

**NORTHERN CALIFORNIA
EDUCATION AND RESEARCH
CENTER FOR OCCUPATIONAL
SAFETY AND HEALTH**

**ANNUAL REPORT
July 1, 2005 – June 30, 2006**

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I. Table of Contents

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

Since the last funding cycle, the Northern California ERC trained 104 students/ residents (24 IH, 52 OHN, 16 OMR, 16 Ergonomics, 1 HSAT). Current extramural research grants total over \$15 million. During 2007-2008, we expect to fund a minimum of 36 students (7 IH, 15 OHN, 5 OMR, 5 Ergonomics, including 1 post-doctoral position, 3 HSAT, and 1 student from a partner program).

The faculty of the core disciplines in the Northern California ERC are nationally and internationally recognized leaders in their fields. Julia Faucett, currently acting director of the OEHN Program, is a lead investigator in the Agricultural Ergonomics Research Center which has conducted cutting edge research on practical ways to prevent musculoskeletal injuries in strawberry picking, wine grape pruning, and citrus tree bud grafting (*Appl Ergon* 2006 Apr 14; [Epub ahead of print] and *J Agric Saf Health* 2006;12:17-28). David Rempel, the Director of the Ergonomics Program, along with several other ERC faculty, recently conducted the first randomized, clinical trial to evaluate the effects of workstation interventions on upper body pain and incident musculoskeletal disorders among computer operators. The results of this NIOSH-funded study were recently published (*Occup Environ Med* 2006;63:300-6) and the authors were recognized with an award for outstanding paper of the year by a professional orthopedic association. The stature of both Drs. Faucett and Rempel in the field of ergonomics has been recognized by their appointment to National Academy of Sciences committees.

In industrial hygiene, Mark Nicas has been modeling contaminant emission and dispersion in air as well as airborne infectious disease transmission. This work has led to real-world applications to protect workers from inhaled toxins. He was honored for his work with the Edward J. Baier Technical Achievement Award from the American Industrial Hygiene Association in 2001 for the "individual or group of individuals, company, academic institution, organization, or association that has made the most significant contribution to industrial hygiene in recent years."

In occupational and environmental medicine, Drs. Paul Blanc and John Balmes have recently provided strong evidence that up to 20% of the population attributable risk of chronic obstructive pulmonary disease is due to occupational factors toward which preventive efforts should be directed (*Eur Respir J* 2003; 22:462-9). Dr. Balmes was honored with the Robert A. Kehoe Award of Merit from the American College of Occupational and Environmental Medicine in 2006 for his contributions to research in the field of occupational and environmental lung disease as well as his leadership of the Division of Occupational and Environmental Medicine at San Francisco General Hospital. In 2006 to much acclaim, Dr. Blanc published a book entitled, "How Everyday Products Make Us Sick," published by the University of California press.

The faculty of the ERC core programs take great pride in developing future leaders in their fields. Examples of recent graduates or current trainees who have been successful in having their research published are Charles LaRoche (OEM) and Hui Dong (Ergonomics), who have both designed and investigated improved hand tools to prevent musculoskeletal injury from dental practice (*J Biomech* 2006 Mar 6; [Epub ahead of print] and *J Am Dent Assoc* 2006;137:1123 -30). Julia Roberts of Occupational and Environmental Health Nursing wrote a paper on the impact of process of care (health maintenance organization vs. other) on work-related asthma (*AAOHN J* 2004;52:327-37). Another such example is Rachel Jones (IH) who has had two papers published on the risk of infection by airborne pathogens (*Appl Biosafety* 2005;10:277-239 and 11:32-41).

Two recent graduates of the OEHN Program have been successful practitioners in positions at Abbott Laboratories and Lawrence Berkeley Laboratory. These two alumni are developing an outreach program to bachelor's degree nursing schools in the San Francisco Bay Area to recruit candidates for the OEHN Program. In the area of public health policy, Michael Wilson (IH) has played a leadership role in the efforts to develop a more precautionary chemicals policy for California.

The COEH and ERC programs have continued to collaborate with multiple agencies and organizations, including the California Department of Health Services, CAL/EPA, CAL/OSHA,

the U.S. EPA, the Natural Resources Defense Council, labor unions (e.g., UNITE HERE, SEIU, and UAW) and industry (e.g., Alcoa Corporation and the Semiconductor Manufacturing Association). 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 has been funded primarily by NIOSH through a cooperative agreement with the Association of Occupational Health Clinics, but COEH has contributed funding for one internship position per year for the last several years to increase the number of students who can participate.

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 projects are an ergonomic evaluation of commercial fishing along the central California coast and an assessment of cement dust concentrations and noise levels in a cement plant in Nicaragua.

B. Significant Changes since June 30, 2005

In Fall 2006, several changes in leadership were made; Marion Gillen was appointed as the ERC Deputy Director, and John Balmes as the Director. Former OEHN director Julia Faucett assumed the Acting Director role while recruiting for a new OEHN director to replace Dr. Gillen. 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. 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 providing a smooth transition to new leadership. We regard the recruitment of Dr. Gillen as a major accomplishment. As former Director of the OEHN Program and former director of the ERC CE Program, she brings content expertise to her current role and enhances the Administrative Core's ability to plan and direct future program initiatives. 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-oeht.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. During this transition period, Administrator Suzanne Llewellyn meets weekly with Dr. Gillen and COEH administrative staff. 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 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), conferences (held annually with a theme selected by the COEH Executive Committee), long-range planning (involving a

sub-committee of the Executive Committee), newsletter production (quarterly), website maintenance, the Student Award program, dinner meetings to welcome new faculty, and retreats (held every few years as necessary). In the last 4 years we have held one all-day retreat and a 25th Anniversary celebration dinner. 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. This committee met twice in the past year. 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, such as the jointly sponsored conferences on the impact of psychosocial factors on health in the workplace held in Newport Beach in April 2004 and on occupational and environmental health in the developing world held in Berkeley in October, 2005.

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 Health 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 (ranging from one to two million dollars per year).

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:

- **Safe Jobs for Youth Month and Young Worker Leadership Academies**
- **Small business outreach**, including workshops for restaurant owners, and development of training resources for small business owners in a variety of industries
- **Preventing heat stress in agriculture**, a collaborative public information campaign in conjunction with state agencies, business associations, community-based organizations, the Western Center for Agricultural Health and Safety Center at UC Davis, and various college campuses rural California
- **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).

ERC-funded Internship Program: LOHP is currently developing a minimum of four paid internship opportunities per year for students. Each internship will be 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 will be 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 [John Miles, Fadi Fathallah (UC Davis agricultural engineering/ergonomics), Faucett (OEHN), Ira Janowitz (Ergonomics), students from OEHN and Ergonomics programs]
 - 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. Please also see information about the NUMMI project.

4. NORA Research Training

A. Program Title: NORA Research Training

B: Program Director: Marion Gillen, RN, MPH, PhD, Center Deputy Director and Academic Coordinator

C. Program Description:

1. Project Goals: The primary goal of the NORA Research Training program is to prepare researchers at both the MS and PhD level to conduct occupational health studies responsibly and in accordance with the national NORA objectives.

2. Program Plan

Program Goals and Administration: The administration of the NORA Research activity is under the overall supervision of Dr. Gillen. Students are typically funded by NORA monies in the second academic year. Other requirements for these students are addressed under *Proposed Training* below. Multi-year projects may be funded (up to the maximum allowable under NRSA guidelines), principally for doctoral students. After the first year, applications for continued funding are treated as competitive renewal requests.

Dr. Gillen appoints a faculty committee, the Faculty Research Training Advisory Committee, annually, to evaluate the proposals and provide advice on funding decisions, using a process similar to that of our successful COEH Student Award Program. In brief, the student proposals will be reviewed by two to three COEH faculty members with relevant expertise in the area of the proposed project who will provide written critiques. The reviews will be used by the Advisory Committee in their recommendations. The Director and Deputy Director will make the final decision with due regard to Center-wide balance of student support and opportunities to initiate new areas of research. Those selected will be funded or moved to the NORA Research Training budget in the summer at the end of the academic year in which the application was submitted. The successful applicants will be required to satisfactorily respond in writing to the reviewer critiques. We consider this type of iterative research proposal writing process to be an important educational experience, especially for those students planning academic careers.

Faculty Participation: The Program Faculty will include all faculty with professorial titles affiliated with the core programs plus those with such titles in Berkeley or San Francisco departments of the University that may be approved to supervise a student selected for NORA funding from outside of the core programs. Faculty are involved in mentoring projects, on the Advisory Committee, and in guiding ERC activities related to research training, such as lecturing in the seminar on the responsible conduct of science.

Proposed Training and Curricula: For students enrolled in core programs there are no additional curricular requirements beyond those of the core except the seminar on *Responsible Conduct of Research* and the *NORA Research Training Seminar* (to be instituted in 2007). Each supported student must prepare a project report at the end of the academic year in which they received NORA support. This report is prepared by the student and transmitted to Dr. Gillen by the faculty advisor. On receipt of these reports, she will convene a meeting of the

Faculty Advisory Committee to review them, summarize the contributions, and evaluate the overall program for the Director and on behalf of the participating faculty prior to the next proposal cycle. In most cases, degree requirements will require either a formal dissertation or project report, which may serve this purpose if it is completed by the end of the academic year in which ERC NORA support was received. For multi-year research projects it is understood that the NORA report may be a progress report and serve, with appropriate addenda, as the continuation request for the following year.

Students with projects selected for ERC NORA funding, who are not enrolled in one of the core programs will be expected, as part of the proposal, to identify courses from the core programs that they propose to take during the academic year they are supported by ERC funds. This element of the proposal would be evaluated and approved or amended by the Advisory Committee.

Dr. Gillen is developing the NORA Research Training Seminar, in conjunction with Dr. Balmes, to be initiated in 2007. The objective of the monthly seminar sessions is to introduce students to the interdisciplinary nature of occupational health and the contributions of various professionals and researchers thereto. Dr. Gillen will present the first seminar, which will be an introduction to NIOSH and the NORA Agenda. Thereafter, the students from each core program will host the seminar and present their program, its objectives, curricula, and faculty, and the role of its graduates in occupational health. For students outside the core areas, they will provide an overview of the relevance of their field to occupational health, both currently and historically, together with key concepts that might be useful to the other participants.

NORA Research Training Seminar: As noted above, the only curricular element common to all ERC-supported students and not part of the curriculum of the core programs is this seminar. The course outline for this seminar is shown here.

NORA Research Training Seminar

Time: Monthly throughout academic year, 2 hours per session
Instructor: Dr. Marion Gillen
Place: Alternating between UC Berkeley and UCSF campuses.

Session	Subject	Presenter
1	History of Occupational Health in the US	Gillen
2	The Occupational Safety and Health Act NIOSH and NORA	Gillen
3	Occupational and Environmental Medicine	Resident
4	Industrial Hygiene	Student
5	Occupational and Environmental Health Nursing	Student
6	Ergonomics	Student
7	Other discipline	Student
8	Project Summaries	Students

The student and resident presenters will be charged with presenting a historical overview and the current roles of professionals and researchers working in these fields emphasizing their specialized knowledge base and potential contributions to the inherently multi-disciplinary nature of both occupational health and safety research and professional practice. The final session will be comprised of summaries of each student's project in a format similar to that used at a professional conference.

Responsible Conduct of Research Plan: As with minority recruitment, dealing with the responsible conduct of research is covered in the academic program narratives. To the extent that non-core program students are selected for NORA support, they will be required to take the training offered by one of the ERC academic programs on the campus in which they are enrolled.

D. Program Activities and Accomplishments:

Trainee Candidates: Candidates enrolled in core programs are eligible to submit proposals related to a NORA topic. For master's students, it is likely that their research projects would begin in the summer after the first academic year. We plan to encourage students to become familiar with opportunities through the ERC's Outreach Program to gain access to workers and/or workplaces in January of their first year with a view towards developing a NORA research proposal for submission in April of that year.

Enrolled graduate students at either UC Berkeley or UCSF are eligible to apply for this research training funding. Such proposals will be judged with similar criteria to those used for the core programs, but the Committee may choose to solicit expert review of proposals that lie beyond their expertise. While there are existing disciplinary partnerships to target for the dissemination of information on the availability of NORA support, for example the Graduate Groups in Toxicology, Epidemiology, Health Policy, Bioengineering, and Environmental Engineering, we will also contact other COEH faculty affiliates based on their known publications or interest in workers or the workplace environment.

Recent NORA Projects: The NORA trainees mentored in 2005-06 and their research supervisors are listed below:

- **Krishna Asundi** (Ergonomics, Rempel): Effects of Static Load on the Expression of MMP-1, IL-1B and COX-2 mRNA in Rabbit Flexor Tendons
- **Leena Nakama** (Ergonomics, King, Rempel): Peak Force has a Greater Effect than Repetition Rate on the Formation of Micro-tears in Tendon in an *In Vivo* Cyclical Loading Model.
- **Mary Foley** (OEHN, Gillen): Organizational Factors and Needlestick Rates in California Acute Care Hospitals
- **Kathleen Mullen** (OEHN, Gillen): What Motivations and Obstacles Do Hospital Nurses Experience when Returning to Work after an Injury?
- **Rachael Jones** (IH, Nicas): A Markov Model of Infectious Aerosol Exposures in a Boeing-767 Passenger Cabin
- **Heather Madison** (IH, Nicas, Wilson): Cal/OSHA's Requirements for Confined Space Emergency Planning: Analysis and Recommendations for Clarification

Training Program Evaluation: The Faculty Research Training Advisory Committee will also evaluate the progress and performance of the Research Training Program overall. They will consider the quality of the research contributions, their relevance to overall NORA priorities both nationally and within the Center, and the potential of the reported work for continued or expanded research. The committee will ask for the prospects of journal publication and conference presentation of the reported work from the student and faculty advisor and encourage such publication or dissemination where promising or useful.

Minority Recruitment Plan and Retention: Insofar as most candidates for ERC-NORA support are from the funded core and allied programs, minority recruitment and retention is covered in these individual sections.

Collaborative Research Training Program: The Northern California ERC has long been actively fostering collaborative research with graduate students from disciplines closely related to the core occupational safety and health disciplines as evidenced by the fact that we are entering into our 10th year of the interdisciplinary COEH Student Award Program. Also, in addition to the NIOSH-funded disciplines, COEH includes faculty from programs in epidemiology, toxicology, environmental engineering, agricultural engineering, risk assessment, and environmental health policy. COEH faculty and students from these disciplines frequently collaborate on research projects with faculty and students from the ERC core academic programs. One example of this is the CDC-funded Berkeley Center for Environmental Public Health Tracking (BCEPHT) headed by Dr. Balmes. His co-investigators include an epidemiologist (Ira Tager), a risk assessment expert (Tom McKone), and an environmental policy expert (Amy Kyle) who are all members of COEH. In addition, consistent with our philosophy, multiple Environmental Health Sciences and Epidemiology graduate students have worked on projects for the BCEPHT.

E. Program Products: NORA trainees made several regional (Mullen) and national (Nakama) presentations about their work. Seven peer-reviewed articles written by NORA trainees were also published during this time period (Jones [4] and Nakama [3]). Support for NORA pilot study work also led to dissertation funding for Mullen.

F. Future Plans: In the past, NORA Research Training funds have been targeted at discrete research projects of individual students in the various core programs. Many of these projects have a Research to Practice focus, but not exclusively. In our current year, the strategy for the utilization of funds will be basically unaltered, but with priorities emphasizing research to practice translational projects, wherever possible in workplace settings that deal with occupational health issues in the evolving American economy.

Problem-solving skills, such as those attained through NORA research training, emerge as essential to allow graduates to succeed. Hence, while the core curricula evolve in response to these realities, research training, specifically research training with an applied emphasis, is no longer separate from practitioner training, but increasingly a key element of it. Research training in the professional schools and colleges, which are the homes for our ERC, has always had a strong interdisciplinary element. In these settings, the synthesis of diverse information and approaches has been the key to cutting edge research. Problem-solving skills emerge as essential to allow graduates to cope with the diverse and unusual problems that may arise in the technically, institutionally, and culturally complex workplaces that characterize the current economy.

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

More than 80 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. However, a partial annotated list of research and/or projects that are likely to have an effect on health and safety is listed below:

- NUMMI Project: As a result of this multidisciplinary student and faculty research project about respiratory exposures and symptoms, the employer installed additional ventilation in the body welding department. This study was directed by Dr. Kathie Hammond and completed in conjunction with both management and labor representatives at NUMMI.
- N-Hexane: Dr. Michael Wilson's dissertation work prompted manufacturer removal of N-hexane from brake cleaning products in California and throughout the nation.

- 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.

- Dental Tool Design: Drs. Charles LaRoche and Hui Dong demonstrated a strong influence of dental tool design (diameter, weight, texture, shape) on pinch force and forearm muscle activity. Results were published in a widely read dental journal and also presented at the annual California Dental Association meeting attended by 400 dentists.

- Dr. Rempel and team found that a padded forearm support could significantly reduce arm and neck pain potentially preventing shoulder disorders in customer service operators. The study was widely cited in the popular press. Further, work from this laboratory has influenced the design of keyboards and computer manufactured by Microsoft and Logitech. Dr. Rempel's work has also led to changes in the design of furniture used by garment workers.

- Dr. Gillen's work on health care workers appraisal of needle safety devices was presented at three conferences. There was considerable interest from product manufacturers in the findings that provide information as to how these products could be better designed from a user perspective.

- The agricultural research team, led by Drs. Fatallah, Faucett, and Meyers, has led to new tools and task practices, such as rest breaks in stoop posture, smaller grape bins, better trellis height and nursery tools to reduce pinch force that are being disseminated throughout California and other agricultural industries.

- Dr. Kin Cheung's dissertation, a total population study of home care nurses in Hong Kong, demonstrated that the office environment and static postures were important predictors of low back pain in home care nurses. Office environments in Hong Kong home care offices are, for the most part, extremely crowded and ergonomically challenging for the workers. Minor and rather simple adjustments in these environments could lead to reduction in symptoms.

- Findings by Drs. Balmes and Blanc that 20% of the attributable risk of COPD is due to occupational factors should lead to widespread preventive efforts in this area given the economic and personal burden of this condition.

- Members of Dr. Blanc's research team modified and validated an ergonomic assessment instrument and demonstrated that using a hand-held computer to capture postural exposures is possible in changing environments such as health care.

Appendix A - Interdisciplinary Courses

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

Industrial Hygiene Training Program
University of California, Berkeley
Program Director's Annual Report for July 1,2005 – June 30,2006

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

III. **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 1,2005 to June 30,2006 reporting period, Dr. Nicas advised four MPH, one MS, and two PhD students in the IH Program, and was actively engaged in the research project of one of the PhD 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 1,2005 to June 30,2006 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), the "Characterization of Airborne Chemicals" course, and a seminar on "Occupational & Environmental Issues in the Semiconductor Industry".

There are other EHS faculty who teach IH-related coursework, serve on PhD dissertation committees, and conduct research that can be considered IH-related; however, they typically do not serve as academic advisors for IH students and do not provide funding support to IH students. Dr. Robert Spear presents lectures in the “Exposure Assessment and Control I and II” courses. Dr. Tom McKone presents lectures in the “Exposure Assessment and Control II” course, and with Dr. Hammond co-teaches the “Health Risk Assessment, Regulation and Policy” course. Dr. Martyn Smith teaches the “Toxicology” course. Dr. Nina Holland teaches the “Molecular and Genetic Epidemiology” course. Dr. Allan Smith teaches the “Occupational and Environmental Epidemiology” course. David Rempel, MD (a member of the EHS Graduate Group), teaches the “Occupational Biomechanics” course and the “Ergonomics Seminar”. John Balmes, MD, presents lectures in the “Exposure Assessment and Control I” course. Barbara Plog, MPH, CIH, CSP, teaches the “Hazardous Substances Management and Control” course, and directs an independent study in fatality case analysis; she does not serve on dissertation committees.

4. 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 UC-San Francisco. Fundamentals of Workplace Safety is a 16-hour continuing education course presented annually during the COEH Summer Institute; Ms. Plog is the course director. Following the latter course, in the Fall semester, MPH IH students took two units of independent study (PH 299 Section) with Ms. Plog to analyze causation for one or more occupational fatality cases. A sample curriculum for a MPH IH student is presented in Appendix A.

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, 2005 to June 30, 2006 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 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. Funding requires that the students be from two or more different program areas (e.g., industrial hygiene and epidemiology). In 2005, an IH student and health policy student conducted a COEH-funded project titled “Assessment of Cement Dust and Noise Levels in a Cement Plant in Nicaragua.” Fourth, MPH IH students are eligible to receive NORA fellowships, if 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 Exam. 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 1,2005 to June 30,2006 reporting period was the second 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, 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 1,2005 to June 30,2006 reporting period, there were nine students in the IH Program (five MPH, one MS, three PhD), of whom eight received NIOSH funding. This number is up from seven students in the budget year July 1,2004 to June 30,2005.

As reflected by the mix of students (4 MS/PhD, 5 MPH), the IH Program is changing to a research-training orientation from its past practitioner training. There are 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 the case of occupational safety, a CE short course.

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, medical residents and 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 doing rotations at the Occupational Health Clinic. The nursing students attend the two-day Fundamentals of Workplace Safety CE 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: In 2005, the SPH hired Ms. Abby Rincon in the new position of Director of Diversity. Her objective is to recruit underrepresented students for all the SPH programs, including the IH Program. In the past year, Ms. Rincon participated in approximately 20 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 1,2005 to June 30,2006 academic year, two minority students applied to the IH Program, and one was accepted. We note that the rejected candidate reapplied for the July 1,2006 to June 30,2007 academic year, and was accepted. We also note that in the period July 1,2002 to June 30,2006, there were a total of 14 students admitted to the IH Program. Of these 14 students, seven (50%) were from underrepresented groups. Among these seven students, none left the program prior to completion.

4. Trainee Recruitment: We initiated efforts to recruit students in the undergraduate Public Health program in the UC-Berkeley College of Letters and Sciences. There are 200 undergraduates 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 created a multi-colored brochure that describes the IH Program and how to apply. We distributed the brochure 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>.

E. Program Products

1. Publications: In the July 1,2005 to June 30,2006 reporting period, there were 12 peer-reviewed research papers authored by IH core faculty and students. The list of these papers is provided in Appendix 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 IH-related courses presented by the CE Program of the NIOSH ERC.

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 is 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.

IV. F. Future Plans

At the Masters level, we intend to admit more MS than MPH students due to the EHS Division's research orientation and the limited funding for practitioner training. For the MPH IH students, we will implement an Independent Study in Industrial Hygiene Practice course (PH 299 Section) wherein the 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

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
<i>Summer Session</i>		
PH 297	Internship (full time)	3 units
	Fundamentals of Workplace Safety short course	No units
<i>Year 2, Fall Semester</i>		
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
<i>Year 2, Spring Semester</i>		
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

Appendix B – See attached Tables

Appendix C - Publications

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

Jones RM, M Nicas, A Hubbard, M Sylvester and A Reingold (2005): The Infectious Dose of *Francisella tularensis* (Tularemia), *Applied Biosafety* 10:277-289

Jones RM and **M Nicas** (2006): Evaluation of COSHH Essentials for Vapor Degreasing and Bag Filling Operations, *Annals of Occupational Hygiene* 50:137-147

Jones RM and **M Nicas** (2006): Margins of Safety Provided by COSHH Essentials and the ILO Chemical Control Toolkit, *Annals of Occupational Hygiene* 50:149-156

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

Nicas M (2005): Use of a Probabilistic Infectious Dose Model for Estimating Airborne Pathogen Infection Risk: Application to Respiratory Protection, *J. Int. Soc. Respir. Prot.* 22:24-37

Hammond SK, E Gold, R Baker, P Quinlan, W Smith, William, R Pandya, and J Balmes (2005): Respiratory Health Effects Related To Occupational Spray Painting And Welding. *J. Occup. Environ. Health* 47:728-739.

Eisner MD, J Klein, **SK Hammond**, G Lactao and C Iribarren (2005): Directly Measured Secondhand Smoke Exposure and Asthma Health Outcomes, *Thorax* 60:814-821

Mulcahy M, DS Evans, **SK Hammond**, JL Repace and M Byrne (2005): Second-hand Smoke (SHS) Exposure and Risk following the Irish Smoking Ban: An Assessment of Salivary Cotinine Concentrations in Hotel Workers and Air Nicotine Levels in Bars *Tobacco Control* 14:384-388

Eisner MD, J Balmes, EH Yelin, PP Katz, **SK Hammond**, N Benowitz and PD Blanc (2006): Directly Measured Secondhand Smoke Exposure and COPD. *BMC Pulm Med.* 6 12-16

T-W Hu, Z Mao, M Ong, E Tong, T Ming, H Jiang, **SK Hammond**, K R Smith, J de Beyer, A Yurekli (2006): China at the Crossroads: The Economics of Tobacco and Health. *Tobacco Control* 15:i37-i41

Gan Q, KR Smith, **SK Hammond**, Y Jiang, TW Hu: "Estimating the Burden of Disease from Passive Smoking in China in 2002—Preliminary Results," Proceedings: *Indoor Air 2005*, pp. 1676-1680, 2005.

Dr. Hammond also contributed to:

The Health Consequences of Involuntary Exposure to Tobacco Smoke. A Report of the Surgeon General, Center for Disease Control and Prevention, 2006.

ERC Applicant Institution: University of California, Berkeley
 Program Director: Nicas, Mark
 Discipline: Industrial Hygiene

Table 4a
Academic Training Report
Previous Budget Period: July 1, 2005 to June 30, 2006

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled¹	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses²	# Trainees Graduated
Baccalaureate/associate degree							
Master's degree							
MPH	Master in Public Health	5	5	N/A	N/A	25	3
MS	Masters of Science	1	1	N/A	N/A	0	0
Doctorate degree							
Ph.D.	Doctor of Philosophy	3	2	N/A	N/A	4	0
Post-doctoral (Include formally Registered Occupational Medicine Residents in all years of the residency.) ³							
Other (specify, e.g., undergraduate Certificate program trainees)							

Refer to: Supplemental Instructions, page 10.

¹ Trainee counts include all students in the approved programs.

² Does not include trainees counted in any of the full-time or part-time categories

³ In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

**Hazardous Substance Academic Training Program (HSAT)
Progress Report, July 1, 2005 - June 30, 2006**

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

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 will be under the overall direction of Dr. Nicas. Continued development and implementation of the HSAT Program will be 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 Health Nursing Program at UCSF. She teaches Occupational Safety to both OHN 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 has 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 will complete 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. This class will be taught each academic year.

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 choose Hazardous Substances as an area of concentration: to provide additional advanced training including field experience in the specialty. To meet this goal the students supported by HSAT grant will complete the following objectives:

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

Responsible Conduct of Research: In the past IH and HSAT curriculum has conveyed some material related to the responsible conduct of research, and it is a campus-wide requirement that every student engaged in research complete an online tutorial addressing human subjects issues. However, our coverage of the responsible conduct of research has not been comprehensive and well organized. Therefore, starting in Spring 2007, we will offer a new seminar course to remedy the situation. This course will be organized by John Balmes, MD, ERC Director, and will cover:

1. Growth and development of the American research university
2. Recent controversies surrounding university-based research
3. Conflicts of interest and of commitment
4. Human subjects
5. Animal subjects
6. Plagiarism, originality, and authorship
7. Data management, access, and sharing
8. Ethical issues surrounding research sponsorship

All IH and HSAT students (MPH, MS, PhD) will take the seminar whether or not they receive NIOSH training funds. In addition, the seminar will be required of all EHS Division MS and PhD students, and of all MPH students supported by the ERC grant. It will be open to all other MPH students after the pilot year.

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. In the July 1,2005 to June 30,2006 reporting period, Dr. Nicas advised four MPH, one MS, and two PhD students in the IH Program, and was actively engaged in the research project of one of the PhD 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. During the July 1 2005 to June 30 2006 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), the “Characterization of Airborne Chemicals” course, and a seminar on “Occupational & Environmental Issues in the Semiconductor Industry.”

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

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 courses (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 UC-San Francisco. Fundamentals of Workplace Safety is a 16-hour continuing education course presented annually during the COEH Summer Institute for which Ms. Plog is the course director. In the Fall semester following the Safety course, MPH IH students take two units of independent study (PH 299 Section) with Ms. Plog to analyze causation for one or more occupational fatality cases. A sample curriculum for a MPH IH student is presented in Appendix A.

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, 2005 to June 30, 2006 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 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. Now in his second academic year, the student is the only one supported by this funding due to limited HSAT funds.

New 3-Credit Hazardous Substances Class. All students in the Industrial Hygiene specialization were required to complete a new 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 (Director of the ERC’s Continuing Education program) and Henry J. McDermott, CIH, CSP, PE (Consultant).

The class aimed at preparing students to fill the role of “Site Safety and Health Officer (or Supervisor)” as required by the OSHA Hazwoper regulation. This is the individual located on a hazardous waste site or spill site who 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).

The format of the class included presentations of basic material by an instructor (Plog or McDermott) supplemented with “seminar” presentations by noted outside speakers. In addition, Ms. Plog or Mr. McDermott placed each speaker’s topic in context relating to OSHA Hazwoper, CERCLA, RCRA or other hazardous substances relevance. Outside speakers and their topics include:

- 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 Hlth 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 budget. 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, and also federal programs under agreement with the corresponding federal agencies (U.S. EPA, federal OSHA, U.S. Coast Guard, etc.).

E. Program Products:

CE Course Offerings. The new *Hazardous Substances: Management and Control* class fulfilled multiple roles. The 3-credit graduate class was also offered by COEH as a continuing education seminar series for practicing industrial hygienists, safety and environmental specialists. Typically 10-15 local professionals attended each class, which resulted in a richer discussion and more exposure to real world challenges than would occur in a purely academic class; this benefited the Industrial Hygiene specialization students.

Program Impact: Because the HSAT program is relatively new, the most tangible impact of the program (in addition to the student support) is 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. Here is input from 3 of the 7 class students:

- A student who is 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, a procedure that was taught in the class. He also participated in an unannounced compliance inspection at an industrial site. Material covered in the class about industrial activities 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. The most prevalent comments about the course were that some of the guest presentations were not fully on the mark, and the students recommended a more focused class with less use of outside speakers. Similarly, student questionnaires are 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). The evaluation point scheme is different here with a possible highest value of 4.0. For the outside speakers at this class, 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 speaker.

F. Future Plans: Depending upon increased HSAT funding levels, we will continue work on the goals and action items discussed above. HSAT students are recruited from MS and MPH students (see the Industrial Hygiene Annual Report for more on recruitment).

For the MPH IH students, we will implement an Independent Study in Industrial Hygiene Practice course (PH 299 Section) wherein the 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. For HSAT students there is a further goal to provide targeted hazardous substance management and control internship experiences.

Appendix A

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

ERC Applicant Institution: University of California, Berkeley
 Program Director: Nicas, Mark
 Discipline: HSAT

Table 4a
Academic Training Report
Previous Budget Period: July 1, 2005 to June 30, 2006

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled¹	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses²	# Trainees Graduated
Baccalaureate/associate degree							
Master's degree							
MPH	Master in Public Health	1	1	N/A	N/A	45*	0
Doctorate degree							
Post-doctoral (Include formally Registered Occupational Medicine Residents in all years of the residency.) ³							
Other (specify, e.g., undergraduate Certificate program trainees)							
* Includes 20 students who took HSAT course as a CE offering, and 25 academic students who took HSAT coursework.							

Refer to: Supplemental Instructions, page 10.

¹ Trainee counts include all students in the approved programs.

² Does not include trainees counted in any of the full-time or part-time categories

³ In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

**Occupational Health Nursing Program
University of California, San Francisco
Annual Report July 1, 2005 – June 30, 2006**

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

**B. Program Director: 2005-06: Marion Gillen, RN, MPH, PhD
2006-07: Julia Faucett, RN, PhD, FAAN (acting)**

C. Program Description:

The OEHN Program offers a 2-year Master of Science (MS) degree and a PhD degree. Ten master's students, six doctoral students, and one international special studies student were enrolled in the Program during 2005-06. The OEH NP and CNS tracks prepare students to be certified by the State of California; the OEH NP students are eligible for national certification as well. Additionally, graduates 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. 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). *For course titles and numbers, please see Appendix B.* 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:

Marion Gillen was the Director of the OEHN program from 2003-2006, and continues to provide support to the doctoral program. Dr. Faucett was the Program Director from 1994-2003, and is again Director for 2006-07. Ms. Barbara Burgel also remains an active faculty member. In 2005, Rossana Segovia-Bain, MS, OHNP, COHN-S, joined the faculty to replace Dr. Julie Roberts. Dr. Gillen was responsible for the administration of the OEHN Program during this last academic year. She taught the injury control course (N274b), the OEH issues course (N273b), and, with Dr. Faucett, 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 clinical seminars and Occupational Health Program Planning (N405). 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), pulmonary disorders (Blanc, Janson), cardiovascular disease (Froelicher), infectious disease (White, Gillen), 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.

4. Curricula:

(a) Master of Science Degree (see Appendix B for sample curricula):

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 (N274b, 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), program management (N234), and 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 quantitative and qualitative research design (N209A/B, N212A/B, N285A/B or N289A/B) (see Appendix 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 student received awards or extramural support this year: Soo-Jeong Lee (Ashe Fellowship Funds, UCSF Graduate Student Research Award and Century Club Fund); Barbara Burgel (CSAORN Joyce Simonowitz Scholarship), Pamela Foreman (CSAORN Edwards and Sara Jenks Scholarships, AAOHN Medique/Green Guard New Investigator Research Grant); Christina Foushee (ANA Nurse in Washington Award); Kathleen Hagan (Sigma Theta Tau, Alpha Tau Chapter, Research Award) Jane Inaura (SANPPA Scholarship Award) Kathleen Mullen (Lanctot Scholarship), and Meredith Gajda and Daniel Bertheau (OSHA Office of Nursing Internship).

Two students this year were awarded the prestigious Occupational Safety and Health Administration (OSHA) Internships in Washington D.C. These students participated in an 8-week program and conducted projects for OSHA as part of their experience. Experience in writing for publication is encouraged through our annual Barbara Resnik writing award, named in honor of the founder of the OEHN program. In this last student cohort, Meredith Gajda won the award.

(b) Faculty new honors, awards, appointments: none

(c) Trainee thesis

Kathleen Hagan completed an MS thesis entitled: "Rates of Sharps Injuries in California Home Health Agencies from 1997 – 2001."

(d) New faculty positions

With Dr. Marion Gillen leaving the UCSF campus for the position of COEH Deputy Director, the OEHN program is seeking a new Program Director. A faculty search has been opened and several promising applicants have applied. Given the quality of these applicants, the position is fully expected to be filled before the new academic year.

(e) New courses - none

(f) Trainee recruitment, including diversity efforts (for Admission Requirements, see Appendix A) NIOSH training funds assist us to recruit students into the field. Outreach is conducted through solicitations to advisory board members, alumni, publication of a yearly newsletter that prominently features alumni accomplishments, at local nursing undergraduate programs, and attendance at regional and national conferences. NIOSH support also assists OEHN faculty to attend the annual AAOHN Conference. In Fall 2005, our outreach resulted in 3 new MEPN students, 2 new MS students and 2 new doctoral students, bringing our total enrollment to 16, including one special studies student (three Asian, one Latino, and one Native American). (Student Tables may be found in Appendix C). In 2005-06, we increased our recruitment efforts both locally and regionally. Dr. Gillen and Ms. Segovia-Bain developed a new slide presentation featuring environmental health nursing, and alumna Karen Hill presented to the University of San Francisco undergraduate nursing students.

Assistant Dean for Recruitment and Retention, Judith Martin-Holland concentrated on the OEHN program this year, conducting OEHN outreach at one state (San Francisco) and one national conference (Philadelphia). Faculty members and students assist in staffing the booth at such conferences. Dr. Martin Holland's activities from 2005-06 also reflect steps taken to improve school diversity and enrollment. Presentations were provided for a number groups such 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. There were two important liaison events in 2006 with faculty from Howard University. 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. Also in 2005, the School of Nursing initiated 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 D) and presentations:

The Core OEHN Program nursing faculty published or had accepted for publication 8 research articles, book chapters, or monographs during this program period (see Appendix D). OEHN trainees during this time period published a master's thesis (and one additional manuscript was published in January 2006 by a recent graduate in conjunction with 3 COEH-affiliated faculty).

2. Conferences/symposia offered: none

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 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 2005-06 but will be offered again in 2007.

4. R2P:

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. 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.

5. Research projects with significant trainee involvement:

Six students were enrolled in the doctoral program, with another two entering the program in Year 5 of this cycle. 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), intimate partner violence and employment (Foreman), return to work following injury (Mullen), environmental chemical policy in California (Foushee) and needlestick injuries (Foley). Incoming students will focus on chronic disease in the workplace (Thomas) and musculoskeletal injury (Drew Nord). In the last year, Ms. Lee, Mullen, and Hagan (MS student) served as RAs on Dr. Gillen's study of safe needle devices. Ms. Lee and Ms. Mullen also served on a collaborative research project regarding lifting devices with Drs. Faucett and Gillen. Ms. Lee also worked as an RA with Dr. Faucett on her agricultural studies. Non-OEHN

students have also served as RAs with both Drs. Gillen and Faucett (e.g., Linhart, Imhof, Minarik, and Agrillo).

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 2006-07, OEHN will focus on recruiting and orienting a new Program Director and on student recruitment. We have revitalized our recruitment plan and will be utilizing previous graduates to develop an expert panel who can outreach to undergraduate program and other groups. They will design a presentation that any of them can present, develop liaisons with key faculty in undergraduate programs, and participate more closely with program faculty in identifying key opportunities. Additionally, we will continue to develop our OHS work with Glide Health Services.

Appendix A – Admission Requirements

University of California, San Francisco, 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:

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).

Appendix A

Modal Curriculum (2006-08) – OEHN Clinical Nurse Specialist Program

Course	Number	Units	Time	Faculty (FOR)
FALL QUARTER, YEAR ONE (13 units) (2006-07)				
Family Nursing Theory & Practice <u>or</u> 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) <u>and</u> Practicum <u>and</u> Skills Lab (qwk) for CNS	N405*	2	Thu 12-2 qowk Thu 10-12 qwk	Segovia-Bain
Current Concepts in Occupational Health Nursing Teaching Learning**	N273A	2	Thu 2-4	Burgel
Issues in Occupational Health (Do not register this qtr)	N201B N273B†	2 -	Contact Zina Mirsky 2 hr. seminar TBA	Mirsky 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	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	N405*	2	Wed 11-1 qowk	Segovia-Bain
Management of Clinical Occup Health Problems	N271.06*	3	Wed 3-5	Burgel
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	N405*	1	Seminar TBA	Segovia-Bain
Occupational Safety	N274C	2	Summer workshop- <u>and</u> 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	N405*	3	TBA	OEH Faculty
Occupational Biomechanics (Do not register this qtr)	BioE C279	-	Fri 2-5	Rempel
Practicum: Education & Training**	N436*	2-3	TBA	OEH Faculty
Sociocultural Course Requirement (Chosen by Student)	N273B† S222	- 2	2 hr. seminar –TBA Wed. 3-5	Various Faculty Segovia-Bain Harrington
Issues in Occupational Health (Do not register this qtr)				
Health Care Economics and Policy				
SPRING (10.5 units)				
N405: OHN Program Planning	N405*	2	Wed 11-1 qow	Segovia-Bain
Program Management	N234	3	TBA	Waters
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 †Please register for this course in Spring Qtr. Of Year Two ONLY Curriculum meets State BRN requirements for CNS. **Curriculum & scheduling subject to change.**

Appendix A

Modal curriculum (2006-08) – OEHN Nurse Practitioner Program

Course	Number	Units	Time	Faculty (FOR)
FALL QUARTER, YEAR ONE (11 units)				
Family Nursing Theory & Practice <u>or</u> Theories of the Policy Process	N279 <u>or</u> 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)	N404.01*	2	Thu 12-2 qowk Thu 10-12 qwk	Segovia-Bain
and Practicum and Skills Lab (qwk)	N273A	2	Thu 2-4	Burgel
Current Concepts in Occupational Health Nursing Issues in Occupl 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: Health Protection and Promotion	N404.01*	2	Wed 3-5 qowk	Segovia-Bain
Clinical Pharmacology	N232	4	Web-Based & Wed 1-3	Saxe/Ford
Introduction to Epidemiology	E&B190	3	Thu 9-12	White
Issues in Occup 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
Program Management	N234	3	Tues 1-4	Waters
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	N404.01*	4	Wed 3-5 qow	Burgel
Issues in Occup 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	N404.01*	4	Wed 12-1 qw	Burgel
ANP Seminar: Complex Health Problems	N247.01	2	Wed 1-3	Dennehy
Health Care Economics and Policy	S222	2	Wed 3-5	Harrington
Occupational Biomechanics (Ergonomics)	BioE C269	–	Fri 2-5	Rempel
Issues in Occup 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 Occup Health Problems	N271.06	2	Wed 3-5	Burgel/Blanc
Adult Primary Care Residency	N404.01*	4	Wed 1-3 qowk	Burgel
Issues in Occup 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. Nutrition (Nu249, 2 units) Fall or Winter Quarter (Dates and Times TBA) is required.

† 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.

Appendix A

One Year Modal curriculum (2006-07) – OEHN Specialist Program

Course	Number	Units	Time	Faculty (FOR)
FALL QUARTER, YEAR ONE (12 units)				
<i>Theories of the Policy Process</i>	N253	3	Wed 8-10	Malone
Outcomes of Care	N230	3	Wed 10-1	Carrieri-Kohlman
<i>Dimensions of Advanced Practice Nursing</i>	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)				
<i>Research Methods</i>	N262A	2	Wed 8-10	Alkon
Health Protection and Promotion (recommended)	N245	2	Wed 10-12	Oka
<i>Introduction to Epidemiology</i>	E&B190	3	Thu 9-12	White
Occupational Biomechanics (Ergonomics)	BioE C269	-	Fri 2-5	Rempel
<i>Sociocultural course requirement (chosen by student)</i>	TBA	2	TBA	
<i>Health Care Economics and Policy</i>	S222	2	Wed 3-5	Spetz
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	Tues1-4 or Wed 8-11	Waters
Management of Clinical Occupational Health Problems	N271.06	2	Wed 3-5	Burgel/Blanc
Occupational Biomechanics (Ergonomics)	N273B†	4.5	Fri 2-5	Rempel
Issues in Occupational Health		1	2 hr. seminar TBA	Segovia-Bain
SUMMER (10 units)				
OHN Residency	N404.01*	8	TBA	OHN faculty
Toxicology (taken either summer)	M180	2	TBA	
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. Curriculum and course scheduling subject to change.

Appendix A: Masters Core Curriculum – 2006-07 Schedule*

CORE COURSES

YEAR 1 - FALL QTR.

N257	A&M of PS&S	Chafetz	2	<i>NP</i>	10-12
N270	Adv Hlth Assess	Hollinger	2	<i>NP/CNS</i>	1-3
N2XX	Res Utilization	3 depts	2	<i>NP/CNS</i>	TBA

Choose ONE theory course in Fall

N279	Family Nrsng Theory	Humphreys	3	<i>NP/CNS</i>	Web/5-7
N253	Theor of Hlth Pol Proc	Malone	3	<i>NP/CNS</i>	8-10
N221.01	Theor Rel to Nsg Care	Kohlman	3	<i>NP/CNS</i>	8-10
N227	Theor of Mental Illns	Weiss	3	<i>NP/CNS</i>	8-10

YEAR 1 - WINTER QTR.

N262A	Research Methods	Alkon	2	<i>NP/CNS</i>	8-10
N245	Hlth Main & Promo	Oka	2	<i>NP</i>	10-12
N232	Clin Pharm	Saxe	4	<i>NP/CNS</i>	1-3
S222	Hlth Care Ethics/Policy	Harrington	2	<i>NP/CNS</i>	3-5

YEAR 1 - SPRING QTR.

N246	A&M of S&S	Meg Scott	3	<i>NP</i>	8-11
N2XX	Res Utilization	3 dept	2	<i>NP/CNS</i>	TBA
N234	Program Mgt	Waters	3	<i>CNS</i>	8-11 Tu 1-4

YEAR 2 - FALL QTR.

N241	Dims of APN	Dracup, Fontaine	2	<i>NP/CNS</i>	1-3
N230	Outcomes Meas in HC	Kohlman	3	<i>CNS</i>	10-1

YEAR 2 – WINTER QTR.

Soc222	Health Care Ecs/Pol	Harrington	2	<i>NP/CNS</i>	3-5
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RESEARCH UTILIZATION COURSES

FALL QTR.

N206A	Psych Symptom Mgt (Phoenix)				We 3-5
N262.02	Family Res Utilization (Rehm)				We 3-5
N262.03	Pediatric/Fam Res Utilization (Chen)				We 3-5
N262.04	Perinatal Res Utilization (Kennedy, H)				We 3-5
N262.06	Res Util in Hlth Policy (Chapman)				Th 10-12

WINTER QTR.

E&B 190	Intro to Epidemiology (White)				Th 9-12
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SPRING QTR.

N262.01	Research Utilization (Froelicher)				TBA
N262.05	Res in Comp Healing (Janson)				TBA
N262.06	Res Utilization in Hlth Policy (Chapman)				TBA

PHARMACOLOGY COURSES

FALL QTR.

N259.04	Contraception in PC (Ooms)				Web/We 12-1
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WINTER QTR.

N232	Clinical Pharm (Saxe/Ford)				We 1-3
N259.4	Contraception in PC (Ooms)				Web/We 12-1
N232.4B	Complex Topics in Ped Pharm				We 9-11
N232.05	Pharm in Acute Care (Howie)				TBA
N469	Sem Psychotropic Reg (Johnson)				TBA
Ph170.01	Dietary Supplements				TBA

SPRING QTR.

N232.04A	Neonatal Pharmacology				We 8-10
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SOCIO-CULTURAL COURSES

FALL QUARTER

Soc236	Race/Class Factors	Pinderhughe			We 3-5s
N252A	Mental Hlth-High Risk	HarrisMuche			Th 2-4 II
N260D	Latino Health/Culture	BernalPheils			<i>NTBO</i>
N265	Cancer Prevention	Koetters			We 10-12

WINTER QTR.

N260F	Cultural Competency	Bain			Sa 8:30-4:30
N288C	Issues in Acute Care	Puntillo			Tu 10-12
Soc230	Soc-Cult Iss in AIDS	Harrington			<i>NTBO</i>
Soc 233	Sociology of Aging	Fox			<i>NTBO</i>

SPRING QTR.

N203	End of Life Care	Puntillo			TBA
N217A	Care of High Risk Pop I	Mon/White			TBA
N260G	Disparities Wmn's Hlth	H. Kennedy			Web
N260H	Culture, Spirit, Health	Sweet			TBA
N274D	Farmworker PHC	Hollinger			TBA
Soc233	Sociology of Aging	Fox			<i>NTBO</i>

MINOR COURSES

FALL QTR.

N201B	Teaching-Learning Process				Sa 9-5/Tu 5-7
N253	Theories of Health Policy Proc				We 8-10
N242A	HIV/AIDS: An Overview				Th 3-5
N242B	HIV/AIDS: Clinical Pharmacology				11/3
N242D	HIV/AIDS: Integrated Care				Tu 10-1
N294A	Intro to Human Genomics				We 4-6
Soc236	Race/Class Factors				We 3-5

WINTER QTR.

N201C	Clinical Instruction				Sa 9-5/We 5-7
N242.01	HIV/AIDS: Seminar				We 10-12
N267.01	Ethical Dilemmas				We 5-7
N294B	Medical Genetics				We 10-12
Soc230	Soc-Cult Issues in AIDS				<i>NTBO</i>

SPRING QTR.

N201A	Curr/Prog Dev				Sa 8-5
N242B	HIV/AIDS: Clinical Pharmacology				5/4
N242C	HIV/AIDS: Pop Based Chronic Illness				We 3-5
N242.02	HIV/AIDS: Seminar				Tu 2-4
Soc211	Info Tech & Org Change				TBA
Soc219	Social Policy & Aging				TBA
Soc225	Org Analysis of U.S. HC				TBA
Soc235	Tobacco Control Policy				TBA
Soc246	Communications & Policy				TBA

SATURDAY COURSES

FALL QTR.

N201B	Teaching-Learning				10/7, 11/4
N236A	Complementary Healing				10/14

WINTER QTR.

N201C	Clinical Instruction				1/6, 2/24
N236D	Complementary Healing				1/20, 1/21, 2/10, 2/11
N260F	Cultural Competency				1/13, 1/27, 2/3

SPRING QTR.

N201A	Curr/Prog Dev				4/14, 5/19
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*Subject To Change: Revised: August 2006 - © Copyright 2006 University of California Regents, All Rights Reserved 8/14/06

Appendix B – Please see Attached Tables

Appendix C – Student and Faculty Publications

Barbara Burgel:

Burgel, B. (2006). "Direct Care in the Occupational Setting" in AAOHN Core Curriculum for Occupational Health Nurses, 3rd edition. Salazar, M. (ed), Philadelphia: WB Saunders, 295-330.

Kin Cheung:

Cheung K, Gillen M, Faucett J, Krause N. (2006). The prevalence of and risk factors for back pain among home care nursing personnel in Hong Kong. *Am J Ind Med.* 49(1):14-22.

Diane Pravikoff:

Pravikoff DS, Tanner AB, Pierce ST. (2005). Readiness of U.S. nurses for evidence-based practice. *Am J Nurs.* 105(9):40-51; quiz 52.

Allen MP, Jacobs SK, Levy J, Pierce S, Pravikoff DS, Tanner A. (2005). Continuing education as a catalyst for inter-professional collaboration. *Med Ref Serv Q.* 24(3):93-102.

Pravikoff DS, Pierce ST, Tanner A. (2005). Evidence-based practice readiness study supported by academy nursing informatics expert panel. *Nurs Outlook.* 53(1):49-50.

Lynette Landry:

Landry LG. (2006). Preventing occupational injuries: women's perception of risk from musculoskeletal exposures. *AAOHN J.* 54(2):75-83.

Donna Haiduven:

DiSalvo H, Haiduven D, Johnson N, Reyes VV, Hench CP, Shaw R, Stevens DA. (2006). Who let the dogs out? Infection control did: utility of dogs in health care settings and infection control aspects. *Am J Infect Control.* 34(5):301-7.

Julia Faucett:

Faucett, J. (2005). Integrating "psychological" factors into a theoretical model for work-related musculoskeletal disorders. *Theoretical Issues in Ergonomics Science,* 6(6): 531-550.

Faucett, J., Meyers, J., Janowitz, I., Miles, J., Fathallah, F. Rest break interventions in stoop labor tasks. *Applied Ergonomics* (In press).

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

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

Cheung K, **Gillen M**, Faucett J, Krause N. (2006). The prevalence of and risk factors for back pain among home care nursing personnel in Hong Kong. *Am J Ind Med.* 49(1):14-22.

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

Gordon DR, Ames GM, Yen IH, **Gillen M**, Aust B, Rugulies R, Frank JW, Blanc PD. (2005). Integrating qualitative research into occupational health: a case study among hospital workers. *J Occup Environ Med.* 47(4):399-409.

UCSF Occupational and Environmental Medicine Update, San Francisco, CA 2005 (research paper).

Association of Occupational Health Professionals, Sacramento, CA, 2006 (research paper).

California Department of Health Services, Occupational Health Branch, Sharps Injury Stakeholders Meetings: October 6, 2006 (Oakland, CA) and October 20, 2006 (Los Angeles, CA) (research paper).

Kathleen Mullen

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

DOCTORAL FOUNDATION COURSE SCHEDULE		
<i>Course Number Name (Instructor)</i>	<i>Schedule</i>	
Year One - Fall Qtr.		
N209A Comp Qual Res Des (Rehm/Gudmondsdottir)	Th 10-12	
N209B Comp Quant Res Design (Padilla/Stotts)	W 10-12	
N269 Hlth/Nsg Sys (Drew/C. Kennedy)	Th 1-5	
Theory (choose one course from below)		
N290 Family Theory (Chesla)	W 1-4	
N202A Theory Dev in Nrsng (Faucett/Portillo)	W 1-3	
N253 Theories of the Policy Process (Malone)	W 8-10	
N221.01 Theories Related to Nsg Care (Kohlman)	W 8-10	
N227 Theories of Mental Illness (Weiss)	W 8-10	
Year One - Winter Qtr.		
N229 Philosophy Nsg Sci (Rankin/Holzemer)	T 1-4	
B187 Intro Probability/Stats (Paul)	T/Th 10-12	
B187 Lab (Paul)	Th 1-3	
Year One - Spring Qtr.		
N212B Quant Measurement/Theory (Slaughter)	Th 9-12	
B192 Intro Linear Models (Paul)	T/Th 1-3	
B192 Lab (Paul)	T/Th 3-5	
N212A Qual Data Coll/Ethics (Humphreys/Davies)	T 10-12	
Year Two - Fall Qtr.		
N/S285A Comp Qual Res Meth (Clarke, H. Kennedy)	T 1-4	
- OR -		
N289A Comp Quant Res Meth (Alkon/Spetz)	W 9-12, W 1-3	
- OR -		
S289A Comp Quant Res Meth (Newcomer)	W 9-12, W 1-3	
Year Two - Winter Qtr.		
N/S285B Comp Qual Res Meth (Clarke/H. Kennedy)	W 1-4	
- OR -		
N289B Comp Quant Res Meth (Weiss/Lee)	W 9-12	
- OR -		
S289B Comp Quant Res Meth (Newcomer)	W 9-12, W 1-3	
Year Two - Spring Qtr.		
N291 Applied Stat Methods (Cooper)	W 9-12	
N291 Lab (Cooper)	W 1-3	

ADVANCED NURSING SEMINARS 2006-07		
<i>Course Number Name (Instructor)</i>	<i>Schedule</i>	
Fall Quarter 2006		
N223A Symptom Research (Aouzirat/Humphreys)	Th 9-12	
N240.01 Biomarkers I (Oka)	We 12-2	
N240.04 Violence & Health (Alkon)	NTBO	
N240.06 Sem on HIV/AIDS (Holzemer)	We 3-5	
N240.08 Adv Child Develop Sci (Kenn/Kools/Weiss)	NTBO	
N240.09 Health Policy I (Harrington)	Th 10-12	
N240.11 OH Research Seminar (Faucett/Gillen)	tba	
N240.15 Gerontological Nursing Research (Wallhagen)	We 4-6	
Winter Qtr. 2007		
N223B Symptom Research (Janson)	Th 10-1	
N240.02 Biomarkers II (Aouzirat)	We 2-4	
N240.05 Vulnerable Women (Juarbe/Portillo)	NTBO	
N240.06 Sem on HIV/AIDS (Holzmr/Portillo)	Tu 12-1	
N240.08 Adv Child Devlp Sci (Ken/Kls/Weiss)	NTBO	
N240.12 Family Health (Chesla/Rankin)	Th 3-5	
N240.16 Research Issues in Aging: Interdisciplinary Perspectives (Wallhagen)	Th 3:30-5:30	
N240.17 Cardiovascular Disease Epidemiology (Froelicher)	NTBO	
N240.18 Workforce & Health Systems (Seago)	Tu 4-6	
Spring Qtr. 2007		
N223C Symptom Research (Carrieri-Kohlman)	tba	
N240.03 Grief/Bereavement (Davies/Hughes)	tba	
N240.06 Sem on HIV/AIDS (Holzemer)	tba	
N240.08 Adv Child Devlp Sci (Weiss/Kools/Kenn)	tba	
N240.10 Health Policy (Harrington)	NTBO	
N240.13 Psychological Factors (Chafetz/Weiss)	tba	
N240.14 Health Promotion & Chronic Disease Prevention (Oka)	tba	

ERC Applicant Institution: University of California, San Francisco
 Program Director: Julia Faucett
 Discipline: Occupational and Environmental Health Nursing

Table 4a
Academic Training Report
Previous Budget Period: July 1, 2005 to June 30, 2006

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled¹	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Part-Time Trainees Taking OS&H Courses²	# Graduated Trainees
Baccalaureate/associate degree							
Master's degree							
MS	Master of Science	10	10	0	0	0	7
Doctorate degree							
PhD	Doctor of Phil. in Nursing	6	4	0	0	1	0
Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.) ³							
Other (specify, e.g., undergraduate Certificate program trainees)							

Refer to: Supplemental Instructions, page 8.

¹ Trainee counts include all students in the approved programs.

² Does not include trainees counted in any of the full-time or part-time categories

³ In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: University of California, San Francisco
 Program Director: Julia Faucett
 Discipline: Occupational and Environmental Health Nursing

Table 13
Minority Recruitment Data¹
Previous Budget Period: July 1, 2005 to June 30, 2006

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
1	1	1	60	In-training	NIOSH	

Refer to: Supplemental Instructions, page 11.

¹ First three columns are a group total; last four columns refer to individual trainees.

**Occupational and Environmental Medicine
University of California, San Francisco
Program Director's Progress Report
June 30, 2005 – July 1, 2006**

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 by providing them with 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 through direct supervision and role modeling.

Faculty Participation: The faculty are actively involved in the following curricular and mentoring activities: attendance at semi-annual Residency Advisory Committee and annual Curriculum Committee meetings; as practicum rotation preceptors, academic year instructors, advisors, research mentors, and attending physicians during clinics sessions; instructors in didactic programs, participation in industrial site visits, special investigations, and projects.

Curricula: Clinical training occurs during both years utilizing a multi-disciplinary approach. The Occupational Health Services program at San Francisco General Hospital is a primary training site for OEM residents. The Kaiser Permanente Occupational Health Clinic in downtown San Francisco is a clinical rotation that has been added so that residents now have greater exposure to the private practice world of OEM. 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. An additional clinical site includes the Upper Extremity Clinic held by Dr. Rempel at the UCB campus.

All residents also attend the summer didactic program which is conducted during July and August of each year. 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 industrial site visits are rotated on a 2-year cycle to afford as wide an experience as possible. The residents are responsible for preparing pre-visit briefings on the industry and the particular employer. During visit, residents observe and record 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 A.

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 for enhanced support of their projects.

Principal faculty research mentors include Drs. Balmes, Blanc, Eisner, Rempel, and Steinmaus. There are also a large number of other supporting and core faculty members who help 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) to attain the Master of Public Health degree in Environmental Health Sciences (EHS). Required coursework includes biostatistics, epidemiology, health services organization and administration, environmental and occupational health, and social and behavioral influences on health. 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 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 residents' 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.

Practicum Training: The training is focused on 1-2 month core rotations at OEM clinics and with employers 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., 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: Cal-OSHA, the California Department of Health Services (either 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 or Cincinnati, or at the WHO in Geneva.

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 Principal Investigator and Dr. Mark Miller is the Director; key personnel include OEM clinical faculty member, Dr. Gina Solomon. 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.

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 to be acquired during each rotation, including most often, the completion of a project. Residents discuss their rotation selections with the program director, and are required, in conjunction with their on-site preceptor, to develop a list of goals and objectives for the rotation. 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.

A new rotation was established with the World Health Organization in Geneva in 2005-2006. Two OEM residents, Drs. Sarah Janssen, and Josef Thundiyil, completed this rotation during their practicum-year training in 2005-2006.

Providing OEM residents with training opportunities in other disciplines is an ongoing priority for the program. For example, 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 specialists in orthopedics, ENT, rehabilitation medicine, allergy, and other relevant specialty areas are also available.

The practicum year follows the academic year and officially starts during the summer session. 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 beginning 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 regularly developed to meet the educational and training needs of particular residents.

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

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

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, ergonomists, and other health and safety personnel are developed.

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

The multi-disciplinary clinic integrates trainees in multiple disciplines (medicine, nursing, and IH). The UCSF OEM faculty practice clinic uses a multi-disciplinary approach including Patricia Quinlan, MPH, CIH, OEM industrial hygienist and School of Nursing faculty member, 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 from UCSF Employee Health Services. 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 during their MPH studies through workplace site visits, grand rounds, research seminars, the yearly ergonomics conference and other COEH interdisciplinary activities such as the Summer Institute.

In addition, there are two joint study programs to which potential residents may apply: a joint OEM/Medical Toxicology program, and a joint OEM/Pulmonary fellowship. 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. Successful applicants to the UCSF pulmonary fellowship can apply for training in the joint program. A typical research project for such a trainee would involve an extensive research project in the area of occupational or environmental lung disease.

D. Program Activities and Accomplishments

Progress: The program continues to broaden the didactic program and expand the types of industrial site visits. New courses and rotations have been added as residents and faculty identify new training needs and opportunities. Three new rotations were developed this year. 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.

In October 2005, the ACGME granted full re-accreditation to the OEM program for the maximum length of time (five years) for 8 trainees. This year, both senior residents were OPSF Scholars who graduated successfully and plan to take the ABPM certification examination. One will also be taking the Medical Toxicology certification examination. One resident has accepted a position as a research fellow at the Natural Resources Defense Council, while the second has accepted an academic position at the Orlando Regional Medical Center. Doctors Rempel and Goldberg (and collaborators) received the International Ergonomics Association Liberty Mutual Prize for Ergonomics and Occupational Safety in 2006. Dr. Balmes received the Robert A. Kehoe Award of Merit from the American College of Occupational and Environmental Medicine for his contributions to the field.

Minority Recruitment: UCSF is strongly committed to minority recruitment. Applicants to this year's program included one Asian male, and one African woman, in addition to two female applicants. The program has a long successful record in attracting highly qualified applicants and trainees from under-represented groups. Our success is based on several factors: 1) the Director and the faculty are committed to achieving a high level of diversity; 2) applicants are sought from under-represented groups; and 3) interviewees meet with the residents where they are able to see the level of diversity that exists within current cohorts. The UCB and UCSF campuses are models for diversity of student populations as is evident by touring the respective campuses.

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. On the UCSF campus, the Chancellor's Committee on Diversity is a standing committee that advises and makes specific recommendations to the Chancellor and Cabinet for campus-wide diversity issues. The policy statement that drives recruitment efforts values and promotes diversity because it enhances the educational experience, workplace, and services provided to the public. 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.

Trainee Recruitment: The program recruits highly qualified candidates based on the national reputation of the program, its director and faculty, as well as the recommendation and reputation of successful alumni. The incoming residents for 2006-07 are well-qualified candidates. One applicant holds an MPH already and will supplement her OS&H coursework with additional courses in the EHS division at UCB. The second applicant holds an MBA and was awarded an OPSF Scholarship.

E. Program Products: The residents and faculty have been very productive in their research projects including publication of scholarly works, book chapters, and monographs. Presentations were given by faculty at a number of regional, national, and international meetings. 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. Dr Janssen completed research on a scientific literature-based approach to targeting chemicals for environmental health tracking. Dr Thundiyil completed research on arsenic in drinking water wells. Please see Appendix C for more detail.

F. Future Plans: The program plans to develop a formal mentor program for each resident with the assistance of the UCSF Office of GME. There are also plans for a new effort on competency-based training and assessment in cooperation with the UCSF GME office in accordance with the new ACGME requirements. A new rotation in the petroleum industry is being developed with Chevron. Additional clinical training opportunities are being considered with Kaiser Permanente. Development of a part-time program is ongoing. During the next year, it is anticipated that the program will admit as many as four or five new trainees reaching a full complement of positions (6 – 7) depending on level of funding by NIOSH and other sources.

Appendix A

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/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 preserve 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

Appendix B – Please see attached Tables

Appendix C

Trainee Publications

1. 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.
2. Solomon GM, Janssen S. Talking with patients and the public about endocrine disrupting chemicals. In: *Handbook of Endocrine Disrupting Chemicals*. Ed. Gore A. Humana Press, Totowa, NJ. (in press).
3. Janssen S, Fujimoto VY, and Guidice LC. Endocrine Disruption and Female Reproductive Outcomes. In: *Handbook of Endocrine Disrupting Chemicals*. Ed. Gore A. Humana Press, Totowa, NJ. (in press).
4. Goldberg, R. and Janssen, S. Reproductive Hazards. In: *Handbook of Agricultural Medicine*. Ed. James E. Lessenger, Springer, New York, 1st edition, 2006.
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7. Thundiyil, JG. Sulfonylurea Toxicity. Call Us. The Official Newsletter of the California Poison Control System. Awaiting publication. <http://www.calpoison.org>
8. Thundiyil, JG. Halons and Freons. Trichloroethane, Trichloroethylene, and Perchloroethylene; Chapters in Olson KR ed., *Poisoning & Drug Overdose*, 5th edition. San Francisco, CA: McGraw-Hill Co., Accepted for publication 2005.
9. Thundiyil, JG. Anderson IB, Stuart P, Olson KR. Lamotrigine-induced seizures in a child: a case report and review of the literature. *Clinical Toxicology*. Accepted for publication 2005.

Trainee Presentations

1. Thundiyil, JG. Seasonal Variation of Arsenic Concentration in Wells in Nevada. OEM Research Seminar, 2006.
2. Janssen S. Environmental Public Health Tracking of Environmental Hazards: Using neurodevelopmental outcomes as a framework for decision-making. OEM Research Seminar, 2006.
3. Janssen S. Brominated Flame Retardants: Protecting or Endangering Human Lives? OEM Grand Rounds Presentation, 2006.
4. Abbah, Effiem. Obesity and Mortality in a Prospective Study of a Middle-Aged Industrial Population; Tsai S et al. (2006) *JOEM* 48; 22-27. OEM Journal Club Presentation, 2006.
5. Mamantov, Tatiana. Mortality of Employees of a Perfluorooctanesulphonyl Fluoride Manufacturing Facility; Alexander BH et al. (2003) *Occup. Environ Med* 60; 722-729. OEM Journal Club Presentation, 2006.

Faculty Publications

John R. Balmes

1. Cullen MR, Barnett MJ, **Balmes JR**, Cartmel B, Redlich CA, Brodtkin CA, Barnhart S, Rosenstock L, Goodman GE, Sam P, Hammar SP, Thornquist MD, Omenn GS. Predictors of lung cancer among asbestos-exposed men in the β -Carotene and Retinol Efficacy Trial. *Am J Epidemiol* 2005;161:260-270.

2. Arjomandi M, Schmidlin I, Girling P, Boylen K, Ferrando R, **Balmes J**. Sputum induction and bronchoscopy for assessment of ozone-induced airway inflammation in asthma. *Chest* 2005;128:416-423.
3. Blanc PD, Eisner MD, Katz PP, Yen IH, Archea C, Earnest G, Janson S, Masharani U, Quinlan PJ, Hammond SK, Thorne PS, **Balmes JR**, Trupin L, Yelin EH. Impact of the home indoor environment on adult asthma and rhinitis. *J Occup Environ Med* 2005;47:362-372.
4. Arjomandi M, Witten A, Abbritti E, Reintjes K, Zhai W, Solomon C, **Balmes J**. Repeated exposure to ozone increases alveolar macrophage recruitment into asthmatic airways. *Am J Respir Crit Care Med* 2005;172:427-432.
5. Tager IB, Balmes J, Lurmann F, Ngo L, Alcorn S, Kunzli N. Chronic exposure to ambient ozone and lung function in young adults. *Epidemiology* 2005;16:751-759.
6. Witten A, Solomon C, Abbritti E, Arjomandi M, Zhai W, Kleinman M, **Balmes J**. Effects of nitrogen dioxide on allergic airway responses in subjects with asthma. *J Occup Environ Med* 2005;47:1250-1259.
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8. Aliyu, OA, Cullen MR, Barnett MJ, **Balmes JR**, Cartmel B, Redlich CA, Brodtkin CA, Barnhart S, Rosenstock L, Israel L, Goodman GE, Thornquist MD, Omenn GS. Evidence for excess colorectal cancer incidence among asbestos-exposed men in the β -Carotene and Retinol Efficacy Trial (CARET). *Am J Epidemiol* 2005;162:868-878.
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. Eisner MD, **Balmes J**, Katz PP, Trupin L, Yelin EH, Blanc PD. Lifetime secondhand smoke exposure and the risk of chronic obstructive pulmonary disease. *Environ Health* 2005;4:7.
12. Tager IB, **Balmes J**, Lurmann F, Ngo L, Alcorn S, Kunzli N. Effect of chronic exposure to ambient ozone on lung function in young adults. *Epidemiology* 2005;16:751-759.
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Paul D. Blanc

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20. Eisner MD, Trupin L, Katz PP, Yelin EH, Earnest G, Balmes J, **Blanc PD**. Development and validation of a survey-based COPD severity score. *Chest* 2005; 127:1890-1897.
21. Katz PP, Eisner MD, Yelin EH, Trupin L, Earnest G, Balmes J, **Blanc PD**. Functioning and psychological status among individuals with COPD. *Quality Life Res* 2005; 14:1835-1843.
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25. **Blanc PD**, Yen IH, Chen H, Katz PP, Earnest G, Balmes JR, Trupin L, Friedling N, Yelin EH, Eisner MD. Area-level socioeconomic status and health status among adults with asthma and rhinitis. *Eur Respir J* 2005; 27:85-94.
26. 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 Med Toxicol* (In Press).
27. Yen IH, Yelin EH, Katz P, Eisner MD, **Blanc PD**. Perceived neighborhood problems and quality of life, physical functioning, and depressive symptoms. *Am J Pub Health* (In Press).
28. Chen H, Eisner MD, Katz PP, Yelin EH, **Blanc PD**. Measuring disease-specific quality of life in obstructive airway disease: validation of a modified version of the Airways Questionnaire 20 (AQ20). *Chest* (In Press).

Robert L. Goldberg

29. Rempel, D., Kraus, N., **Goldberg, R**. A Randomized Controlled Trial Evaluating the Effects of Two Workstation Interventions on Upper Body Pain and Incident Musculoskeletal Disorders among Computer Operators *Occupational and Environmental Medicine* (in press)
30. **Goldberg R**. Polychlorinated Biphenyls (PCBs). *Poisoning and Drug Overdose* 5th Edition. Olson, K. editor New York: Lange Medical Books 2006
31. **Goldberg R.**, Janssen S. Reproductive Hazards in Worldwide Agriculture. *Handbook of Agricultural Medicine*. Lessenger JE editor New York: Springer Verlag 2005
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David Rempel

33. Dong H, Barr A, Loomer P, **Rempel D**. The effects of finger rest positions on hand muscle load and pinch force in simulated dental hygiene work. *J Dent Educ* 2005 69(4):453-60.

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39. 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 (in press).
40. Conlon, C and **Rempel DM**. Upper Extremity Mono-neuropathy Among Engineers. *J Occ Environ Med* 2006 (in press).

Patricia Quinlan

41. Blanc P, Eisner M, Katz P, Yen I, Archea C, Earnest G, Janson S, Masharani U, **Quinlan P**, et al, Impact of the Home Environment on Adult Asthma and Rhinitis, *Journal of Occupational and Environmental Medicine* 2005; 47(4):362-37
42. Hammond K, Gold E, Baker R, **Quinlan P**, et al, Respiratory Health Effects Related to Occupational Spray Painting and Welding, *Journal of Occupational and Environmental Medicine* 2005; 47(7):728-739.

Faculty Presentations

1. **Rempel, D**. A simple ergonomic intervention prevents musculoskeletal disorders among computer users: a randomized controlled trial. OEM Grand Rounds Presentation, 2005.
2. **Rempel, D**. The Design of Hand Tools. Department of Mechanical Engineering, University of Illinois at Urbana-Champaign, 2005.
3. **Rempel, D**. Ergonomic and Repetitive Stress Injuries. University Health Services, UC Berkeley, 2005.
4. **Rempel, D**. (Co-Chair) Ergonomic Interventions and Research. Talk: Ergonomic Interventions in the Dental Practice. UC Berkeley, Center for Occupational and Environmental Health, Berkeley, 2005.
5. **Rempel, D**. Update on Office Ergonomics. Bay Area Ergonomics Roundtable, Richmond, CA, 2005.
6. **Rempel, D.**, Scholssberg E, Morrow S, Llosa A, Dietrich P. Musculoskeletal disorders and computer use among engineering graduate students: An internet based study. Human Computer Interface Conference 2005, Las Vegas.
7. **Rempel, D**. A systematic review of interventions among computer users. Office Ergonomics Research Committee, San Jose, 2006.
8. **Rempel, D**. Preventing Hand/Arm Pain Among Computer Users. Univ Utah State-of-the-Art Conference on Musculoskeletal Disorders, Salt Lake City, 2006.
9. **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.

10. **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, Milan, 2006.
11. **Rempel, D.** Workplace Intervention Studies: Preventing Musculoskeletal Disorders among Computer Users. American Occupational Health Conference, Los Angeles, 2006.
12. **Rempel, D.** Preventing Musculoskeletal Disorders in the Dental Office. California Dental Association Annual Meeting, Los Angeles, 2006.
13. **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.
14. **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.
15. **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, Chicago, 2006.
16. **Goldberg, R.** The Assessment and Treatment of Upper Extremity Musculoskeletal Disorders: The Evidence Base for Treatment of Lateral Epicondylitis. OEM Grand Rounds Presentation, 2006.
17. **Goldberg, R.** Upper Extremity Pain Syndromes: Carpal Tunnel Syndrome, Western Occupational and Environmental Medical Association, 2005
18. **Goldberg, R.** Excellence in Occupational Medicine Practice. DOE/EFCOG Meeting, The U.S. Department of Energy, 2005.
19. **Goldberg, R.** New Research on an Intervention Trial for call center computer users DOE/EFCOG Meeting, The U.S. Department of Energy, 2006.
20. **Goldberg, R.** Update on the Medical Management of Upper Extremity Musculoskeletal Disorders, University of Michigan/University of California Los Angeles Conference on Ergonomics and Rehabilitation, 2006.
21. **Seward, J.** Health Concerns for Animal Handlers. OEM Didactic Presentation, 2006.
22. **Seward, J.** Radiation Hazard Response for Medical Personnel: Seton Hospital Medical Grand Rounds, 2006
23. **Seward, J.** A Comprehensive Occupational Medicine Program Model for DOE Facilities; Energy Facility Contractors Occupational Medicine Group, Albuquerque, NM, 2006.
24. **Seward, J.** The New ANSI Respirator Standard: Physical Qualifications for Personnel. American Industrial Hygiene Association Teleconference, 2006.
25. **Blanc, P.** Dozor Visiting Professor, Ben Gurion University of the Negev; Israel, 2005.
26. **Blanc, P.** Department of Pediatrics Grand Rounds: "Taking an Environmental Health History", 2005-06.
27. **Blanc, P.** Department of Epidemiology, "COPD from an Epidemiological Perspective", 2005-06.
28. **Blanc, P.** School of Pharmacy, "Metal Toxicity", guest lecture in toxicology course for pharmacy students, 2005-06.
29. **Blanc, P.** Society for Occupational Medicine. Israel Medical Association, Tel Aviv, Israel ("COPD from an Epidemiological Perspective"), 2005-06.
30. **Blanc, P.** European Respiratory Society – American Thoracic Society Joint Course on "Basics in Asthma," Oslo, Norway ("Asthma and Occupation"; "Asthma and Smoking"), 2005-06.
31. **Blanc, P.** British Thoracic Society, Winter Meeting London ("Orphan occupational lung disease"), 2005-06.
32. **Blanc, P.** National Institute for Environmental Health Sciences Investigator's Meeting, Research Triangle Park, NC; 2005 ("Musculoskeletal injuries in Hospital Workers")

33. **Blanc, P.** University of West Virginia Health Sciences Health Hazards of Welding Conference (“Metal Fume Fever”), 2005-06.
34. **Blanc, P.** Yale University, Occupational Medicine Program, New Haven, Conn. (“COPD from an epidemiological perspective”), 2005-06.
35. **Blanc, P.** American Academy of Allergy Asthma Annual Meeting (“Cause and effect: is there such a phenomenon?”), 2005-06.
36. **Blanc, P.** “The History of Dry Rot” Bay Area History of Medicine Club, San Francisco, 2005.

Research Projects

1. **Janssen S., Balmes J.**, Exposure Assessment and Environmental Public Health Tracking.
2. **Thundiyil, J., Steinmaus, C.**, Evaluation of Arsenic Levels in Wells Based on Seasonality and Well Depth.

ERC Applicant Institution: University of California, San Francisco
 Program Director: Robert L. Goldberg, MD
 Discipline: Occupational and Environmental Medicine

Table 4a
Academic Training Report
Previous Budget Period: July 1, 2005 to June 30, 2006

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled ¹	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses ²	# Trainees Graduated
Baccalaureate/associate degree							
Master's degree							
Public Health	Master of Public Health	2	2	0	0	0	2
Doctorate degree							
Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.) ³							
Occupational Medicine	Occupational & Environmental Medicine	4	4	0	0	0	2
Other (specify, e.g., undergraduate Certificate program trainees)							

Refer to: Supplemental Instructions, page 10.

¹ Trainee counts include all students in the approved programs.

² Does not include trainees counted in any of the full-time or part-time categories

³ In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: University of California, San Francisco

Ergonomics Program
University of California, San Francisco and Berkeley
Annual Report July 1, 2005 – June 30, 2006

PROGRAM PROGRESS REPORT

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 compete well in a Ph.D. training program, develop an ergonomics consultation practice, or become a competent resource for ergonomics issues within a company or agency. 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 will take Integrity in Science - PH276A (2 units) and students in Bioengineering have a choice of 4 ethics courses but will 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 is provided by Ira Janowitz, C.P.E. 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.

The director, David Rempel M.D., 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, PH298).

Ira Janowitz and Arlie Stern lecture in ergonomics classes and direct the ergonomic CE courses. Mr. Janowitz is trained in industrial engineering and is a Certified Professional Ergonomist. Mr. Janowitz and Ms. Stern provide consulting services to more than 30 industries, governmental agencies, and unions in California. Industrial clients range from construction, office, and light

manufacturing to petrochemical sectors. Through these consulting arrangements students gain access to industrial sites for research and training. Mr. Janowitz lectures in the Ergonomics course (PH269C) and oversees the field work performed by ergonomics students in Ergonomics Internship (PH297) and Clinical Ergonomics (PH298). Ms. Stern provides lectures to students on adult training methods.

Dr. Delphine Cody, whose background is in Cognitive Psychology and Human Factors is a Research Specialist in the College of Engineering and is involved in research on human performance and modeling in transportation systems. She 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 MS and PhD 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.

Dr. Spear has taught safety and industrial hygiene from an engineering perspective and has expanded the industrial hygiene course on physical agents to include vibration and temperature.

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

Progress: Unfortunately, at the end of this year, Professor Karen King took a tenured faculty position at Denver Health Sciences. This was an excellent position for Professor King but a loss to the program due to her knowledge of cell biology, arthritis and her important contributions in the development of an animal model of musculoskeletal disorders. Professor King will continue her work on the model at her new University.

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 enrolled in the Ph.D. program in the UCB Mechanical Engineering department. The Ph.D. graduate has been offered a junior faculty position and she has written a grant to NIOSH to continue her work in dental ergonomics. 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).

The program received the International Ergonomics Association/Liberty Mutual Prize in Occupational Safety and Ergonomics, 2006 for the paper

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.

The paper made an important contribution to the R2P initiative of NIOSH (see below).

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

A total of 21 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.

The student first-author publications and student conference presentations were:

- 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.
- 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.
- 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.
- 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 2006 (in press).
- 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 2006 (in press).
- Dong H, Loomer P, Villanueva A, Rempel D. Pinch forces and instrument tip forces during periodontal scaling. J Periodontology 2006 (in press).
- Villanueva A, Dong H, Rempel D. A biomechanical analysis of applied pinch force during periodontal scaling. J Biomechanics 2006 (in press).
- 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 microspectroscopic imaging and polarized light microscopy study. Arthritis Research & Therapy 2006 (in press).
- 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 2006 (in press).
- 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 2006 (in press).
- Nakama L, King KB, Abrahamsson SO, Rempel DM. The effect of repetition rate on the formation of microtears in tendon in an *in vivo* cyclical loading model. J Orthop Res 2006 (in press)
- 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.
- 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.
- 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.
- 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.

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 to 2 new PhD students 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 –ADMISSION REQUIREMENTS

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.

APPENDIX A – SAMPLE CURRICULA

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

Year 1

Fall

EHS Seminar PH292 (1)
Biostatistics PH142A (4)**
Engineering Design E28 (3)
Exposure Assessment PH270A (3)**
Work Systems IEOR171 (2)*
Ergo Seminar PH 295 (1)*

Spring

Ergonomics PH269C (3)*
Biostatistics PH142B (4)**
Human Physiology IB132 (3)
Risk Assessment PH220C (4)**
Ergo Seminar PH295 (1)*

Summer

Internship (3)*

Year 2

Fall

Occup Biomech PH 269D (2)*
Physical Agents PH 274A (2)
Psychosocial N 274B (2)*
Safety PH 275B (2)*
Epidemiology PH250A (4)**
Integrity in Science PH276A (2)**

Spring

Clinical Ergonomics PH298 (2)*
Interface Design IEOR170 (2)
Ergo Seminar PH 295 (1)*
Research PH 299 (4)
Tissue Mechanics ME214 (3)**

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

Year 1

Fall

Motor Control IB127 (2)
Multivar Statistics PH 245 (4)
Ergo Seminar PH 298 (1)
Anatomy IB 131 (3)
Orthop Biomech ME176 (4)

Spring

Ergonomics PH 269C (3)*
Bioengineering E153 (4)
Motor control IB 127 (3)
Physiology IB 132 (4)
Ergo Seminar PH 298 (1)*

Summer

Internship (3)*

Year 2

Fall

Occup Biomech PH 269D (2)*
Safety PH 275B (3)*
Psychosocial N 248 (2)*
EHS Seminar PH 292 (1)
Work Systems IEOR171 (2)*
Ergo Seminar PH 298 (1)*
Ethics in Science BioE 100 (3)**

Spring

Research PH 299 (4)
Tissue Mechanics ME 214 (3)
Cell Biology MCB 130 (4)
Interface Design IEOR170 (2)

APPENDIX B – TABLES (attached)

APPENDIX C – STUDENT PUBLICATIONS

Dong H, Barr A, Loomer P, Rempel D. The effects of finger rest positions on hand muscle load and pinch force in simulated dental hygiene work. *J Dent Educ* 2005 69(4):453-60.

Asundi K, Bach J, Rempel D. Thumb force and muscle load are influenced by pipetting tasks and pipette design. *Human Factors* 2005, 47(1):67-76.

Kursa K, Diao E, Latanza L, Rempel D. In vivo forces generated by finger flexor muscles do not depend on the rate of fingertip loading during an isometric task. *J Biomechanics* 2005, 38:2288-2293.

Nakama L, King K, Abrahamsson SO, Rempel D. Evidence of tendon microtears due to cyclical loading in an *in vivo* tendinopathy model. *J Orthop Res* 2005, 23(5):1199-1205.

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.

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.

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.

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* 2006 (in press).

Rempel D, Barr A, Brafman D, Young E. The effects of six keyboard designs on wrist and forearm postures. *Appl Ergonomics* 2006 (in press).

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* 2006 (in press).

Dong H, Loomer P, Villanueva A, Rempel D. Pinch forces and instrument tip forces during periodontal scaling. *J Periodontology* 2006 (in press).

Villanueva A, Dong H, Rempel D. A biomechanical analysis of applied pinch force during periodontal scaling. *J Biomechanics* 2006 (in press).

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* 2006 (in press).

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* 2006 (in press).

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* 2006 (in press).

ERC Applicant Institution: University of California, Berkeley & San Francisco
 Program Director: David Rempel
 Discipline: ERGONOMICS

Table 4a

Academic Training Report

Previous Budget Period: July 1, 2005 to June 30, 2006

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled ¹	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses	# Trainees Graduate
Baccalaureate/associate degree							
Master's degree							
MS	MS Engineering	1	1			4	0
Doctorate degree							
PhD	Doctor of Philosophy in Environmental Health Sciences	3	2			2	1
PhD	Doctor of Philosophy in Bioengineering	4	2			7	0
PhD	Doctor of Philosophy in Mechanical Engineering	1	0				1
Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.) ³							
Other (specify, e.g., undergraduate Certificate program trainees)							

Refer to: Supplemental Instructions, page 10.

¹ Trainee counts include all students in the approved programs.

² Does not include trainees counted in any of the full-time or part-time categories

³ In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

**COEH Continuing Education Program
Progress Report, July 1, 2005 - June 30, 2006**

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 received 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 15 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 and one HST course developed by Center core academic program faculty in the last reporting period:

1. "Workers' Compensation Overview Update for OSH Professionals," July 25-26, 2005. Barbara Burgel, RN, MS, FAAN, COEH Occupational and Environmental Nursing Faculty, served as co-course director with two Nursing Program graduates.
2. "Ergonomics Analysis for Job and Tool Design," July 28-29, 2005. Ira Janowitz, MPS, CPE, Senior Consultant at the COEH Ergonomics Program, served as course director.
3. "Occupational and Environmental Toxicology for OSH Professionals," July 28-29, 2005. Sarah Jewell, MD, MPH, COEH Occupational and Environmental Medicine Faculty, served as course director.
4. "Ergonomic Interventions and Research: Preventing Musculoskeletal Disorders in Healthcare, Construction and Other Industries," December 8-9, 2005. David Rempel, MD, MPH, Director of the COEH Ergonomics Program, served as course director.
5. "Hazardous Substances Management and Control Seminar Series," January 18 -April 26, 2006. Mark Nicas, PhD, COEH Environmental Health and Safety Faculty, served as course director and faculty of record. (This was an academic course in the HSAT program as well as a CE course.)

ERC core academic program faculty members 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 have served as speakers in the last year:

1. "Occupational & Environmental Toxicology for OSH Professionals," July 28-29, 2005
 - John Balmes, MD taught Respiratory Sensitizers
 - Stephen Born, MD, MPH taught Toxins and Cancer
 - Nina Holland, PhD taught Biomarkers of Toxic Exposure and Effect
 - Sarah Jewell, MD, MPH taught Respiratory Irritants and Asphyxiants
 - Gina Solomon, MD, MPH taught Reproductive Toxins
2. "COEH Symposium: Occupational & Environmental Health in the Developing World: Making a Difference," October 28, 2005
 - Joseph Eisenberg, PhD, MPH Environmental Change & Diarrheal Disease in the Northern Coastal Rain Forests of Ecuador
 - Katharine Hammond, PhD, CIH, An Overview of the Health Effects of Environmental Tobacco Smoke in China
 - Richard Jackson, MD, MPH, Making the Strands Whole Cloth -- California as Loom
 - Marc Schenker, MD, MPH, Immigration, Occupation and Health
 - Allan Smith, MD, PhD, Challenge of Arsenic in Argentina, Bangladesh, Chile and Bengal
 - Kirk Smith, PhD, MPH, International Environmental Health Priorities
 - Martyn Smith, PhD, Benzene: A Continuing Health Problem from China to California
3. "Ergonomic Interventions and Research," December 8-9, 2005
 - David Rempel, MD, MPH, taught Ergonomic Interventions in the Dental Practice.

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 teaches the Local Exhaust Systems portion of “Ventilation: Diagnosing and Troubleshooting HVAC and Local Exhaust Systems.”

-Roy McKay, PhD, Director of Occupational Pulmonary Services and Research Assistant Professor at the University of Cincinnati coordinates and teaches “Respiratory Protection Overview Update” and “Development of Respirator Chemical Cartridge and Filter Change Out Schedules” courses.

-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, Bay Area Regional Manager, Hazard Management Services, Inc., Pleasant Hill, CA, is the course director and lead 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 creation of a 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 activities continued at more intense efforts such as course 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 most significant accomplishment for the CE Program in 2005-2006 was the addition of the “Asbestos and Lead Paint Training Program.” This program more than doubled the number of trainings offered during the year and added 873 trainees to overall numbers. This is an exceptional program, rated highly by the accrediting organizations Cal/OSHA and the California Department of Health Services (CDHS) Childhood Lead Poisoning Prevention Branch. The audience includes many industrial hygienists and safety professionals, but also enables CE to train a new audience of consultants, construction contractors and painters. Asbestos and lead courses offered in 2005-2006 were:

- * AHERA Building Inspector 1/2 day Refresher: Given 9 times
- * AHERA Building Inspector/Management Planner full-day Refresher: Given 9 times
- * AHERA Contractor/Supervisor full-day Refresher: Given 9 times
- * AHERA Project Designer full-day Refresher: Given 5 times
- * AHERA Building Inspection for Asbestos 24-hour Initial Class: Given 4 times
- * AHERA Building Inspection & Management Planning for Asbestos 40-hour Initial Class: Given 4 times
- * AHERA Contractor/Supervisor 40-hour Initial Class (“Practices & Procedures in Asbestos Control”): Given 3 times
- * AHERA Project Designer 24-hour Initial Class (“Designing Asbestos Abatement Projects”): Given 2 times
- * Lead General Continuing Education 7-hour Class (“Continuing Education for Certified Lead Professionals”): Given 6 times
- * Lead Paint Inspection & Assessment 40-hour Initial Class: Given 3 times
- * Lead-based Paint Supervision & Monitoring 40-hour Initial Class: Given 2 times.

The CE Program began to try 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 is voluntary. Nationwide, all CE Program Directors have been

discussing the best way to collect this information, and have recently devised a form that includes a privacy notice about how the information will be used.

However, the CE Program does have some ethnicity information at this time. The CDHS has an ethnicity question on the course completion form filled out by all students taking lead courses. That data is summarized here from September 2005-August 2006, and shows trainees in Lead Courses. Out of 212 students who answered the ethnicity question: 48 or 70% were "White"; 23 or 11% were "Asian"; 18 or 8% were "Latino"; 13 or 6% were "Black"; 4 or 2% were "Pacific Islander"; 2 or 1% were "Native American"; and 4 or 2% were "Other" (one of these wrote in Filipino).

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. Starting in 2007 the CE Program plans to do impact evaluation on all CE and HST classes. A more elaborate survey form will be 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 83 courses to 2,468 total trainees. (See Tables 12 and 12a attached to this report.) Of the total number of trainees, 554 were physicians; 141 were nurses; 475 were industrial hygienists and 326 were safety professionals. A total of 970 attendees listed themselves in the "other category." As for the employer breakdowns of the trainees, 1008 were from private industry; 140 from the federal government; 108 from the state government; 301 from local government; 8 from a foreign country; 826 from academic professions and 67 listed the "other" category. A few brief highlights of the year follow.

In addition to the Lead and Asbestos training and certification courses mentioned above, of special note during the past year a large and very exciting conference. The CE Program collaborated with the California Commission on Health and Safety and Workers' Compensation to present the "Forum on Catastrophe Preparedness: Partnering to Protect Workplaces" in South San Francisco, CA on April 7, 2006. This event attracted 113 attendees and featured speakers from many government agencies, including the California Governor's Office of Emergency Preparedness, the California Department of Health Services Emergency Preparedness Office, the United States Geological Survey, the San Francisco Department of Public Health, and Cal/OSHA.

Two 1-day technical classes were offered in fall 2005:

-**"Noise and Noise Control"** was presented on September 27, 2005. The Noise course featured an interesting local case study presentation by Chris Kirkham of Cal/OSHA on noise issues that came up during construction of the new Bay Bridge.

"The New OSH Management Systems - ANSI Z10" was given on November 1, 2005. This class was developed by Charles Redinger, a Bay Area industrial hygienist who was actively involved in the making of this new standard.

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, etc. 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 areas 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 plans particularly 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 Health Services - Occupational Health Branch
- * 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 two web or CD-based projects in production which will continue over the next few years.

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 for comments by CE staff and feedback sent in letters to instructors.

ATTACHMENT A

2005-2006 COEH CONTINUING EDUCATION ADVISORY COMMITTEE

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2005-2006 COEH CONTINUING MEDICAL EDUCATION COMMITTEE

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**Hazardous Substance Training Program (HST)
COEH Continuing Education Program
Annual Report July 1, 2005 – June 30, 2006**

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 253 per year and over a 500% increase from the early grant years).

The HST Program has focused on two primary objectives. It:

- 1) 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.)
- 2) 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.

As one example, instructors for a June, 2005 course, **Pesticide Health Issues** (Spanish, June 8, 2005, and English, June 9, 2005, Yuma, Arizona) included Richard Bennett, Pesticide Training Specialist, Inter Tribal Council of Arizona, Inc.; Henry Ghiotto, Pesticide Enforcement Officer/Inspector, Quechan Pesticide Control Office, Quechan Indian Tribe; Oscar Salcedo, Industrial Hygienist II, Arizona Department of Agriculture, Environmental Services Division and Jennifer Weber, Pesticide Safety Field Consultant, Arizona Department of Agriculture. It is of note that the HST Program was especially invited by the Inter Tribal Council to help bring this class to their community in Arizona.

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/HSAT 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 500% increase from the early grant years). See Table 12c for a one year training summary. This year HST trainees numbered 247. 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 cosponsorships of such groups as the Inter Tribal Council and other Native American organizations. 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. This includes:

- *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 is sent out three months after the course is completed along with self-addressed stamped envelopes. (Currently response rates are between 22-44%.) Although impact evaluations are currently performed in HST classes offering medical credit, plans call for impact evaluations to be instituted for all CE and HST Program courses over the next grant cycle.

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 expanded to become a joint HST/HSAT (Hazardous Substances Academic Training Program) with the addition of several new members. This past year the HST Program also instituted semi-annual conference call meetings of the entire advisory committee. The first conference call meeting of the newly reconstituted HST/HSAT Advisory Committee took place on October 17, 2006. Previously, members from each state were consulted with on a state-by-state basis.

Needs assessments. In this area too, the HST Program has taken significant steps. As mentioned above, the Program instituted a regular, semi-annual conference call meeting of the entire HST/HSAT 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 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 cosponsorships 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 nine shifts of firefighters in northern and southern California.

Within the past two years of the project, needs assessment activities identified training opportunities in every state in the region. Subsequently classes were held in Nevada, Arizona and northern and southern California. (See Table 12a) Two classes were actually slated for Hawaii in Honolulu but had to be postponed due to the illness of a course director. The classes will be held in late 2006 or spring 2007. They are being especially tailored for Hawaii. One is **Pesticides Injury and Illness in Hawaii**, a class aimed at medical professionals. The second class will be **Hazards of Pesticides to Emergency Responders in Hawaii**. This class will be offered to emergency personnel and will be given for all shifts of Hawaii firefighters.

Distance Learning Initiatives. In a very important and exciting development for the HST Program (and the whole 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 will complete the training on line and take a test. If they pass the test, a certificate will be issued which can be downloaded and printed after they complete a course evaluation online. The course has been in an online testing phase, has been presented and tested by occupational health nurses in southern California and should be fully in place by October 31, 2006.
- **Pesticide Illness**-- is a 6-8 hour CD-based training in 4 parts with training PowerPoint presentation and speaker notes. This has been created in cosponsorship with the California Department of Health Services 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 at the early stages.

E. Program Products. Other 2005-2006 classes drew 247 students in 7 classes. See Table 12a. The classes included the following:

Hazards of Pesticides to Emergency Responders (September 7, 2005, 46 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, 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 the California Department of Corrections and Rehabilitation) as well as a number of environmental specialists from the Pyramid Lake Paiute tribe in Nevada. The HST Program provided full scholarships.

Hazards of Pesticides to Emergency Responders (November 17, 2005, 24 attendees, Las Vegas, NV). This course was held as part of the annual HazMat Eplo 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, an emergency response coordinator from Utah and an emergency planner from North Dakota. Students attended from a total of ten different states including Arizona, Nevada, Utah, Texas, North Dakota, Iowa, Wisconsin, Nebraska, Virginia and California. Full scholarships were provided.

Pesticide Illness and Injury Workshop (January 31, 2006, 24 attendees, San Diego, CA). This was a workshop for physicians and nurses in rural and migrant community clinics and nurses in Migrant Education for San Diego County. Attendees were physicians, nurses, and medical directors. County clinics and the National Latino Research Center. Scholarships were provided.

Hazardous Substances Management and Control Seminar Series (January through April, 2006 in 13 3-hour sessions, 113 attendees, Berkeley, CA). 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 active remediation.

Respiratory Protection Overview/Update (July 25-26, 2005, 11 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 (July 27, 2005, 15 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.

Occupational and Environmental Toxicology (July 28-29, 2005, 14 attendees, Oakland, CA). Course Director is Sarah Jewell, MD, MPH who is an UCSF/COEH faculty. This class was taught in the CE/HST Program's annual Summer Institute. Attendees were industrial hygienists, safety and medical professionals from the region.

F. Future Plans. Depending on the NIOSH contribution, 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. For distance learning classes, the first web training will be fully operational by Fall 2006. We will institute marketing and outreach plans and create training targets and identify markets by Spring 2007. For the second distance-learning product, we plan to institute marketing and outreach by Spring 2008.

Appendix A

HST/HSAT Program Regional Advisory Committee

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ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Medicine Page 1 of 2

Course/Seminar Title	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC San Francisco	OM																		
Occ & Env Grand Rounds (annually) San Francisco, CA (17 1-hr events)		84	17	238	53	20	3	0	8	16	5	4	0	0	0	0	53	6	
Occ Med Monthly Research Seminar San Francisco, CA (10 1-hr events)		80	10	133	70	5	4	0	1	0	0	0	0	0	0	0	79	1	
Weekly Occ Med Case Conference Mr. Zion Hospital (45 1-hr events)		261	45	1958	195	33	33	0	0	0	0	0	0	0	0	0	261	0	
Occ Med Monthly Journal Club San Francisco, CA (10 1-hr events)		52	10	87	46	2	3	0	1	0	0	0	0	0	0	0	52	0	

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Medicine Page 2 of 2

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Davis	OM																		
25th Annual Occ & Env Medicine Symposium Sacramento, CA May 20, 2006		62	8	83	37	6	0	0	19	48	0	0	0	0	0	0	14	0	0
Ag Health & Safety Seminar Series Davis, CA (9 1-hr events)		169	9	254	75	0	0	0	94	47	0	0	0	0	0	0	109	13	0
Clinical Epidemiology & Study Design Davis, CA July 11-15, 2005		40	40	267	34	0	0	0	6	1	0	2	0	0	0	0	37	0	0
Subtotal	OM	748	139	3,018	510	66	43	0	129	112	5	6	0	0	0	605	20	0	20

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
 CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene Page 1 of 2

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH																		
Comprehensive Review of Industrial Hygiene Oakland, CA July 25-29, 2005		17	35.75	101	0	0	11	6	0	0	14	0	2	1	0	0	0	0	0
Fundamentals of Industrial Hygiene Oakland, CA July 25-29, 2005		12	28.75	58	0	2	2	7	1	9	2	0	1	0	0	0	0	0	0
IH Forum Series "Risk & Crisis Communication" Oakland, CA October 18, 2005		28	3	14	0	0	26	2	0	18	6	2	2	0	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Other Occupational Safety & Health Topics Page 1 of 3

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	OT																		
Emerging Infectious Diseases Oakland, CA July 25-26, 2005		17	13	37	1	3	5	7	1	12	1	2	2	0	0	0	0	0	0
Workers' Compensation Overview Update Oakland, CA July 25-26, 2005		44	12.25	90	11	19	3	7	4	26	0	3	3	0	12	0	0	0	0
Ventilation: Diagnose/Trouble shoot HVAC & Local Exhaust Oakland, CA July 27, 2005		12	7	14	0	0	5	7	0	10	0	1	1	0	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Other Occupational Safety & Health Topics Page 2 of 3

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer									
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	OT																			
Ergonomics Analysis for Job & Tool Design Oakland, CA July 28-29, 2005		35	13	76	1	2	1	4	27	30	1	1	0	0	0	3	0			
Noise & Noise Control Oakland, CA Sept 27, 2005		17	6	17	0	2	7	8	0	10	2	1	2	0	2	0	0			
COEH Symposium: Occ & Env Health in the Developing World Berkeley, CA October 28, 2005		146	6.5	158	12	17	21	10	86	19	4	10	6	1	106	0				

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Other Occupational Safety & Health Topics Page 3 of 3

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	OT																			
The New OSH Mgmt Systems - ANSI Z10 Oakland, CA Nov 1, 2005		17	6	17	0	0	5	8	4	13	1	1	2	0	0	0	0	0	0	0
Ergonomics Interventions & Research Berkeley, CA Dec 8-9, 2005 (co-sponsor U Mich)		108	12	216	11	10	4	22	61	71	1	1	6	4	23					2
Forum on Catastrophe Preparedness San Francisco, CA April 7, 2006		113	7.5	141	1	0	5	20	87	66	0	10	6	0	2	29				
Subtotal	OS&H	509	83	766	37	53	56	93	270	257	10	30	28	5	148	31				

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a

CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Hazardous Substances Training Page 1 of 3

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	HST																		
Respiratory Protection Overview Update Oakland, CA July 25-26, 2005		11	13.5	25	0	0	3	4	4		6	1	0	3	0	0	1		0
Dev of Respirator Chemical Cartridge & Filter Change Out Schedules Oakland, CA July 27, 2005		15	6.25	16	0	0	9	5	1		9	1	0	4	0	1			0
Occupational & Environmental Toxicology Oakland, CA July 28-29, 2005		14	13	30	5	3	4	2	0		9	0	0	0	0	0	5		0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
 CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Hazardous Substances Training Page 2 of 3

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	HST																		
Hazards of Pesticides to Emergency Responders Sacramento, CA Sept 7, 2005		46	4	31	0	0	6	9	31	3	2	11	20	0	0	0	10		
Hazards of Pesticides to Emergency Responders Las Vegas, NV Nov 17, 2005		24	4	16	0	0	9	1	23	1	1	2	19	0	0	0	1		
Pesticide Illness Injury Workshop San Diego, CA January 31, 2006		24	3	12	2	6	0	0	16	9	1	0	11	0	0	0	3		

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 1 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
AHERA Refresher - Asbestos Bldg Inspectors Richmond, CA Sept 19, 2005		6	3.5	4	0	0	1	0	0	5	3	0	0	2	0	0	1	0	0
AHERA Refresher - Asbestos Bldg Inspector/Mgmt Planner Richmond, CA Sept 19, 2005		31	7	36	0	0	8	10	13	16	2	0	9	0	0	4	0	0	0
AHERA Refresher - Asbestos Contractor/Supervisor Richmond, CA Sept 20, 2005		37	7	43	0	0	7	16	14	18	2	1	11	0	0	5	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a

CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 2 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer									
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	IH-A/L																			
AHERA Refresher - Asbestos Project Designers Richmond, CA Sept 21, 2005		20	7	23	0	0	5	8	7	12	0	2	3	0	3	0				
Continuing Education for Certified Lead Professionals Richmond, CA Sept 22, 2005		11	7	13	0	0	2	3	6	8	0	0	3	0	0	0				
Building Inspection for Asbestos Richmond, CA Sept 26-28, 2005		5	24	20	0	0	1	2	2	3	0	0	2	0	0	0				

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
 CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 3 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
Building Inspection/Mgmt Planning for Asbestos Richmond, CA Sept 26-30, 2005		19	40	127	0	0	5	8	6	10	4	2	2	1	0	0	0	0	0
Management Planning for Asbestos Richmond, CA Sept 29-30, 2005		1	16	3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Lead-Based Paint Inspection & Assessment Richmond, CA Oct 3-7, 2005		15	40	100	0	0	0	5	10	6	2	0	7	0	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
 CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 4 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	IH-AL																			
Practices & Procedures in Asbestos Control Richmond, CA Oct 17-21, 2005		20	40	133	0	0	3	6	11	15	0	3	2	0	0	0	0	0	0	0
Lead-Based Paint Abatement Supervision & Monitoring Richmond, CA Oct 24-28, 2005		11	40	73	0	0	1	0	10	5	0	0	6	0	0	0	0	0	0	0
AHERA Refresher - Asbestos Bldg Inspectors Richmond, CA Oct 31, 2005		6	3.5	4	0	0	0	3	3	3	1	1	1	0	0	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
 CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 8 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other		
UC Berkeley	IH-A/L																	
Building Inspection for Asbestos Richmond, CA Dec 5-7, 2005		4	24	16	0	0	0	0	0	4	1	1	0	2	0	0	0	0
Building Inspection/Mgmt Planning for Asbestos Richmond, CA Dec 5-9, 2005		10	40	67	0	0	2	0	8	4	2	1	2	0	1	0	0	0
Management Planning for Asbestos Richmond, CA Dec 8-9, 2005		1	16	3	0	0	0	1	0	0	0	0	1	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 9 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	IH-AL																			
Lead-Based Paint Inspection & Assessment Richmond, CA Jan 30-Feb 3, 2006		14	40	93	0	0	2	2	10	6	5	2	0	0	0	1	0			
AHERA Refresher - Asbestos Building Inspectors Richmond, CA Feb 6, 2006		7	3.5	4	0	0	0	0	7	1	0	0	4	0	2	0				
AHERA Refresher - Building Inspector/Mgmt Planner Richmond, CA Feb 6, 2006		31	7	36	0	0	7	6	18	18	6	2	3	0	2	0	0			

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a

CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 10 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer									
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
UC Berkeley	IH-A/L																			
AHERA Refresher - Asbestos Contractor/Supervisor Richmond, CA Feb 7, 2006		39	7	46	0	0	14	7	18	27	8	1	2	0	1	0				
AHERA Refresher - Asbestos Project Designers Richmond, CA Feb 8, 2006		24	7	28	0	0	16	1	7	16	3	1	2	0	2	0				
Continuing Education for Certified Lead Professionals Richmond, CA Feb 9, 2006		38	7	44	0	1	19	3	15	27	3	0	5	0	2	1				

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 12 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
AHERA Refresher - Asbestos Building Inspectors Richmond, CA Mar 8, 2006		7	3.5	4	0	0	4	0	0	3	2	0	0	4	0	0	1	0	0
AHERA Refresher - Asbestos Bldg Inspector/Mgmt Planner Richmond, CA Mar 8, 2006		16	7	19	0	0	5	2	9	7	1	0	5	0	3	0	0	0	0
AHERA Refresher - Asbestos Contractor/Supervisor Richmond, CA Mar 9, 2006		22	7	26	0	0	5	1	16	11	5	0	5	0	1	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a

CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 15 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
Lead-Based Paint Inspection & Assessment Richmond, CA April 24-28, 2006		10	40	67	0	0	1	2	7	3	1	1	5	0	0	0	0	0	0
Building Inspection for Asbestos Richmond, CA May 1-3, 2006		8	24	32	0	0	1	1	6	6	1	0	1	0	0	0	0	0	0
Building Inspection/Mgmt Planning for Asbestos Richmond, CA May 1-5, 2006		15	40	100	0	0	5	3	7	11	2	0	1	1	0	0	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a
CE Course Offerings by Program Area
Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 16 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession						# Trainees by Employer								
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
Management Planning for Asbestos Richmond, CA May 4-5, 2006		1	16	3	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
AHERA Refresher for Asbestos Building Inspector Richmond, CA May 16, 2006		5	3.5	3	0	0	0	0	0	0	5	3	0	0	2	0	0	0	0
AHERA Refresher - Asbestos Building Inspector/Mgmt Planner Richmond, CA May 16, 2006		12	7	14	0	0	0	8	1	3	4	1	3	3	0	1	0	0	0

ERC Applicant Institution: Northern California ERC
 Program Director: John Balmes

Table 12a

CE Course Offerings by Program Area
 Current Budget Period: July 1, 2005 to June 30, 2006

Program Area: Industrial Hygiene - Asbestos & Lead Training Page 17 of 19

Course/Seminar Title ¹	Program Area	Total Trainees	Length of Course	Total Pers Days	# Trainees by Profession							# Trainees by Employer							
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other			
UC Berkeley	IH-A/L																		
AHERA Refresher - Asbestos Contractor/Supervisor Richmond, CA May 17, 2006		16	7	19	0	0	4	1	11	7	0	3	3	0	3	0			
Continuing Education for Certified Lead Professionals Richmond, CA May 18, 2006		34	7	40	0	0	9	2	23	19	4	1	7	0	3	0			
Practices & Procedures in Asbestos Control Richmond, CA June 12-16, 2006		10	40	67	0	0	1	0	9	7	0	0	3	0	0	0			

ERC Applicant Institution: Northern California Education and Research Center
 Program Director: John Balmes

Table 12b
CE Course Offerings - Summary by Program Area
July 1, 2005 - June 30, 2006

Program Area	Number of Courses	Total Length of Course Days	Total Pers Days	# Trainees by Profession										# Trainees by Employer					
				MD	NURS	HYG	SAFETY	OTR	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other				
Industrial Hygiene (IH)	4	77	71	183	0	2	58	16	1	52	13	5	7	0	0	0			
Occupational Health Nursing (OHN)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Occupational Medicine (OM)	7	748	139	3018	510	66	43	0	129	112	5	6	0	0	0	605			
Occupational Safety	1	14	13.25	31	0	9	2	2	1	4	1	0	0	0	0	9			
Hazardous Substance Training (HST)	7	247	47	186	7	9	100	52	88	125	19	22	60	0	7	14			
Industrial Hygiene (IH) Asbestos & Lead Training	55	873	863	1947	0	2	216	163	481	458	92	45	206	3	57	2			
Agricultural Safety and Health (Ag S&H)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Other OS&H (OT)	9	509	83	766	37	53	56	93	270	257	10	30	28	5	148	31			
TOTAL	83	2468	1216.3	6131	554	141	475	326	970	1008	140	108	301	8	826	67			