for those who may not meet the criteria for NIOSH support. For example, one resident is supported by an Occupational Physicians Scholarship Fund, and one OEHN doctoral student received full funding through the Betty Irene Moore Foundation.

The faculty of the core disciplines in the Northern California ERC are nationally and internationally recognized leaders in their fields. During the current academic year, faculty published 146 book chapter or articles in peer-reviewed journals, many of which were interdisciplinary in nature or involved student input and mentorship. For example, Marion Gillen, of the OEHN program and Deputy Director of COEH, published a paper this year with Dr. Paul Blanc of the OEM program about the association of socioeconomic status and psychosocial and physical workplace factors with musculoskeletal injury in hospital workers (*Amer J Ind Med 2007; 50:245-260*). Results of this paper along with a paper by d'Errico and Punnett were featured in a Bureau of National Affairs publication. David Rempel, the Director of the Ergonomics Program, along with several other ERC faculty and students, recently reported on the effects of task chairs on shoulder and neck pain among sewing operators in the Los Angeles garment industry (*Spine 2007; 32:931-938*). Drs. Rempel, Krause, and Goldberg received the International Ergonomics Association/Liberty Mutual Prize in Occupational Safety and Ergonomics. Dr. Goldberg also became an honorary fellow in the Faculty of Occupational Medicine, Royal College of Physicians in Ireland.

In industrial hygiene, Mark Nicas' analysis of airborne pathogen exposure has led to the recognition that the quality of respiratory protection substantially affects infection risk. In addition, Dr. Kathie Hammond's research on exposure to second hand tobacco smoke has supported the prohibition of smoking in private and public workplaces. Dr. Hammond has worked extensively with researchers in Ireland on this issue. Also of note, new faculty member, Dr. Stephen Rappaport, was just awarded funding from the Genes, Environment and Health Initiative of the National Institute of Health to develop a Center for Exposure Biology, one of only a few such centers nationwide.

Occupational medicine faculty (Eisner and Balmes), along with their industrial hygiene and public health colleagues (Hammond and Tager), have recently shown that second hand smoke exposure is a risk factor for lung function decline and cardiovascular disease mortality (***citation here).*** While most employees are no longer exposed to second hand smoke in the workplace, which historically has not been the case for workers in many industries such as eating and drinking establishments, and the airline field. Given the success of their work, the University of California, San Francisco, Flight Attendants Medical Research Institute Center of Excellence received another five years of funding for multidisciplinary research.

Students in the Northern California ERC have a prominent publication record. During the past academic year, students or residents published 40 book chapter and articles in peer-reviewed journals. Rachael Jones (IH) published a manuscript on the infectious dose of Q Fever (*Appl Biosafety; 11:32-41*); Kin Cheung (OEHN) published results from her dissertation on risk factors for back pain among homes care nursing personnel in Hong Kong (*Amer J Ind Med 2006; 49:14-22*). Sarah Janssen co-authored a chapter on reproductive hazards with Dr. Robert Goldberg for a textbook called *Agriculture Medicine*. Finally, **XX** Nakama reported on the effect of repetition rate on the formation of microtears in tendons (*J Orthop Res 2007; 25:1176-1184*). Topics of other student publications included: worker exposure to volatile organic compounds in

the vehicle repair settings; preventing musculoskeletal disorders in musicians; periodontal instrument handle design; persistent chemical pollutants in the environment and breast milk; alternative mouse and forearm support on upper body discomfort; and pinch forces during periodontal scaling.

The COEH and ERC programs have continued to collaborate with multiple agencies and organizations, including the California Department of Public Health, CAL/EPA, CAL/OSHA, the U.S. EPA, the Natural Resources Defense Council, labor unions (e.g., UNITE HERE, SEIU, and UAW) and industry. A notable example of a newly developed collaboration led by COEH-ERC faculty is the Occupational Health Internship Program, a national program to provide summer internships for students interested in occupational health and safety careers that involve exposures to real-world issues in workplaces with organized labor representation. This program recently received direct funding from NIOSH in order to expand the program. Each year COEH contributes funding for one intern. In addition, three former OHIP interns have applied and been accepted to the OEHN program making this an invaluable recruitment mechanism.

Although not supported through NIOSH funds, the COEH Student Award program provides support (up to $5,000 per project) for student-initiated, interdisciplinary research projects for students in the ERC core programs. The process by which the awards are made is a competitive and iterative one designed to teach the students about research grant writing. Two recent examples of completed or ongoing projects are noise assessment of a rapid transportation system, and manganese sampling in manufacturing facilities in China.

B. Significant Changes since June 30, 2006

In Spring 2006, Oisaeng Hong, RN, PhD, accepted the position at the director of the OEHN program. Dr. Hong comes to us from the University of Michigan where she held a similar position. Julia Faucett, current Chair of the Community Health Systems department and Acting Program Director, will be retiring in 2008. Plans are underway to recruit for a faculty member for her position. Marion Gillen, former OEHN program director, serves as the ERC Deputy Director, and John Balmes as the Director. John Balmes remains the Chief of the Division of Occupational and Environmental Medicine of the UCSF Department of Medicine at San Francisco General Hospital. Deputy Director Gillen spends 100% of her time at UCB, though she continues to work with doctoral students who are nearing completion of their studies. Dr. Balmes spends 40% time at UC Berkeley and he holds full academic-senate faculty appointments at both UCSF and UC Berkeley. Dr. Balmes' joint appointment facilitates the coordination and integration of the UCSF and UC Berkeley programs of the ERC. That the current ERC leadership is from UCSF provides evidence of the true integration of programs.

While Dr. Gillen retains a without-salary faculty appointment in the UCSF School of Nursing, she also holds the position of Academic Program Coordinator at UC Berkeley. Her role as ERC Deputy Director includes supervision of two full-time staff positions (Communications and Financial Administration), organization of center-wide activities, organization of the COEH-ERC Executive and External Advisory Committees and record-keeping (minutes of meetings, measures of success, training outcomes). Drs. Balmes and Gillen have joint responsibility for the COEH Student Award program, the COEH newsletter, the ERC's Diversity Recruitment Plan, Interdisciplinary activities, and the NORA Research Training Program. While we acknowledge that the replacement of Dr. Robert Spear as ERC Director and long-time COEH-ERC Administrator Suzanne Llewellyn as challenges, they are both still involved and continue to provide input on important issues. We take pride in the careful transition of leadership of the

COEH-ERC that has occurred over the past 4 years and which has ensured continuity and enhanced vision.

C. COEH-ERC Websites (including links to programs and faculty/staff directory)

Center Administration:
COEH web site: http://coeh.berkeley.edu/
Staff & Faculty: http://coeh.berkeley.edu/people/

Programs:
Berkeley EHS: http://ehs.sph.berkeley.edu/
UCSF COEH: http://coeh.berkeley.edu/ucsfoem/
Berkeley/UCSF Ergonomics: http://www.me.berkeley.edu/ergo/
Occupational & Environmental Health Nursing:
http://nurseweb.ucsf.edu/www/spec-oeh.htm
International Occupational & Environmental Health:
http://ehs.sph.berkeley.edu/hed/page.asp?id=1
Davis Toxicology: http://www.envtox.ucdavis.edu/ptx/
Davis Public Health Sciences: http://phs.ucdavis.edu/

III. Program Progress Report – Center Wide Activities

A. Program Title: Northern California Education and Research Center, Center for Occupational and Environmental Health

B. Program Director: John R. Balmes, MD

C. Program Description

1. Center Administration

The Northern California ERC supports programs on two UC campuses -- Berkeley and San Francisco. It has campus facilities and off-campus clinical and research space in San Francisco, and at the Richmond field station. Large research projects also rent off-campus space. The Administrative and Planning Core is housed on the Berkeley campus. This geographical separation is challenging, but has not prevented the development of an integrated interdisciplinary teaching, research, and service program in occupational and environmental health. Please see above for a description of Center leadership.

Drs. Balmes (Center Director) and Gillen (Center Deputy Director) have a long-standing working relationship. They meet about COEH-ERC issues at least weekly. Dr. Balmes has been COEH Director and ERC Deputy Director since 2002. Both he and Dr. Gillen also have a long-standing working relationship with the former ERC Director, Dr. Spear. Administrator Suzanne Llewellyn, who is now working on special projects for COEH, meets regularly with Dr. Gillen and Dr. Balmes, continuing to play an active role in COEH activities such as the Bridges newsletter and Green Chemistry initiatives. The COEH Executive Committee consists of the Director, the Deputy Director, the Immediate-Past Director, the Director of each ERC Program, the UC Davis Epidemiology Program Director, and the UC Davis Agricultural Engineering Program Director. This committee meets approximately bimonthly and is the primary forum for planning discussions to ensure the coordination and integration of the ERC programs.

The COEH-ERC conducts a number of center-wide activities, including "get-togethers" (held once or twice annually, hosted by one of the core academic programs in rotation, and featuring the research of faculty and students from that program), symposia (held bi-annually with a theme selected by the COEH Executive Committee), long-range planning (involving a sub-committee of the Executive Committee), newsletter production (three to four times per year), website maintenance, the Student Award program, dinner meetings to welcome new faculty, and retreats (held every few years as necessary). Drs. Balmes and Gillen, in consultation with the Executive Committee, are responsible for planning these with assistance from COEH administrative staff.

The COEH Executive Committee is the internal management committee for the ERC. The COEH-ERC external Advisory Committee has been reorganized over the past year to better represent the stakeholders in the activities of the center programs. In addition to verbal discussion at these meetings, the committee provided written input to the long-range planning process for the COEH-ERC.

There is regular communication and shared conference sponsorship between the Southern and Northern California COEH-ERCs. Unfortunately, a jointly-sponsored conference planned for 2006 was canceled due to unforeseen staffing difficulties.

Several of the ERC faculty have served on the NIOSH Board of Scientific Counselors (e.g., Julia Faucett, Robert Spear). Several have also served on NORA committees (e.g., Dr. Balmes served on the committee on asthma and chronic obstructive pulmonary disease for 5 years). Drs. John Balmes and Paul Blanc have served 5-year terms on the Safety and Occupational Health study section. Drs. Balmes and Blanc were recently appointed to an NRC panel that will be reviewing the research conducted by the Respiratory Disease Branch of NIOSH.

2. Outreach

The Labor Occupational Heath Program (LOHP) provides a wide array of outreach and research-to-practice (R2P) activities with educational institutions, businesses, labor unions, community groups and agencies in the region. As in the past, these activities are funded through a rich mixture of COEH funds and diverse extramural sources.

***On-Going Outreach Activities*:** LOHP general services include: (1) original publications; (2) conferences and training programs; (3) technical assistance; (4) a library; (5) policy research; (6) referrals to medical, legal, industrial hygiene, and laboratory services; and (7) course development and instruction at the high school, community college, and university levels. LOHP also acts as a clearinghouse and liaison, making the ERC's resources and expertise accessible to constituencies outside the University.

Examples of some of the many specific LOHP projects for the next year include:

- **Young Worker Leadership Academies:** In 2007, enthusiastic teens from throughout California attended two, 3-day leadership academy on workplace health and safety. Teams of young people work to create outreach activities for their schools and communities to promote positive, safe youth employment. Over 100 youth applied for the 2007 Academies from 30 teams. Five youth mentors from the 2006 Academy helped conduct the activities. Twenty-one

youth attended the Northern California Academy held in Berkeley, and 19 attended the Los Angeles Academy.

- **Hazardous Waste Project**: this project has trained over 4,000 workers in English and Spanish since 1987. In 2007, the following courses were offered: 8-Hour Annual Refresher (5 times, including 2 in Spanish), and 24-Hour Treatment, Storage, and Disposal. (2 times, including 1 in Spanish) Also, free introductory Hazard Awareness courses are regularly offered.
- **Safe Jobs for Youth Month Poster Contest:** The winning poster for 2007 was developed by Abby Chung. She was recognized with a cash gift and distribution of her poster throughout the state.
- **Small business outreach**, including workshops for restaurant owners, and development of training resources for small business owners in a variety of industries
- **Course offerings** at universities and colleges throughout northern California
- **Home Care Attendants**, a collaboration with employers, unions, workers, and NIOSH to improve their working conditions
- **Working Immigrant Safety and Health (WISH) Coalition,** including, a conference on protecting immigrant construction workers in conjunction with the Center to Protect Workers Rights and the California State Building and Construction Trades Council.

COEH faculty also make significant outreach contributions, through curriculum development, speaking, consulting and conducting other projects that bring an occupational health perspective to professionals in other fields and to the community.

***New Outreach/R2P Initiative*:** The plan for the 07-08 NIOSH outreach budget is to establish a new student internship program for the ERC. The goals of this internship program are to: 1) Attract students from a variety of fields and introduce them to occupational health careers; recruit students from under-represented groups to enhance diversity of the field; 2) Expose students interested in occupational safety and health to real-world environments, allowing them to apply and enhance academic learning; 3) Conduct research-to-practice (R2P) projects where students work under academic supervision with partners in the community, labor, business, and/or public agencies; and 4) Promote the interaction of occupational health and safety practitioners with ERC faculty and students through the internship program.

Student Outreach: LOHP will coordinate with COEH academic programs on all campuses to conduct informational class presentations to make students aware of community service and research-to-practice opportunities and to recruit students to participate in the internship program. In addition, LOHP will conduct outreach to faculty in other disciplines in order to arrange class presentations to undergraduate and graduate students to raise awareness of the occupational health field and how it may intersect with their chosen field of study (e.g. biology, chemistry, physics, architecture, engineering, business, and sociology). Special emphasis is placed on reaching a diverse student population, for example through outreach to ethnic studies programs.

Student outreach extends beyond the three UC campuses. LOHP staff contact faculty in other institutions of higher learning in the area to arrange class presentations at, for example, San Francisco State University, Samuel Merritt College of Nursing, and others throughout northern California. Finally, LOHP conducts outreach to teachers in secondary schools throughout the

state, offering curriculum materials for inclusion of occupational health topics in a variety of classes in secondary schools (sciences, social studies, work readiness programs).

Internship Program: LOHP has developed a minimum of four paid internship opportunities per year for students. Each internship is carefully designed to involve a community partner (e.g. labor union, business association, community-based worker center), as well as a health professional partner (e.g. health department representative, occupational safety or health professional, health care provider). Each project is selected based on the opportunity to translate science into practical solutions to protect workers, with a special emphasis on addressing the needs of underserved workers, who often do not benefit from traditional means of disseminating occupational health knowledge (e.g. low wage immigrant workers, the contingent workforce, and young workers).

3. Interdisciplinary Coordination

The Northern California ERC is committed to the concept that a multi-disciplinary team approach is usually the best way to address complex occupational and environmental health problems. This commitment is modeled to the students by the faculty's interdisciplinary collaborative approach to their own research. For example, Dr. Katharine Hammond (IH) has been actively collaborating with both Drs. Balmes and Blanc (OEM) for many years. In particular, the joint UAW-NUMMI project led by Dr. Hammond includes Dr. Balmes, Dr. Ellen Gold (COEH epidemiologist from UC Davis), Patricia Quinlan (IH with the OEM program) and Robin Baker (LOHP and Outreach Director). Drs. Blanc and Gillen, in conjunction with Drs. Harrison, Meister, Masharani (UCSF medicine faculty), Jacobs (UCSF medicine faculty), Yen (UCSF Specialist), Ames (UCB psychology faculty) recently completed a 5-year follow-up study on musculoskeletal injuries in hospital workers. Students from each of the programs represented by these faculty have participated in the UAW-NUMMI project.

Many ongoing activities bring ERC faculty, staff, and students together. Listed below are the permanently established ways in which the ERC is integrated:

- **Summer Institute on Continuing Education** - a week-long training institute.
- **Clinical Training** - Involving training sites for residents, nurses, industrial hygiene, and ergonomics students to collaborate.
- **COEH Symposium** - All day discussion of a topic of current interest such as how to infuse the California Workers' Comp system with prevention activities.
- **COEH Student Award Program** - **Funds** awarded to interdisciplinary teams conducting a research, teaching, or service project.
- **COEH home page** - Links the programs on all three campuses: http://coeh.berkeley.edu.
- **COEH newsletter**, ***Bridges,*** which disseminates information about the teaching, research, and service activities of all component programs.
- **Joint Grand Rounds, research seminars, journal club, workplace site visits, and case conferences**
- **COEH Get-togethers** - Social/scientific events attended by students and faculty of all programs.
- **Outreach to other disciplines** - Through formalized activities targeting non-ERC students.
- **Joint Faculty and Lecturer Appointments** - Joint faculty appointments are further evidence of the integration of our programs: David Rempel (UCSF and UCB Bioengineering); John Balmes (UCSF-OM and UCB-SPH); Patty Quinlan (UCSF OM and OEHN); Marion Gillen (UCSF-OEHN and UCB-Admin) -and Barbara Plog (UCB-SPH and UCSF-OEHN).

- **Research** – Examples involving faculty and trainees from at least two disciplines include:
  - Respiratory Health Among Spray Painters and Body Welders, the UAW-NUMMI project.
  - Fresno Asthmatic Children's Environment Study project (FACES) funded by NHLBI [Ira Tager (COEH epidemiologist from UC Berkeley), Balmes (OEM), Hammond (IH)]
  - Ergonomic Demonstration Projects in Agriculture funded by NIOSH [Fadi Fathallah (UC Davis agricultural engineering/ergonomics), Faucett (OEHN), Ira Janowitz (Ergonomics), students from OEHN and Ergonomics programs]
  - Respirator surveillance and respirator training program in collaboration with the California Department of Public Health, Occupational Health Branch involving Dr. Janice Prudhomme (OEM), Ms. Patricia Quinlan (IH), Dr. John Balmes (OEM), and Ms. Rossana Segovia-Bain (OEHN).
  - Work-related asthma project involving Dr. Robert Harrison (OEM) and an OEHN student
  - A study of the impact of the environment on asthma funded by NIEHS [Blanc, Balmes (OEM), Quinlan (IH-OEM) and Hammond (IH)]

- **Interdisciplinary Courses** - Exemplified by joint MPH course work for IH, Ergonomics and OEM students; joint attendance at UCSF OEM Grand Rounds (OEM residents/faculty and OEHN students/faculty); joint clinical experience in the management of upper extremity musculoskeletal disorders for Ergonomics students and OEM residents at Dr. Rempel's clinic at the UC Berkeley Tang Center; a course on Clinical Management of Occupational Health Problems that is co-taught by Dr. Paul Blanc (OEM) and Barbara Burgel (OEHN), which is required for both OEM residents and OEHN students; and joint clinical experience for OEHN students and some OEM residents at the Community Occupational Health Project, an outreach program designed to provide occupational health screenings for low-income, minority workers. In addition, Dr. Michael Bates, epidemiology and COEH faculty member at UCB, is developing a research training course for the OEM residents and OEHN PhD students. This course will complement Grand Rounds and journal club sponsored by the OEM program.

4. NORA Research Training: NORA funding not received this fiscal year.

IV. Report on Specific Improvements in OS&H Resulting from ERC Programs

More than 180 papers by faculty and/or students were published or accepted for publication in peer-reviewed scientific journals during this period. Many of the papers have the potential to influence specific improvements in OS&H, though the current time frame prevents an analysis of the full impact of these published papers. See above for a partial list of student and faculty papers.

Appendix A - Interdisciplinary Courses

Course Number and Title	Students	Faculty
M180 *Industrial Toxicology*	*OEHN, OEM, other UCSF students*	*Jewell (OEM)*
N271.06 *Management of Clinical Occupational Health Problems*	*OEM Residents, OEHN*	*Burgel (OEHN) and Blanc (OEM)*
N273B *Issues in Occupational Health*	*OEHN attend OEM Grand Rounds as part of this course*	*Segovia-Bain and practitioners from multiple disciplines*
Joint UCSF/UCB: N274A and PH 268C *Health & Safety Hazards of the Workplace/Professional Practices*	*IH, OEHN participate in the field trips together*	*Gillen (OEHN), Quinlan (IH), Plog (IH)*
N274C / PH269B *Occupational Safety*	*IH, OEHN, Ergonomics*	*Plog (IH)*
N405 *OEHN Program Planning Practicum*	*OEHN: Internships with professionals in all disciplines*	*Segovia-Bain, Burgel, (OEHN)*
PH 204C *(offered every other year) Occupational Health Education*	*IH, Health Education students*	*Baker (LOHP)*
PH 220C *Risk Assessment, Policy and Toxics Regulation*	*IH, Ergonomics, OEM*	*Hammond and McKone (EHS)*
PH254A *Occupational and Environmental Epidemiology*	*IH, Ergonomics, OEM, OEHN*	*A. Smith (Epidemiology)*
PH 269C/BioE C279 *Ergonomics*	*Ergo, Bioengineering, OEHN, IH, OEM -- job analysis & design with student from another discipline*	*Rempel (OEM, Ergo)*
PH 269D *Occupational Biomechanics*	*Ergo, Engineering, OEM*	*Rempel (OEM, Ergo)*
PH270A *Exposure Assessment and Control*	*IH, OEM*	*Nicas and Spear (IH)*
PH270B *Environmental Toxicology*	*IH, OEM, OEHN*	*M. Smith (Toxicology)*
PH271E *Environment and Policy*	*IH, OEM, Toxicology, Epidemiology*	*A. Kyle (EH Policy)*
PH 297 *Field Study in Ergonomics*	*Ergonomics, IH*	*Rempel (Ergonomics)*
PH 298 *Clinical Ergonomics*	*Ergonomics, OEM*	*Rempel (Ergo) and physical therapists*
Joint UCSF/UCB: PH 298 and N404 *Clinical rotations (SFGH, Mt. Zion, and clinics)*	*OEHN, OEM, IH*	*Segovia-Bain and Burgel (OEHN,) Quinlan (IH), Jewell, Goldberg, Harrison, and Kosnik (OEM)*
PH 298 Group Study *Respiratory Health at an Automotive Manufacturing Facility*	*IH, OEM, Epidemiology*	*Hammond, Balmes, Baker, Gold, Quinlan*
PH 298-002 *Exposure Assessment and Control II*	*OEM, IH*	*Nicas (IH)*

Industrial Hygiene Training Program
University of California, Berkeley
Annual Report July 1, 2006 – June 30, 2007

A. Program Title: The Industrial Hygiene (IH) Program at the School of Public Health (SPH), University of California, Berkeley. The IH Program is part of the broader Exposure Assessment and Control track within the Environmental Health Sciences (EHS) Division, SPH.

B. Program Director: Adjunct Professor Mark Nicas, PhD, MPH, CIH, has been the IH Program Director since July 2002. Dr. Nicas has been a professional industrial hygienist for 30 years. He is a Fellow of the American Industrial Hygiene Association, is a recipient of the AIHA Edward J. Baier Technical Achievement Award, and has nationally recognized expertise in exposure assessment methods, microbial risk assessment, and personal respiratory protection.

C. Program Description

1. Goals and Objectives: The primary goal is to provide students with a multi-disciplinary approach to analyzing and solving occupational and environmental health problems. Specific objectives include academic training in the requisite knowledge foundation and technical skills, and practicum training (via an internship) in performing industrial hygiene field work in an occupational setting. Upon graduation, it is expected that the professional track (MPH) student can successfully work as an IH and, after the requisite employment experience, pass the ABIH certification examination in Comprehensive Practice. Upon graduation, it is expected that the academic track (MS and PhD) student can successfully conduct research activity, in addition to demonstrating the same fundamental competencies as the MPH graduates.

2. Responsible Conduct of Science: The IH curriculum conveyed some material related to the responsible conduct of research, for example, the confidentiality of medical information and ethical considerations in biological monitoring. It is a campus-wide requirement that every student engaged in human subjects research complete an online tutorial addressing human subjects issues, and that every student research project involving human subjects be reviewed and approved by the UC-Berkeley Committee for the Protection of Human Subjects. We are developing a seminar course that will systematically cover issues related to the responsible conduct of science. All IH students (MPH, MS, PhD) will take the seminar. Topics will include: conflicts of interest; human subjects; animal subjects; plagiarism and authorship; data access; and ethical issues surrounding research sponsorship.

3. Faculty Participation: The IH Program had two core faculty members, Dr. Nicas and Dr. S. Katharine Hammond. Both conduct IH research, serve as graduate advisors for the IH students, and teach in IH-related courses. In the July 1,2006 to June 30,2007 reporting period, Dr. Nicas advised four MPH, two MS, and two PhD students in the IH Program, and was actively engaged in the research projects of one of the PhD students and one of the MS students. He is the primary instructor for the “Exposure Assessment and Control I and II” courses (required for IH students). Dr. Hammond served as the IH Program Director prior to July 2002. In the July 1,2006 to June 30,2007 reporting period, she advised one PhD student in the IH Program. Dr. Hammond teaches the “Health Risk Assessment, Regulation and Policy” course (required for IH students) and the “Characterization of Airborne Chemicals” course (a recommended elective course for IH students). In 2006, Dr. Stephen Rappaport also joined the EHS/IH faculty.

There are other EHS faculty who teach IH-related coursework, serve on PhD dissertation committees, and conduct research that is IH-related; however, they typically do not serve as academic advisors for IH students . The following is a list of faculty who either provide lectures to or teach courses to IH students: Dr. Robert Spear (lectures in Exposure Assessment and Control I and II); Dr. Tom McKone (lectures in Exposure Assessment and Control II, and with Dr. Hammond co-teaches "Health Risk Assessment, Regulation and Policy"); Dr. Martyn Smith (teaches Toxicology); Dr. Nina Holland (teaches Molecular and Genetic Epidemiology); Dr. Allan Smith (teaches Occupational and Environmental Epidemiology); Dr David Rempel, MD, a member of the EHS Graduate Group, (teaches Occupational Biomechanics and the Ergonomics Seminar); Dr. John Balmes, MD (lectures in Exposure Assessment and Control I); Ms. Barbara Plog, MPH, CIH, CSP (teaches Hazardous Substances Management and Control, is the faculty or record for Fundamentals of Workplace Safety, including an independent study in fatality case analysis).

4. Curricula

Master of Public Health: This is a two-year program. MPH IH students are required to take toxicology (e.g., NIST 100 or PH 270B), epidemiology (e.g., PH 250B), two exposure assessment and control courses (PH 270A, PH 298-002), risk analysis (PH 220C), two biostatistics courses (e.g., PH 142, PH 145), a workplace safety, including an independent study in fatality case analysis (PH 299 Section), a group study at the Occupational Health Clinic (PH 298), two public health breadth course (PH 200C and 200D), and at least three electives related to occupational and environmental health. They must also perform a paid internship (PH 297) under the direction of a CIH during the summer between the first and second academic years, and pass a final comprehensive exam. Students enroll in the Occupational Health Clinic (PH 298 Section) in the Fall or Spring semester of their second year, and each student participates in five Clinic sessions. Each case work up involves a team of doctors, nurses, industrial hygienists, and health educators. IH students are directed by Ms. Patricia Quinlan, MPH, CIH, who is affiliated with UCSF. Fundamentals of Workplace Safety is a 16-hour continuing education course, offered for academic credit for most students, and presented annually during the Summer Institute; Ms. Plog is the course director. Following the latter course, in the Fall semester MPH IH students take two units of independent study (PH 299 Section) with Ms. Plog to analyze causation for occupational fatality cases. A sample curriculum for a MPH IH student is presented in Appendix C.

Although the MPH degree is not research-oriented, MPH IH students have the opportunity to participate in academic research. First, faculty in the EHS Division (and related faculty outside the Division) have research grants and contracts which typically fund Graduate Student Researcher (GSR) positions. In the July 1,2006 to June 30,2007 reporting period, Dr. Nicas partially funded a MPH IH student via a GSR position on a confined space hazards project. Second, students are encouraged to apply to COEH for interdisciplinary project grants which are usually awarded $5,000 each. Funding requires that the students be from two or more different program areas (e.g., industrial hygiene and epidemiology). In 2006-2007, an IH student and a nursing student pursued a study on welding fume exposure titled "Characterization of Manganese Exposure in Welding Processes". Third, MPH IH students are eligible to receive NORA fellowships, when available.

Master of Science: This is a two-year program. The curriculum for MS IH students is similar to that for the MPH IH students, except that MS students are not required to take the two public health breadth courses (PH 200C and 200D), Fundamentals of Workplace Safety, and the

independent study in fatality case analysis (PH 299 Section). In addition, they are not required to perform a summer internship (PH 297). Instead, MS students take more elective courses in their areas of interest, and focus on their original research. The student's advisor approves the written thesis or project, but there is no formal ending examination.

Doctor of Philosophy: The PhD program is typically completed in five to six years. There are no formal course requirements other than the Doctoral Seminar (PH 293) which is taken several times. However, PhD students are expected to know the material taught in the required courses for the EHS Exposure Assessment and Control track for their Graduate Group Examination. Therefore, most students take coursework in toxicology, epidemiology, exposure assessment and control, risk analysis and biostatistics, unless they have learned the material previously. In general, other PhD coursework is designed to provide academic knowledge geared to the dissertation project, and to fulfill the course requirements of two minor subjects as suggested by the student's dissertation committee members. The development of a PhD research plan, collection and analysis of data, and the written description of the project are done under the tutorial direction of the student's major advisor. A written proposal of the research project is submitted to a committee of four faculty from the Graduate Group in EHS (an interdisciplinary group which, under the jurisdiction of the Dean of the Graduate Division, awards the academic degrees), and the student must pass an oral exam (the Graduate Group Exam) to determine the adequacy of academic preparation and the definition of the proposed research. After passing the Graduate Group Exam, the student normally takes the Qualifying Exam, a Graduate Division requirement which is conducted by a faculty committee comprised of four Berkeley Academic Senate faculty members, including one member from outside the student's major discipline. Once the Qualifying Exam is completed, the student is advanced to candidacy and the research project is carried out under the guidance of the major advisor and the dissertation committee, which also includes an Academic Senate member from outside the student's area of specialty. The student's progress is formally evaluated each year by the major advisor.

D. Program Activities and Accomplishments

1. Progress Report: The July 1,2006 to June 30,2007 reporting period was the third year of our revised IH Program curriculum. The revision primarily involved folding material from three IH specialty courses into a new Exposure Assessment and Control II course (PH 298-002), replacing a semester-long occupational safety course with a two-day CE course followed up by a case fatality analysis via an independent study course, and permitting students to take more electives. In part due to these changes, we were able to recruit more students into the IH Program. For the July 1,2006 to June 30,2007 reporting period, there were twelve students enrolled in the IH Program (seven MPH, two MS, three PhD), of whom ten received NIOSH funding. This number is increased from the eight enrolled students in the budget year July 1,2005 to June 30,2006.

As reflected by the mix of students (7 MPH, 5 MS/PhD), the IH Program is a balanced mixture of practitioner training (the MPH degree) and research training (the MS and PhD degrees). There was a higher proportion of research-degree students than in the past due to two reasons. First, the IH core faculty (along with other EHS Division faculty) are actively involved in research, and desire to mentor students with interests in similar research questions. A previous NIOSH site visit comment was that the curriculum logically should reflect the research interests of the faculty. Second, the long-term decline in IH student enrollment made it untenable to provide classes dedicated to MPH IH practitioners. Our solution has been to implement a more general curriculum in Exposure Assessment and Control, and to provide specialized practitioner

training through the mechanism of group study, independent study, and in occupational safety, a CE course with an independent study follow-up.

2. Interdisciplinary Interactions: There are routine interactions among IH students, ergonomics students, nursing students and occupational medicine residents. The IH students, medical residents, and some nursing and ergonomics students take PH 270A Exposure Assessment and Control I. Some MPH IH students and medical residents and all nursing students take PH 269C Occupational Biomechanics (along with the ergonomics students), and are involved in multidisciplinary class projects. The MPH and MS IH students interact with nursing students and medical residents while completing rotations at the Occupational Health Clinic. The nursing students attend the two-day Fundamentals of Workplace Safety course which is taken by the MPH IH students. As previously mentioned, the COEH student project awards program requires that funded projects involve students from at least two disciplines. In addition, the emphasis on electives promotes MPH IH and MS IH students taking courses and interacting with students from other departments/disciplines such as Civil and Environmental Engineering, Public Health Microbiology and the School of Business. The MPH IH students are required to take Public Health Breadth Core Seminar (PH 200C) and Applied Public Health (PH 200D), which thereby ensures interaction with students from all the Divisions in the School of Public Health. Finally each semester, an event is hosted by one of the COEH programs to introduce trainees from the various ERC programs to each other.

3. Minority Recruitment: Ms. Abby Rincon, SPH Director of Diversity, recruits underrepresented students for all the SPH programs, including the IH Program. Ms. Rincon participates in graduate school recruitment events inside and outside California. She established contacts with key campus resources including the Black Student Health Association and Chicanos in Health Education. She attends the SPH Conference for Prospective Students and delivers the SPH message on the commitment to diversity.

For the July 1,2006 to June 30,2007 academic year, one minority student applied to the IH Program, and was accepted. In the period July 1,2006 to June 30,2007, 3 of the 12 (25%) enrolled IH students were from minority groups. All are currently enrolled.

4. Trainee Recruitment: We continued efforts to recruit students from the undergraduate Public Health program in the UC-Berkeley College of Letters and Sciences. There are 200 undergraduate in this major, and they are exposed to occupational health issues via a course taught by EHS faculty Dr. Robert Spear and Dr. Kirk Smith. Dr. Spear has used case studies involving California workers (e.g., pesticide poisoning among farm workers, n-hexane induced peripheral neuropathy among brake repair mechanics) to illustrate evaluating and controlling occupational health risks. He provides information about the IH Program, and encourages applications. We continued to distribute a multi-colored brochure describing the IH Program to nearly all the science departments and programs on the UC-Berkeley campus. We worked with the campus Career Center to promote awareness among undergraduates of the occupational health disciplines and of the IH Program in particular. We recruited from outside the UC-Berkeley campus via the EHS Division web site which describes all our academic programs, the faculty's research programs, and related activities. The web site URL for the EHS Division is: http://ehs.sph.berkeley.edu. Although only four students applied (and were accepted) to the IH program for entry in Fall 2006, three more students from the enrolled first-year EHS Division students were subsequently recruited into the IH program. The availability of NIOSH funding, and the non-restrictive nature of the revised IH curriculum, were key points of attraction.

E. Program Products

1. Publications: In the July 1,2006 to June 30,2007 reporting period, there were six peer-reviewed research papers authored by IH core faculty and students. The list of these papers is provided in Appendix A and B.

2. Conferences/symposia offered: none

3. CE courses presented: The IH Program does not offer its own CE courses. However, IH core faculty participated in all IH-related courses presented by the CE Program of the NIOSH ERC, including Fundamentals of Industrial Hygiene, and Comprehensive Review of Industrial Hygiene.

4. R2P: Dr. Nicas' analysis of airborne pathogen exposure has led to the recognition that the quality of respiratory protection (specifically, the degree of face seal leakage) substantially affects infection risk. Dr. Hammond's research on exposure to secondhand tobacco smoke has supported the prohibition of smoking in private and public workplaces.

5. Research projects with significant trainee involvement: Dr. Nicas was Principal Investigator on a project to prevent worker fatalities in confined spaces; MPH student Heather Madison worked as a GSR on the project. Dr. Nicas is Principal Investigator on a microbial risk assessment project which involves developing an airborne particle transport-and-fate model; PhD student Rachael Jones worked on the project and participated in drafting a manuscript. Dr. Hammond is Principal Investigator on a project to analyze the association between airborne particle concentrations and the respiratory health status of body weld department workers at the New United Motors Manufacturing plant in Fremont, CA; PhD student Sa Liu performed aerosol exposure measurements and mapped particle concentrations and particle size distributions.

F. Future Plans: At the Masters level, we intend to admit a balance of MPH and MS students. For the MPH IH students, we will implement an Independent Study in Industrial Hygiene Practice course (PH 299 Section) wherein he students will work with industrial hygienists in the campus Environmental Health and Safety Office on IH-related projects. The goal is to provide MPH students with some field experience, including familiarity with basic IH monitoring equipment, prior to their summer internship between the first and second academic years. In part, the mentoring provided by the EH&S Office will replace some material that used to be offered in the discontinued semester-long course Professional Practice in Industrial Hygiene.

Appendix A – Student Publications (students underlined; faculty in bold)

1. **Nicas M** and RM Jones (2007): Apportioning Influenza Infection Risk Across Exposure Pathways, submitted to *Risk Analysis*

2. **Nicas M**, W Nazaroff and RM Jones (2007): A Markov Chain Model for the Transport and Fate of Supermicron Particles in Indoor Air, submitted to *J. Occup. Environ. Hyg.*

3. Wilson MP, **SK Hammond, M Nicas** and A Hubbard (2006): Worker Exposure to Volatile Organic Compounds in the Vehicle Repair Industry, *J. Occup. Environ. Hyg.4*:301-310

4. Jones RM, **M Nicas**, A Hubbard and A Reingold (2006): The Infectious Dose of *Coxiella burnetii* (Q Fever), *Appl. Biosafety 11*:32-41

5. Jones RM and **M Nicas** (2006): Evaluation of COSHH Essentials for Vapor Degreasing and Bag Filling Operations, *Ann. Occup. Hyg. 50*:137-147

6. Jones RM and **M Nicas** (2006): Margins of Safety Provided by COSHH Essentials and the ILO Chemical Control Toolkit, *Ann. Occup. Hyg. 50*:149-156

Appendix B – Faculty Publications (faculty in bold; student names underlined)

Hammond, Katherine:

1. Wilson MP, **Hammond SK, Nicas M**, Hubbard AE. Worker exposure to volatile organic compounds in the vehicle repair industry. J Occup Environ Hyg. 2007 May;4(5):301-10.

2. **Eisner MD**, Wang Y, Haight TJ, **Balmes J, Hammond SK,** Tager IB. Secondhand smoke exposure, pulmonary function, and cardiovascular mortality. Ann Epidemiol. 2007 May;17(5):364-73.

3. Barnes RL, **Hammond SK**, Glantz SA. The tobacco industry's role in the 16 Cities Study of secondhand tobacco smoke: do the data support the stated conclusions? Environ Health Perspect. 2006 Dec;114(12):1890-7.

4. Hjelmroos-Koski, Mervi, Macher, Janet, **Hammond, S. Katharine**, Tager, Ira B. Pollen grain and fungal spore aggregations and exposure considerations for an epidemiological study. *Grana,* 45:261-287, 2006.

5. Solomon GM, Hjelmroos-Koski M, Rotkin-Ellman M, **Hammond SK.** Airborne mold and endotoxin concentrations in New Orleans, Louisiana, after flooding, October through November 2005. Environ Health Perspect. 2006 Sep;114(9):1381-6.

6. T-W Hu, Z Mao, M Ong, E Tong, T Ming, H Jiang, **K Hammond**, K R Smith, J de Beyer, A Yurekli China at the crossroads: the economics of tobacco and health. *Tobacco Control*, 15**:**i37-i41, 2006.

7. **Eisner, MD**., **Balmes, J**, Yelin, EH., Katz, PP., H**ammond, S**, Benowitz, N, **Blanc, PD**. Directly measured secondhand smoke exposure and COPD. *BMC Pulm Med.* **6**: 12- , 2006.

Nicas, Mark:

5. Wilson MP, **Hammond SK, Nicas M**, Hubbard AE. Worker exposure to volatile organic compounds in the vehicle repair industry. J Occup Environ Hyg. 2007;4(5):301-10.

6. Sutton PM, Vergara X, Beckman J, **Nicas M**, Das R. Pesticide illness among flight attendants due to aircraft disinfection. Am J Ind Med. 2007;50(5):345-56.

7. **Nicas M**, Sun G. An integrated model of infection risk in a health-care environment. Risk Anal. 2006;26(4):1085-96.

8. **Nicas M** and RM Jones (2007): Apportioning Influenza Infection Risk Across Exposure Pathways, submitted to *Risk Analysis*

9. **Nicas M**, W Nazaroff and RM Jones (2007): A Markov Chain Model for the Transport and Fate of Supermicron Particles in Indoor Air, submitted to *J. Occup. Environ. Hyg.*

10. **Nicas M,** MJ Plisko and JW Spencer (2006): Estimating Benzene Exposure at a Solvent Parts Washer, J. Occup. Environ. Hyg. 3:284-291

11. Jones RM, **M Nicas**, A Hubbard and A Reingold (2006): The Infectious Dose of *Coxiella*

burnetii (Q Fever), *Appl. Biosafety 11*:32-41

12. Jones RM and **M Nicas** (2006): Evaluation of COSHH Essentials for Vapor Degreasing and Bag Filling Operations, *Ann. Occup. Hyg. 50*:137-147

13. Jones RM and **M Nicas** (2006): Margins of Safety Provided by COSHH Essentials and the ILO Chemical Control Toolkit, *Ann. Occup. Hyg. 50*:149-156

Rappaport, Stephen:

14. Y.-C. E. Chao*, L. L. Kupper, B. Serdar, P. P. Egeghy*, ***S.* M. Rappaport**, and L. Nylander-French, Dermal Exposure to Jet Fuel JP-8 Significantly Contributes to the Production of Urinary Naphthols in Fuel-Cell Maintenance Workers, *Environ Health Perspect*, 114(2): 182-185 (2006).

15. S. Kim*, R. Vermeulen, S. Waidyanatha, B. Johnson, Q. Lan, N. Rothman M. T. Smith, G. Li, L. Zhang, M. Shen, S. Yin, and **S. M. Rappaport**, Using Urinary Biomarkers to Elucidate Dose-Related Patterns of Human Benzene Metabolism, *Carcinogenesis*, 27(4): 772-781 (2006).

16. J. D. Pleil*, W. F. Funk*, and **S. M. Rappaport**, Residual Indoor Contamination from World Trade Center Rubble Fires as Indicated by Polycyclic Aromatic Hydrocarbon (PAH) Profiles, *Environ Sci Technol*, 40: 1172-1177 (2006).

17. M. Shen, Q. Lan, L. Zhang, S. Chanock, G. Li, R. Vermeulen, **S. M. Rappaport**, W. Guo, R. B. Hayes, M. Linet, S. Yin, M. Yeager, R. Welch, M. S. Forrest, N. Rothman, M. T. Smith, Polymorphisms in Genes Involved in Genome Maintenance Confer Susceptibility to Benzene-Induced Hematotoxicity, *Carcinogenesis*, 27(10): 2083-2089 (2006).

18. K. Yokley, H. T. Tran, K. Pekari , **S. M. Rappaport**, V. Riihimaki, N. Rothman, S. Waidyanatha, and P. M. Schlosser, Physiologically Based Pharmacokinetic Modeling of Benzene in Humans: A Bayesian Approach, *Risk Anal.*, 26(4): 925-943 (2006).

19. B. Serdar, R. Tornero-Velez, D. Echeverria, L. Nylander-French, L. L. Kupper, and **S. M. Rappaport**, Predictors of Occupational Exposure to Styrene and Styrene-7,8-Oxide in the Reinforced Plastics Industry, *Occ Environ Med*, 63: 707-712 (2006).

20. S. Kim*, R. Vermeulen, S. Waidyanatha, B. A. Johnson, Q. Lan, M. T. Smith, G. Li, L. Zhang, M. Shen, S. Yin, N. Rothman, and **S. M. Rappaport**, Modeling Human Metabolism of Benzene Following Occupational and Environmental Exposures, *Cancer Epidemiol Biomarkers Prev*, in press.

21. Y.S. Lin, R. Vermeulen, C. Tsai†, S. Waidyanatha, Q. Lan, N. Rothman, M.T. Smith, L. Zhang, M. Shen, G. Li, S. Yin, S. Kim*, and **S. M. Rappaport**, Albumin Adducts of Electrophilic Benzene Metabolites in Benzene-exposed and Control Workers, *Env Health Perspect*, in press.

22. J. D. Pleil, D. Kim, J. D. Prah and **S.M. Rappaport**, Exposure Reconstruction for Reducing Uncertainty in Risk Assessment: Example Using MTBE Biomarkers and a Simple Pharmacokinetic Model, *Biomarkers*, in press.

23. S. Kim*, Q. Lan, S. Waidyanatha, S. Chanock, B. Johnson, R. Vermeulen, M. T. Smith, L. Zhang, G. Li, M. Shen, S. Yin, N. Rothman and **S. M. Rappaport**, Genetic Polymorphisms and

Benzene Metabolism in Humans Exposed to a Wide Range of Air Concentrations, *Pharmacogenetics and Genomics*, in press.

24. B. A. Johnson and **S. M. Rappaport**, On Modeling Metabolism-Based Biomarkers of Exposure: A Comparative Analysis of Nonlinear Models with Few Repeated Measurements, *Med Stat*, in press.

Spear, Robert:

25. Liang S, Seto EY, Remais JV, Zhong B, Yang C, Hubbard A, Davis GM, Gu X, Qiu D, Spear RC. Environmental effects on parasitic disease transmission exemplified by schistosomiasis in western China. Proc Natl Acad Sci U S A. 2007;104(17):7110-5.

26. Spear RC, Seto E, Remais J, Carlton EJ, Davis G, Qiu D, Zhou X, Liang S. Fighting waterborne infectious diseases. Science. 2006;314(5802):1081-3; author reply 1081-3.

Appendix C

Sample Two-Year Curriculum for a MPH IH Student

Year 1, Fall Semester		
PH 142	Introduction to Probability & Statistics in Public Health	4 units
PH 200C	Public Health Core Breadth Seminar	2 units
PH 270A	Exposure Assessment & Control I	3 units
NST 110	Toxicology	3 units
PH 292	EHS Masters Seminar	1 unit
Year 1, Spring Semester		
PH 145	Statistical Analysis of Continuous Outcome Data	4 units
PH 298-002	Exposure Assessment & Control II	3-4 units
PH 298-052	Hazardous Substances Management and Control	3 units
CE 111	Environmental Engineering [Elective]	3 units
Summer Session		
PH 297	Internship (full time)	3 units
Fundamentals of Workplace Safety short course		No units
Year 2, Fall Semester		
PH 250B	Epidemiologic Methods	4 units
PH 220C	Health Risk Assessment, Regulation and Policy	4 units
PH 298	Occupational Health Clinic	1 unit
PH 299	Independent Study in Fatality Case Analysis	2 units
PH 260A	Principles of Infectious Disease [Elective]	3 units
Year 2, Spring Semester		
PH 200D	Applied Public Health	2 units
PH 267B	Characterization of Airborne Chemicals [Elective]	3 units
PH 269E	Current Topics in Environmental Medicine [Elective]	2 units
PH 201A	Social & Cultural Perspectives in Public Health [Elective]	3 units
MBA 296	Special Topics in Business Administration [Elective]	3 units

Hazardous Substances Academic Training Program
University of California, Berkeley
Annual Report July 1, 2006 – June 30, 2007

A. Program Title: Hazardous Substance Training Program (HSAT). Please note that this academic year represents the final year of the HSAT program

B. Program Director: Adjunct Professor Mark Nicas, PhD, MPH, CIH, has been the IH Program Director since July 2002. Dr. Nicas has been a professional industrial hygienist for 30 years. He is a Fellow of the American Industrial Hygiene Association, is a recipient of the AIHA Edward J. Baier Technical Achievement Award, and has nationally recognized expertise in exposure assessment methods, microbial risk assessment, and personal respiratory protection.

C. Program Description: The HSAT Program development and execution is under the overall direction of Dr. Nicas. Continued development and implementation of the HSAT Program was performed by Barbara Plog and Henry J. McDermott under Dr. Nicas' overall direction with direct involvement by the other Industrial Hygiene faculty as described later in this section. Barbara A. Plog, MPH, CIH, CSP, is the Director of the ERC's Continuing Education program, Lecturer in the Industrial Hygiene Program and assistant clinical professor in the Occupational and Environmental Health Nursing Program at UCSF. She teaches Occupational Safety to both OEHN and IH graduate students. Ms Plog has over twenty-five years of experience as a teacher, continuing education provider, industrial hygienist, safety professional and author. Her textbook, *Fundamentals of Industrial Hygiene*, 5th edition, 2002 published by the National Safety Council, is widely recognized as a basic textbook in the field. In July 2002, she was given the Christine Einert Award by the AIHA-Northern California Section "in recognition of outstanding contributions to the industrial hygiene profession in northern California." Henry J. McDermott, CIH, CSP, PE is a private consultant with over 35 years of comprehensive professional practice in Industrial Hygiene with Chevron Corporation (including Chief Industrial Hygienist), and other private and public sector organizations. He is the author of *Handbook of Ventilation for Contaminant Control* (3rd Edition – ACGIH, 2001), and *Air Monitoring for Toxic Exposures* (2nd Edition – Wiley Interscience, 2004). He holds a Bach. of Civil Engineering from University of Delaware, an M.S. in Environmental Engineering from Northwestern University and a M. Public Administration from University of New Mexico.

The Hazardous Substances Academic Training (HSAT) program had two broad goals:

(1) For all students within the IH/EAC specialization plus other interested MPH students and related professionals: to broadly develop interest in, understanding of, and competence to solve the problems of hazard recognition, evaluation and control at hazardous waste sites and during emergency response to chemical spills and fires. To meet this goal all students in the IH/EAC specialization completed the 3 credit course (PH 298-052: Hazardous Substances Management and Control) covering detailed Hazardous Substance information and issues including regulations, health effects, air sampling, biological monitoring, and safe work practices/exposure controls. The course satisfies the requirements for 40-hour Site Investigators/Site Safety and Health Officer training, which will qualify him/her under OSHA Standard 1910.120 to participate in hazardous waste and emergency response operations. Students receive a HAZWOPER certification upon completion of this course.

> Course Description: PH 298-052: Hazardous Substances Management and Control Description: This course covers hazardous substances management, and OSHA and EPA and corresponding state regulations. It also presents more hazardous substance-

targeted detail on topics covered in other courses on air sampling, biological monitoring, health effects and safe work practices/exposure controls. For example, the operation and applications of direct-reading field instruments used for hazardous substance monitoring (e.g., PID, FID, XRF, Portable GC, GC/MS, and Portable IR/FTIR instruments) will be covered. The course also satisfies the Hazwoper standard's requirements for 40-hour Site Investigators/Site Safety and Health Officer training, which qualifies students who successfully complete the course to participate in hazardous waste and emergency response operations under OSHA Standard 1910.120. Students receive a HAZWOPER certification upon completion of this course.

(2) For IH/EAC students who chose Hazardous Substances as an area of concentration: provided additional advanced training including field experience in the specialty. To meet this goal, the students supported by HSAT grant completed the following objectives:

- Completed their required field internship of at least 210 hours in a manner that provides experience with hazardous waste and/or emergency response operations. The students received three course credits for this work.
- Completed the "Competencies" relevant to Hazardous Substances. ("Competencies" are a defined list of desirable professional practice skills. Students were able to plan a flexible course of study and develop the skills through course work, internship, independent study or other means.)
- Satisfactorily completed online and other specialty training such as the FEMA Incident Command course sequence.
- Were encouraged to complete relevant electives from the School of Engineering and other University schools and departments that are relevant to his/her career interests.

Faculty Participation: The IH Program (and the HSAT Program) has two core faculty members, Dr. Nicas and Dr. S. Katharine Hammond. Both conduct IH research, serve as graduate advisors for the IH students, and teach in IH-related courses. There are other EHS faculty who teach IH-related coursework, serve on PhD dissertation committees, and conduct research that is IH-related; however, they typically do not serve as academic advisors for IH students. See IH report for a list of faculty and courses in which they teach.

Curricula: **Master of Public Health**: This is a two-year program. MPH IH students are required to take toxicology (e.g., NIST 100), epidemiology (e.g., PH 250B), two exposure assessment and control courses (PH 270A, PH 298-002), risk analysis (PH 220C), two biostatistics courses (e.g., PH 142, PH 145), a "Fundamentals of Workplace Safety" short course, an independent study in fatality case analysis (PH 299 Section), a group study at the Occupational Health Clinic (PH 298), two public health breadth course (PH 200C and 200D), and at least three electives related to occupational and environmental health. They must also perform a paid internship (PH 297) under the direction of a CIH during the summer between the first and second academic years, and pass a final comprehensive exam. Students enroll in the Occupational Health Clinic (PH 298 Section) in the Fall or Spring semester of their second year, and each student participates in five Clinic sessions. Each case work up involves a team of doctors, nurses, industrial hygienists, and health educators. IH students are directed by Ms. Patricia Quinlan, MPH, CIH, who is affiliated with UCSF. The Fundamentals of Workplace Safety is a 16-hour continuing education course presented annually during the COEH Summer Institute; Ms. Plog is the course director. In conjunction with the CE safety course, MPH IH students take two units of independent study (PH 299 Section) with Ms. Plog to analyze

causation for occupational fatality cases. A sample curriculum for a MPH IH student is presented in Appendix C.
Although the MPH degree is not research-oriented, MPH IH students have the opportunity to participate in academic research. First, faculty in the EHS Division (and related faculty outside the Division) have research grants and contracts which typically fund Graduate Student Researcher (GSR) positions. Second, students are encouraged to participate in the Semiconductor Environmental, Safety and Health Association scholarship program. Third, students are encouraged to apply to the COEH for interdisciplinary project grants which are usually awarded $5,000 each.

D. Program Activities and Accomplishments: Progress towards goals occurred in several areas as follows. *Student Trainee Support:* The first HSAT trainee was accepted into the HSAT program in Fall Semester, 2005. He was supported for two years. He graduated in spring, 2007 with an MPH and also with a current HAZWOPER certification. He accepted a position as an environmental health scientist for a state Department of Public Health. A second HSAT traineeship was offered to a student beginning her two year MPH in Fall, 2007. She will be supported for the 2007-08 academic year. The HSAT funding will be discontinued after this year.

New 3-Credit Hazardous Substances Class. All students in the Industrial Hygiene specialization were required to complete a 3-credit course developed under the grant (PH 298-052: Hazardous Substances Management and Control) first presented in the Spring 2006 semester that covered relevant information and issues in more detail than available in other courses. Dr. Nicas is the Faculty of Record for the class; the class material was developed and presented by Barbara Plog, MPH, CIH, CSP, and Henry J. McDermott, CIH, CSP, PE. Both students supported by the HSAT grant completed this class.

The class prepared students to fill the role of "Site Safety and Health Officer (or Supervisor)" as required by the OSHA Hazwoper regulation. This individual located on a hazardous waste site or spill site is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements. To prepare students to fill this role, the specific class topics and materials were based on an outline of provisions in the HAZWOPER standard (e.g., Risk Identification and Evaluation, Safety and Health Program, Chemical Hazards, Physical Hazards, Air Monitoring, Personal Protective Equipment, Medical Surveillance, Site-specific Safety and Health Plan, Safety and Health Training Program, Standard Operating Procedures for Safety and Health, Emergency/Spill Response) plus other topics to provide adequate coverage of the field (e.g., hazardous substance management, "Best Practices Programs" in different industries, abandoned or orphan sites, and preventing future problems through proper management of Hazardous Substances).

In this class, basic material was presented by an instructor (Plog or McDermott) supplemented with "seminar" presentations by noted outside speakers. Before and after each seminar speaker, Ms. Plog or Mr. McDermott placed the speaker's topic in context relating to OSHA Hazwoper, CERCLA, RCRA or other hazardous substances relevance. Outside speakers and their topics included:

- State Designation/Regulation of Hazardous Waste Sites: B. Cook, PE (Cal. DTSC)
- Protecting the Public Health from Hazardous Materials: W. Brunner, MD, MPH (County Pub Health Dir.)

- Hazardous Substance Management in a High-Tech Environment: B. Sherin, CSP (EORM, Inc.)
- Electrical Hazards and Controls: K. Gershon, PE (LLNL)
- Noise: Measurement & Control: C. Kirkham, MPH, CIH (Cal-OSHA)
- Medical Surveillance and Case Studies: R. Harrison, MD, MPH (UCSF)
- Respiratory Protection, PPE Ensembles: P. Quinlan, MPH, CIH (UCSF)
- Respirator fit-testing: S. Souza and R. Waller (UC Campus EH&S)
- UC Berkeley's Hazardous Materials Management Program: H. Randol (UC Campus EH&S)
- Port of Oakland Hazardous Substances Program: J. Jones, MS, CIH (Port of Oakland)
- UC Berkeley's RFS (Old Munitions Plant) site remediation: Karl Hans (UC)
- Emergency Spill Response: G. Hunting, CIH, CSP (Chevron Corporation)
- Preventing Future Problems – Prudent Practice and Due Diligence: C. Laszcz-Davis, CIH (EQO, LLC)

"Competencies" for a Hazardous Substances Technical Specialist. Professional Competencies are a listing of the skills that a graduate should possess to be prepared for an entry level professional technical position. This approach is used at UC-Berkeley as an informal guide for students in planning their academic experience. It allows the students flexibility in using their summer internship, independent study, and prior experience as well as course work to prepare for their career.

Informal "Needs Assessment. A full needs assessment could not be accomplished due to insufficient funds. Instead, an informal needs review was conducted with selected agency contacts (primarily California DTSC) which demonstrated the critical need in California and nearby states for properly trained health and safety professionals and related Hazardous Substance professional specialists. The Department of Toxic Substances Control (part of the California EPA) is the lead state agency over hazardous waste sites and most other environmental hazardous substances issues. The State Water Board has jurisdiction over the >10,000 leaking underground storage tanks, while the Office of Spill Prevention and Response within the California Department of Fish and Game is the lead state agency charged with oil spill prevention and response for the state's marine environment. Cal-OSHA has jurisdiction over hazardous substances exposure and control in private and public workplaces. These agencies administer state programs, ands also federal programs under agreement with the corresponding federal agencies (U.S. EPA, federal OSHA, U.S. Coast Guard, etc.).

E. Program Products:

Program Impact: Because the HSAT program was relatively new, the most tangible impact of the program (in addition to the student support) was the practical payout of the material covered in the new course (Hazardous Substances Management and Control) for the students during their summer internships or initial careers. The following is a summary of the experiences of 3 of the 7 class students who took the first class:

- A student who was supported under the HSAT grant had an internship with Cal-OSHA. He used the respirator quantitative fit test knowledge and understanding of the OSHA respirator standard requirements that he gained during the class to perform fit testing on Cal-OSHA compliance officers. Key to his success was knowing how to perform the tests using the Portacount device, which he learned in this class. He also participated in an unannounced compliance inspection at an industrial site. Material covered in the class about industrial

activities at locations such as the one he visited aided him in this inspection. Having the "40 Hour HAZWOPER" certification made him a more valuable employee for Cal-OSHA during these inspections.

- Another first year MPH candidate used the site assessment training information from the class to evaluate organic vapors at a gasoline service station site using direct reading instruments such as a Photoionization detector. He also evaluated confined space hazards.
- A third MPH graduate now works for a local consulting firm. He is serving as on-site Health, Safety and Environment staff for a start-up company that has numerous hazardous substances issues. He is using class information to help with regulatory, monitoring, and program implementation work.

Program Evaluation: The feedback from the Spring 2006 Hazardous Materials Management Course was 5.1 for the overall class and 6.2 for the instructor (McDermott) out of a possible 7.0. Some students commented that some guest presenters were not fully on the mark. They further recommended a more focused class with less use of outside speakers. Similarly, student questionnaires were given to each student in continuing education classes asking that the class and speaker be rated on a scale of one (poor) to four (excellent). Please note the difference in the point scheme. For the outside speakers, the evaluations ranged from 3.5 – 3.9 (with a mean of 3.7) in meeting class objectives, and from 3.4 – 4.0 (with a mean of 3.8) for the quality of the speakers.

F. Future Plans: This is the final year of funding for the HSAT program.

Appendix A: There were no student publications during this time period.

Appendix B: Please see the IH report for a list of faculty publications.

Appendix C: Sample Two-Year Curriculum for a MPH IH Student

Year 1, Fall Semester

PH 142	Introduction to Probability & Statistics in Public Health	4 units
PH 200C	Public Health Core Breadth Seminar	2 units
PH 270A	Exposure Assessment & Control I	3 units
NST 110	Toxicology	3 units
PH 292	EHS Masters Seminar	1 unit

Year 1, Spring Semester

PH 145	Statistical Analysis of Continuous Outcome Data	4 units
PH 298-002	Exposure Assessment & Control II	3-4 units
PH 298-052	Hazardous Substances Management and Control	3 units
CE 111	Environmental Engineering [Elective]	3 units

Summer Session

PH 297	Internship (full time)	3 units
Fundamentals of Workplace Safety short course		No units

Year 2, Fall Semester

PH 250B	Epidemiologic Methods	4 units
PH 220C	Health Risk Assessment, Regulation and Policy	4 units
PH 298	Occupational Health Clinic	1 unit
PH 299	Independent Study in Fatality Case Analysis	2 units
PH 260A	Principles of Infectious Disease [Elective]	3 units

Year 2, Spring Semester

PH 200D	Applied Public Health	2 units
PH 267B	Characterization of Airborne Chemicals [Elective]	3 units
PH 269E	Current Topics in Environmental Medicine [Elective]	2 units
PH 201A	Social & Cultural Perspectives in Public Health [Elective]	3 units
MBA 296	Special Topics in Business Administration [Elective]	3 units

Occupational Health Nursing Program
University of California, San Francisco
Annual Report July 1, 2006 – June 30, 2007

A. Program Title: Occupational and Environmental Health Nursing (OEHN) Program

B. Program Director:
2006-07: Julia Faucett RN, PhD, FAAN (acting)
2007-08: Oisaeng Hong RN, PhD

C. Program Description: The OEHN Program offers a 2-year Master of Science (MS) degree and a PhD degree. Seven master's students and eight doctoral students were enrolled in the Program during 2006-07. The OEH NP and CNS MS tracks prepare students to be certified by the State of California; the OEH NP students are eligible for national certification as well. In 2007-08, we will offer a new 4 quarter long track (Specialist), intended to attract both nurses already working in the OEH field and those who wish roles more related to program development, implementation and evaluation than to direct clinical care. All graduates may obtain ABOHN's COHN-S certification, when eligible.

1. Goals and objectives: The goal of the program is to prepare advanced nurses with expertise in OEH and to be leaders in the field. Nurse practitioner (NP) graduates diagnose and treat work related injuries and illnesses in collaboration with other core OEH disciplines. Clinical Nurse Specialists (CNS) triage injured and ill workers and design prevention programs that focus on such areas as worker training or environmental health. Specialists are prepared to develop, implement and evaluate OEH programs, e.g. injury and illness prevention and/or return to work programs. Doctoral students (PhD) contribute to occupational health knowledge development and assume leadership positions in the profession.

2. Responsible conduct of science training: The research training program in occupational health nursing at UCSF occurs primarily at the doctoral level; however, MS students receive 6 required units of research training (N262A: Research Methods and E&B190 Introduction to Epidemiology) (see Appendix for curricula course numbers and names). MS students are also encouraged to participate in faculty or other research projects. Several have worked with Drs. Faucett and Gillen. Doctoral students are thoroughly trained with regard to the responsible conduct of science through course work, completion of research residencies, human subjects protection training, and monthly OEHN doctoral seminars. Doctoral training includes two years of core courses in quantitative and/or qualitative research design and methods (N209, N285, N289, N212), biostatistics (B187, B192), nursing science (N229, N269) and theory development (one elective), and two research rotations for practical skill development (N250.01).

3. Faculty Participation: Dr. Faucett was the Program Director 1994-2003, and is again Director for 2006-07. Marion Gillen was the Director of the OEHN program from 2003-2006, and continues to provide support to the doctoral program. Dr. Hong, previously the Program Director at the University of Michigan, will become the Program Director in Fall 2007. Ms. Barbara Burgel remains an active faculty member. In 2005, Rossana Segovia-Bain, MS, OHNP, COHN-S, joined the faculty. Dr. Faucett, with Dr. Gillen, taught the OEHN PhD research seminar (N240.11). Ms. Burgel taught Current Concepts in OEHN (N274a), and Assessment of Clinical Occupational Health Problems (N271.06), with Dr. Paul Blanc. Ms. Segovia-Bain taught the OEH issues course (N273b), clinical seminars, and Occupational

Health Program Planning residencies (N405). Our didactic program planning course (N234) is now offered by Dr. Catherine Waters, a member of the community health nursing faculty. Dr. Sarah Jewell offers the toxicology course (M180). Ms. Burgel and Ms. Segovia-Bain were responsible for clinical aspects of the OEH NP and CNS programs. They offered clinical seminars and practica throughout the MS program. The core OEHN Program faculty included experts with skills in OH clinical management (Blanc, Burgel, Jewell, Rempel, Segovia-Bain), primary care (Burgel, Segovia-Bain, Janson), symptom management (Faucett, Janson, Lee, Segovia-Bain), work organization (Faucett), nursing research (Faucett, Gillen, Lee, Janson), epidemiology (Froelicher, White), and behavioral science (Faucett, Gillen, Janson). Faculty also offer expertise in industrial hygiene (Quinlan, Plog), toxicology (Blanc, Jewell), ergonomics and musculoskeletal disorders (Faucett, Rempel, Burgel), pulmonary disorders (Blanc, Janson), cardiovascular disease (Froelicher), infectious disease (White, Gillen), hazard response (Segovia-Bain, Faucett), and occupational injury (Burgel, Faucett, Gillen, Segovia-Bain). The affiliated faculty also provided expertise and curricular support in occupational health (Balmes, Harrison), primary care (Saxe) and administration (Hirsch, Seago). Drs. Blanc, Rempel, and Jewell, Ms. Plog and Ms. Quinlan are included as core faculty of the OEHN Program because they are direct responsibility for teaching OEHN core courses and provide invaluable interdisciplinary collaboration to the program. Dr. Hong will bring needed expertise to this group on occupational hearing loss, behavioral intervention, and worker training.

4. Curricula (see Appendix for course numbers and names)

a. Master of Science Degree: The Program's OEH core required curriculum focuses on the OEHN role (N273a, N405); the assessment and control of toxic, safety, and ergonomic hazards (N274a, N274c, M180, and BioE 279); intervention in the form of injury control, clinical management, and program planning and evaluation (N234, N271.06, N405); and research, policy, and regulatory issues in the field (N273a, N273b, N274a, N274c).

MS students are also required to take School of Nursing core courses in research methods (N262a), health care ethics and policy (S222), dimensions of advanced practice nursing (N241) and they must select a course each in research utilization (from N262 series), sociocultural issues (various courses offered), and theory (various courses offered).

OEH-NP and OEH-CNS students are also required to take clinical core courses in assessment and management of health and illness (N270, N257, N246), health promotion and maintenance (N245), clinical pharmacology (N232 – NP only), outcomes measurement (N230-CNS only). NP (630 hours) and CNS (500 hours) students also take clinical practica (N404 series) and residencies (N405 series) to build their diagnostic and treatment skills, including a minimum of 90 hours in OEH program planning residencies.

b. Doctor of Philosophy Degree: Research training in the doctoral program includes an initial 2 years of core courses in nursing science (N229, N269), biostatistics (B187, B192), and beginning and advanced quantitative and qualitative research design (N209A/B, N212A/B, N285A/B or N289A/B). Students also select one course about nursing theory (N290 or N202A, N202B), 2 cognate courses (didactic non-nursing content related to the student's area of research interest) and 2 quarters of advanced nursing seminars that focus on key areas of nursing research interest (e.g. social support, symptom management). The OEHN doctoral seminar (N240.11) qualifies as an advanced nursing seminar. The seminar is required of NIOSH funded OEHN students and, in fact, all OEHN PhD students attend every quarter. Additional students from the School with a research interest in OEH topics may now attend on a quarter to quarter basis, facilitating outreach about OEHN to other nurse scientists. Students

also participate in two research rotations for practical skill development (N250.01). The research rotations require working with established researchers on funded projects in their field of study or in an area that will supplement their knowledge.

NIOSH funded students are required to take OEHN didactic core courses if they have not already had relevant coursework or OEH experience previously. For their cognate coursework, they are encouraged to take courses in ergonomics, toxicology, occupational epidemiology and other electives offered by COEH affiliate programs or consortium universities (Stanford, SF State) as well as to complete their research residencies with funded OEH researchers.

D. Program Activities and Accomplishments

1. Progress towards goals and objectives

a. Trainee honors, awards, scholarships: The following students received awards or extramural support this year: Soo Jeong Lee [UCSF Graduate Dean's Health Science Fellowship; Jim Keogh Scholarship (APHA), and Cook-Synder Scholarship (AOEC)]; Kathleen Mullen (Lanctot Scholarship for Native American Students, UCLA ERC Pilot Award); Mary Foley (Nurses Educational Funds, California Nurse Leaders, and Margretta Styles scholarships) and Elizabeth Thomas (Gordon and Betty Moore Scholarship).

Experience in writing for publication is encouraged through our annual Barbara Resnik writing award, named in honor of the founder of the OEHN program. From the last student cohort, alumna Kathleen Hagan won the award in 2007. Additionally, Barbara Burgel won a NORA award for a project on nurse staffing and disability rates and Kathleen Mullen won a NORA award for a project on injured nurses' return to work.

b. Faculty new honors, awards, appointments: Dr. Faucett (Visiting Professor and Florence Nightingale lecturer, King's College, London; 2007 UCSF School of Nursing Graduation Marshall; Margretta Styles Service Award, Sigma Theta Tau-Alpha Eta);

c. Trainee thesis - NA

d. New faculty positions: In August 2007, Dr. Oisaeng Hong joined the UCSF as Associate Professor and new OEHN Director. Dr. Hong served five years as the Director of the OHN Program at the University of Michigan before joining the faculty at UCSF.

e. New courses - NA

f. Trainee recruitment, including diversity efforts: NIOSH training funds assist us to recruit students into the field. Outreach is conducted through solicitations to advisory board members and alumni, at local nursing undergraduate programs, publication of a yearly newsletter that prominently features alumni accomplishments, and attendance at regional and national conferences. We attract a number of students to the School's Master Entry into Professional Nursing Program (MEPN) who have elected OEHN for MS degree study. For 2006-07, our outreach resulted in 2 new MEPN students and 2 new doctoral students, bringing our total enrollment to 13 (1 Asian, 1 Native American). In 2007-08, we increased our recruitment efforts both locally and regionally, attracting 1 new MS student and a special studies student, 3 new MEPN students and 1 new doctoral student, for a total enrollment of 17 (including 2 Black African Americans, 4 Asian) for the MEPN, MS, and PhD programs.

Assistant Dean for Recruitment and Retention, Judith Martin-Holland offered outreach at several conferences this year, OEHN faculty members and students assist in staffing the booth at such conferences. Dr. Martin Holland also provides activities for such groups as the National Coalition of Pacific Islander Nurses, Minorities in Health Care Conference, the National Youth Leadership Forum on Health Care, and the California Forums for Diversity in Graduate Education. Of particular note is a two-week academic enrichment summer program targeted for ethnically diverse undergraduate nursing students and pre-college students. Phase I of this program seeks to recruit, support and assist in the socialization and academic preparation of recipients for acceptance and entry into graduate programs in nursing. Phase II is a pre-college internship offering hands-on nursing experience to high school under-represented students. The School of Nursing also operates a joint program with John F. Kennedy University (JFKU) to assist nurses with associate degrees in nursing to complete their bachelor's degree at JFKU with the goal of continuing their graduate education at UCSF.

E. Program Products

1. Publications (see Appendix) and presentations: The core OEHN Program nursing faculty, including Gillen (who transferred this year to UC Berkeley) published or had accepted for publication 11 research articles, book chapters, or monographs during this program period. Faculty also provided 12 research, clinical or program presentations at conferences or universities or as guest lectures (Faucett, Burgel, Segovia-Bain, Gillen), four of which were international; and two program consultations on graduate studies in OEHN (Faucett, Burgel). Doctoral students also presented their work at American Public Health Association (Lee) and AAOHN (Thomas) as well as locally at UCSF.

2. Conferences/symposia offered: NA

3. CE courses presented: The OEHN program acts as sponsor for the Worker Compensation Update that is given each year at the COEH Annual Summer Institute. This two day course, coordinated by Ms. Segovia-Bain is very well attended by professionals from across the OH disciplines. In the past, OEHN also taught a clinical update course for OHNs that we have now moved to be every other year. This was not offered in 2006-07 but will be offered again in 2008.

4. R2P: Dr. Faucett's research on farm workers and musculoskeletal disorders has long been recognized for its immediate applicability to the agriculture industry. As the lead health care researcher on the UC Agricultural Ergonomics Research Center team, her work has provided a key cornerstone for testing engineering, administrative and behavioral interventions in fruit, vegetable and horticulture commodities – leading to new tools and task practices that are disseminating throughout California and other agricultural industries. Dr. Gillen's research has led to considerably increased interest in the hazards of bloodborne pathogens and sharps injuries. Her work to evaluate regulatory efforts to reduce such injuries has direct impact on practical efforts to improve working conditions of health care personnel through regulation and also local effort to change practice. Dr. Hong's work on hearing loss will significantly add to our range of activities.

5. Research projects with significant trainee involvement: Eight students were enrolled in the doctoral program during 2006-07, and one new student will enroll in the program in 2007-08. Drs. Faucett and Gillen focus their work on traumatic and musculoskeletal injuries and consider injury prevention a central OEHN Program focus. Additional areas of OEHN student research are well supported by affiliated faculty. PhD students focused their work on

musculoskeletal injury (Burgel, Lee, Drew Nord), intimate partner violence and employment (Foreman), return to work following injury (Mullen), environmental chemical policy in California (Foushee), needlestick injuries (Foley), and chronic disease in the workplace (Thomas). The entering doctoral student will be focusing on health disparities (Hill). In the last year, several students participated as RAs on Dr. Gillen's study of safe needle devices and Dr. Faucett's agricultural studies.

6. Unique training courses: All OEHN students take 2 quarters of an OEHN role residency (N405), working with an OEHN preceptor in one of a variety of OH services. The residency includes planning, implementation, and evaluation of an occupational health program specifically targeted to groups of high risk employees. A formal workplace community based needs assessment, organizational analysis, and executive summary are required. Because of the OEHN program in low-wage workers, many of the projects have involved targeted outreach to these groups. Having a student body with rich bicultural and bilingual capabilities has allowed us to conduct outreach with high-risk groups that have little or not contact with OHS professionals. Recently, students have worked with janitors (chemical safety, respiratory protection), welders, Vietnamese nail salon operators, Korean American women in a variety of occupations, uninsured musicians, and Cantonese speaking garment workers. Other students completed their program planning at more traditional sites including a national research laboratory, fire department, employee health departments, biotechnology research and development, and a pharmaceutical manufacturing company as examples. One OEHN student worked with the campus-wide Sustainability Committee of UCSF to develop a pharmaceutical waste program for the hospital – the only student from the entire campus (and four schools) to ever participate in such an activity.

This last year N405 students also worked with Professors Burgel and Segovia-Bain at our faculty practice site (Glide Health Services Clinic - GHS, associated with Glide Memorial United Methodist Church) to identify OHS needs and possible services. GHS Clinic manager, Karen Hill, RN, MS, OHNP, has worked with several students to develop heretofore non-existent health and safety policies and procedures for Glide staff. Faculty and students have been providing limited OHS to GHS since its inception (BBP training, hand-washing and food safety training). However, the presence of an OEHN graduate in this clinic has provided the OEHN program with the opportunity to expand services into a more broadly defined consultation service. Projects have focused on illness and injury prevention related to safety and ergonomic hazards, development of policies and procedures to meet regulatory requirements, toxic exposures in various sites as well as on health promotion with high-risk workers.

F. Future Plans: For academic year 2007-08, OEHN will focus on orienting Dr. Hong to her new position as Program Director and on student recruitment. We will also initiate our new 4 quarter MS Specialist track to prepare nurses to develop, implement and evaluate OEH programs. We are initiating our alumni expert panel that will provide outreach to undergraduate programs and other groups. They have designed a lecture presentation that any of them can present, and are developing liaisons with key faculty in undergraduate and community health programs, and participating more closely with program faculty in identifying key recruitment opportunities. Additionally, we will continue to develop our OHS work with Glide Health Services.

Appendix A: Student Publications (student names are underlined and faculty names are in bold.)

1. Cheung, K., **Gillen, M., Faucett, J., Krause, N**. The prevalence of and risk factors for back pain among home care nursing personnel in Hong Kong. American Journal of Industrial Medicine. 49: 14-22, 2006.

2. **Gillen, M**., Yen, I., Trupin, L., Swig, L., Rugulies, R., Mullen, K., Font, A., Burian, D., Ryan, G., Janowitz, I., Quinlan, P., Frank, J., & **Blanc, P**. (2007). The association of socioeconomic status and psychosocial and physical workplace factors with musculoskeletal injury in hospital workers. American Journal of Industrial Medicine, 50(4), 245-260.

3. Foxman, I & **Burgel, BJ** (2006). Musician health and safety: Preventing playing-related musculoskeletal disorders. AAOHN Journal, 54(7):309-16.

4. Janowitz, I., **Gillen, M.,** Ryan, G., Rempel, D., Trupin, L., Swig, L., Mullen, K., Rugulies, R., &, **Blanc,P**. (2006). Measuring the physical demands of work in hospital settings: Design and implementation of an ergonomics assessment. Applied Ergonomics, 37(5), 641-658.

Appendix B: Faculty Publications (student names are underlined and faculty names are in bold.)

1. Cheung, K., **Gillen, M., Faucett, J., Krause, N**. The prevalence of and risk factors for back pain among home care nursing personnel in Hong Kong. American Journal of Industrial Medicine. 49: 14-22, 2006.

2. **Faucett, J**., Meyers, J., Janowitz, I., Miles, J., Fathallah, F. (2007). Rest break interventions in stoop labor tasks. Applied Ergonomics, 38: 219-226.

3. **Gillen, M**., Yen, I., Trupin, L., Swig, L., Rugulies, R., Mullen, K., Font, A., Burian, D., Ryan, G.,Janowitz, I., Quinlan, P., Frank, J., & **Blanc, P**. (2007). The association of socioeconomic status and psychosocial and physical workplace factors with musculoskeletal injury in hospital workers. American Journal of Industrial Medicine, 50(4), 245-260.

4. Foxman, I & **Burgel, BJ** (2006). Musician health and safety: Preventing playing-related musculoskeletal disorders. AAOHN Journal, 54(7):309-16.

5. Janowitz, I., **Gillen, M.,** Ryan, G., Rempel, D., Trupin, L., Swig, L., Mullen, K., Rugulies, R., &, **Blanc,P**. (2006). Measuring the physical demands of work in hospital settings: Design and implementation of an ergonomics assessment. Applied Ergonomics, 37(5), 641-658.

6. Kato, A., Fathallah, F., Miles, J., Meyers, J., **Faucett, J.**, Janowitz, I., Garcia, E. Ergonomic evaluation of wine grape trellis systems pruning operation. Journal of Agricultural Safety and Health, 12(1): 17-28, 2006.

7. Larson JL, Ahijevych K, Gift A, Hoffman L, Janson SL, Lanuza DM, Leidy NK, Meek P, **Roberts J,** Weaver T, Yoos HL. (2006). ATS Nursing Research Priorities Subcommittee. American Thoracic Society statement on research priorities in respiratory nursing. American Journal of Respiratory and Critical Care Medicine, 174(4):471-8.

8. Leigh, J.P., **Gillen, M**., Franks, P., Sutherland, S., Nguyen, H.N., Steenland, K., & Xing, G. (2007). Costs of needlestick injuries and subsequent hepatitis and HIV infection. Current Medical Research and Opinion, 23(9), 2093-2105.

9. Leigh, J.P., Wiatrowksi, **Gillen, M.**, & Steenland, N.K. (2007). Characteristics of Persons and Jobs with Needlestick Injuries in a National Data Set. American Journal of Infection Control (in press).

10. Meyers, J., Miles, J., **Faucett, J**., Fathallah, F., Janowitz, I., Smith, R., Weber, E., Garcia, L., Tejeda, D., Duraj, V., Tarter, M. Ergonomics prevention of back injury in wine grape harvest. Agromedicine (In press).

11. Peek-Asa C, Casteel C, Allareddy V, Nocera M, Goldmacher S, OHagan E, Blando J, Valiante D, **Gillen M**, & **Harrison R**. (2007). Workplace violence prevention programs in hospital emergency departments. Journal of Occupational and Environmental Medicine, 49(7), 756-763.

Appendix C – Admission Requirements and Curriculum

UCSF, OEHN Program, School of Nursing, Prospective Students, Masters Program

Admission Requirements to the Master's program

1. Baccalaureate (bachelor's) degree from an NLN- or CCNE-accredited program in nursing. Nurses who have a U.S. bachelor's degree in another discipline are also eligible to apply.
2. Licensure as a registered nurse in California (or home state of residency).
3. Completion of an introductory course in statistics.
4. Completion of the Graduate Record Examination General Test (GRE) within the last five years.
5. Evidence of personal qualification and capacity for graduate study as reflected in the application, references, Graduate Record Examination, and grade point average (3.0). Past academic performance and professional activity are evaluated, e.g., community, organizational, and volunteer service, and creative professional accomplishments.
6. Congruence of applicant's goal with the goals and resources of the School and University.
7. A minimum of one-year registered nurse experience which is related to the area of specialization is desirable. Some specialties may require additional experience.
8. Computer proficiency is highly recommended (especially word processing and internet skills).

Admission Requirements to the Doctoral program

Requirements for admission to the doctoral program (for applicants with either BSN or MS degrees) are as follows:

1. An undergraduate Grade Point Average (GPA) of 3.2.
2. If a graduate (master's) degree has been earned, a Grade Point Average of 3.5 is expected.
3. Completion of Graduate Record Examination (GRE) General Test within the last five years prior to application. The GRE score should indicate strong verbal, quantitative, and analytical potential.
4. Comprehension of basic statistics is essential. A prior statistics course is required; a recent course is desirable.
5. Completion of a research course equivalent to the N 262A "Research Methods" course at UCSF.
6. Evidence of capacity for original scholarship and research in nursing.
7. Congruence of applicant's goals with the program's goals and the resources of the School and University.
8. Evidence of the ability to communicate in a scholarly manner, both orally and in writing.
9. Evidence of licensure as a registered nurse.
10. *Preferred:* one year of professional nursing experience.
11. Computer literacy is highly recommended (especially competence in word processing skills and the internet)

Occupational and Environmental Health Clinical Nurse Specialist Program
Sample Curriculum (2006-08)

Course	*Number*	*Units*	*Time*	*Faculty (FOR)*
FALL QUARTER, YEAR ONE (13 units) (2006-07)				
Family Nursing Theory & Practice **or** Theories of the Policy Process	N279 or N253	3	Wed 8-10	Humphreys; Malone
Assessment/Management of Common Psychiatric Symptoms	N257	2	Wed 10-12	Chafetz
Advanced Health Assessment	N270	2	Wed 1-3	Hollinger
Advanced Health Assessment Seminar (qowk) **and** Practicum **and** Skills Lab (qwk) for CNS	N405*	2	Thu 12-2 qowk Thu 10-12 qwk	Segovia-Bain
Current Concepts in Occupational Health Nursing	N273A	2	Thu 2-4	Burgel
Teaching Learning**	N201B	2	Contact Zina Mirsky	Mirsky
Issues in Occupational Health **(Do not register this qtr)**	N273B†	-	2 hr. seminar TBA	Segovia-Bain
WINTER (13 units)				
Research Methods	N262A	2	Wed 8-10	Alkon
Health Protection and Promotion	N245	2	Wed 10-12	Oka
Practicum: Advanced Clinical Practice (4 hours/week)	N405*	2	Wed 3-5 qowk	Segovia-Bain
Clinical Pharmacology	N232	4	Web-Based & Wed	Saxe/Ford
Introduction to Epidemiology	E & B 190	3	1-3	White
Issues in Occupational Health **(Do not register this qtr)**	N273B†	-	Thu 9-12 2 hr. seminar-TBA	Segovia-Bain
SPRING (12 units)				
Health & Safety Hazards of the Workplace	N274A	4	Mon 9-5	Quinlan
Symptom Assessment and Management	N246	3	Wed 8-11	Scott
Practicum: Advanced Clinical Practice (4 hours/week)	N405*	2	Wed 11-1 qowk	Segovia-Bain
Global Health Interventions	N215.01	3	Thurs 9-12	Portillo
Issues in Occupational Health **(Do not register this qtr)**	N273B†	-	2 hr. seminar -TBA	Segovia-Bain
FALL, YEAR TWO (12 units) (2007-08)				
Outcomes Evaluation	N230	3	Wed 9-12	Carrieri-Kohlman
Dimensions in Advanced Practice	N241	2	Wed 1-3	Dracup/Fontaine
Health Systems Management	N287A	4	Thursday 8-12	Spicer
Practicum: OHN Role (4 hours/week)	N405*	1	Seminar TBA	Segovia-Bain
Occupational Safety	N274C	2	Summer workshop-**and** Fall seminar	Plog
Issues in Occupational Health **(Do not register this qtr)**	N273B†	-	TBA 2 hr. seminar TBA	Segovia-Bain
WINTER (11-12 units)				
Toxicology	M180	2	Wed 9-11	Jewell
Disability Management (8 hours/week)	N405*	3	TBA	OEH Faculty
Occupational Biomechanics **(Do not register this qtr)**	BioE C279	-	Fri 2-5	Rempel
Practicum: Education & Training (6-8 hours/week**)	N436*	2-3	TBA	OEH Faculty
Sociocultural Course Requirement (*Chosen by Student)*	- N273B†	2 -	- 2 hr. seminar –TBA	Various Faculty Segovia-Bain
Issues in Occupational Health **(Do not register this qtr)** *Health Care Economics and Policy*	S222	2	Wed. 3-5	Harrington
SPRING (10.5 units)				
N405: OHN Program Planning (4 hours/week)	N405*	2	Wed 11-1 qow	Segovia-Bain
Occupational Injury and Illness Management	N271.06	3	TBA	Burgel
Occupational Biomechanics (continued)	BioE C279	4.5	Fri 2-5	Rempel
Issues in Occupational Health **(Register this qtr)**	N273B	1	2 hr. seminar TBA	Segovia-Bain
Comprehensive Exam				

NOTES: Students are expected to attend Occupational & Environmental Medicine Grand Rounds (Thu 8-9 am qowk), Journal Club, and/or Research Rounds (Thu 9-10 am qowk) as a requirement of N273B, in addition to the quarterly seminars. *School of Nursing core requirements are in italics*. *1 unit N400 coursework = 3 hours clinical per week in addition to seminars.

**Education minor includes at least two academic courses in education (N201A, B or C) and 3 units N436 Teaching Practicum

Curriculum meets State BRN requirements for CNS. **Curriculum & scheduling subject to change.** **2/07**

Occupational and Environmental Health Nurse Practitioner Program
Modal curriculum *(2006-08)*

Course	*Number*	*Units*	*Time*	*Faculty (FOR)*
FALL QUARTER, *YEAR ONE* (13 units)				
*Family Nursing Theory & Practice **or** Theories of the Policy Process*	N279 **or** N253	3	Wed 8-10	Humphreys; Malone
Assessment/Management of Common Psych Symptoms	N257	2	Wed 10-12	Chafetz
Advanced Health Assessment	N270	2	Wed 1-3	Hollinger
Advanced Health Assessment Seminar (qowk) **and** Practicum **and** Skills Lab (qwk)	N404.01*	2	Thu 12-2 qowk Thu 10-12 qwk	Segovia-Bain
Current Concepts in Occupational Health Nursing	N273A	2	Thu 2-4	Burgel
Nutrition (or can be taken in Winter, 1st or 2nd year)	Nu218	2	Web-based	
Issues in Occupational Health **(Do not register this qtr)**	N273B†	–	2 hr. seminar TBA	Segovia-Bain
WINTER (14 units)				
Research Methods	N262A	2	Wed 8-10	Alkon
Health Protection and Promotion	N245	2	Wed 10-12	Oka
ANP Seminar: Health Promotion	N245.01	1	Wed 3-5 qowk	Kelber
ANP Residency (seminar **and** 4 hours/week)	N404.01*	2	Wed 3-5 qowk	Segovia-Bain
Clinical Pharmacology	N232	4	Web-Based **and** Wed 1-3	Saxe/Ford
Introduction to Epidemiology	E&B190	3	Thu 9-12	White
Issues in Occupational Health **(Do not register this qtr)**	N273B†	–	2 hr. seminar TBA	Segovia-Bain
SPRING (13 units)				
Health & Safety Hazards	N274A	4	Mon 9-5	Quinlan
Global Health Interventions	N215.01	3	Thurs 9-12	Portillo
Symptom Assessment and Management	N246	3	Wed 8-11	Scott
ANP Seminar: Urgent Care	N246.01	1	Wed 11-1 qowk	Dreier
ANP Residency (seminar **and** 4 hours clinical/wk)	N404.01*	2	Wed 11-1 qowk	Segovia-Bain
Issues in Occupational Health **(Do not register this qtr)**	N273B†	-	2 hr. seminar TBA	Segovia-Bain
FALL QUARTER, *YEAR TWO* (13 units)				
Complex Health Problems & Management	N247	3	Tue 2-5	Capaldini
Dimensions of Advanced Practice Nursing	N241	2	Wed 1-3	Dracup/Fontaine
Primary Care Residency (8 hours/week in primary care and 4 hours/week orthopedics, and seminar)	N404.01*	4	Wed 3-5 qow	Burgel
Issues in Occupational Health **(Do not register this qtr)**	N273B†	–	2 hr. seminar TBA	Segovia-Bain
Practicum: OHN Program Planning	N405*	2	Seminar TBA	Segovia-Bain
Occupational Safety	N274C	2	Summer workshop **and** Fall seminar TBA	Plog
WINTER (13 units)				
OHN Role	N405*	1	TBA	Segovia-Bain
Toxicology	M180	2	Wed 9-11	Jewell
Adult Primary Care Residency (8 hours.week in primary care and 4 hours/week in occ medicine, and seminar)	N404.01*	4	Wed 5-6PM qw	Burgel
ANP Seminar: Complex Health Problems	N247.01	2	Wed 1-3	Dennehy
Health Care Economics and Policy	S222	2	Wed 3-5	Spetz
Occupational Biomechanics (Ergonomics)	BioE C269	–	Fri 2-5	Rempel
Issues in Occupational Health **(Do not register this qtr)**	N273B†	–	2 hr. seminar TBA	Segovia-Bain
Sociocultural course requirement (chosen by student)	-	2	-	-
SPRING (11.5 units)				
Management of Clinical Occupational Health Problems	N271.06	2	Wed 3-5	Burgel/Blanc
Adult Primary Care Residency (8 hours/week in primary care and 4 hours/week in specialty rotation, & seminar)	N404.01*	4	Wed 1-3 qowk	Burgel
Issues in Occupational Health **(Register this quarter)**	N273B	1	2 hr. seminar TBA	Segovia-Bain
Occupational Biomechanics (continued)	BioE C269	4.5	Fri 2-5	Rempel
Comprehensive Exam				

Notes: Students are expected to attend Occupational & Environmental Medicine Grand Rounds (Thu 8-9 am qowk), Journal Club and/or Research Rounds (Thu 9-10 am qowk) as a requirement of N273b, in addition to the quarterly seminars. School of Nursing core requirements are in italics. *1 unit N400 coursework =3 hours clinical per week in addition to seminars. † Please register for this course in Spring Qtr. of Year Two ONLY
Curriculum meets the requirements of the ANCC & CA State BRN for Adult Nurse Practitioner Certification.

Curriculum and course scheduling subject to change. **2/07**

Occupational and Environmental Health Specialist Program
One Year Modal curriculum *(2006-07)*

Course	*Number*	*Units*	*Time*	*Faculty (FOR)*
FALL QUARTER, *YEAR ONE* (12 units)				
Theories of the Policy Process	N253	3	Wed 8-10	Malone
Outcomes of Care	N230	3	Wed 10-1	Carrieri-Kohlman
Dimensions of Advanced Practice Nursing	N241	2	Wed 1-3	Dracup/Fontaine
Current Concepts in Occupational Health Nursing	N273A	2	Thu 2-4	Burgel
Occupational Safety (includes summer 2 day CE course preceding MS program)	N274C	2	TBA	Plog
Issues in Occupational Health **(Do not register this qtr)**	N273B†		2 hr. seminar TBA	Segovia-Bain
WINTER (11 units)				
Research Methods	N262A	2	Wed 8-10	Alkon
Health Protection and Promotion (recommended)	N245	2	Wed 10-12	Oka
Health Care Economics and Policy	S222	2	Wed 3-5	Spetz
Introduction to Epidemiology	E&B190	3	Thu 9-12	White
Occupational Biomechanics (Ergonomics)	BioE C269	-	Fri 2-5	Rempel
Sociocultural course requirement (chosen by student)	TBA	2	TBA	
Issues in Occupational Health **(Do not register this qtr)**	N273B†	–	2 hr. seminar TBA	Segovia-Bain
SPRING (14.5 units)				
Health & Safety Hazards	N274A	4	Mon 9-5	Quinlan
Program Management	N234	3	Wed 8-11	Waters
Management of Clinical Occupational Health Problems	N271.06	2	Wed 3-5	Burgel/Blanc
Occupational Biomechanics (Ergonomics)		4.5	Fri 2-5	Rempel
Issues in Occupational Health	N273B†	1	2 hr. seminar TBA	Segovia-Bain
SUMMER (10 units)				
OHN Residency	N404/N405*	8	TBA	OHN faculty
Toxicology (taken either summer)	M180	2	TBA	
Comp Exam				

NOTES: Students are expected to attend Occupational & Environmental Medicine Grand Rounds (Thu 8-9 am qowk), Journal Club and/or Research Rounds (Thu 9-10 am qowk) as a requirement of N273b, in addition to the quarterly seminars.

School of Nursing core requirements are in italics. **1 unit N400 coursework =3 hours clinical per week in addition to seminars.*

Curriculum and course scheduling subject to change. 2/07

University of California, San Francisco, School of Nursing
Doctoral Foundation Course Schedule – 2007

Fall			**Winter**			**Spring**		
Year 1								
N209A	Comp Qual Res Des (Rehm & Gudmondsdottir)	Th 10-12	N229	Philosophy of Nsg Sci (Rankin & Holzemer)	T 1-4	N212B	Quant Measurement/Theory (Slaughter)	Th 9-12
N209B	Comp Quan Res Design (Padilla & Stotts)	W 10-12	B187	Intro Probability/Stats (Paul)	T/Th 10-12	B192	Intro Linear Methods (Paul)	T/Th 1-3
N269	Hlth/Nsg Systems (Drew/Kennedy)	Th 1-5		Lab (Paul)	Th 1-3		Lab (Paul)	T/Th 3-5
Theory (choose one course from below)								
N290	Family Theory (Chesla)	W 1-4						
N202A	Theory Dev Nsg (Faucett & Portillo)	W 1-3						
N253	Theories of Policy Process (Malone)	W 8-10						
N221.01	Theories Re to Nsg Care (Kohlman)	W 8-10						
N227	Theories of Mental Illness (Weiss)	W 8-10						
Year 2								
N/S285 A	Qual Res Methods (Clarke & Kennedy)	T 1-4	N/S285B	Qual Res Methods (Clarke & Kennedy)	W 1-4	N291	Applied Stat Methods (Cooper)	W 9-12
N289A	Quan Res Methods (Alkon & Spetz)	W 9-12	N289B	Quan Res Methods (Weiss & Lee)	W 9-12		Lab (Cooper)	W 1-3
	OR	W 1-3		OR				
S289A	Quan Res Methods (Newcomer)	W1-3	S289B	Quan Res Methods (Newcomer)	W 1-3			

Advanced Nursing Seminars

Fall				**Winter**				**Spring**			
N223 A	Aouzirat & Humphreys	Symptom Research	TBA	N223B	Janson	Symptom Research	TBA	N223C	Carrieri-Kohlman	Symptom Research	TBA
N240. 01	Dodd	Biomarkers I	We 12-2	N240.02	Aouzirat	Biomarkers II	TBA	N240.03	Davies & Hughes	Grief/Bereave ment	NTBO
N240. .06	Holzemer	Sem on HIV/AIDS	We 3-5	N240.05	Portillo	Vulnerable Women	TBA	N240.04	Humphreys	Violence & Health	TBA
N24- .08	Kenn & Weiss	Adv Child Develop Sci	NTBO	N240.06	Holzmr/Portillo	Sem on HIV/AIDS	TBA	N240.05	Portillo	Vulnerable Women	TBA
N240. 09	Harrington	Health Policy I	Th 10-12	N240.08	Kenn & Weiss	Adv Child Dev Sci	NTBO	N240.06	Holzemer	Sem on HIV/AIDS	TBA
N240. 011	Faucett	OH Res Seminar	TBA	N240.10	Harrington	Health Policy	TBA	N240.07	Janson & Holzemer	Adherence	TBA
				N240.12	Chesla	Family Health	TBA	N240.08	Weiss & Kenn	Adv Child Dev Sci	TBA
				N240.14	Oka	Hlth Prom & Chronic Dis	TBA	N240.13	Chafetz & Weiss	Psychol Factors	TBA
				N240.17	Froelicher	CV Epi	NTBO	N240.18	Seago	Workforce & Hlth	Tu 4-6
								N248	Blegen	Patient Safety	TBA

Occupational and Environmental Medicine
University of California, San Francisco
Program Director's Annual Report
June 30, 2006 – July 1, 2007

The Occupational and Environmental Medicine (OEM) Residency Program at the University of California, San Francisco (UCSF) continues to produce well-trained OEM physicians who have had great success gaining employment in private practice, industry, governmental public health agencies, non-governmental organizations, and academia.

A. Program Title: The Occupational and Environmental Medicine (OEM) Residency Program at the University of California, San Francisco (UCSF)

B. Program Director: Robert L. Goldberg, MD, FACOEM continues as the Director since October 1, 2002.

C. Program Description:

Goals and Objectives: The primary goal of the Occupational and Environmental Medicine Program at UCSF is to recruit and train physicians who will become future leaders of the field. A specific objective is to provide high-quality academic and practicum training experiences. The expected outcomes include high levels of attainment in the ACGME General Competencies and significant exposure to and competence in the vast majority of the ACOEM OEM Competencies. The utilization of these benchmarks guides the training program and allows for periodic assessment of the progress of the residents. Upon graduation it is expected that the resident is capable of performing as an OEM specialist and is well prepared for the ABPM examination. The program has an excellent record of success in these outcomes. The program actively seeks multidisciplinary training opportunities and continues to seek enhancement of training opportunities through development of new practicum rotations and broader didactic instruction. NIOSH grant support is essential to allow UCSF to continue to achieve the training goals and objectives.

Responsible Conduct of Science: A UCSF course on bioethics and the responsible conduct of human research is required for the OEM residents (EPI 201). The UCSF Committee on Human Research also requires continuing faculty training on human subjects research. Faculty research mentors provide further training during the research aspects of the practicum year by direct supervision and role modeling.

Faculty Participation The faculty are actively involved in the following areas: semi-annual Residency Advisory Committee and annual Curriculum Committee meetings, practicum rotation preceptors, academic year instructors and advisors, research mentors, clinic attendings, didactic programs, industrial site visits, special investigations, site visits and projects, grand rounds, journal club, case conferences, and research seminars.

Curricula: Clinical Training occurs during both years utilizing a multi-disciplinary approach. The Kaiser Permanente Occupational Health Clinic in San Francisco is a clinical rotation that has been added so that there is now greater exposure to the private practice world of OEM. The Occupational Health Services program at San Francisco General Hospital is a primary clinical training site for OEM residents. The UCSF OEM Multi-Disciplinary Clinic is operated at the UCSF-Mt. Zion campus. This site provides for multi-disciplinary team training of OEM residents with the OEM program's industrial hygienist, Ms. Patricia Quinlan, UCSF Employee Health

Nurses, and UCB IH students. OEHN students train with UCSF OEM faculty physician Dr. Robert Harrison at the same site. There is a weekly case conference to review the complex OEM consultations that are referred by other UCSF clinical departments, community clinicians, the AOEC network, governmental agencies, employers, and the legal community. Other clinical sites include the Upper Extremity Clinic held by Dr. Rempel at the UCB campus and the UCSF Hand Clinic.

The summer didactic program, which all residents attend, begins each July and runs through late August. Basic topics in occupational and environmental health are covered annually and more advanced topics are covered on a 2-year cycle.

Industrial site visits are held two days each week during the same time period as the didactic sessions. The sites are rotated on a 2-year cycle so as to afford as wide an experience as possible. The residents hold pre-visit briefings on the industry and the particular employer. They observe and record the occupational exposures and risks and the corresponding control measures.

Research Training: Residents are required to participate in OEM research activities. The research training activities of core UCSF faculty members are focused on three areas: occupational/environmental lung diseases, musculoskeletal disorders of the upper extremity, and occupational/environmental epidemiology (arsenic-related cancers, low back injury, disability, cardiovascular disease, air pollution health effects). Residents seek an OEM faculty research mentor in their first year of training and begin to prepare for the second year that includes two protected months for research. The Training in Clinical Research (TICR) course series offered by the UCSF Department of Epidemiology and Biostatistics meets for seven weeks in the early part of the practicum year. Please see Appendix C for a summary of the curricula.

The OEM residents are required to develop and present the design and protocol for a relevant research project. There is peer review and faculty supervision of the trainee project, which forms the basis of their mentored research program. After selection of the research project, the trainee works closely with his/her research preceptor over the course of the practicum year. Continued training is provided in the monthly Research Seminar and through Journal Club, which has a special emphasis on statistical methodology. Research activities are extensively supported by extramural funds and residents may apply for COEH Student Award grants.

Principal faculty research mentors include Drs. Balmes, Blanc, Eisner, Rempel, Goldberg, Krause, and Steinmaus. There is also a large number of other supporting and core faculty members who sponsor resident research activities and regularly participate in the research-training program through Research Seminar and Journal Club. In addition to the clinical and basic science research program, there is a strong commitment to the study of the epidemiology of occupational and environmental disease.

Academic Training: The academic-year OEM residents attend the UCB School of Public Health (SPH) for the degree of Master of Public Health in Environmental Health Sciences (EHS). Required coursework includes biostatistics, epidemiology, health services organization and administration, environmental and occupational health, and the social and behavioral influences on health. The School of Public Health requires a core course sequence (PH 200 C and D) that covers health services organization, social and behavioral factors on health, and environmental health issues. A minimum of 24 units and a passing score on the comprehensive exam is required for graduation. The EHS curriculum at the UCB SPH continues to meet the

requirements of the ACGME and the ABPM. Course opportunities beyond those required for the EHS track include the areas of health policy, advanced biostatistics, and advanced occupational epidemiology. Residents are also expected to attend UCSF OEM Grand Rounds, Journal Club, and Research Seminar on every 2nd & 4th Thursday morning (except when there is a conflict with regularly scheduled classes). The OEM resident's curriculum advisor at the SPH is Dr. James Seward, MD, MPP in the Division of EHS. Further support and advice is available from the OEM Program Director's office and the Program Coordinator. Academic-year residents receive training in medical center infectious diseases and cover the UCSF infectious disease hotline for four weeks each year.

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Practicum Training: The training is focused on 1-2 month core rotations with employers and at OEM clinics providing comprehensive occupational health services. The current list of available placements includes core OEM rotations with: UCSF/UCB Ergonomics Program with Dr. Robert Goldberg and Dr. David Rempel, San Francisco General Hospital Occupational Health Services, California Pacific Medical Center (CPMC), Kaiser-Permanente (San Francisco Occupational Medicine Center and Medical Center and Regional Headquarters), Lawrence Livermore National Laboratory (LLNL), Richard Cohen MD, MPH, Inc. (corporate medical consulting), the Lawrence Berkeley National Laboratory (LBNL) and ALZA Corporation. The program continues to develop new opportunities.
In addition to the required four months of core OEM rotations, the residents are also required to fulfill two months of public health rotations at one or more of the following: the California Department of Health Services (at the Occupational Health Branch or the Environmental Health Investigation Branch), the California Environmental Protection Agency (Cal-EPA), the Natural Resources Defense Council, SHARP (Washington State OEM Research and Standards Enforcement), the UCSF Pediatric Environmental Health Specialty Unit (PEHSU) or the San Francisco Bay Area Regional Poison Control Center. Residents may also elect to take a public health rotation at Federal OSHA in Washington D.C., at NIOSH in Morgantown, WV, or Cincinnati, OH, or at the World Health Organization (WHO) in Geneva. This new rotation at the WHO, established with the World Health Organization in Geneva in 2005-2006, is extremely valuable and remains popular with residents as a possible rotation choice.

UCSF has had a PEHSU since 2000. The PEHSU is funded by the Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency through a cooperative agreement with the Association of Occupational and Environmental Clinics (AOEC). Dr. Balmes is the chief of the service of the Northern California component. The key personnel include Dr. Solomon and Dr. Mark Miller. The primary function of the PEHSU is education and outreach to community physicians. It provides consultative services, mostly by telephone for pediatric environmental health problems with a focus on environmental triggers of asthma. Individual and families cases are evaluated on a multidisciplinary basis at the UCSF OEM faculty clinic.

The remaining months of the practicum year are devoted to elective rotations and completion of the required research project during a two month protected rotation with a UCSF Faculty preceptor. Electives may include any of the core rotations listed above as well as others on the practicum list. Residents are encouraged to seek out new educational experiences and may propose rotations to fill special needs. A new elective rotation for 2006-2007 was developed at Chevron's Global Employee Health Services Department in Houston to meet the particular interests and educational needs of one resident.

Residents are expected to self-evaluate their strengths and weaknesses based on a spreadsheet of OEM competencies. Each rotation preceptor is required to complete a

competencies spreadsheet indicating those that can be acquired during the course of a rotation. Residents are expected to review the competencies that to be acquired during each rotation. In addition, residents discuss their rotation selections with the program director. At the start of each rotation, residents are required to develop a list of rotation goals and objectives with their on-site preceptor. An expectation of most rotations is to complete a project. Residents are evaluated based on how well they have achieved goals and objectives for each rotation. The UCSF E*value system has been implemented to provide evaluation of residents and faculty in addition to periodic conferences with the Program Director.

Providing OEM residents with training opportunities in other disciplines is an ongoing priority for the program. Residents can attend Dermatology Clinic at UCSF. Lectures by Dr. Howard Maibach, a leading expert on occupational dermatology, and an introduction to the Occupational Dermatology Clinic, are a part of summer didactic training. Dr. Balmes gives formal didactic instruction in pulmonary disease, pulmonary function testing and ILO scoring of chest radiographs. Hands-on instruction in slit lamp examination of the eyes is available to OEM residents. Opportunities to work with orthopedists, ENT specialists, rehabilitation medicine specialists, allergists and other relevant specialists are also available.

The practicum year follows the academic year and officially starts July 1. The first rotation actually occurs in June of the academic year. The program for the year is developed in consultation with the Program Director based on program requirements, competency assessment, and educational and career goals. The final schedule is reviewed with the Program Director during the Spring of the academic year. The actual approved schedule of rotations must be established by May 1 preceding the start of the practicum year.

Throughout the practicum year, each resident participates in one of the occupational medicine clinics one day per week and attends UCSF OEM Grand Rounds, Journal Club and Research Seminar. Additionally there is a required weekly clinical case conference. The current broad selection creates opportunities in medical management, manufacturing, biotechnology, semiconductors, research laboratories, high-energy physics, ergonomics, public health, environmental health, medical toxicology, and clinical and consulting occupational medicine. New rotations are developed to meet the educational and training needs of particular residents.

Practicum Rotations: A complete list can be found in Appendix C.

Conferences and Courses: A complete list can be found in Appendix C.

Interdisciplinary Experiences: The faculty of the OEM Program at UCSF approach occupational health teaching, research, and service activities from an interdisciplinary perspective. Whenever possible, interdisciplinary training opportunities with nurses, industrial hygienists and other health and safety personnel are developed.

Dr. Blanc co-directs, with Barbara Burgel of the OEHN program, a course designed for both the nursing students and OEM residents, called “N271.06 Clinical Management of Occupational Health Problems.” Residents in the practicum year are required to take this 10-week UCSF course, which explores the evaluation and clinical management of acute and chronic occupational and environmental health problems. The format is primarily case-based problem solving which facilitates interaction between the residents and nursing students. OEM residents already have a MPH degree in their practicum year when the course is taken so they do not receive credit for the course.

The multi-disciplinary clinic integrates trainees in multiple disciplines (medicine, nursing, and IH). The UCSF OEM faculty practice clinic uses a multi-disciplinary approach to include the OEM industrial hygienist, Patricia Quinlan, MPH, CIH, and IH students as well as OEM residents and physicians in the evaluation of patients and their workplaces. The staff is composed of professionals from these same disciplines as well as OEHNPs. OEHN students are trained at the same site under the supervision of OEM physician, Dr. Robert Harrison. OEM residents interact with Ergonomics students at Dr. Rempel's Upper Extremity Clinic at UCB. OEM residents also interact with IH, OEHN and Ergonomics students at UCB during their MPH studies. Workplace site visits, grand rounds, research seminars, the yearly ergonomics conference and other COEH activities (Summer Institute) have participants from multiple disciplines.

There is a joint OEM/Medical Toxicology Program. Successful applicants to the UCSF Medical Toxicology (MT) Program spend their first year as MT fellows, followed by the OEM Academic Year. The third year includes OEM rotations, clinic and research that also meet the requirements for the MT Program.

There is a joint OEM/Pulmonary fellowship. Successful applicants to the UCSF pulmonary fellowship can apply for training in the joint program which requires an extensive research project. A typical research project for a trainee would be in the area of occupational or environmental lung disease.

D. Program Activities and Accomplishments

Progress: The program continues to broaden the didactic program and the industrial site visits. New courses and rotations have been added as residents and faculty identify new training needs and opportunities. One new rotation was developed this year at Chevron in Houston. The formal affiliation of the UCSF Medical Toxicology fellowship with OEM has benefited the training of OEM residents in medical toxicology. The program is actively exploring the possibility of developing a separate practicum year track for qualified residents interested in part-time training. This would allow residents to complete their practicum training over two years with the support of a sponsoring institution, without the need for additional residency training funds. The ACGME granted full re-accreditation in October 2005 for 8 trainees for the maximum 5- year length of time. Doctors Rempel, Kraus and Goldberg (and collaborators) received the International Ergonomics Association Liberty Mutual Prize for Ergonomics and Occupational Safety in July 2006. The graduating chief resident successfully completed the year and is qualified for and plans to take the ABPM certification examination. Her research abstract and poster were selected for presentation at the PREMUS meeting in Boston in 2007. Dr Michael Gallagher was awarded a scholarship from the Occupational Physicians Scholarship Fund for 2006-2007. The full list of honors is part of Appendix B.

Trainee Recruitment: The program recruits highly qualified candidates based on the national reputation of its program, its Director and Faculty, and the recommendation and reputation of successful alumni. The program accepted 2 new applicants of very high caliber. There are plans to increase visibility further by updating the website and attending key venues for recruitment.

Minority Recruitment: UCSF is strongly committed to minority recruitment. This year included one Hispanic woman and one African woman. The incoming class includes an Asian male. The program has a long record of high success in attracting highly qualified

applicants and trainees from under-represented groups. Our success is based on several factors. The Director and the faculty are committed to achieving a high level of diversity. Applicants are sought from all under-represented groups. Interviewees meet with the residents and they are able to see the high level of diversity that exists within the current cohort. There is a diverse faculty that also attracts residents. The UCB and UCSF campuses are models for diversity as campus tours clearly demonstrate. Our selection committee is keenly aware of the need to maintain a highly diverse resident cohort. Although affirmative action is specifically prohibited at the University by state law, the program is nonetheless highly successful in attracting and retaining trainees from under-represented groups. The UCSF Chancellor's Committee on Diversity is a standing committee to advise and make specific recommendations to the Chancellor and Cabinet for campus-wide diversity issues. The statement of policy is that UCSF values and promotes diversity because it enhances the education, workplace, and services to the public provided by this campus. The Dean's office holds specific sessions for residents from minority backgrounds in order to promote retention and continued high levels of diversity in the UCSF training programs. Lastly, the San Francisco Bay Area is well known for its diverse environment, which further attracts applicants from under-represented groups. Our plans for the future are to continue our current efforts and increase our coordination with the Dean's programs and new efforts by the Center.

E. Program Products: The residents and Faculty were very productive in their research projects as well as in achieving publication of various scholarly works. There were **83** faculty publications, **15** trainee publications, 61 Faculty presentations, and 14 trainee presentations. The faculty were involved in the organization and/or sponsorship of the COEH Summer Institute, the annual Ergonomics Conference, and the Western Occupational Health Conference. The UCSF Division sponsors CE through its Grand Rounds program throughout the year. The Division also sponsored the UCSF Advances in Occupational Medicine Conferences. Dr. Abbah completed research on the baseline data from the NIOSH National Collaborative Study on Workplace Upper Extremity Musculoskeletal Disorders that is being conducted at UCSF by Doctors Rempel and Goldberg. Her poster was presented at the AOHC in New Orleans and the PREMUS conference in Boston. Please see Appendix A and B for a list of publications and presentations.

F. Future Plans: Based on the critiques from the November 2006 site visit, the Program Director and the Residency Advisory Committee have developed a new research and academics course to be directed by Michael Bates, PhD, UCB epidemiologist and faculty member, in cooperation with Drs. Balmes and Goldberg. The course will provide further seminar-style instruction in all facets of research, as well as additional support for the residents' research projects. The program also plans to address the new CEPH requirements for the UCB SPH that will require 42 credit hours. The new ACGME competency requirements are being addressed by a competency committee that was established in 2006-2007 with roll-out of new methods in the 2007-2008 academic year. Enhancement of the Multidisciplinary Clinic is planned by relocating to larger clinic space at the Kaiser Permanente OM Clinic site and developing an expanded referral base for complex referrals in OEM. Further work towards a part-time program is ongoing. It is anticipated that the program will admit as many as four new trainees in 2007-08 to reach a complement of five trainees depending on NIOSH funding and outside sources. Dr Goldberg has recently received funding for a research project that will include salary support in 2008-2009 for the graduating Chief Resident, Michael Gallagher, so that he may remain involved in the research project and be active within the division and program.

Appendix A: Trainee Publications (trainee names are in bold; faculty names are underlined):

1. **Arredondo SA**, Latini DM, Sadetsky N, Kawakami J, Pasta DJ, DuChane J, Carroll PR, and the CaPSURE™ Investigators. Quality of Life for Men Receiving a Second Treatment for Prostate Cancer. Journal of Urology, January 2007.

2. Latini DM, Chan JM, Cowan JE, **Arredondo SA**, Kane CJ, Penson DF, DuChane J, Carroll PR, and the CaPSURE Investigators. Quality of Life for Men with Prostate Cancer and Diabetes: A Longitudinal Analysis from CaPSURE. Urology, December 2006.

3. **Arredondo SA**, Latini DM, Sadetsky N, Kawakami J, Pasta DJ, DuChane J, Carroll PR, and the CaPSURE™ Investigators. Quality of Life for Men Receiving a Second Treatment for Prostate Cancer. Conference on Cancer Nursing Research, Hollywood, February 2007. (ABSTRACT)

4**.** Goldberg RL, **Janssen S**, Reproductive Hazards Chapter. Agriculture Medicine, Lessenger, Editor, Springer 2006

5. Bahr JM, Dalponte M, **Janssen S**, Bunick D, Nakai M. Ion Transporters for Fluid Reabsorption in the Rooster (*Gallus domesticus)* Epididymal Region. *Animal Reprod Sci*, 95:331-37, 2006.

6. **Dong H**, Barr A, Loomer P, **Laroche C**, Young E, Rempel D. The effects of periodontal instrument handle design on hand muscle load and pinch force. J Am Dental Assoc 2006, 137(8):1123-30.

7. **Laroche C**, Barr A, **Dong H**, Rempel D. Effect of dental tool surface texture and material on static friction with a wet gloved fingertip. J Biomechanics 2007; 40(3):697-701.

8. **Dong H**, Loomer P, Barr A, **Laroche C**, Young E, Rempel D. The effects of tool handle shape on hand muscle load and pinch force in a simulated dental scaling task. Appl Ergonomics 2007; 38:525-531.

9. Steinmaus C, Moore L, **Shipp M**, Kalman D, Biggs ML, Hopenhayn C, Bates M, Zheng S, Smith AH. Genetic Polymorphisms in MTHFR 677 and 1298, GSTM1 and T1, and Metabolism of Arsenic. *Journal of Toxicology and Environmental Health*, 70:159-70, 2007

10. **Thundiyil JG**, Anderson IB, Stuart P, Olson KR. Lamotrigine-induced seizures in a child: a case report and review of the literature. Clinical Toxicology. 2007; 45(2): 169-172.

11. **Thundiyil, JG**, Kearney TE, Olson KR. Evolving epidemiology of drug-induced seizures reported to a poison control center system. Journal of Medical Toxicology 2007 Mar; 3(1): 15-19.

12. **Thundiyil JG**, Solomon GM, Miller MD,. Transgenerational exposures: persistent chemical pollutants in the environment and breast milk. *Pediatric Clinics of North America*. 2007; 54(1): 81-101.

13. **Thundiyil JG**, Yuan Y, Smith AH, Steinmaus C*. Seasonal Variation of Arsenic Concentration in Wells in Nevada. *Environmental Research*, 104:367-73, 2007

14. **Wang, C**., Laroche, C., Levin, C., and Maibach, H. Transdermal Drug Delivery System- An Overview. Chapter 9, Dermatotoxicology, 7th Edition, Zhai, H. and Maibach, H.I., Eds., CRC Press, Boca Raton, *publication pending* 2006

15. **Wang, C**., Maibach, H. Vulvar Toxicology. Chapter 18, Women's Health- The Vulva: Current Knowledge and Understanding, 1st Edition, Farage, M. and Maibach H., Eds., Taylor and Francis, 2006, *publication pending*

Trainee Presentations:

Abbah:

1. **Abbah E**, Garcia M, Harris C, Goldberg R, Krause N, Rempel D. Impact of hand or wrist pain on work function among workers performing hand intensive work. PREMUS 2007 (Prevention of Musculoskeletal Disorders), 27 August 2007. Boston.

2. **Abbah E**, Rempel D, Goldberg R, Krause N. Impact of hand/wrist pain on work function among blue collar workers. American Occupational Health Conference, 2007, New Orleans.

Janssen:

3. August 10, 2006, Presentation: "*PVC and DEHP in medical devices: Problems and Solutions*", session sponsored by San Francisco Dept. of Environment for city hospitals including representatives from UCSF, San Francisco General Hospital, and St. Luke's Hospital.

4. September 14, 2006, Presentation: "*Hormonal Effects of Chemical Pollutants – Endocrine Disruptors and Human Health*". Session held at the University of California, Berkeley, School of Public Health for course entitled "Current Topics in Environmental Medicine".

5. September 19, 2006, Presentation: "*Building Green Hospitals: Healthy Alternatives for Interior Flooring and Finishing*". Session focused on toxic building materials including phthalates, halogenated flame retardants, and semi-volatile organic compounds. Session sponsored by San Francisco Dept. of Environment and attended by architects from all over Bay area as well as some hospital representatives.

6. September 27, 2006, Presentation: "*Chemical Exposures and Chronic Disease*" given at a side event sponsored by the International POPs Elimination Network during Forum V of the Intergovernmental Forum on Chemical Safety. Discussion focused on heavy metals (Pb and Hg) and pesticides (DDT and lindane) and endocrine disruption. Session attended by ~80 people including international NGOs, delegates to the Forum representing the Ministries of Environment from their respective countries, physicians and scientists.

7. November 21, 2006, Presentation: "*First do no Harm: The problems with using PVC and plasticizers in the Healthcare Settings and Alternatives to their uses."* Grand Rounds presentation for the Pediatrics Dept. at San Francisco General Hospital. Attended by staff physicians, residents, medical students, nurses and purchasing staff.

8. January 29, 2007, Led a lunch circle discussion at the UCSF-CHE Summit on Environmental Challenges to Reproductive Health and Fertility entitled, **"***CHE's Toxicant and Disease Database, and Online Abstracts and News Libraries***"**. CHE's science-based,

searchable database (http://database.healthandenvironment.org/index.cfm) summarizes links between chemical contaminants and approximately 180 human diseases or conditions. CHE's Online Abstracts and News Libraries (http://www.environmentalhealthnews.org/topic.jsp?term=Topic%2FcheFertility), developed with EnvironmentalHealthNews.org, catalogues research and news stories related to environmental chemical factors in fertility and early pregnancy compromise.

9. January 30, 2007, Co-facilitated a break out session at the UCSF-CHE Summit on Environmental Challenges to Reproductive Health and Fertility entitled **"**Critical research directions and collaborations." Discussion of the most critical research directions/tools identified at the meeting; key research areas that basic scientists and epidemiologists, clinical researchers, and patient/community representatives might work on together; and key questions to be addressed in future research. Participated in plenary discussion afterwards to summarize group discussion.

10. March 15, 2007**,** Presentation, "*Talking to patients about endocrine disruption*" Talk at SEIU Local 790 conference "What is a healthy hospital? A conference for health care workers on environmental issues facing healthcare institutions", SEIU headquarters San Francisco.

11. April 19, 2007, Presentation, "*Exposure to and health effects of halogenated fire retardants*" given at workshop entitled: "The Fire Retardant Dilemma: Part II." UC-Berkeley.

12. May 30, 2007, Poster presentation, *"Policy Implications of endocrine disrupting chemicals",* presented at a workshop entitled "Endocrine disrupters and consumer products: Possible effects on human populations", Copenhagen, Denmark.

Thundiyil:

13. Content Reviewer for WHO Training Package for the Health Sector. World Health Organization. "Children and Chemicals." July 2006. Created by Jenny Pronczuk, MD.

Gallagher:

14. Resident rounds, guest lecturer. An Approach to the Medical Literature, Kaiser Permanente, Oakland, 2007.

Trainee Honors:

Michael Gallagher
Occupational Physicians Scholarship Fund award for 2006-2007 (and 2007-2008)

Appendix B: Faculty Publications (faculty names in bold; student names underlined)

Balmes, John

1. Pinkerton KE, **Balmes JR**, Fanucchi MV, Rom WN. Ozone, a malady for all ages. Am J Respir Crit Care Med. 2007;176(2):107-8.

2. **Eisner MD**, Wang Y, Haight TJ, **Balmes J**, Hammond SK, Tager IB. Secondhand smoke exposure, pulmonary function, and cardiovascular mortality. Ann Epidemiol 2007;17:364-373.

3. Thompson L, Diaz J, Jenny A, Diaz A, Bruce N, **Balmes J**. Nxwisen, ntzarrin or ntzo'lin? Mapping children's respiratory symptoms among indigenous populations in Guatemala. Soc Sci Med 2007;65:1337-1350.

4. Chen C, Arjomandi M, Tager IB, Holland N, **Balmes JR**. Effects of antioxidant enzyme polymorphisms on ozone-induced lung function changes. Eur Respir J 2007;30:677-683.

5. Eisner MD, Wang Y, Haight TJ, **Balmes J**, **Hammond SK**, Tager IB. Secondhand smoke exposure, pulmonary function, and cardiovascular mortality. Ann Epidemiol. 2007;17(5):364-73.

6. **Blanc PD, Balmes JR**. Epidemiology and costs of COPD. Eur Respir J. 2006;28(6):1290.

7. **Balmes JR**. The World Trade Center collapse: a continuing tragedy for lung health? Am J Respir Crit Care Med. 2006;174(3):235-6.

8. Kyle AD, **Balmes JR**, Buffler PA, Lee PR. Integrating research, surveillance, and practice in environmental public health tracking. Environ Health Perspect. 2006;114(7):980-4.

9. Yelin E, Katz P, **Balmes J**, Trupin L, Earnest G, Eisner M, **Blanc P**. Work life of persons with asthma, rhinitis, and COPD: a study using a national, population-based sample. J Occup Medicine Toxicol 2006;1:2.

10. Tujague J, Bastaki M, Holland N, **Balmes J**, Tager I. Antioxidant intake, GSTM1 polymorphism and pulmonary function in healthy young adults. Eur Respir J 2006;27:282-288.

11. **Blanc PD,** Yen IH, Chen H, Katz PP, Earnest G, **Balmes JR**, Trupin L, Freidling N, Yelin EH, Eisner MD. Socioeconomic status at the area level is linked to health status among adults with asthma and rhinitis. Eur Respir J 2006;27:85-94.

12. Ratto J, Wong H, Liu J, Fahy J, Boushey H, Solomon C, **Balmes J**. The effects of multi-day exposure on ozone-induced airway inflammation as determined using sputum induction. Environ Health Perspect 2006;114:209-212.

13. Bastaki M, Huen K, Manzanillo P, Chande N, Chen C, Tager IB, **Balmes JR**, Holland N. Genotype-activity relationship for Mn-superoxide dismutase (MnSOD), glutathione peroxidase 1 (GPX1) and catalase in humans. J Pharmacogenetics and Genomics 2006;16:279-286.

14. Chen C, Arjomandi M, Qin H, **Balmes J**, Tager I, Holland N. Cytogenetic damage in buccal epithelia and peripheral lymphocytes of young, healthy individuals exposed to ozone. Mutagenesis 2006;21:131-137.

15. **Eisner MD, Balmes JR**, Yelin EH, Katz PP, Hammond SK, Benowitz N, **Blanc PD.** Directly measured secondhand smoke exposure and COPD health outcomes. BMC Pulm Med 2006;6:12.

Blanc, Paul

16. Kogevinas M, Zock JP, Jarvis D, Kromhout H, Lillienberg L, Plana E, Radon K, Toren K, Alliksoo A, Benke G, **Blanc PD**, Dahlman-Hoglund A, D'Errico A, Hery M, Kennedy S, Kunzli N, Leynaert B, Mirabelli MC, Muniozguren N, Norback D, Olivieri M, Payo F, Villani S, van Sprundel M, Urrutia I, Wieslander G, Sunyer J, Anto JM. Exposure to substances in the workplace and new-onset asthma: an international prospective population-based study (ECRHS-II). Lancet. 2007 Jul 28;370(9584):336-41.

17. Kim SY, Anderson IB, Dyer JE, Barker JC, **Blanc PD**. High-risk behaviors and hospitalizations among gamma hydroxybutyrate (GHB) users. Am J Drug Alcohol Abuse. 2007;33(3):429-38.

18. **Blanc PD**, Toren K. Occupation in chronic obstructive pulmonary disease and chronic bronchitis: an update. Int J Tuberc Lung Dis. 2007 Mar;11(3):251-7.

19. Mirabelli MC, Zock JP, Plana E, Anto JM, Benke G, **Blanc PD**, Dahlman-Hoglund A, Jarvis DL, Kromhout H, Lillienberg L, Norback D, Olivieri M, Radon K, Sunyer J, Toren K, van Sprundel M, Villani S, Kogevinas M. Occupational risk factors for asthma among nurses and related healthcare professionals in an international study. Occup Environ Med. 2007 Jul;64(7):474-9.

20. Gillen M, Yen IH, Trupin L, Swig L, Rugulies R, Mullen K, Font A, Burian D, Ryan G, Janowitz I, Quinlan PA, Frank J, **Blanc P**. The association of socioeconomic status and psychosocial and physical workplace factors with musculoskeletal injury in hospital workers. Am J Ind Med. 2007 Apr;50(4):245-60.

21. **Eisner MD, Blanc PD**, Sidney S, Yelin EH, Lathon PV, Katz PP, Tolstykh I, Ackerson L, Iribarren C. Body composition and functional limitation in COPD. Respir Res. 2007 Jan 29;8:7.

22. **Blanc PD, Balmes JR**. Epidemiology and costs of COPD. Eur Respir J. 2006 Dec;28(6):1290.

23. Rosenson J, Smollin C, Sporer KA, **Blanc P**, Olson KR. Patterns of ecstasy-associated hyponatremia in California. Ann Emerg Med. 2007 Feb;49(2):164-71, 171.e1.

24. **Eisner MD**, Yelin EH, Katz PP, Lactao G, Iribarren C, **Blanc PD**. Risk factors for work disability in severe adult asthma. Am J Med. 2006 Oct;119(10):884-91.

25. Archea C, Yen IH, Chen H, **Eisner MD**, Katz PP, Masharani U, Yelin EH, Earnest G, **Blanc PD**. Negative life events and quality of life in adults with asthma. Thorax. 2007 Feb;62(2):139-46.

26. Miller MK, Lee JH, **Blanc PD**, Pasta DJ, Gujrathi S, Barron H, Wenzel SE, Weiss ST; TENOR Study Group. TENOR risk score predicts healthcare in adults with severe or difficult-to-treat asthma. Eur Respir J. 2006 Dec;28(6):1145-55.

Goldberg, Robert:

27. **Rempel D**, **Krause N**, **Goldberg R**, Benner D, Hudes M, Goldner GU. A Randomized Controlled Trial Evaluating the Effects of Two Workstation Interventions on Upper Body Pain and Incident Musculoskeletal Disorders among Computer Operators. Occup Environ Med 2006, 63(5):300-306.

28. Odell D, Barr A, **Goldberg R**, Chung J, **Rempel D**. Evaluation of a Dynamic Arm Support for Seated and Standing Tasks: A Laboratory Study of Electromyography and Subjective Feedback. Ergonomics 2007; 50(4):520-535.

29. **Goldberg R**, Polychlorinated Biphenyls (PCBs). Poisoning and Drug Overdose 5th Edition. Olson, K. editor New York: Lange Medical Books 2006

30. **Goldberg R**. Editor and Lead Author, The Physician's Guide to the California Worker's Compensation System The California Division of Workers' Compensation (in press) 2007

Rempel, David:

31. Nakama L, King KB, Abrahamsson SO, **Rempel DM**. VEGF, VEGFR-1 and CTGF cell densities in tendon are increased with cyclical loading: An *in vivo* tendinopathy model. J Orthop Res 2006, 24(3):393-400.

32. **Rempel D**, **Krause N, Goldberg R**, Benner D, Hudes M, Goldner GU. A Randomized Controlled Trial Evaluating the Effects of Two Workstation Interventions on Upper Body Pain and Incident Musculoskeletal Disorders among Computer Operators. Occup Environ Med 2006, 63(5):300-306.

33. Kursa K, Latanza L, Diao E, **Rempel D**. In vivo forces generated by finger flexor muscles increase with finger and wrist flexion during active finger flexion and extension. J Orthop Res 2006, 24(4):763-9.

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36. Dong H, Barr A, Loomer P, Laroche C, Young E, **Rempel D**. The effects of periodontal instrument handle design on hand muscle load and pinch force. J Am Dental Assoc 2006, 137(8):1123-30

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spectroscopic imaging and polarized light microscopy study. Arthritis Research & Therapy 2006; 8(5):R147.

39. Keir PJ, Bach JM, Hudes M, **Rempel DM**. Guidelines for wrist posture based on carpal tunnel pressure thresholds. Human Factors 2007, 49(1):88-89.

40. LaRouche C, Barr A, Dong H, **Rempel D**. Effect of dental tool surface texture and material on static friction with a wet gloved fingertip. J Biomechanics 2007; 40(3):697-701.

41. Dong H, Loomer P, Villanueva A, **Rempel D**. Pinch forces and instrument tip forces during periodontal scaling. J Periodontology 2007; 78(1):97-103.

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43. Nikanjam M, Kursa K, Lehman S, **Rempel D**. Finger Flexor Motor Control Patterns during Active Flexion: An *In Vivo* Tendon Force Study. Human Movement Science 2007; 26(1):1-10.

44. Odell D, Barr A, **Goldberg R**, Chung J, **Rempel D**. Evaluation of a Dynamic Arm Support for Seated and Standing Tasks: A Laboratory Study of Electromyography and Subjective Feedback. Ergonomics 2007; 50(4):520-535.

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46. Menendez CC, Amick BC, Jenkins M, Janowitz I, **Rempel D**, Robertson M, Dennerlein JT, Chang CH, Katz JN. A Multi-Method Study Evaluating Computing-Related Risk Factors among College Students. Work 2007; 28(4):287-97.

47. Villanueva A, Dong H, **Rempel D**. A biomechanical analysis of applied pinch force during periodontal scaling. J Biomechanics 2007; 40:1910-1915.

48. Dong H, Loomer P, Barr A, LaRouche C, Young E, **Rempel D**. The effects of tool handle shape on hand muscle load and pinch force in a simulated dental scaling task. Appl Ergonomics 2007; 38:525-531.

49. Asundi K, Kursa K, Lotz JC, **Rempel D**. In vitro system for applying cyclic loads to connective tissues under displacement or force control. Ann Biomed Eng 2007; 35(7):1188-95.

50. Nakama L, King KB, Abrahamsson SO, **Rempel DM**. Effect of repetition rate on the formation of microtears in tendon in an *in vivo* cyclical loading model. J Orthop Res 2007; 25(9):1176-84.

51. **Rempel D**, Willms K, Anshel J, Jaschinski W, Sheedy J. The effects of visual display distance on eye accommodation, head posture, and vision and neck symptoms. Human Factors (in press)

52. **Rempel D**, Star D, Gibbons B, Barr A, Janowitz I. Development and evaluation of a new device for overhead drilling. Prof Safety (in press).

53. Conlon CF, **Rempel DM**, **Krause N**. A randomized controlled trial evaluating an alternative mouse and forearm support on upper body discomfort and musculoskeletal disorders among engineers. Occup Environ Med (in press).

54. Wang PC, **Rempel DM**, Harrison RJ, Chan J, Ritz BR. Work-organizational and personal factors associated with upper body musculoskeletal disorders among sewing machine operators. Occup Environ Med 2007 (in press).

55. Asundi KR, **Rempel DM**. Cyclic loading inhibits expression of MMP-3 but not MMP-1 in an in vitro rabbit flexor tendon model. Clin Biomech (in press).

56. Asundi KR, **Rempel DM**. MMP-1, IL-1β and COX-2 mRNA Expression is Modulated by Static Load in Rabbit Flexor Tendon. Ann Biomed Eng (in press).

57. Asundi KR, King KB, **Rempel DM**. Evaluation of gene expression through qRT-PCR in cyclically loaded tendons: an in vivo model. Eur J Appl Physiol (in press).

58. Rogers MS, Barr AB, Kasemsontitum B, **Rempel DM**. The development and validation of a 3D model of the hand. Ergonomics (in press).

Sheppard, Dean:

59. Choudhry S, Coyle NE, Lind D, Tang H, Salari K, Clark SL, Ung N, Matallana H, Avila PC, Casal J, Torres A, Nazario S, Castro R, Rodriguez-Cintron W, Shriver MD, Kwok PY, **Sheppard D**, Risch N, Ziv E, Burchard EG. Genetics of Asthma in Latino Americans (GALA) Study. Population stratification confounds genetic association studies among Latinos. Hum Genet. 2006 118:652-64

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62. Rao H, Lu G, Kajiya H, Garcia-Palacios V, Kurihara N, Anderson J, Patrene K, **Sheppard D**, Blair HC, Windle JJ, Choi SJ, Roodman GD. 9, a novel osteoclast integrin that regulates osteoclast formation and function. J Bone Min Res 2006 21:1657-65.

63. Chen C, Huang X, **Sheppard D**. ADAM33 is not essential for growth and development and does not modulate allergic asthma in mice. Mol Cell Biol 2006 26:950-956.

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65. Kim K, Kugler MC, Wolters PJ, Robillard L, Galvez MG, Brumwell AN, **Sheppard D**, Chapman HA. Alveolar epithelial cell mesenchymal transition develops in vivo during pulmonary fibrosis and is regulated by the extracellular matrix. Proc Natl Acad Sci (USA). 2006 103:13180-5.

66. Su G, Hodnett M, Wu N, Atakilit A, Kosinski C, Godzich M, Huang XZ, Kim K, Frank JA, Matthay MA, **Sheppard D***, Pittet J-F*. Integriņ□v□5 regulates lung vascular permeability and pulmonary endothelial barrier function Am J Respir Cell Mol Biol 2007 36:377-86 (*denotes equal contributions)

67. Hahm K, Lukashev ME, Luo Y, Yang WJ, Dolinski BM, Weinreb PH, Simon KJ, Wang LC, Leone DR, Lobb RR, McCrann DJ, Allaire NE, Horan GS, Fogo A, Kalluri R, Shield, CF, **Sheppard D**, Gardner HA, Violette SM.□v□6 integrin regulates renal fibrosis and inflammation in Alport mouse. Am J Pathol 2007 170:110-125.

68. Nandrot EF, Anand M, Almeida D, Atabai K, **Sheppard D**, Finnemann SC. Essential role for MFG-E8 as ligand foṛ□v□5 integrin in diurnal retinal phagocytosis. Proc Natl Acad Sci (USA). 2007 104:12005-10.

69. Vlahakis NE, Young BA, Atakilit A, Hawkridge AE, Isaaka RB, Boudreau N, **Sheppard D**. Integriņ□9□1 directly binds to vascular endothelial growth factor (VEGF)-A and is necessary for VEGF-A and tumor-induced angiogenesis. J Biol Chem 2007 282:15187-96.

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Harrison, Robert:

80. Flattery J, Davis L, Rosenman KD, **Harrison RJ**, Lyon-Callo S, Filios M: The proportion of self-reported asthma associated with work in three states – California, Massachusetts and Michigan, 2001. Journal of Asthma 43:213-218, 2006.

81. Sutton PM, Quint J, Prudhomme J, Flattery J, Materna B, **Harrison RJ**: Glutaraldehyde exposures among workers making bioprosthetic heart valves. J Occup Environ Hygiene 4:311-320, 2007.

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83. Peek-Asa C, Casteel C, Allareddy V, Nocera MA, Goldmacher S, OHagan E, Blando J, Valiante D, **Gillen M, Harrison RJ**: Workplace violence prevention programs in hospital emergency departments. J Occ Environ Med 49:756-763, 2007.

84. Wang PC, **Rempel D**, **Harrison RJ**, Chan J, Ritz B: Work-organizational and personal factors associated with upper body musculoskeletal disorders among sewing machine operators. Accepted for publication, Occ Env Med 2007.

85. Mazurek JM, Filios M, Willis R. Rosenman KD, Reilly MJ, McGreevy K, Schill DP, Valiante D, Pechter E, Davis L, Flattery J, **Harrison RJ**: Work-related asthma in the educational services industry—California, Massachusetts, Michigan, and New Jersey, 1993–2000. Submitted for publication, 2007.

Olson, Kent:

86. *Poisoning and Drug Overdose*, Fifth Edition, KR Olson, Editor. New York, McGraw-Hill, 2006

87. Camphor Poisoning: an evidence-based practice guideline for out-of-hospital management. Manoguerra AS, Erdman AR, Wax PM, Nelson LS, Caravati EM, Cobaugh DJ, Chyka PA, **Olson KR**, Booze LL, Woolf AD, Keyes DC, Christianson G, Scharman EJ, Troutman WG; American Association of Poison Control Centers. Clin Toxicol (Phila). 2006;44(4):357-70.

88. Diphenhydramine and dimenhydrinate poisoning: an evidence-based consensus guideline for out-of-hospital management. Scharman EJ, Erdman AR, Wax PM, Chyka PA, Caravati EM, Nelson LS, Manoguerra AS, Christianson G, **Olson KR**, Woolf AD, Keyes DC, Booze LL, Troutman WG. Clin Toxicol (Phila). 2006;44(3):205-23.

89. Acetaminophen poisoning: an evidence-based consensus guideline for out-of-hospital management. Dart RC, Erdman AR, **Olson KR**, Christianson G, Manoguerra AS, Chyka PA, Caravati EM, Wax PM, Keyes DC, Woolf AD, Scharman EJ, Booze LL, Troutman WG; American Association of Poison Control Centers. Clin Toxicol (Phila). 2006;44(1):1-18.

90. Yam bean seed poisoning mimicking cyanide intoxication. Hung YM, Hung SY, **Olson KR**, Chou KJ, Lin SL, Chung HM, Tung CN, Chang JC. Intern Med J. 2007 Feb;37(2):130-2.

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93. Patterns of Ecstasy-Associated Hyponatremia in California. Rosenson J, Smollin C, Sporer KA, Blanc P, **Olson KR**. Ann Emerg Med 2007; 49(2):164-71.

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Krause, Niklas:

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99. Pole JD, Franche RL, Hogg-Johnson S, Vidmar M, **Krause N**, Duration of work disability: a comparison of self-report and administrative data, Am J Ind Med 2006;49:394-401

100. Tuechsen F, Hannerz H, Roepstorff C, **Krause N**, Stroke among male professional drivers in Denmark 1994-2003, Occup Environ Med 2006;194:524-9

101. **Rempel DM, Krause N**, **Goldberg R**, Benner D, Hudes M, Goldner GU, A randomized controlled trial evaluating the effects of two workstation interventions on upper body pain and incident musculoskeletal disorders among computer operators, Occup Environ Med 2006;63:300-306

102. Rugulies R, Scherzer, T, **Krause N,** Associations between Psychological Demands, Decision Latitude and Job Strain with Smoking in Female Hotel Room Cleaners in Las Vegas, Social Medicine 2007 (in press)

103. Mehling,WE, **Krause N**, Alexithymia and 7.5-year incidence of compensated low back pain

in 1,207 urban public transit operators, J Psychosom Res 2007 (in press)

104. **Krause N**, Brand RJ, Kaplan GA, Kauhanen J, Malla S, Tuomainen TP, Salonen JT, Occupational physical activity, energy expenditure, and 11-year progression of carotid atherosclerosis, Scand J Work Environ Health 2007 (in press)

Meister, Raymond:

105. Meister R.K., Zheng Y. "Biological Monitoring" in LaDou J. (ed) Current Occupational & Environmental Medicine, 4th Ed., Lange Medical Books/McGraw-Hill, 2007

Seward, James:

106. **Seward J** and Larsen R: "Occupational Stress" in LaDou J (4th ed.) Current Occupational and Environmental Medicine. McGraw Hill 2007

Steinmaus, Craig:

107. **Steinmaus C**, Moore L, Shipp M, Kalman D, Biggs ML, Hopenhayn C, Bates M, Zheng S, Smith AH. Genetic Polymorphisms in MTHFR 677 and 1298, GSTM1 and T1, and Metabolism of Arsenic. *Journal of Toxicology and Environmental Health*, 70:159-70, 2007

108. Thundiyil JG, Yuan Y, Smith AH, **Steinmaus C**. Seasonal Variation of Arsenic Concentration in Wells in Nevada. *Environmental Research*, 104: 367-73, 2007.

109. **Steinmaus C**, Bates MN, Yuan Y, Kalman D, Atallah R, Rey O, Biggs ML, Hopenhayn C, Moore L, Hoang B, Smith AH, Arsenic Methylation and Bladder Cancer Risk in Case-Control Studies in Argentina and the United States. *Journal of Occupational and Environmental Medicine* 48: 478-88, 2006.

Faculty Presentations:

Goldberg, Robert:

1. The U.S. Approach to Competency Assessment and Certification. Assessment Tools in Occupational Medicine, European Association of Schools of Occupational Medicine and the Union of European Medical Specialists:, Barcelona 2006

2. New research on an Intervention Trial for call center computer users. DOE/EFCOG Meeting, Albuquerque 2006

3. The Impact of the New California Worker's Compensation Laws, University of Michigan and the UC Center for Occupational and Environmental Health
Annual Conference on Control of Musculoskeletal Disorders in the Workplace, Oakland, CA 2006

4. Update on the Medical Management of Upper Extremity Musculoskeletal Disorders, University of Michigan/University of California Los Angeles Conference on Ergonomics and Rehabilitation, Los Angeles, CA 2006

5. The Assessment and Treatment of Upper extremity Musculoskeletal Disorders:

The Evidence Base for Treatment of Lateral Epicondylitis. Grand Rounds UCSF School of Medicine, San Francisco, CA 2006

6. Complementary and Alternative Medicine in Musculoskeletal Pain Control, Western Occupational and Environmental Medical Association, Incline Village, NV, 2006

7. The use and abuse of Epidural Steroid Injections in back pain, Western Occupational and Environmental Medical Association, San Diego, CA 2007
8. Rempel D, Krause N, **Goldberg R**, Benner D, Hudes M. A Randomized Controlled Trial of Ergonomic Interventions among Computer Users, International Congress on Occupational Health, Milan, 2006

Rempel, David:

9. Rempel D, Wang PC, **Rempel D**, Harrison R, Janowitz I, Ritz B. A Randomized Controlled Trial Evaluating the Effects of Two Task Chair Designs on Shoulder and Neck Pain among Sewing Operators. Human Factors and Ergonomics Society 2006, San Francisco.

10. Asundi K, **Rempel D**. MMP-1 expression is up-regulated with increased static load and correlates to creep. Biology, Medicine and Engineering Sciences, 2006, Chicago.

11. Nakama L, King K, **Rempel D**. The effect of repetition rate on the formation of microtears in tendon in an in vivo repetitive loading animal model. Human Factors and Ergonomics Society 2006, San Francisco.

12. Dong H, Loomer P, Villanueva A, **Rempel D**. Pinch forces and instrument tip forces during periodontal scaling. Human Factors and Ergonomics Society 2006, San Francisco.

13. Barr A, **Rempel D**, Young E, Brafman D. The effect of six keyboard designs on wrist and forearm postures. Human Factors and Ergonomics Society 2006, San Francisco.

14. **Rempel D**, Brewer S, Van Erg D, Amick BC, Irvin E, Daum K, Gerr F, Moore JS, Cullen K. Posture modifying interventions and musculoskeletal health among computer users: a systematic review. International Ergonomics Association, 2006, Maastricht, Netherlands.

15. **Rempel D**, Dong H, Loomer P. The effects of periodontal instrument handle diameter and weight on hand muscle load and pinch force in a dental scaling task. International Ergonomics Association, 2006, Maastricht, Netherlands.

16. **Rempel D**, Dalamagas D, Gibbons B, Barr A, Janowitz I. Development and evaluation of interventions for overhead drilling in concrete. International Ergonomics Association, 2006, Maastricht, Netherlands.

17. **Rempel D**, Krause N, Goldberg R, Benner D, Hudes M. A Randomized Controlled Trial of Ergonomic Interventions among Computer Users, International Congress on Occupational Health, 2006 Milan.

18. **Rempel D**, Wang PC, Harrison R, Janowitz I, Ritz B. Recovery Pattern of Neck and Shoulder Pain among Sewing Machine Operators. International Congress on Occupational Health, 2006 Milan.

19. Wang PC, **Rempel D**, Harrison R, Janowitz I, Ritz B. A field trial of an ergonomic chair to reduce neck and shoulder pain in sewing machine operators in Los Angeles. North American Congress of Epidemiology 2006, Seattle.

20. Wang PC, **Rempel D**, Harrison R, Janowitz I, Ritz B. Recovery Pattern of Neck and Shoulder Pain among Sewing Machine Operators. North American Congress of Epidemiology 2006, Seattle.

21. **Rempel D**. Workplace Intervention Studies: Preventing Musculoskeletal Disorders among Computer Users. American Occupational Health Conference 2006, Los Angeles.

22. **Rempel D**, Wang PC, Rempel D, Harrison R, Janowitz I, Ritz B. Recovery Pattern of Neck and Shoulder Pain among Sewing Machine Operators. National Occupational Research Agenda 2006, Washington, DC.

23. **Rempel D**, Krause N, Goldberg R, Benner D, Hudes M. A Randomized Controlled Trial of Ergonomic Interventions in Computer Users. National Occupational Research Agenda 2006, Washington, DC.

24. **Rempel D**, Krause N, Goldberg R, Benner D. A Randomized Trial Evaluating Interventions on Upper Extremity Disorders among Computer Operators. Annual Meeting of the American Academy of Orthopaedic Surgeons, 2006, Chicago.

25. Marecek GS, Opel C, **Rempel D**, King KB. Repetitive finger joint flexion without external load leads to articular cartilage thinning in an in vivo rabbit model. Orthopaedic Research Society, 2006, Chicago.

26. Nakama LH, Amano K, King KB, **Rempel DM**. The effect of repetition rate on blood vessel formation in the paratenon of a repetitively loaded tendon in vivo. Orthopaedic Research Society, 2006, Chicago.

27. Nakama LH, King KB, **Rempel DM**. The effect of loading rate on VEGF, VEGTR-1, and CTGF production in an in vivo cyclically loaded tendon. Orthopaedic Research Society, 2006, Chicago.

28. Shergill AK, Asundi K, Barr A, Shah JN, Ryan JC, McQuaid KR, **Rempel D**. Evaluation of distal upper extremity musculoskeletal load during routine colonoscopy. Annual Meeting of American College of Gastroenterologists. 2007.

29. **Rempel DM**, Story M, Luce A, Leung A, Lemke M, Winters J. Reducing patient handling: Accessibility barriers for radiology equipment for patients with mobility impairment. ICOH International Conference on the Health of Healthcare Workers, 2007, Vancouver.

30. Abbah E, Garcia M, Harris C, Goldberg R, Krause N, **Rempel D**. Impact of hand or wrist pain on work function among workers performing hand intensive work. PREMUS 2007 (Prevention of Musculoskeletal Disorders), 27 August 2007. Boston.

31. **Rempel D**, Nakama L, King K. Contributions of repetition rate and peak force to microtears and growth factor density in a rabbit model of epicondylitis PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

32. **Rempel D**, Keir P, Bach J. Wrist posture influences carpal tunnel pressure during keyboard use PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

33. **Rempel D**. Design of the San Francisco prospective study of musculoskeletal disorders. PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

34. Harris C, Chen B, Janowitz I, **Rempel D**. Ergonomic evaluation of an alternative tool for cake decorating. PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

35. Story M, Winters J, Lemke M, **Rempel D**. Evaluating the accessibility of medical equipment. International Conference on Inclusive Design, 2007 London

36. Abbah E, **Rempel D**, Goldberg R, Krause N. Impact of hand/wrist pain on work function among blue collar workers. American Occupational Health Conference, 2007, New Orleans.

37. Asundi K, **Rempel D**. Clamping tendons in vitro can affect gene expression at the midsubstance. Orthpaedic Research Society Annual Meeting 2007, San Diego.

38. Asundi K, **Rempel D**. IL-1B expression in tendon correlates with creep strain under static load. Orthpaedic Research Society Annual Meeting 2007, San Diego.

Jewell, Sarah:

39. "Multidisciplinary Approaches to Pain Control." (speaker and moderator of panel discussion). UCSF CME Course: Updates in Occupational and Environmental Medicine, 2006

40. "Respiratory Irritants and Asphyxiants." UC Northern California Center for Occupational and Environmental Health Summer Institute CME Course (Lecturer and Course Leader),2007

Solomon, Gina:

41. Controlling Environmental Hazards in Communities of Color
National Legal Aid and Defenders Association Conference, Snowbird, UT, 6/06

42. Health Effects of Global Warming *California Joint Legislative Briefing, Sacramento, CA, 8/06*

43. Healthy Food in Healthcare *Stanford Medical School, Palo Alto, CA, 10/06*

44. Endocrine Disruptors in the Home and Community *Heinz Conference on Women and the Environment, Boston, MA, 10/06*

45. Pediatric Environmental Health Toolkit for Pediatricians *Kaiser Oakland, Oakland, CA, 10/06*

46. Mold Contamination in New Orleans Post-Katrina *CDC National Environmental Public Health Conference, Atlanta, GA, 12/06*

47. Protecting the Body from Heat *MarketWatch Special Report: An Investor Guide to Global Warming (Web Video), 5/07*

48. New Tools for Identifying, Tracking, and Reducing Environmental Health Hazards in California- *CA Toxic Substances Research & Teaching Program 20th Annual Symposium, Monterey, CA, 4/07*

49. Pediatric Environmental Health Toolkit for Pediatricians *Stanford Lucile Packard Children's Hospital Grand Rounds, Palo Alto, Ca, 4/07*

50. Pediatric Environmental Health Toolkit for Pediatricians *Oakland Children's Hospital, Oakland, CA, 5/07*

51. Pediatric Environmental Health Toolkit for Pediatricians *O'Connor Hospital Combined Grand Rounds, San Jose, CA, 4/07*

52. Pediatric Environmental Health Toolkit for Pediatricians *Kaiser Santa Teresa Hospital, San Jose, CA, 6/07*

53. Cancer and the Environment *UCLA Ted Mann Family Resource Center Insights Into Cancer Lecture, Los Angeles, CA, 3/07*

54. Health Risks to Children and Communities from Recent EPA Decisions on Air and Water Quality *Hearing of the Senate Committee on Environment and Public Works, Washington, DC, 2/07*

Krause, Niklas:

55. Institute for Work and Health, Toronto, Canada, 2006

56. 28th International Congress on Occupational Health (ICOH), Milan, Italy, 2006 (Chair of Symposium "Working posture and cardiovascular disease,"and 5 papers)

57. Grand Rounds, graduate and continuing education courses at University of California San Francisco and University of Michigan 2000-2006

58. 6th International Scientific Conference on Prevention of Work-Related Musculoskeletal Disorders (PREMUS), Boston, Massachusetts, 2007 (2 papers)

59. Center for Occupational and Environmental Health, University of California, Berkeley, 2006

Seward, James:

60. Health and Productivity at the Workplace: Practical and Methodological issues. US Department of Energy Occupational Medicine Group, Albuquerque April 2007

61. Pandemic Influenza Planning at the Worksite. American Association for the Advancement of Science (AAAS) San Francisco, February, 2007.

Faculty Honors:

Goldberg, Robert

2006 The International Ergonomics Association/Liberty Mutual Prize in Occupational Safety and Ergonomics (awarded for the OEM 2006 publication)

2007 James Smiley Annual Lecture, Faculty of Occupational Medicine, Royal College of Physicians

2007 Honorary Fellow, Faculty of Occupational Medicine, Royal College of Physicians (Ireland)

Rempel, David:

IEA/Liberty Mutual Prize in Occupational Safety and Ergonomics, 2006

Sheppard, Dean:

McClement Lecturer, New York University, 2006
Kass Medal, University of Nebraska, 2007

Harrison, Robert:

2006-present National Institute for Occupational Safety and Health
NORA Sector Council on Health Care and Community Services

2006-2007 President, Council of State and Territorial Epidemiologists

2006-2007 Chair-elect, Occupational Health Section, American Public Health Association

Olsen, Kent:

2006 Selected as Keynote Speaker, Commencement Ceremony
Joint Medical Program, UC Berkeley-UC San Francisco

2007 Award for Outstanding Medical Teaching
Joint Medical Program, UC Berkeley-UC San Francisco

Krause, Niklas:

2006 IEA/Liberty Mutual Prize in Occupational Safety and Ergonomics 2006
for paper on randomized controlled trial evaluating the effects of two workstation interventions on upper body pain and incident musculoskeletal disorders among computer operators

Seward, James:

2007 University of California Association of Clinical Faculty
Special Recognition Award for Teaching

2007 Department of Energy Contractors Operations Group
Team Award for Occupational Medicine

Appendix C

UCB EHS Occupational Medicine Curriculum

1 Year Program

Fall:

Probability & Statistics (Required)	4 units
Overview of Public Health (Required)	2 units
Epidemiologic Methods (Required)	4 units
EHS Seminar (Required)	1 unit
Exposure Assessment & Control (Required) or Risk Assessment Course	3 units

Spring:

Advanced Statistics (Required)	4 units
Integrative Breadth Course (Required)	2 units
Toxicology (Required)	3 units
Ergonomics (Required)	4 units
Preventive Medicine Seminar	2 units
Electives	2-4 units

Comprehensive written exam and oral examination

Advanced Courses and Electives:

Advanced Occupational. & Environmental Epi	3 units
Environmental Science and Policy	3 units

Residents are strongly encouraged to take the Preventive Medicine Residency Seminar as scheduling permits

Practicum Rotations

These rotations may be taken in any order, with the expected duration as listed. Residents may adjust their schedule to accommodate their interests when possible with the approval of the Program Director. Each rotation is arranged between the resident and the rotation preceptor, with the approval and assistance of the Program Director.

Before each rotation, specific educational goals that include the acquisition of occupational medicine competencies are documented. Evaluations are based on achieving the outlined goals and competencies.

1. Core OEM Practicum Rotations - 4 months

Required rotations are usually taken in two-month blocks. They may also be taken as one-month electives. **Clinical Rotations are required for a minimum of 2 months.**

Kaiser Permanente Medical Group: Occupational Medicine Clinic and Northern California Corporate Headquarters. Primary Occupational Medicine services. The San Francisco clinic has an emphasis on musculoskeletal evaluations and ergonomic issues. Preceptors: Linda Morse, MD, and Paul Johnson, MD. The Oakland office is the headquarters for the Northern California network. Preceptor: Douglas Benner, MD.

San Francisco General Hospital Occupational Health Services: Primary Occupational Medicine Services for City/County of SF workers. Preceptor: Sarah Jewell, MD, and Stephen Born, MD.

California Pacific Medical Center: A hospital-based OM practice that provides consultative services and a hospital-based clinic. Preceptor: Tom McClure, MD.

UCSF Ergonomics This rotation includes onsite ergonomics assessments, musculoskeletal disorders, orthopedics, and medical management. Preceptors: Robert L. Goldberg, MD, and David Rempel, MD.

ALZA Corporation: A pharmaceutical company with facilities in Mountain View and Vacaville. Preceptor: Susan Tierman, MD.

Lawrence Berkeley Laboratory, Health Services Department: National laboratory with extensive health services and research activities in Berkeley. Preceptor: Peter Lichty, MD.

Lawrence Livermore National Laboratory, Health Services Department: National laboratory with extensive health services, medical surveillance, ergonomics, and research activities in Livermore. Preceptor: James Seward, MD.

Richard Cohen MD, MPH, Inc.: Consulting Medical Director. Biotechnology and pharmaceutical research and manufacturing, semiconductor equipment and microprocessor production, healthcare supplies and equipment manufacturing, and electronic equipment research and development. South San Francisco, Peninsula, and North Bay areas. Preceptor: Rich Cohen, MD, MPH.

2. Public Health Rotations - 2 months

California Department of Health Services/Occupational Health Branch: **Required for one-month** State agency located in Richmond that is responsible for investigation, consultation, and review of workplace hazards. Preceptors: Robert Harrison, MD, Ray Meister, MD, and Rupali Das, MD. (1-2 months)

California Department of Health Services/Environmental Health Investigations Branch (EHIB): State agency responsible for conducting field studies of imputed human health effects from hazardous waste, air, water, and food contamination episodes. Preceptor: Richard Kreutzer, MD. (1 month)

California EPA – Office of Environmental Health Hazard Assessment, Air Toxicology Branch: State program responsible for reviewing air pollution standards and for conducting selected field investigations; located in Oakland. Preceptor: George Alexeef, PhD. (1 month)

California Department of Occupational Safety and Health (Cal/OSHA): State consultation and enforcement services for California OSHA regulations with offices throughout CA. Center of Operation, San Francisco.

SF Regional Poison Control Center: **Required for 1 month** Physician and pharmacologist teams with extensive experience advise physicians and the public regarding toxic ingestions, skin and inhalation exposures. Occasional opportunities occur to consult on in-patient toxicology cases. Preceptor: Kent Olsen, MD.

Natural Resources Defense Council: The goal of this NGO is to preserves the environment, protect public health and ensure conservation of wilderness and natural resources. Preceptor: Gina Solomon, MD.

Pediatric Environmental Health Specialty Unit: This program is part of the OEM Division at SFGH.
Preceptors are Gina Solomon, MD and Mark Miller, MD. This can be combined with NRDC rotation.

SHARP, Washington State: Occupational Medicine research and standards enforcement for the state of Washington. Special emphasis is placed on ergonomics issues. Preceptor: Barbara Silverstein, PhD, MPH. (1 month)

NIOSH: The Federal agency devoted to industry investigations and research and education in Occupational Medicine. This can be arranged with the permission of the Director. (1 month)

Federal OSHA: The Federal agency that is responsible for workplace health and safety education, regulation and enforcement. This can be arranged with the permission of the Director. (1 month)

3. Elective rotations - 3 months

These rotations should be from the list above as well as those below. New elective rotations must be arranged and approved by the Program Director well in advance and must have a signed letter of agreement.

James Craner, MD, MPH: A consultant to gaming, mining, various other industries with clinical practices throughout the state of Nevada. Preceptor: James Craner, MD, MPH.

National Jewish Hospital/University of Colorado. Denver, CO: Occupational lung disease, asthma, and chronic beryllium disease. Preceptor: Kathryn Mueller, MD, MPH.

Jordan Rinker, MD, MPH: Consulting Medical Director. Pharmaceutical research and manufacturing, biotechnology, medical center occupational health.

State Compensation Insurance Fund: The largest workers compensation insurance company in California, it is headquartered in San Francisco. Health systems and utilization management and policy. Preceptor: Gideon Letz ,MD.

World Health Organization: The occupational health branch is located in Geneva, Switzerland

Michael Kosnett, MD: Medical toxicology private practice, affiliated with the University of Colorado

Jonathan Rutchik, MD: Neurotoxicology private practice

4. Research Project - 2 months

Projects typically span the course of the year with a full-time block for in-depth work. A research mentor is selected before the start of the year. A poster presentation at AOHC in the Spring is

expected and a publication is highly desired in addition to presentation at UCSF Grand Rounds or Research Seminar.

Research Training

Designing Clinical Research EPI 202: (S. Hulley, Director) Tuesday Mornings, 9:00-Noon. This course follows the text, *Designing Clinical Research*, to provide instruction in developing a research question and creating a protocol that includes a literature review, study design, subject recruitment and sampling plan, survey instruments and other measurement approaches, sample size, consent form, budget and timetable. Each trainee produces a 5-page protocol for a planned actual study, and reviews and supports the work of colleagues.

Responsible Conduct of Research EPI 201: (B. Lo, Director) Thursday Mornings, 9:00-10:15 am. Trainees learn through case discussions how to identify and resolve common ethical dilemmas that arise in clinical research, how research on human subjects is regulated by the federal government, and what constitutes research misconduct. Each trainee produces a written document resolving the ethical considerations involved in the research protocol developed in the Designing Clinical Research course or a suitable alternative.

Building a Career in Clinical Research EPI 227: (M. Whooley, Director) Thursday Mornings, 10:30-11:45am. Trainees learn about choosing a mentor, time management, generating finished projects, getting grants and getting a job; about how UCSF administration works; and about sources of clinical research funding and career options in industry and foundations as well as NIH and other government agencies. Each trainee produces a 2-year career plan.

Conferences and Courses

The Training In Clinical Research methods course series at UCSF described above is an excellent forum in which to plan the research project. This course is required prior to starting the research project. Additionally UCSF courses on bioethics and success in the academic world are taken concurrently.

Management of Clinical Occupational Health Problems (N271.06) is an interdisciplinary course that is co-taught by occupational medicine and nursing faculty, and emphasizes integrated management of occupational health problems using the case-based teaching approach. The course is taught at the UCSF-Parnassus campus during the winter academic quarter. Practicum-year residents are required to take this course as part of their didactic training.

Advances in Occupational Medicine is a short intense course covering selected topics in OEM sponsored by the OEM Division at UCSF. Practicum-year residents are required to attend this course as part of their didactic training.

Various COEH courses throughout the year are considered part of the curriculum. These courses include the COEH Summer Institute, Spring and Fall Symposia and the Annual Ergonomics Course.

The Western Occupational Health Conference and the American Occupational Health Conference are annual meetings that are also attended by the residents. The American College of Preventive Medicine meeting, Prevention, is a possible additional option. Other meetings are considered optional and can be attended upon approval by the program director. A recent example is the ICOEH 2006 meeting in Milan.

Ergonomics Program
University of California, San Francisco and Berkeley
Annual Report July 1, 2006 – June 30, 2007

A. Program Title: Ergonomics Program

B. Program Director: David Rempel. MD, MPH

C. Program Description

1. Goals and Objectives

The goals of the M.S. Training Program are to provide an adequate foundation and practical experience in human biology, performance, and biomechanics so that a successful graduate can develop an ergonomics consultation practice, or become a competent resource for ergonomics issues within a company or agency, or compete well in a Ph.D. training program. Graduates should also be able to pass the examination to become a Certified Professional Ergonomist.

The Ergonomics Research Training Proposal (Ph.D.) is designed for students interested in a career in original research and teaching in the field of ergonomics. Doctoral students would normally complete course work in two years and submit a dissertation on a research project in a total of five years. The goal is to graduate 1-2 doctoral students per year with the expectation that they will continue with post-doctoral training, join the faculty at other universities, work for a governmental agency or work for a company and that their work will remain related to occupational health and safety.

2. Responsible Conduct of Science

All graduate students are required to take an ethics course. Students in the EHS program take Integrity in Science - PH276A (2 units) and students in Bioengineering have a choice of 4 ethics courses but most likely take Ethics in Science and Engineering - BioE 100 (3 units).

3. Faculty Participation

Lecturing and oversight of the field training for M.S. students has been provided by Ira Janowitz, C.P.E. and Kristin Amlie, PT. Professor Fathallah of the UC Davis Agricultural Engineering Department and Professor Krause of the UC San Francisco Occupational Medicine Program provide strong expertise in spine biomechanics and the epidemiology of low back injuries, respectively. Both faculty lecture in the Ergonomics course (PH 269C) and are available to assist students with research projects. Professor Ken Goldberg from the Department of Industrial Engineering provided lectures to students on design and the Fitts test.

The director, David Rempel M.D., M.P.H., is the primary graduate advisor for the M.S. and Ph.D. students; approximately 40% of his time is directly involved in teaching (e.g., courses, oversight of graduate students' research projects, clinic teaching). Dr. Rempel is the faculty of record for all ergonomics courses (PH269C, PH269D, PH295, PH297, and PH298).

Dr. Christopher Nowakoski, whose background is in Human Factors Engineering is a Research Specialist in the College of Engineering and is involved in research on human performance and modeling in transportation systems. He lectures on cognitive human factors issues in the

Ergonomics Course (BioEc279).

Mark Hudes, Ph.D., is a full-time biostatistician with the School of Public Health. Dr. Hudes is supported (5% time) to advise M.S. and Ph.D students on the statistical issues involved in research projects.

Barbara Plog is Director of the Continuing Education Program and has been director for the CE safety courses. She recruits adjunct faculty from local industry and governmental agencies to assist with teaching the safety courses.

4. Curricula

Curricula changes include improved training in the area of experimental design. All trainees are required to take Ergonomics Seminar (PH 295, 1 unit) which meets continuously in Fall and Spring. This seminar focuses on experimental design by reviewing recent studies published in the literature and having students present and discuss research proposals. Occupational Biomechanics (PH 269D) is taught every-other-year and is required of all trainees. PH269D focuses on experimental and quantitative methods in research. In addition, Dr. Hudes, our biostatistician faculty, meets monthly with students to discuss statistical problems they face in their research. There are no changes in the training faculty.

D. Program Activities and Accomplishments

During this period, the program graduated one student with an M.S. degree and one student with a Ph.D. degree. The M.S. graduate is now enrolled in the MPH program in Ergonomics in the school of Public Health. The Ph.D. graduate is doing a post-doctoral fellowship in Occupational Biomechanics at Harvard School of Public Health. Students published 1 to 3 articles each as first authors in well-respected journals (J Orthopaedic Surgery, J Biomechanics, JOEM) and students presented 5 papers at scientific meetings (Orthopaedic Research Society, Human Factors Society).

Minority Recruitment and Retention: The University of California at Berkeley has a very active program to attract and retain a diverse student body. The Graduate Diversity Program recruits students from historically Black colleges and universities with predominantly Hispanic populations. The Program also provides individual advising to minority graduate students to increase retention. The annual Berkeley Edge Conference brings underrepresented minority students to the Berkeley campus for tours and research fellowships. Dr. Rempel has been involved in the Berkeley Edge program as a research mentor.

Dr. Rempel regularly gives lectures to undergraduate students on the UC Berkeley campus (e.g., biology, public health, engineering, architecture) in order to attract students from minority and other underserved groups to graduate studies in ergonomics. He also actively participates in undergraduate activities in the College of Engineering designed to attract minority and other underserved students to graduate research (e.g., Summer Undergraduate Program in Engineering Research, Berkeley Undergraduate Bioengineering Research Program, Undergraduate Research Opportunities). Promising undergraduate minority students are provided with financial support to continue their research work with the Ergonomics Laboratory.

Once in the program, every effort is made to provide a supportive environment for all graduate students that will ensure their successful completion of the training. Students receive adequate desk and laboratory space for research; each receives a computer; and supplies and research

equipment are ordered as needed. The program administrator addresses financial issues rapidly. Dr. Rempel meets one-on-one with graduate students every 2 to 3 weeks to review past progress and plans for their work over the next few weeks. In addition, he has an open door policy so that students can drop in to discuss research or other issues as needed.

E. Program Products

More than 20 papers were published or accepted for publication in peer-reviewed scientific journals during this period. All but 3 papers involved significant contributions from students. Eleven of these papers were first authored by graduate students. Three book chapters were written by program faculty during this period. The program sponsored two, 2-day CE courses during the period and Dr. Rempel participated in four national meetings providing CE training in ergonomics to occupational health professionals.

Several of the publications involved important R2P activities. Examples are the finding of the strong influence of dental tool design (diameter, weight, texture, shape) on pinch force and forearm muscle activity. Adopting new designs may reduce musculoskeletal disorders among dental practitioners. Not only were these findings published in a widely read dental journal (JADA), but they were also presented at the annual California Dental Association meeting at a course on dental ergonomics attended by 400 dentists and dental hygienists. Another example is the completion of an intervention study among computer using customer service operators which found that a padded forearm support could significantly reduce arm and neck pain and prevent shoulder disorders. The study was widely cited in the popular press.

Student conference presentations (student papers are presented in the Appendix):

Shergill AK, Asundi K, Barr A, Shah JN, Ryan JC, McQuaid KR, Rempel D. Evaluation of distal upper extremity musculoskeletal load during routine colonoscopy. Annual Meeting of American College of Gastroenterologists. 2007.

Rempel DM, Story M, Luce A, Leung A, Lemke M, Winters J. Reducing patient handling: Accessibility barriers for radiology equipment for patients with mobility impairment. ICOH International Conference on the Health of Healthcare Workers, 2007, Vancouver.

Abbah E, Garcia M, Harris C, Goldberg R, Krause N, Rempel D. Impact of hand or wrist pain on work function among worers performing hand intensive work. PREMUS 2007 (Prevention of Musculoskeletal Disorders), 27 August 2007. Boston.

Rempel D, Nakama L, King K. Contributions of repetition rate and peak force to microtears and growth factor density in a rabbit model of epicondylitis PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

Harris C, Chen B, Janowitz I, Rempel D. Ergonomic evaluation of an alternative tool for cake decorating. PREMUS 2007 (Prevention of Musculoskeletal Disorders), Boston.

Story M, Winters J, Lemke M, Rempel D. Evaluating the accessibility of medical equipment. International Conference on Inclusive Design, 2007 London

Abbah E, Rempel D, Goldberg R, Krause N. Impact of hand/wrist pain on work function among blue collar workers. American Occupational Health Conference, 2007, New Orleans.

Asundi K, Rempel D. Clamping tendons in vitro can affect gene expression at the midsubstance. Orthpaedic Research Society Annual Meeting 2007, San Diego.

Asundi K, Rempel D. IL-1B expression in tendon correlates with creep strain under static load. Orthpaedic Research Society Annual Meeting 2007, San Diego.

Asundi K, Rempel D. MMP-1 expression is up-regulated with increased static load and correlates to creep. Biology, Medicine and Engineering Sciences, 2006, Chicago.

Nakama L, King K, Rempel D. The effect of repetition rate on the formation of microtears in tendon in an in vivo repetitive loading animal model. Human Factors and Ergonomics Society 2006, San Francisco.

Dong H, Loomer P, Villanueva A, Rempel D. Pinch forces and instrument tip forces during periodontal scaling. Human Factors and Ergonomics Society 2006, San Francisco.

Barr A, Rempel D, Young E, Brafman D. The effect of six keyboard designs on wrist and forearm postures. Human Factors and Ergonomics Society 2006, San Francisco.

F. Future Plans

The plan is to recruit 1 to 3 new M.S. students to the program in the next 3 years. Undergraduates are informed of the Program by faculty lectures to classes at UC Berkeley and by encouraging undergraduate to do paid and volunteer research work in the laboratory. Others are informed by talks to health and safety professionals at regional and national conferences and by maintaining an informative web site.

The plan is to recruit 1 new PhD student per year. Doctoral students are recruited through presentations to undergraduate students at UC Berkeley and from other universities (in the past year there have been talks to U Washington and U Illinois). Promising undergraduate students who rotate through the Ergonomics Laboratory or who take the Ergonomics course are encouraged to consider doctoral work. Doctoral students are also recruited from current MS students or from PhD students who have been admitted to the Bioengineering Program.

Appendix A: Student Publications (student names underlined; faculty names are in bold)

1. Laroche C, Barr A, Dong H, **Rempel D**. Effect of dental tool surface texture and material on static friction with a wet gloved fingertip. J Biomechanics 2007; 40(3):697-701.

2. Dong H, Loomer P, Villanueva A, **Rempel D**. Pinch forces and instrument tip forces during periodontal scaling. J Periodontology 2007; 78(1):97-103.

2. **Rempel D**, Barr A, Brafman D, Young E. The effects of six keyboard designs on wrist and forearm postures. Appl Ergonomics 2007; 38(3):298-8.

5. Nikanjam M, Kursa K, Lehman S, **Rempel D**. Finger Flexor Motor Control Patterns during Active Flexion: An *In Vivo* Tendon Force Study. Human Movement Science 2007; 26(1):1-10.

6. Odell D, Barr A, **Goldberg R**, Chung J, **Rempel D**. Evaluation of a Dynamic Arm Support for Seated and Standing Tasks: A Laboratory Study of Electromyography and Subjective Feedback. Ergonomics 2007; 50(4):520-535.

7. Villanueva A, Dong H, **Rempel D**. A biomechanical analysis of applied pinch force during periodontal scaling. J Biomechanics 2007; 40:1910-1915.

8. Dong H, Loomer P, Barr A, Laroche C, Young E, **Rempel D**. The effects of tool handle shape on hand muscle load and pinch force in a simulated dental scaling task. Appl Ergonomics 2007; 38:525-531.

9. Asundi K, Kursa K, Lotz JC, **Rempel D**. In vitro system for applying cyclic loads to connective tissues under displacement or force control. Ann Biomed Eng 2007; 35(7):1188-95.

10. Nakama L, King KB, Abrahamsson SO, **Rempel DM**. Effect of repetition rate on the formation of microtears in tendon in an *in vivo* cyclical loading model. J Orthop Res 2007; 25(9):1176-84.

11. Conlon CF, **Rempel DM, Krause N**. A randomized controlled trial evaluating an alternative mouse and forearm support on upper body discomfort and musculoskeletal disorders among engineers. Occup Environ Med (in press).

12. Asundi KR, **Rempel DM.** Cyclic loading inhibits expression of MMP-3 but not MMP-1 in an in vitro rabbit flexor tendon model. Clin Biomech (in press).

13. Asundi KR, **Rempel DM**. MMP-1, IL-1β and COX-2 mRNA Expression is Modulated by Static Load in Rabbit Flexor Tendon. Ann Biomed Eng (in press).

14. Asundi KR, **King KB**, **Rempel DM**. Evaluation of gene expression through qRT-PCR in cyclically loaded tendons: an in vivo model. Eur J Appl Physiol (in press).

15. Rogers MS, Barr AB, Kasemsontitum B, **Rempel DM**. The development and validation of a 3D model of the hand. Ergonomics (in press).

Appendix B: Faculty Publications: (faculty names are in bold; students names are underlined)

1. Nakama L, King KB, Abrahamsson SO, **Rempel DM**. VEGF, VEGFR-1 and CTGF cell densities in tendon are increased with cyclical loading: An *in vivo* tendinopathy model. J Orthop Res 2006, 24(3):393-400.

2. **Rempel D**, **Krause N, Goldberg R**, Benner D, Hudes M, Goldner GU. A Randomized Controlled Trial Evaluating the Effects of Two Workstation Interventions on Upper Body Pain and Incident Musculoskeletal Disorders among Computer Operators. Occup Environ Med 2006, 63(5):300-306.

3. Kursa K, Latanza L, Diao E, **Rempel D**. In vivo forces generated by finger flexor muscles increase with finger and wrist flexion during active finger flexion and extension. J Orthop Res 2006, 24(4):763-9.

4. Janowitz I, **Gillen M**, Ryan G, **Rempel D**, Trupin L, Swig L, Mullen K, Rugulies R, **Blanc PD**. Measuring the physical demands of work in hospital settings: Design and implementation of an ergonomic assessment. Appl Ergonomics 2006, 37(5):641-58.

5. Village J, **Rempel D**, Teschke K. Musculoskeletal disorders of the upper extremity associated with computer work: A systematic review. Occupational Ergonomics 2006, 5(4):205-218.

6. Dong H, Barr A, Loomer P, Laroche C, Young E, **Rempel D**. The effects of periodontal instrument handle design on hand muscle load and pinch force. J Am Dental Assoc 2006, 137(8):1123-30

7. Brewer S, Van Erg D, Amick BC, Irvin E, Daum K, Gerr F, Moore JS, Cullen K, **Rempel D**. Workplace Interventions to Prevent Musculoskeletal and Visual Symptoms and Disorders among Computer Users: A Systematic Review. J Occupational Rehab 2006; 16(3):317-50

8. Saadat E, Lan H, Majumdar S, **Rempel DM**, King KB. Long-term cyclical in vivo loading increases cartilage proteoglycan content in a spatially specific manner: an infrared micro spectroscopic imaging and polarized light microscopy study. Arthritis Research & Therapy 2006; 8(5):R147.

9. Keir PJ, Bach JM, Hudes M, **Rempel DM**. Guidelines for wrist posture based on carpal tunnel pressure thresholds. Human Factors 2007, 49(1):88-89.

10. LaRouche C, Barr A, Dong H, **Rempel D**. Effect of dental tool surface texture and material on static friction with a wet gloved fingertip. J Biomechanics 2007; 40(3):697-701.

11. Dong H, Loomer P, Villanueva A, **Rempel D**. Pinch forces and instrument tip forces during periodontal scaling. J Periodontology 2007; 78(1):97-103.

12. **Rempel D**, Barr A, Brafman D, Young E. The effects of six keyboard designs on wrist and forearm postures. Appl Ergonomics 2007; 38(3):298-8.

13. Nikanjam M, Kursa K, Lehman S, **Rempel D**. Finger Flexor Motor Control Patterns during Active Flexion: An *In Vivo* Tendon Force Study. Human Movement Science 2007; 26(1):1-10.

14. Odell D, Barr A, **Goldberg R**, Chung J, **Rempel D**. Evaluation of a Dynamic Arm Support for Seated and Standing Tasks: A Laboratory Study of Electromyography and Subjective Feedback. Ergonomics 2007; 50(4):520-535.

15. **Rempel D**, Wang PC, Janowitz I, Harrison R, Yu F, Ritz B. A Randomized Controlled Trial Evaluating the Effects of New Task Chairs on Shoulder and Neck Pain among Sewing Operators: The Los Angeles Garment Study. Spine 2007; 32(9):931-8.

16. Menendez CC, Amick BC, Jenkins M, Janowitz I, **Rempel D**, Robertson M, Dennerlein JT, Chang CH, Katz JN. A Multi-Method Study Evaluating Computing-Related Risk Factors among College Students. Work 2007; 28(4):287-97.

17. Villanueva A, Dong H, **Rempel D**. A biomechanical analysis of applied pinch force during periodontal scaling. J Biomechanics 2007; 40:1910-1915.

18. Dong H, Loomer P, Barr A, LaRouche C, Young E, **Rempel D**. The effects of tool handle shape on hand muscle load and pinch force in a simulated dental scaling task. Appl Ergonomics 2007; 38:525-531.

19. Asundi K, Kursa K, Lotz JC, **Rempel D**. In vitro system for applying cyclic loads to connective tissues under displacement or force control. Ann Biomed Eng 2007; 35(7):1188-95.

20. Nakama L, King KB, Abrahamsson SO, **Rempel DM**. Effect of repetition rate on the formation of microtears in tendon in an *in vivo* cyclical loading model. J Orthop Res 2007; 25(9):1176-84.

21. **Rempel D**, Willms K, Anshel J, Jaschinski W, Sheedy J. The effects of visual display distance on eye accommodation, head posture, and vision and neck symptoms. Human Factors (in press)

22. **Rempel D**, Star D, Gibbons B, Barr A, Janowitz I. Development and evaluation of a new device for overhead drilling. Prof Safety (in press).

23. Conlon CF, **Rempel DM**, **Krause N**. A randomized controlled trial evaluating an alternative mouse and forearm support on upper body discomfort and musculoskeletal disorders among engineers. Occup Environ Med (in press).

24. Wang PC, **Rempel DM**, Harrison RJ, Chan J, Ritz BR. Work-organizational and personal factors associated with upper body musculoskeletal disorders among sewing machine operators. Occup Environ Med 2007 (in press).

25. Asundi KR, **Rempel DM**. Cyclic loading inhibits expression of MMP-3 but not MMP-1 in an in vitro rabbit flexor tendon model. Clin Biomech (in press).

26. Asundi KR, **Rempel DM**. MMP-1, IL-1β and COX-2 mRNA Expression is Modulated by Static Load in Rabbit Flexor Tendon. Ann Biomed Eng (in press).

27. Asundi KR, King KB, **Rempel DM**. Evaluation of gene expression through qRT-PCR in cyclically loaded tendons: an in vivo model. Eur J Appl Physiol (in press).

28. Rogers MS, Barr AB, Kasemsontitum B, **Rempel DM**. The development and validation of a 3D model of the hand. Ergonomics (in press).

Appendix C: Admission Requirements and Curriculum

UCSF/UCB Joint Graduate Group in Bioengineering Path

Entering students are expected to have a B.A. or B.S. in engineering, biology, or other sciences. Typically this will include a two-year college mathematics sequence, a one-year sequence in each of physics, chemistry and computer science, and extensive upper-division work in either engineering or biology. The mathematical level should include calculus, differential equations, and linear algebra. Outstanding students who are lacking in some of these areas may be admitted with the condition that they complete any necessary undergraduate coursework while in the program.

UCB Environmental Health Sciences Program Path

A baccalaureate or higher degree in physical, chemical or biological science; engineering; or medicine with a GPA of 3.0 (minimum). Applicants with non-science majors who meet the undergraduate course work requirements will be considered. Course work which must be completed prior to enrolling are:
Calculus (one year minimum), Chemistry (two years minimum, including Organic Chemistry), and Biology (one year minimum). Although there is no minimum GRE score required for admission, most applicants score at or above the 60th percentile.

Sample Curricula:

A typical curriculum for an M.S. student in the EHS pathway with a biology background would be:

Year 1

Fall	**Spring**	**Summer**
EHS Seminar PH292 (1)	Ergonomics PH269C (3)*	Internship (3)*
Biostatistics PH142A (4)**	Biostatistics PH142B (4)**	
Engineering Design E28 (3)	Human Physiology IB132 (3)	
Exposure Assessment PH270A (3)**	Risk Assessment PH220C (4)**	
Work Systems IEOR171 (2)*	Ergo Seminar PH295 (1)*	
Ergo Seminar PH 295 (1)*		

Year 2

Fall	**Spring**
Occup Biomech PH 269D (2)*	Clinical Ergonomics PH298 (2)*
Physical Agents PH 274A (2)	Interface Design IEOR170 (2)
Psychosocial N 274B (2)*	Ergo Seminar PH 295 (1)*
Safety PH 275B (2)*	Research PH 299 (4)
Epidemiology PH250A (4)**	Tissue Mechanics ME214 (3)**
Integrity in Science PH276A (2)**	

A typical curriculum for an M.S. student with an engineering background would be:

Year 1

Fall	**Spring**	**Summer**
Motor Control IB127 (2)	Ergonomics PH 269C (3)*	Internship (3)*
Multivar Statistics PH 245 (4)	Bioengineering E153 (4)	
Ergo Seminar PH 298 (1)	Motor control IB 127 (3)	
Anatomy IB 131 (3)	Physiology IB 132 (4)	
Orthop Biomech ME176 (4)	Ergo Seminar PH 298 (1)*	

Year 2

Fall	**Spring**
Occup Biomech PH 269D (2)*	Research PH 299 (4)
Safety PH 275B (3)*	Tissue Mechanics ME 214 (3)
Psychosocial N 248 (2)*	Cell Biology MCB 130 (4)
EHS Seminar PH 292 (1)	Interface Design IEOR170 (2)
Work Systems IEOR171 (2)*	
Ergo Seminar PH 298 (1)*	
Ethics in Science BioE 100 (3)**	

COEH Continuing Education Program
Annual Report, July 1, 2006 - June 30, 2007

A. Program Title: COEH Continuing Education (CE) Program

B. Program Director: Barbara Plog, MPH, CIH, CSP, continues as Director of Continuing Education and the Hazardous Substance Training Program. Ms. Plog's impressive background continues to be a great asset to the CE/HST Program. She has 25 years experience in the field of occupational health and safety as a teacher, continuing education provider, industrial hygienist, safety professional and author. She is author of *Fundamentals of Industrial Hygiene*, a basic reference text in the field. She also has a lecturer appointment at the UC Berkeley School of Public Health and an Assistant Clinical Professorship at the UCSF School of Nursing. Ms Plog was given the Christine Einert Award by the AIHA-Northern California Section in July, 2002 in "recognition of outstanding contributions to the industrial hygiene profession in Northern California." Ms Plog is also interested in intervention safety research and in March 2006 was lead author of "Strategies to Prevent Trenching-Related Injuries and Deaths," a publication through the Center to Protect Workers Rights. She will devote approximately 75% of her time to the CE and HST Programs.

C. Program Description: The Northern California ERC's Community Services Program, which houses both the CE/HST Program and the Labor Occupational Health Program, has had over 20 years of specific experience in health and safety training for both professional and non-professional audiences outside the University. The CE Program currently has a staff of three and is in the process of hiring another program assistant. Linda Ellwood, MBA, remains as Continuing Education Coordinator under Ms. Plog, responsible for course development, program coordination and logistics, as well as staff supervision. Ms. Ellwood has 16 years experience in managing occupational health and safety continuing education. She devotes 100% of her time to the CE and HST Programs. Nonacademic support staff consists of one full-time Program Representative, Laura Volk, who handles day-to-day administrative and clerical duties, assists in course logistics, prepares course materials, and handles registration and record keeping. She has 4 years experience handling logistics of asbestos training as well as extensive office experience. Ms. Volk works 100% on CE and HST.

The goals of the COEH Continuing Education Program involve:

1. The provision of high quality professional education courses for practicing occupational and environmental health professionals. These offerings serve to maintain professional certifications (in nursing, medicine, industrial hygiene, safety and other related professional disciplines);
2. The provision of the most up-to-date skills and information needed to effectively protect worker and community environments throughout the northern California region;
3. Serving as the public face of the Center for Occupational and Environmental Health as a major resource for the professional community and presenting the research and teachings of COEH academic faculty;
4. Providing an opportunity for professionals from a variety of disciplines to come together to explore critical and arising issues of common concerns.
5. Exploring new and innovative methods of providing high quality continuing professional education.

The COEH CE Program has a well established reputation as the premier provider of continuing professional education for occupational health and safety professionals in the region. A large and loyal client base of attendees take a number of offerings every year and depend upon the CE Program to obtain professional certifications and then keep them current.

CE Faculty from ERC Academic Programs. The COEH academic faculty from all of the core and affiliated programs continue to offer full and enthusiastic participation in COEH's Continuing Education Program. All of the ERC's academic programs continue to provide development of CE courses geared toward their specific constituents, as well as contributing to the development of the ERC-wide CE offerings. Each academic program contributes at least one CE course per year. The CE Program in turn provides free or greatly reduced registration fees for students, faculty and others associated with COEH to attend CE courses. Below are five examples of CE courses developed by Center core academic program faculty in the last reporting period:

1. "Workers' Compensation Overview Update for OSH Professionals," July 30-August 1, 2006. Barbara Burgel, RN, MS, FAAN, ANP, COHN-S, and Rossana Segovia-Bain, RN, MS, OHNP, COHN-S, OEHN faculty, served as co-course directors with an OEHN program doctoral candidate.
2. "Ergonomics in Workstation and Facility Design," August 3-4, 2006. Ira Janowitz, MPS, CPE, Senior Consultant at the Ergonomics Program, served as course director.
3. "Controlling Sharps Injuries in California," September 15, 2006. Robert Harrison, MD, MPH, OEM faculty, served as course director.
4. "Ergonomic Interventions and Research: Preventing Workplace Musculoskeletal Disorders," December 14-15, 2006. David Rempel, MD, MPH, Director of the Ergonomics Program, served as course director.
5. "Management of Clinical Occupational Health Problems Occupational Health Nursing Series," 4 sessions in May 2007. Barbara Burgel, RN, MS, FAAN, ANP, COHN-S, OEHN faculty, served as course director.

ERC core academic program faculty members and technical staff show an excellent commitment to CE and frequently serve as speakers in CE courses. Below are some examples of courses in which ERC academic faculty and technical staff have served as speakers in the last year:

1. "Comprehensive Review of Industrial Hygiene," July 31-August 4, 2006
   -S. Katharine Hammond, PhD, CIH, taught *Epidemiology*

2. "Fundamentals of Industrial Hygiene," July 31-August 4, 2006
   -Patricia J. Quinlan, MPH, CIH, taught *Respiratory Protection, Personal Protective Equipment, Noise Measurement and Control, Hearing Conservation Programs, Problem Recognition* and *Engineering Controls*

3. "Controlling Sharps Injuries in California," September 15 & October 20, 2006
   -Marion Gillen, RN, MPH, PhD taught *Safer Needle Devices*
   -Robert Harrison, MD, MPH taught *Research and Prevention: Future Directions for Sharps Injuries*

4. "Ergonomic Interventions and Research," December 14-15, 2006
   -David Rempel, MD, MPH, taught *Intervention Studies for Computer and Other Seated Work.*

Other CE Program Course Faculty. CE faculty are of very high caliber, some nationally and internationally prominent. Outside speakers are drawn from government agencies, community and professional groups, consulting firms, other private businesses and other universities. The following is a sample of outside instructors in the CE Program in the last reporting period:

- **Thomas J. Armstrong, BSE, MPH, PhD, CIH,** Professor, Department of Industrial and Operations Engineering and Director of the Center for Ergonomics at the University of Michigan, co-directed "Ergonomic Interventions and Research" December 8-9, 2005.

- **Stephen C. Davis, MPH, CIH, CSP, CAC, CMID,** of LaCroix Davis, LLC, Lafayette, CA, is an instructor in the COEH CE Lead training courses.

- **Hank McDermott, PE, CIH,** private consultant, is a regular Ventilation instructor in "Comprehensive Review of Industrial Hygiene," and teaches Epidemiology and TLVs & PELs in "Fundamentals of Industrial Hygiene." He also taught the Local Exhaust Systems portion of "Ventilation: Diagnosing and Troubleshooting HVAC and Local Exhaust Systems" at the 2006 Summer Institute.

- **Roy McKay, PhD,** Director of Occupational Pulmonary Services and Professor at the University of Cincinnati coordinated and taught "Respiratory Protection Overview Update" and "Development of Respirator Chemical Cartridge and Filter Change Out Schedules" courses at the 2006 Summer Institute.

- **Linda Morse, MD, MPH,** Chief of Occupational Medicine at Kaiser Permanente in San Francisco, CA, regularly teaches in "Workers' Compensation Overview Update" and teaches Biological Monitoring/Medical Surveillance in "Fundamentals of Industrial Hygiene."

- **Victor Toy, MPH, CIH,** Manager at IBM Corporation's Global Wellbeing Services in San Jose, CA, teaches Noise and Noise Control in "Comprehensive Review of Industrial Hygiene."

- **Tom Wangerin, MS, CAC,** LaCroix Davis LLC, Lafayette, CA, is the course director and principal instructor in the COEH CE Asbestos and Lead Training Program. Mr. Wangerin is highly respected in the field.

D. Program Activities and Accomplishments. Significant accomplishments included the increase in training through the Lead and Asbestos Training Program; instituting impact evaluations for some CE courses; initiating a long-term strategic planning process for both the CE and the HST Programs; and starting to collect ethnicity data on students. Other more intense efforts included outreach activities through mailed brochures and postcards, email blasts, web listings of courses, and participation in national professional conferences through representation at the NIOSH booth. Needs assessment activities continue through the CE Program Advisory Committee (see Attachment A) and the CME Advisory Committee (see Attachment B) as well as through assessments at national conferences, with professional organizations and at CE Program classes.

The CE Program in 2006-2007 continued to be the premier asbestos and lead paint training program in Northern California. The number of trainees in this program increased 19% between 2005-2006 and 2006-2007. Titles of asbestos and lead courses, and the number of times they were offered in 2006-2007 are listed below:

- AHERA Building Inspector 1/2 day Refresher: 9 times

- AHERA Building Inspector/Management Planner full-day Refresher: 9 times
- AHERA Contractor/Supervisor full-day Refresher: 9 times
- AHERA Project Designer full-day Refresher: 5 times
- AHERA Building Inspection for Asbestos 24-hour Initial Class: 4 times
- AHERA Bldg Inspection & Mgmt Planning for Asbestos 40-hour Initial Class: 4 times
- AHERA Contractor/Supv 40-hour Initial Class (Practices/Procedures in Asbes. Cntrl): 3 times
- AHERA Proj.Designer 24-hour Initial Class ("Designing Asbes. Abatement Projects"): 2 times
- Lead General CE 7-hour Class ("CE for Certified Lead Professionals"): 6 times
- Lead Paint Inspection & Assessment 40-hour Initial Class: 3 times
- Lead-based Paint Supervision & Monitoring 40-hour Initial Class: 2 times.

The CE Program began to collect ethnicity data from students in CE courses to gain information on how the program is currently reaching underserved populations. This information is now requested on course registration forms and more participants are providing these data.

Ethnicity data for Lead classes is summarized here from September 2006-June 2007. Out of 227 students who answered the ethnicity question: 161 (71%) were "White"; 22 (10%) were "Asian"; 20 (9%) were "Latino/Hispanic"; 11 (5%) were "Black"; 3 (1%) were "Pacific Islander"; and 10 (2%) were "Other."

The CE Program has begun collecting impact evaluation data in the past few years. The first impact evaluations to be collected were from physicians and nurses in CE and HST courses offering continuing medical education credit. Three months after a course, CE sends out a brief survey form asking whether and how participants have changed their practice as a result of taking the course. A stamped self-addressed envelope is included to send the survey back to CE. These data are discussed in the quarterly CME Committee meetings. The CE Program now conducts impact evaluation on all CE and HST classes. Due to the prohibitive cost of mailing, however, these surveys will be emailed to attendees. A more elaborate survey form has been developed that addresses more specific outcomes, yet still remains short enough to encourage completion.

E. Program Products. During this reporting period, the CE Program gave a total of 84 courses to 2,464 total trainees. Of the total number of trainees, 538 were physicians; 144 were nurses; 489 were industrial hygienists and 207 were safety professionals. A total of 1086 attendees listed themselves in the "other category." As for the employer breakdowns of the trainees, 868 were from private industry; 213 from the federal government; 172 from the state government; 344 from local government; 3 from a foreign country; 792 from academic institutions and 72 listed the "other" category. A few brief highlights of the year follow.

The CE Program collaborated with the California Department of Health Services (now called the Department of Public Health) to present the "Controlling Sharps Injuries in California" one-day conference in Oakland, CA on September 15, 2006. This event was directed at nurses and other health care providers and attracted 94 attendees. Speakers came from all over the US, including New Jersey, Texas, Massachusetts and Virginia to find out the latest information on this continuing occupational hazard.

The CE Program continued its popular Industrial Hygiene Series with three short sessions on "OSHA Health Regulations and Legislative Update," "Pandemic Flu is Coming: Are You Ready?" and "NESHAP: New Asbestos Control Technologies." 85 local industrial hygienists and safety professionals attended the series.

In an ongoing effort to bring new topics and speakers to the ergonomics community, the CE Program brought in Judy Village, an expert on Facility Design from the University of British Columbia, Canada, to teach a one day hands-on workshop at the 2006 Summer Institute ergonomics class “Ergonomics in Facility and Workstation Design.”

F. Future Plans. The CE Program will continue to offer a full schedule of classes in all occupational health disciplines: occupational medicine, industrial hygiene, occupational health nursing, occupational safety, interdisciplinary classes that involves multiple disciplines and finally such allied disciplines that are categorized as “other.” “Other” includes classes on ergonomics, worker’s compensation, for example. In addition, a full component of Asbestos and Lead training and certification classes will be offered on a similar schedule as described earlier in this report. Due to the confined page length of this report, the following plans, listed by program objectives, are simply a general overview.

Objective 1. Continue to serve the Northern California professional community with a variety of live courses from 1/2 day to 5 days in length to meet the differing training needs in the area that are identified in needs assessments. The CE offers multi-course and group discounts as an incentive to participants, and routinely offers a 10% discount to participants from government agencies. The CE Program prepares occupational health and safety professionals for certification in their specific disciplines, helps them to stay certified, and increases their professional knowledge. All initial asbestos and lead courses are prerequisites for state licensing exams.

Objective 2. Reach new members of this audience through improved collaborations, marketing, and outreach to local professional organizations and government agencies. Because CE is a premier continuing education provider in the region, other providers often come to CE for collaboration. The CE Program particularly plans to work more closely with the local chapters of the ASSE and the AAOHN. CE will continue to co-sponsor courses with other educational institutions, professional associations, community organizations, and government agencies. The following is a list of co-sponsors the CE Program has worked with and plans to continue working with in the future:

* American Industrial Hygiene Association - Northern California Section
* California Commission on Health & Safety & Workers’ Compensation
* California Department of Public Health (formerly Department of Health Services)
* California Department of Occupational Safety and Health
* University of Michigan Center for Occupational Health & Safety Engineering
* University of British Columbia School of Occupational & Environmental Hygiene
* US Environmental Protection Agency
* Southern California ERC Continuing Education Program
* Departments of Agriculture in Arizona, Hawaii and Nevada

Past and future collaborations with the local chapter of AIHA, the University of Michigan, the California Department of Pesticide Regulation, and the Southern California ERC/COEH will continue.

Objective 3. Continue to provide forums for presenting the work of COEH academic faculty while also providing a forum for the professional community to explore critical new issues in the field. The yearly COEH Symposium provides an exciting annual gathering to participants statewide to hear experts on the most current issues in the field. In conjunction with the southern COEH, the symposium will rotate between northern and southern California venues each year.

Objective 4. Continue to explore innovative methods of providing continuing education offerings such as through web-based training and compact discs with an interactive web-based component. We plan to conduct further needs assessment within our established courses. And the CE Program website also contains a needs assessment for regional needs in distance learning. The CE/HST Program currently has one web class on pesticides and is collaborating with CDPH on a CD-Rom training.

Objective 5. Enhance and expand CE Program training evaluation activity. We currently gather information that evaluates CE courses in a variety of ways. All attendees fill out evaluations rating the course, content, instructors, facilities and usefulness of the class. This form also asks impact questions. Then, some months after the classes, currently only for the medical classes, we mail out impact evaluations. Plans for the upcoming grant period include extending impact evaluations to all CE Program classes. The current CE evaluation process shows very high ratings in all areas. Usefulness of CE courses, for example, has consistently rated very high with ratings of 3.5 to 3.8 out of a possible 4. Instructor ratings typically show evaluations up to 4.0. Evaluations are always reviewed by the course director, summarized numerically and with comments sent in letter form to all instructors.

ATTACHMENT A

2006-2007 COEH CONTINUING EDUCATION ADVISORY COMMITTEE

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ATTACHMENT B

2006-2007 COEH CONTINUING MEDICAL EDUCATION COMMITTEE

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Hazardous Substance Training Program (HST)
COEH Continuing Education Program
Annual Report July 1, 2006 – June 30, 2007

A. Program Title: Hazardous Substance Training Program (HST)

B. Program Director: Barbara Plog, MPH, CIH, CSP, continues as Director of Continuing Education and the Hazardous Substance Training Program. Ms. Plog's impressive background continues to be a great asset to the CE/HST Program. She has 25 years experience in the field of occupational health and safety as a teacher, continuing education provider, industrial hygienist, safety professional and author. She is author of *Fundamentals of Industrial Hygiene*, a basic reference text in the field. She also has a lecturer appointment at the UC Berkeley School of Public Health and an Assistant Clinical Professorship at the UCSF School of Nursing. Ms Plog was given the Christine Einert Award by the American Industrial Hygiene Association-Northern California in July, 2002 in "recognition of outstanding contributions to the industrial hygiene profession in Northern California." Ms Plog is also interested in intervention safety research and in March 2006 was lead author of "Strategies to Prevent Trenching-Related Injuries and Deaths," a publication through the Center to Protect Workers Rights. She will devote approximately 75% of her time to the CE and HST Programs.

C. Program Description: The Northern California ERC's Community Services Program, which houses both the CE/HST Program and the Labor Occupational Health Program, has had over 20 years of specific experience in health and safety training for both professional and non-professional audiences outside the University. LOHP, for example, has an extensive history of training California workers and labor unions in health and safety, dating to 1974. This training has included numerous pesticide classes for agricultural workers. The Northern California ERC also has substantial hazardous waste training experience. Since 1987, LOHP, has been a member of the NIEHS-funded California-Arizona Consortium. The Northern California components of the Consortium (at Berkeley and Davis) develop curricula and annually present up to 25 courses for over 500 non-professional hazardous waste workers.

The Hazardous Substance Training Program (HST) was originally funded by NIOSH in 1988.The HST Program has experienced 18 years of growth and development bringing specialized training to increasing numbers throughout every state in the region – California, Nevada, Arizona and Hawaii. Trainees, often covered by scholarships, represent minority and underserved populations (Hispanic and Native American) in addition to targeting state, county, municipal and federal government health and safety professionals. While the average number of trainees was 50 per year during the early years from 1988-94, in the past five years, the number of trainees per year has risen to between 218 to 289 per year, (a five-year average of 250 per year and over a 400% increase from the early grant years).

The HST Program has focused on two primary objectives:

- It identifies and trains professionals throughout Region 9 who are involved in site investigation, site mitigation, hazardous substance handling and facilities management at waste sites contaminated by pesticides and wood preservatives, particularly those working in the public sector. (This objective has evolved over the years of the project to focus on all health and safety professionals whose work involves work with pesticides in some way.)
- It supports, through scholarship assistance, general hazardous waste training for other public sector professionals in Region 9 who could not otherwise afford the training they need.

HST Course Faculty: Faculty for each HST Program course are selected for their experience and knowledge in the field, as well as their ability to address the practical needs of course participants. Long time faculty with the program include people such as Michael O'Malley, MD, MPH, UC Davis Employee Health Services and Medical Consultant to the California Department of Pesticide Regulation, Harvard Fong, CIH, California Department of Pesticide Regulation; Robert Schlap, MS, California Environmental Protection Agency; Marylou Verdos-Carlos, DVM, California Department of Pesticide Regulation and Sarah Jewel, MD, MPH, UCSF Occupational and Environmental Medicine Program. Both nationally renowned and locally respected faculty from several disciplines have typically been selected. We will continue to draw from a broad and varied faculty pool in the future. While prestigious academic faculty are chosen to present such topics as toxicology, medical surveillance, and treatment, local community professionals, aware of regional problems and solutions, are also included as instructors to add practical relevance to the courses and ensure that locally specific information is presented.

Coordination with Other Agencies: Coordination of training efforts is necessary in order to prevent duplication of services and to ensure that our training meets all legal and regulatory criteria as well as actual training needs. The HST Program has planned course offerings with input from various governmental agencies and academic institutions throughout the Region. We have also sought input from the joint HST Advisory Committee and from the NIEHS-funded California-Arizona Consortium. Among the governmental agencies with which we have maintained a dialogue are: California Department of Health Services; Cal/EPA; U.S. EPA Region 9; county and state agriculture departments and Agricultural Commissioners; county public health departments; Cal/OSHA; Water Quality Control Boards; California Governor's Office of Emergency Services; the Inter Tribal Council, Inc of Arizona, various other Native American organizations and tribes, community clinics networks and military institutions.

D. Program Activities and Accomplishments: While the average number of trainees was 50 per year during the early years from 1988-94, in the past five years, the number of trainees per year has risen to between 218 to 289 per year, (over a 400% increase from the early grant years). This year, HST trainees numbered 242. This has been an especially exciting and fruitful period for the HST Program with the introduction of distance learning into the curriculum. Also, in the previous year, the HST Program had introduced new curriculum in Spanish and English in cooperation with the Inter Tribal Council of Arizona and the Arizona Department of Agriculture. The HST Program continues to recruit underserved populations into the training through its work and co-sponsorships of such groups as the Inter Tribal Council and other Native American organizations. Further, the introduction of impact evaluations two years ago has been a major step in the evaluation process. Steps were also taken to put ongoing program evaluation and needs assessment on a more formalized basis. Finally, the HST Program took its training to the workplace with its provision of around the clock training of all shifts of firefighters in a specific location. We term this our "on-site all shift training."

New Curriculum. Even though it was not all introduced during the last project year, it is important to point out that the HST Program has produced a wealth of new curriculum and training classes tailored to the specific needs of our regional target audience during the last 5-year grant cycle. Courses include:

- *Pesticide Emergency Response*--a one day class aimed at firefighters, emergency medical technicians, hazardous materials specialists, pesticide applicators and others.
- *Hazards of Pesticides to Emergency Responders*--a new half-day class aimed at firefighters, emergency medical technicians, hazardous materials specialists, pesticide applicators and others. This class has been presented a total of twenty times in Nevada

and southern and northern California. This class marks a novel approach to training this audience as it was offered to numerous “shifts” of firefighters in a location.

- *Pesticides Injuries and Illness Workshop*--a one-day class aimed at nurses and physicians at primary care and rural and immigrant health clinics and others. This class has been taught for Native American tribes on reservations, community health clinic settings in rural areas and elsewhere.
- *Pesticide Health Issues*--a one day class given in English and in Spanish and cosponsored by the Inter Tribal Council of Arizona and the Arizona Department of Agriculture. Using an interactive format of case studies, label reviews, role plays, group discussions and community action plans, this class targeted tribal and state government health care providers and professionals, emergency response personnel and health educators. Agricultural professionals, pesticide applicators and tribal and state pesticide program inspectors, environmental staff and industrial hygienists were also targeted.
- *Asbestos Health Hazard Awareness Field Seminar*--a half day class created for the California Integrated Waste Management Board given in California.
- *Pesticide Health Hazard Awareness Field Seminar*--a half day class created for the California Integrated Waste Management Board given in California.
- *Hazardous Substances: Management and Control Seminar Series*--created by Barbara Plog and Hank McDermott as a joint UC Berkeley Hazardous Substances Academic Training (HSAT) course and an open-enrollment HST course, this class ran for 13 weeks. It is designed to award HAZWOPER certificates to UC Berkeley HSAT trainees. This series was highly successful and well-evaluated and offered industrial hygiene students and the professional community the unique opportunity to interact in a seminar. The class included a field trip to a site undergoing remediation.

Impact Evaluations. In response to reviewers’ comments from the previous grant application, the HST Program introduced an impact evaluation process to the program. This is in two parts. First, in the on-site course evaluation, an impact question was added. Secondly (thus far only in the medical and nursing accredited courses), an impact letter survey was sent out three months after course were completed along with self-addressed, stamped, return envelopes. Although impact evaluations are currently performed in HST classes offering medical credit, the HST Program staff is currently creating an email impact evaluation form for all HST classes and this form will be sent out for the first time (and for all classes thereafter) in November, 2007. Thus the HST Program (and the COEH CE Program) will have instituted a two-stage impact evaluation for all of its classes as of 2007.

Program Evaluation. Improvements in the overall program evaluation process have also been made. First, the HST Regional Advisory Committee (See Attachment B for a roster of the advisory committee) has been asked to add an ongoing program evaluation agenda item to its list for ongoing discussion. The advisory committee has been expanded with the addition of several new members. This past year, the HST Program also instituted an annual conference call meeting of the entire advisory committee. The first conference call meeting of the newly expanded HST Advisory Committee took place on October 17, 2006. Previously, members from each state were consulted with on a state by state basis. The 2007 conference call meeting will take place soon in November, 2007.

Needs assessments. In this area, the HST Program has taken significant steps. As mentioned above, the Program instituted a regular, annual conference call meeting of the entire HST Regional Advisory Committee. We expect this to significantly aid in program needs assessment projects in addition to the ongoing activities in this area. In the past we performed state-by-state

needs assessment to identify training opportunities. While that activity will continue, we feel that the conference call interaction where all states are represented on the line will serve to enhance the identification of training needs.

Recruitment of Underserved Populations. Another aspect of the HST Program's target audience has become work with the underserved population of Native Americans throughout the region. The program has consistently trained tribal members from Arizona, Nevada and California. The HST Program is recognized and respected for its training and has entered into co-sponsorships with a number of tribal groups such as the Inter Tribal Council of Arizona. The Arizona Department of Agriculture and the USEPA Region 9 also work with the HST Program to sponsor training for Native American professionals.

On-Site All Shift Training. The HST Program took its training to the workplace with its provision of around the clock training of all shifts of firefighters in a specific location. We term this our "on-site all shift training." In addition, curriculum was refined and developed further to target firefighters in the training. **Hazards of Pesticides to Emergency Responders** was offered to four shifts of firefighters (and other agriculture, state, military and private health and safety professionals in Honolulu, Hawaii in June, 2007. Plans are being made to offer this class again to southern California firefighters in the Spring, 2008.

Distance Learning Initiatives. In a very important and exciting development for the HST Program (and the CE/HST Program at large), in the area of distance learning, two new online and web training courses have been developed and are in different project stages.

- **Recognition, Management, and Reporting of Pesticide Illness –** offers Continuing Medical Education and Board of Registered Nursing credit and is already approved by the CE/HST Program's CME Committee for an initial 3 year period. This web training program is jointly sponsored with the California Department of Pesticide Regulation Worker Health and Safety Branch and the California Office of Health Hazard Assessment, Pesticide Epidemiology Section. Students complete the training on line and take a test. If they pass the test, a certificate is issued which can be downloaded and printed after they complete a course evaluation online. The course is now fully operational and in the past reporting year 67 students completed the online class.

- **Pesticide Illness –** is a 6-8 hour CD-based training in 4 parts with training PowerPoint presentations and speaker notes. This has been created in co-sponsorship with the California Department of Public Health, Occupational Health Branch. Part 1 covers general principles of pesticide toxicology, epidemiology, recognition, diagnosis and management of acute pesticide illness. Part 2 covers acute pesticide illness due to insecticides. Part 3 details acute pesticide illness due to fungicides, fumigants, herbicides and miscellaneous pesticides. Part 4 discusses chronic illness due to pesticides and the laws that regulate their sale and use. After the student views the CD and successfully completes an examination, they may receive a certificate upon submission of a course evaluation. This project is still in developing stages as the Department of Public Health is undergoing a major reorganization and has put the project on hold temporarily.

E. Program Products. HST classes given in 2006-2007 drew 247 students in the following:

Respiratory Protection Overview/Update (July 31 - August 1, 2006, 10 attendees, Oakland, CA). Course Director and instructor is Roy McKay. This respirator class was taught in

the CE/HST Program's annual Summer Institute. Attendees were industrial hygienists and safety professionals from the region.

Development of Respirator Chemical Cartridge and Filter Change Out Schedules (August 2, 2006, 11 attendees, Oakland, CA.) The Course Director and instructor is Roy McKay. This respirator class was taught in the annual Summer Institute. Attendees were industrial hygienists and safety professionals from the region.

Hazards of Pesticides to Emergency Responders (September 7, 2006, 25 attendees, Sacramento, CA). This course was held as part of the Continuing Challenge HazMat Conference, sponsored by a coalition of federal, state, county and private organizations. These include the Federal Emergency Management Agency, National Fire Protection Association, California Governor's Office of Emergency Services, California State Fire Marshal, California Fire Chiefs Association, and others. Professionals attending the training included state, county and municipal hazardous materials specialists and managers, environmental health specialists/investigators, fire chiefs, fire service hazmat personnel, safety coordinators, environmental technicians and industrial hygienists. Many county, state and municipal agencies were represented (including 14 different county and city fire agencies) as well as a hazardous materials response specialist from Canada and a writer from a health and fitness magazine. The HST Program provided full scholarships.

Hazards of Pesticides to Emergency Responders (November 16, 2006, 14 attendees, Las Vegas, NV). This course was held as part of the annual HazMat Expo conference in Las Vegas, sponsored by a coalition of federal, state, county and private organizations. Professionals attending the training included state, county and municipal hazardous materials specialists, environmental health specialists/investigators, fire chiefs, fire service hazmat personnel, safety coordinators, environmental technicians. Eleven cities and counties were represented. The environmental manager from the Shoshone Tribe in Ely, NV was a student. Other students came from as far away as Texas and Hawaii. Full scholarships were provided.

Hazards of Pesticides to Emergency Responders (June 19-20, 2007, 115 attendees, Honolulu, HI). These courses were cosponsored by the Hawaii Department of Agriculture. The half-day course was offered four times over two days. Attendees included four shifts of Hawaii firefighters. Also in attendance were health and safety and emergency response professionals from the state of Hawaii and various branches of the US military. Students included such diverse occupations as pesticide educators and applicators and farm owners and workers. The HST program is continuing to offer this highly successful, on-site all shift pesticide training to firefighters and others.

Recognition, Management and Reporting of Pesticide Illness (Online Training) (July 1, 2006 - June 30, 2007, 67 students). This training offers Continuing Medical Education and Board of Registered Nursing credit to participants. It is jointly sponsored with the California Department of Pesticide Regulation Worker Health and Safety Branch and the California Office of Health Hazard Assessment, Pesticide Epidemiology Section. Students included occupational medicine physicians, occupational health nurses and other health and safety professionals.

F. Future Plans. Depending on NIOSH funding, we anticipate that from 60 to 100 full and partial scholarships can be awarded each year in HST courses. The HST Program has adopted five-year training goals which are described in the 2007-12 competitive grant renewal. Each of the classes described above has a 5-year regional target number. The first of two planned distance learning classes is fully operational. We hope to continue with the development of the distance learning product during the coming project year.

ATTACHMENT A

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