

FINAL PERFORMANCE REPORT*

for the

Midwest Center for Occupational Health and Safety (MCOHS)
A National Institute for Occupational Safety and Health funded
Education and Research Center
Grant Number T42 OH008434

Ian A. Greaves, B Med Sci, MB BS
Center Director

July 1, 2002 – June 30, 2007

Division of Environmental Health Sciences
School of Public Health
University of Minnesota
Minneapolis, Minnesota 55455

September 30, 2007

* Prepared by MCOHS current leadership team and reviewed by Ian A. Greaves, B Med Sci, MB BS

Table of Contents

	Page
1. List of Abbreviations	2
2. Abstract	4
3. Highlights/Significant Results	6
4. Outcomes/Relevance/Impact	13
5. Technical Reports	14
MCOHS Centerwide Technical Report	15
MCOHS Program Technical Reports	25
A. Industrial Hygiene Program	25
B. Occupational and Environmental Health Nursing Program	37
C. Occupational and Environmental Medicine Program	47
D. Occupational Health Services Research and Policy Program	52
E. Occupational Injury Epidemiology and Control Program	65
F. Occupational Injury Prevention Research Training Program	71
G. Hazardous Substances Academic Training Program	84
H. Agricultural Safety and Health Program	97
I. Continuing Education and Outreach Program	103
J. Hazardous Substances Training Continuing Education Program	110
K. Agricultural Safety and Health Continuing Education Program	115
L. NORA Program	120
M. Pilot Projects Program	129
Appendices	135
Appendix 1: Publications	135
Appendix 2: Presentations	167
Appendix 3: Outreach	202
	250

1. List of Abbreviations

Abbreviation	Definition
AAOHN	American Association of Occupational Health Nurses
ABET	Accreditation Board for Engineering and Technology
ABPM	American Board of Preventive Medicine
ACGIH	American Council of Governmental Industrial Hygienists
ACGME	American Council on Graduate Medical Education
ACMT	American College of Medical Toxicology
ACOEM	American College of Occupational and Environmental Medicine
AIHA-UM	American Industrial Hygiene Association-Upper Midwest section
AIHCE	American Industrial Hygiene Conference and Exposition
AIIR	Airborne Infection Isolation Room
AOHC	American Occupational Health Conference
APHA	American Public Health Association
APT	Appointment, Promotion and Tenure
ASABE	American Society of Agricultural and Biological Engineers
ASH	Agricultural Safety and Health
ASSE-NW	American Society of Safety Engineers – Northwest
ATSDR	Agency for Toxic Substances and Disease Registry
B Med Sci	Bachelor of Medical Science
BAE	Biosystems and Agricultural Engineering
BS	Bachelor of Science
CCHEST	Council on Certification of Health Environmental and Safety Technologists
CDC	Centers for Disease Control and Prevention
CE	Continuing Education
CEPH	Council on Education for Public Health
CEU	Continuing Education Unit
CGR	Community Grand Rounds
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CIHR	Comprehensive Industrial Hygiene Review
CMF	Composite Microporous Fibers
CMS	Centers for Medicaid and Medicare Services (formerly Health Care Financing Administration)
COPD	chronic obstructive pulmonary disease
CPHEO	Centers for Public Health Education and Outreach
CSOMA	Central States Occupational Medicine Association
CSP	Certified Safety Personnel
DLG	Digital Learning Group
DNR	Minnesota Department of Natural Resources
DPS	Minnesota Department of Public Safety
EMS	Emergency Medical Services or Emergency Medical System
EnHS or EHS	Division of Environmental Health Science
ERC	Education and Research Center
ERPIQ	Emergency Response Plan IQ
FAAN	Fellow of the American Academy of Nursing
HPM	Health Policy and Management
HSAT	Hazardous Substances Academic Training Program
HST	Hazardous Substances Training

Principal Investigator/Program Director (Last, First Middle): Greaves, Ian A.

HUD	Housing/Urban Development
HVAC	heating, ventilating, and air-conditioning
IH	Industrial Hygiene
IT	Institute of Technology
ITV	Interactive Television
JD	Doctor of Jurisprudence
M.D	Medical Doctor
MAOHN	Minnesota Association of Occupational Health Nurses
MBBS	Bachelor of Medicine and Surgery
MCOHS	Midwest Center for Occupational Health and Safety
MEHA	Minnesota Environmental Health Association's
MN DOER	Minnesota Department of Employee Relations
MNDOT	Minnesota Department of Transportation
MnTAP	Minnesota Technical Assistance Program
MPCA	Minnesota Pollution Control Agency
MPH	Master of Public Health
MS	Master of Science
MSC	Minnesota Safety Council
MT	Medical Toxicology
NACCHO	National Association of County and City Health Officials
NAGCAT	North American Guidelines for Children's Agricultural Tasks
NCICP	National Center for Injury Prevention and Control
NCOEMA	North Central Occupational and Environmental Medicine Association
NIOSH	National Institute for Occupational Safety and Health
NORA	National Occupational Research Agenda
OEHN	Occupational and Environmental Health Nursing
OEM	Occupational and Environmental Medicine
OHSRP	Occupational Health Services Research and Policy Program
OIECP	Occupational Injury Epidemiology and Control Program
OIPRTP	Occupational Injury Prevention Research Training Program
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
P & A	Professional and Administrative
PDCs	Professional Development Courses
PH Cert-OHS	Public Health Certificate in Occupational Health and Safety
PhD	Doctor of Philosophy
PHI	Public Health Institute
PPRTP	Pilot Projects Research Training Program
PubH	Public Health
R2P	Research to Practice
RN	Registered Nurse
RRC	Preventive Medicine Residency Review Committee
RRV	Red River Valley
RWJ	Robert Wood Johnson Foundation
Sc.D	Doctor of Science
SEP	Special Emphasis Panel
SPH	School of Public Health
TLV	Threshold Limit Value
UMAB	University of Maryland, Baltimore
UMN	University's Regional Partnership for Sustainable Development

Principal Investigator/Program Director (*Last, First Middle*): Greaves, Ian A.

Partnerships	
USDA	United States Department of Agriculture

2. Abstract

MIDWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY EDUCATION AND RESEARCH CENTER

The purpose of the Midwest Center for Occupational Health and Safety (MCOHS) Education and Research Center (ERC) is to ensure an outstanding center that provides: 1) cutting-edge interdisciplinary academic and research training to prepare exceptional leaders who make significant contributions to the field of occupational health and safety, and (2) continuing education to prepare professionals in the field to address current and emerging threats to the nation's health and safety. This ERC, one of 16 nationwide, was designed in response to a mandate of the National Institute for Occupational Safety and Health (NIOSH) -- to provide an adequate supply of qualified personnel to carry out the purposes of the Occupational Health and Safety Act and reduce the national burden of work-related injury and illness. The MCOHS, recognized regionally, nationally, and internationally for its impact, has a service area that includes Minnesota, Wisconsin, and North and South Dakota. The MCOHS provides graduate degree programs, continuing education and outreach activities, and serves as a regional resource for industry, labor, federal, state, and local government agencies, agriculture, and other interested parties.

For over 30 years, the MCOHS has successfully served the educational and research needs of occupational health and safety professionals and workers in the upper Midwest and nationally and, more recently, at the global level. Outstanding graduate and continuing professional education programs have been created in: occupational medicine; industrial hygiene; occupational and environmental health nursing; occupational injury prevention research; and occupational health services research and policy. Selected academic and continuing education training programs also offer innovative specialization tracks and continuing education in agricultural safety and health and hazardous substances to better meet the health and safety needs of a diverse workforce. An external advisory board, consisting of occupational safety and health practitioners and community leaders, advises the Center's administration and faculty on trends shaping practice in occupational safety and health and implications for the Center's education, research, and outreach efforts.

The academic programs offer professional education at the master's and doctoral levels. The purpose of master's level (MPH, MS, and dual-degree MS/MPH) training is to produce well-trained specialists in occupational health and safety. Graduates of the masters' programs serve the needs of industry, government agencies, private consulting, clinical practice, and labor and community groups. The research training (PhD) programs are designed to produce independent investigators who will provide occupational health and safety leadership in academia, industry, and government. To increase the Center's educational "reach", provide cost-efficient continuing education, and respond to feedback from occupational safety and health professionals throughout the region, the MCOHS collaborates closely with the Continuing Education administrative home, the Centers for Public Health Education and Outreach (CPHEO), to provide more alternative learning strategies. CPHEO has an outstanding record in continuing education, as well as in distance learning that includes a new Digital Learning Group with expertise to create interactive online learning products.

During the past five years, the academic programs have graduated 60 professionals. During this same period, 108 students were enrolled in degree programs; of these, 74 were new trainees. Continuing education programs, including hazardous substance training and agricultural health and safety, offered a total of 223 courses that were attended by 5,885 participants. The Midwest Center's faculty and staff continued to provide outreach and service to educational institutions, professional organizations, governmental agencies, industry, and the general public throughout the region.

An extensive number of externally-funded research grants (n=116), in concert with center support, was generated by program faculty between 2002 and 2007 and provided strong support for the high quality of research production by the programs. During the past five years, resulting publications in peer-reviewed journals and professional presentations at the local, national and international levels, have addressed cutting-edge research in occupational health and safety. There has been a minimum of 163 faculty and student peer-reviewed publications. In addition, there have been a minimum of 350 faculty and student research presentations related to the programs; this includes research disseminated at local, regional, national and international professional meetings. Students were directly involved in a minimum of 78 publications and 93 presentations. Disseminating these results to audiences beyond our immediate MCOHS region extends the reach, visibility, and reputation of our Center. Most importantly, many of the papers and presentations have also provided a basis for translation of research into practice that are being used to impact worker protection. Examples of the impact on worker protection, based on faculty/student research and outreach activities, include the following that represent only a small proportion of the MCOHS activities. (Refer, also, to a brochure developed by the new leadership: <http://www.cpheo.sph.umn.edu/img/assets/9114/rtp.pdf>):

- Studies among agricultural household members on both agriculture and non-agriculture-related injuries, in five upper Midwest states, identified not only incidence and consequences of these injuries for all ages – but, also risk factors for agriculture-related injury among children; results have served as a basis for development of intervention efforts and dissemination to key professionals as well as the agricultural community.
- Results from evaluation of a method for incorporating professional judgment regarding exposure assessment quantitatively into industrial hygiene decision-making indicated that targeted training dramatically improves the accuracy of exposure decisions.
- Identification of risk factors for occupational violence, in a large Midwestern health care system, provided a basis for interventions including the redesign of a violent incident reporting surveillance system in order to target high-risk areas/situations, and development of fact sheets for managers and employees to enhance proactive activities and, thus, prevent adverse outcomes.
- Two major studies on work-related violence in populations of employees (one focusing on nurses and the other on Kindergarten-12th grade educators) enabled identification of the magnitude of the problem (physical and non-physical violence), and risk factors for physical assault. Many findings have been disseminated broadly to key decision-makers as well as the populations at-risk and are being used as a basis for focused intervention efforts.
- Identification of worker health and safety exposures throughout the milk production and processing system and critical biosecurity control points to protect milk from intentional contamination has complemented strong educational program, outreach and research relationships with state and federal agencies to ensure safety of potentially exposed workers as well as the general public.
- A collaborative effort with two state agencies identified improved methods for assessment of methamphetamine vapor and aerosol in a former clandestine methamphetamine laboratory that enables improved safety for hazards remediation workers.
- Research, pertinent to agricultural worker and family safety of Asian immigrants, has directly led to efforts addressing the control of occupational health exposures from H5N1 Avian Influenza in Vietnam, Thailand, and in communities throughout the United States.
- Findings from a study of hospital negative-pressure isolation rooms, relevant to control of airborne bacteria or viruses exhaled by infected patients, are being used to guide improvements in isolation capabilities to protect workers and others against emerging diseases. including H5N1 Avian Influenza.
- A study of occupational medicine physicians on the importance of specific core competencies required of their specialty, provides guidance for the content of training programs, including a need for greater emphasis on career development skills.
- Based on a demonstration and evaluation project, disability prevention principles and practices were disseminated through national medical journals, a workers' compensation website, and inclusion within the formal curricula of residency programs and the ACOEM Disability Prevention Guideline.
- A study of employed women's health after childbirth revealed vaginal (versus cesarean) delivery to be strongly associated with overall improved physical health at five weeks after childbirth, an important finding given a cesarean delivery rate in the United States at a record high of 29% in 2004. The published findings were highlighted in 2006 as important to practitioners by the editor of *The American Family Physician*, a peer-reviewed journal of the American Academy of Family Physicians that reaches more than 190,000 family physicians and other clinicians.

The MCOHS faculty and students have also received numerous prestigious awards during the past five years that have recognized their contributions to the field of occupational safety and health. These awards provide further evidence of the impact accomplished by the center efforts.

In summary, the MCOHS has demonstrated excellence in graduate and continuing professional education in occupational safety and health and incorporates novel distance learning technologies to serve the needs of a diverse workforce. The MCOHS is committed to continued excellence in occupational safety and health education and research for the Midwestern United States that is recognized globally, and will continue to produce the leaders who make important contributions to the safety and health of the nation's workforce.

3. Highlights and Significant Results

The purpose of the MCOHS ERC is to provide outstanding academic and continuing education programs to professionals in the key disciplines of occupational health and safety, to conduct outreach to various stakeholders and community groups in areas of workplace health and safety, and to undertake research of occupational health and safety problems in keeping with priorities of the National Occupational Research Agenda of the National Institute for Occupational Safety and Health (NIOSH). Specific results related to the Center's specific objectives are described below.

a. Provide outstanding academic education programs:

During the past five years, the academic programs have graduated 60 professionals. During this same period, 108 students were enrolled in degree programs; of these, 74 were new trainees.

- Within the MCOHS, the Occupational and Environmental Medicine, Industrial Hygiene, Occupational and Environmental Health Nursing and Occupational Injury Epidemiology and Control (OEM, IH, OEHN, and OIECP) programs updated prior surveys of alumni, which requested graduates from 1992-2005 to rate the value of, and personal proficiency in, core competencies for their respective disciplines. The most recent survey, completed in 2006, provided findings that graduates of occupational health and safety programs continue to rank the MCOHS ERC competency set as high in value and report high levels of proficiency in most competencies.
- Within the OEM program, led by Drs. Baker (to 12/06) and RoeberRice (12/06 to present), a total of 12 specialists graduated. All of these physician graduates are employed in positions in which they are working to protect the health and wellness of workers, mostly in the clinical practice of OEM; however many of these graduates serve as medical directors, as well.

One of the major accomplishments, for the OEM program, has been the implementation of a new curriculum model. The OEM Residency Training Program offers a structured two-year training experience, combining an academic phase, leading to a Master's in Public Health (MPH) degree, with the practicum experience emphasizing practice and research in a variety of service settings to include corporations, government agencies, and private health care organizations. Integrating these experiences throughout the two-year period facilitates earlier clinical exposure, provides increased flexibility to accommodate scheduling of all required courses and allows for more evenly distributed research time throughout the training program.

- The IH program, led by Dr. Ramachandran and supported by excellent faculty, has successfully prepared occupational hygiene professionals at the Master's' degree level for positions in industry, consulting companies, and governmental agencies, and at doctoral level as leaders in industry. Over the past five years, 29 students earned Master's' degrees (12 MPH; 17 MS degrees); one student completed a PhD. In 2006-2007, 12 Master's-level students enrolled (6 MPH, and 6 MS). Of these, one was a part-time trainee. There are currently five PhD students enrolled.

IH results from the MCOHS survey of alumni for their satisfaction with, and perceived value and proficiency in their academic training, relevant to discipline-specific and cross-cutting professional competencies, were as follows: 75% (46 of 61) of the IHs contacted participated; 72% were "highly satisfied" or "satisfied" (24%) with their graduate education in occupational safety and health (OSH) and 89% were working in OSH. Among those who responded, 79% had current certification as Certified Industrial Hygienists (CIH)s and 37% as Certified Safety Professionals (CSP)s. Of those whose primary role was not in OSH, 100% reported using the knowledge and skills learned in the graduate program in their current job.

Results of the alumni survey, involving the Hazardous Substances Academic Training Program (HSAT), a program within IH, indicated that 10 of 46 IH graduates also identified themselves as alumni of the HSAT Program. Findings revealed that most HSAT alumni were "very satisfied" (60%) or "somewhat satisfied" (30%) with their graduate education in OSH and 90% were currently working in OSH positions. Among those who responded, 3/10 had current certification as CIHs, 1/10 as a CSP, and 1/10 as a , Certified Hazardous Materials Manager (CHMM). The relatively low level of certification reported by HSAT alumni is due, in part, to 50% of the respondents receiving their degrees in 2003 or later.

- The OEHN program led by Professor McGovern, and supported by Dean Olson and Professor Nachreiner and other ERC faculty, has successfully prepared practitioners at the masters-level that function as administrative leaders in occupational health and safety in business, industrial or health care settings, and researchers and educators at the doctoral level. Over the past five years, 14 students earned Master's' degrees (10 MPH and 4 dual MS-MPH degrees); and one student completed a PhD. In 2006-2007, 10 master's-level students (6 MPH, and 4 dual degree) and one PhD student were enrolled.

OEHN results from the MCOHS survey of alumni for their satisfaction with, and perceived value and proficiency in their academic training, relevant to discipline-specific and cross-cutting professional competencies, were as follows: 73% (24) of the nurses contacted participated; 92% were "highly satisfied" and 8% were "satisfied" with their graduate education in occupational health and

safety (OHS), and 63% were working in occupational health and safety. Among those whose primary role was not in OHS, 88% reported using the knowledge and skills learned in the graduate program in their current job.

Program research efforts have been strongly supported by externally funded grants, during the period of interest, that have resulted in 22 published or "in press" peer-reviewed papers and one dissertation and 50 oral or poster presentations at national, regional and local professional meetings – all involving students and faculty.

- The OHSRP program is led by Professors Dowd and McGovern and supported by excellent faculty from the divisions of environmental health sciences and health policy and management in the School of Public Health. The program prepares graduates for occupational health services research and policy positions in academic institutions, and public and private agencies. During this reporting period, five doctoral students were enrolled; one graduated (July 2007) and accepted employment as an Assistant Professor in health outcomes for a department of environmental health at the State University of New York, Brooklyn. As evidenced by the many examples of research publications and papers in press (26) and presentations (34), new projects, courses, awards and promotions of faculty and students, and examples of impact on the field, this program continues to be both innovative and dynamic and positively influences the field for occupational health services research.
- The OIECP program, led by Drs. Gerberich and Maldonado, provided a multifaceted approach to academic and research training in the prevention and control of injuries by utilizing an epidemiological framework that considered the worker, hazardous agents and energies, and the respective vehicles of these agents within the environment, utilizing strategies involving engineering and technology, education, and legislative approaches. *With implementation of a new doctoral training program in 2001 (OIPRTP), the OIEC program provided only masters' level training, until it was phased out in 2003.* Between 2002 and 2003, three students graduated with MPH degrees and acquired excellent positions that are important to the field; peer-reviewed research publications resulted from their masters' research efforts.

From the 2006 alumni survey of graduates between 1995 and 2005, 11 graduates of the OIECP program participated. Findings revealed that OIECP alumni were "very satisfied" (64%) or "somewhat satisfied" (27%) with their graduate education in occupational safety and health (OSH). The findings on the interdisciplinary competencies addressing "recognition," "evaluation," "control," "communication," "behavior" and "management" revealed that almost all OIECP alumni rated most competencies as "very valuable" or "valuable". The competencies with the most frequent ratings of "very valuable" were: writing well (91%), understanding the relationship between occupational exposures and health outcomes (82%), and communicating effectively with a variety of stakeholders (e.g., management, labor) (82%). Alumni most frequently perceived themselves as "very proficient" in the following competencies: interpreting and applying scientific findings (64%), and functioning effectively on an interdisciplinary team (64%).

- The OIPRTP doctoral program, led by Drs. Gerberich and Alexander and supported by many faculty, incorporates advanced doctoral-level training through curriculum and research opportunities that involve multidisciplinary collaborations with experts in safety, occupational injury epidemiology, engineering and human factors/ergonomics, medicine, and the social sciences, including occupational psychology. Specific opportunities involving industry, labor, and the public sector, including workers' compensation programs, are also included. During this period, OIPRTP enrollment increased to eight full-time doctoral students; two graduated in 2006 and have acquired excellent positions, pertinent to occupational health and safety. Program research efforts have been strongly supported by numerous externally funded grants (n = 31). Publications and presentations, involving students, There were 33 national and international publications and 75 presentations delivered at local, national and international professional meetings – all involving students and faculty; there were also numerous additional publications and presentations by faculty, that did not involve students. Students, as well as faculty, were also the recipients of many prestigious awards during the five-year period.
- The ASH program, led by Dr. John Shutske, and several excellent faculty and staff, is a supporting program that has collaborated with IH, OEHN, OEM, OIECP, and OIPRTP, thus, providing enhanced program opportunities for these students in agricultural safety and health as well as partial trainee support. During this period, there have been six students and five graduated. This program has been most successful in generating research grants that address unique agricultural populations. A total of 10 publications and five theses, as well as 37 presentations were identified.

b. Provide outstanding continuing education programs:

Between, July 1, 2002 and June 30, 2007, continuing education programs, including hazardous substance training and agricultural health and safety, involved a total of 223 courses that were attended by 5,885 participants.

- The CE Program, in concert with ERC academic program directors, added to the successful NORA presentations in June 2007, by presenting a "Research-to-Practice (r2p) Symposium" (now available as a webcast); 45 participants were involved in this onsite

program. All CE online programming is available free of charge and attracted 1,012 participants during the recent one year period, an increase from the previous year.

- The CE program has continued to offer important skill building courses such as Spirometry and Hearing Conservation, adding courses with current topical interest, such as the mold identification, aging workforce, and workforce impact of a pandemic, and by expanding the number and type of distance learning opportunities offered.
- The CE Program continues to expand its strong tradition of collaboration, outreach and leadership with professional organizations. The Team Approach, a unique interdisciplinary effort – sponsored annually by the American Society of Safety Engineers – Northwest (ASSE-NW) chapter, American Industrial Hygiene Association-Upper Midwest section (AIHA-UM - Minnesota Association of Occupational Health Nurses (MAOHN), North Central Occupational and Environmental Medicine Association (NCOEMA), North Star Chapter of the Academy of Certified Hazardous Materials Managers, MCOHS and the Minnesota Safety Council is one example of this.
- Two blended courses were offered: Comprehensive Industrial Hygiene Review (CIHR) and Case Management. Both programs were used by participants as a review before sitting for certification examinations.
- Significant progress was made in distance-based education, visible in: 1) online course components available as part of the MCOHS Regents Certificate in OSH and three additional public health certificates; 2) modularized core OSH program academic course content and developed into distinct web-based learning activities; 3) National Occupational Research Agenda (NORA) programs - expanded their reach with online webcast/video-streamed versions of face-to-face programs; 4) blended courses offered for two certification review courses; and 5) Team Approach program “Pandemic: Are You Ready”, captured and offered as a free web-cast serving 221 people in first two months online
- Three NORA initiatives, designed to stimulate and disseminate research on workplace safety and health, were offered: 1) 2004 NORA Symposium – a 2.5 day program focusing on traumatic injury, occupational health services research, exposure assessment, musculoskeletal disease syndromes, and organization of work – a research poster session was included; 2) 2005 NORA Program Seminars – three evening lectures focusing on vulnerable working populations, the concerns with viewing occupational and environmental issues separately, and the aging workforce; 3) 2007 one day NORA Symposium, involving two key national speakers and a research poster session of student and faculty research.
- A comprehensive needs assessment was conducted, employing multiple strategies such as interviews, surveys, focus groups, and professional association data, to assess the learning needs of OSH professionals.
- During 2002-2007, the Midwest Center exhibited HST course materials through venues with the following organizations: The American Occupational Health Conference; the American Industrial Hygiene Conference; and Minnesota Association of Occupational Health Nurses. The MCOHS participated through attendance and exhibit in the Minnesota Governor’s Homeland Security/Emergency Management Conference in March 2005 and 2006, the Minnesota Safety Council annual conference in May 2005 and 2006, the national meeting of the Waste Water Operators, June 2005, and the Minnesota Department of Health Community Health Services Conference in September 2005. During 2006-2007, face-to-face courses were marketed through a variety of new venues. The addition of these new partnerships provided an opportunity to increase enrollment through students previously unfamiliar with course offerings of MCOHS. The HST program also maintained strong partnerships with multiple agencies. Hazardous Substance Training courses were marketed through regional professional organizations and through MCOHS and NIOSH ERC exhibits at national and local professional meetings..
- During this period, over 20 innovative courses were developed and offered, based on identified needs of the NIOSH HST target audience.
- During 2006-2007, HST-CE 22 face-to-face courses were offered to over 220 participants. Courses ranged from three hour hazard awareness trainings to 40 hour (5-day) emergency response. Courses were offered to a variety of audiences, including public health departments, tribal entities, fire departments and city public works departments, both at their location and at the CE training center. Twenty-three requests for HST tuition subsidies were received and support was provided for the courses.
- Six new HST courses were developed during this time period.

c. Conduct outreach to various stakeholders and community groups

The Midwest Center’s faculty and staff continued to provide outreach and service to educational institutions, professional organizations, governmental agencies, industry, and the general public throughout the region.

- A new Medical Toxicology (MT) fellowship program accepted the first trainee at Regions/HealthPartners in July 2005. This training program is a joint venture between the Emergency Medicine and Occupational and Environmental Medicine Departments at Regions/HealthPartners and the Minnesota Regional Poison Center.
- Interdisciplinary Graduate and C.E. "Research to Practice" Courses were developed. Professors McGovern and Gerberich, Dean Olson and the Centers for Public Health Education and Outreach (CPHEO), and Dr. Lisa Brosseau developed a NORA symposium in May 2004 and three NORA seminars in 2005. These events facilitated translation of "Research to Practice" (r2p). The 2004 symposium, "NORA Health and Safety Priorities for the 21st Century," featured nationally known experts to identify research priorities and initiatives in OSH research. The 2005 seminars included: Dr. Rosie Sokas, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations;" Dr. Nick Ashford, "The Consequences of Thinking about Environmental and Occupational Health as Separate Entities;" and Dr. David Wegman, "Health and Safety Issues: the Aging Workforce," April 21. The presentations can be accessed via <http://cpheo.sph.umn.edu/cpheo/events/NORA.html>. In 2007, a one day NORA Symposium, "Translation of Research to Practice," involved two key national speakers, Dr. Jane Lipscomb, "A Model For Implementing, Evaluating And Translating Violence Prevention Intervention Research In The Health Care And Social Service Workplace" and Dr. Laura Punnett, " Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs." A poster session of student and faculty research, was also held.
- The CE Program has developed extensive cooperative working relationships with federal, state, and local agencies, various industries, labor groups and professional organizations. During the past five years, the network of relationships included organizations dealing with public health (PH), PH preparedness, hazardous substances, environmental health, pollution prevention, tribal college issues, agriculture, and health care. The Center's history of outreach to other organizations, institutions, agencies and professional associations is substantial.
- Partnerships were initiated with the Central States Occupational Medicine Association (CSOMA) and MSC to offer education programs to OSH professionals.
- Several agency partnerships were established with the Leech Lake Band of Ojibwe, bringing training to tribal workers across disciplines.
- In partnership with the Occupational and Environmental Medicine core program and Regions Hospital, a monthly Occupational Medicine Community Grand Rounds (CGR) seminar has been offered to OSH professionals.
- Four tailored three hour Hazardous Materials Awareness courses were presented to the City of White Bear Lake (January 23 and 24th, 2007); these courses reached over 120 participants from a variety of city sectors.
- One three-hour Hazardous Materials High Pressure Awareness course, April 4, 2007, was offered in Federal Dam, Minnesota; 24 fire department volunteers attended, most from the neighboring Leech Lake Tribal Community in Northern Minnesota.
- One toxic awareness and identification course was offered to a diverse neighborhood group in Minneapolis for 12 individuals in August 2006, at their request.

d. Undertake research of occupational health and safety problems in keeping with priorities of the National Occupational Research Agenda of the National Institute for Occupational Safety and Health (NIOSH).

An extensive number of externally-funded research grants (n = 116), in concert with center support, were generated by program faculty between 2002 and 2007 and provided strong support for the high quality of research production by the programs. During the past five years, resulting publications in peer-reviewed journals and professional presentations at the local, national and international levels, have addressed cutting-edge research in occupational health and safety. There has been a minimum of 163 faculty and student peer-reviewed publications, directly related to the programs. In addition, there have been a minimum of 350 faculty and student research presentations related to the programs; this includes research disseminated at local, regional, national and international professional meetings. Students were directly involved in a minimum of 78 publications and 93 presentations. Disseminating these results to audiences beyond our immediate MCOHS region extends the reach, visibility, and reputation of our Center. Most importantly, many of the papers and presentations have also provided a basis for translation of research into practice that are being used to impact worker protection. Examples of the impact on worker protection, based on faculty/student research and outreach activities, include the following that represent only a small proportion of the MCOHS activities. (Refer, also, to: cpheo.sph.umn.edu/img/assets/9114/rtp.pdf):

- Studies among agricultural household members on both agriculture and non-agriculture-related injuries, in five upper Midwest states, identified not only incidence and consequences of these injuries for all ages – but, also risk factors for agriculture-related injury among children; results have served as a basis for development of intervention efforts and dissemination to key professionals as well as the agricultural community.
- Establishment of a guide for measuring worker exposures to airborne nanoparticles resulted from a measurement study of engineered and incidental nanoparticle levels, potentially inhaled by workers in a variety of workplaces.
- Results from evaluation of a method for incorporating professional judgment regarding exposure assessment quantitatively into industrial hygiene decision-making indicated that targeted training dramatically improves the accuracy of exposure decisions.
- Identification of risk factors for occupational violence in a large Midwestern health care system, provided a basis for interventions: redesign of a violent incident reporting surveillance system in order to target high risk areas/situations; development of fact sheets for managers and employees to enhance proactive activities and, thus, prevent adverse outcomes.
- Two major studies on work-related violence in populations of nurses and Kindergarten-12th grade educators enabled identification of the magnitude of the problem (physical and non-physical), and risk factors for physical assault. Many findings have been disseminated broadly to key decision-makers as well as the populations at-risk and are being used as a basis for focused intervention efforts.
- Identification of critical biosecurity control points to protect milk from intentional contamination complements strong educational program, outreach and research relationships with state and federal agencies to ensure safety of potentially exposed workers as well as the general public.
- A collaborative effort with two state agencies identified improved methods for assessment of methamphetamine vapor and aerosol in a former clandestine methamphetamine laboratory that enables improved safety for hazards remediation workers.
- Research, pertinent to agricultural worker and family safety of Asian immigrants, has directly led to efforts addressing the control of occupational health exposures from H5N1 Avian Influenza in Vietnam, Thailand, and in communities throughout the United States.
- Findings from a study of hospital negative-pressure isolation rooms, relevant to control of airborne bacteria or viruses exhaled by infected patients, are being used to guide improvements in isolation capabilities to protect workers and others against emerging diseases. Including H5N1 Avian Influenza.
- A study of occupational medicine physicians on the importance of specific core competencies required of their specialty, revealed findings that provide guidance for the content of training programs, including a need for greater emphasis on career development skills.
- A demonstration and evaluation project, pertinent to disability prevention, resulted in dissemination of disability prevention principles and practices through national medical journals, a workers' compensation website, and inclusion within the formal curricula of residency programs and the ACOEM Disability Prevention Guideline.
- Identification of pathways of pesticide exposures to the farmer, spouse and children, aged four to 17, serves as a basis for development of improved metrics in studies pertinent to health effects.

Key and Supporting ERC faculty have been extremely successful in generated externally funded research support that provides a basis for the MCOHS training efforts. Selected examples of recently funded projects for this reporting period follow:

- Dr. Mandel, with support of Drs. Alexander, Ramachandran, Greaves, and Bender, has been instrumental in developing a new research project focused on the taconite mining industry in northeastern Minnesota. This is a collaborative effort with the Minnesota Department of Health that is a three-part investigation including a cohort mortality study of employees in the taconite mining industry (n=72,000), a nested case-control study of mesothelioma cases occurring within the above cohort, and a cross-sectional assessment of respiratory health within current and former miners of the taconite industry.
- Drs. Raynor and Shutske are co-investigators on a new Centers for Disease Prevention and Control (CDC) funded Upper Midwest and Thailand Zoonotic Disease Cooperative Research Center, focused on the ability of low-pathogenic avian and swine influenza viruses to be transmitted from animal hosts to humans. A key part of Dr. Raynor's effort is to measure the effect that hygiene and personal protection interventions have on the rates of virus transmission to persons working with infected animals.
- Ms. Schermann, Agricultural Safety and Health (ASH), acquired funding to collect data from chicken and duck farmers, market managers, veterinarians and animal health workers, and local government officials in the Red and Mekong River Delta Regions of Vietnam. The goals of this project are to: learn about the behaviors, practices, and beliefs of poultry producers related to HP Avian

Influenza Virus (AIV) H5N1 transmission and prevention; learn from producers about current interventions and their ideas for new interventions for prevention; identify barriers to current interventions; learn about communication channels and perceived effectiveness; and learn about surveillance practices.

- Dr. Ramachandran is serving as coinvestigator on a new project, funded by the National Science Foundation that is evaluating oversight models for active nanostructures and nanosystems.
 - Professor Ramachandran is also serving as coinvestigator on a new project titled, Healthy Homes Technical Studies Grant Program, funded by the United States Department of Housing/Urban Development (HUD). The project investigates the physical factors that affect the retention of allergens in settled dust in carpets, with applications to office workplace settings that typically have commercial carpeting of the type studied in this project.
 - Dr. McGovern was awarded funding from the Academic Health Center Health Disparities Research Program to support a qualitative investigation of women's perception of pesticide exposures in Minnesota's Red River Valley. Maggie Stedman Smith, (Occupational and Environmental Health Nursing (OEHN) and ASH doctoral student), has been using this data for her dissertation research. Numerous collaborators are involved.
 - Dr. Gerberich was awarded funding from NIOSH for a five-year study, "Consequences of Injuries among Children," in collaboration with research team colleagues (Drs. Alexander, Church, McGovern, Dowd, others), staff (A. Ryan), and OIPRTP doctoral student Q. Williams. The major goals of this research, implemented in the Midwest region, involving Minnesota, Wisconsin, North and South Dakota, and Nebraska, are to identify physical, psychosocial, and economic consequences of injuries that occur among children and youths living/working in agricultural operation households; a unique design enables examination of potential changes between baseline and follow-up data, comparing injured and non-injured households while controlling for important factors including injury/illness experience among other household members.
 - Drs. Shutske and Raynor and student Peri Periakruppen were funded by the Minnesota Department of Agriculture and National Institute for Occupational Safety and Health to conduct a comprehensive, quantitative analysis of Minnesota's fluid milk system from the farm, to processors, through retail sales to consumers in an effort to identify critical control points and intervention strategies to protect against intentional contamination by terrorists or other individuals wishing to cause harm (including economic damage or harm to public health). A secondary objective was to identify risks to workers from their exposures to chemical or biological agents that could be used in a contamination event.
 - Dr. Shutske and staff (Schermann) collaborated with Goodwill/Easter Seals Minnesota in a USDA funded project which provides research-based information, on-site visits, individualized assessment, and education for Minnesotans with disabilities who have goals to safely continue farming and/or farm-related occupations. The project targets farmers, farm family members, agricultural workers, rural health care providers and agri-business leaders through educational presentations, regular mailings, collaborative service agreements, a peer support network, and on-site visits.
- Dr. Shutske and staff were also funded by the USDA to develop a comprehensive, research-based assessment (titled "ERPIQ" – Emergency Response Plan IQ). Assessment data are used to build educational programs to improve the skills of growers and encourage specific actions and behaviors that will help growers improve their business and reduce risk. Data related to growers' perception of risk shows that growers are keenly aware of the potential devastating effects of events such as a foodborne illness outbreak from their products – but consider the probability low. They are much more concerned about weather-related issues, such as tornadoes and floods. This work is also tied to the risk-communication research team of the National Center for Food Protection and Defense.
- Dr. Shutske, Dean Olson, and staff (Rasmussen) were funded by the Centers for Public Health Preparedness (CDC) for "FSI – Food Security Investigation." Evaluation results were analyzed from a series of educational workshops for the food industry and food regulatory community.
 - Dr. Alexander was funded by the CDC for a respiratory health screening study of a population with potential environmental exposures to asbestos from a vermiculite processing plant in northeast (NE) Minneapolis, Minnesota. The vermiculite used in this plant (as well as in hundreds of other processing plants throughout the United States) was mined in Libby, Montana. Studies of Libby vermiculite miners, family members, and town residents have shown a greatly increased risk of asbestos-related respiratory disease. The NE Minneapolis study is the first study to examine potential health outcomes at the community level from a vermiculite processing plant outside of Montana and the findings will be important in addressing the potential health risks in the hundreds of other communities that also processed Libby vermiculite.

The faculty and staff of the MCOHS have also been successful in the reporting period 2002-2007, as exemplified in the awards and honors listed below:

- Dr. Lisa Brosseau, Associate Professor, was named the 2007 American Council of Governmental Industrial Hygienists (ACGIH) Meritorious Achievement Award recipient. This award is presented annually to members who have made an outstanding, long-term contribution to the field of occupational health and industrial hygiene. In 2006, she received the prestigious Alice Hamilton Award from the American Industrial Hygiene Association. This award, established in 1993, recognizes outstanding women for their achievements and contributions to the field of occupational hygiene.
- Dr. Susan Gerberich, was appointed to Mayo Professor of Public Health, School of Public Health (SPH). This award is the school's highest recognition of its faculty members. The professorship recognizes the achievements of senior SPH faculty members who demonstrate excellence in research, teaching and outreach. Gerberich is best known for helping to found and being a major contributor to the field of injury prevention research.
- Dr. Patricia McGovern was promoted to the rank of full Professor in June 2007. She also received the Faculty Excellence Award from the graduating class of 2006 in the Division of EHS.
- Associate Dean Debra Olson was inducted into the Fellows of the American Association of Occupational Health Nurses in recognition of occupational and environmental health nurses who have made significant contributions to the field of occupational and environmental health nursing in the areas of clinical practice, education, research, management, or policy (2007).
- Dr. John Shutske, Professor, received the "Superior Paper" award from American Society of Agricultural and Biological Engineers (ASABE), given to the top 2.5% of published journal articles in ASABE's three primary peer-reviewed journals, for the paper: Testing and Creation of a Safety System to Disengage the PTO of a Tractor. *Applied Engineering in Agriculture*. 22(1): 5-12.
- Dr. Nancy Nachreiner, Assistant Professor, received the "Faculty Excellence Award" from the graduating class of 2007 in the Division of EHS.
- Andrew Ryan MS, Program Analyst and Statistical Applications Research Fellow, received the School of Public Health (SPH) Academic Professional and Administrative (P&A) Excellence Award for outstanding initiative, skill, and commitment that he contributes to the mission of the school (2006).
- Doctoral candidate (OIPRTP), Kathleen Ferguson Carlson received the Injury Control and Emergency Health Services Section (ICEHS) Student Paper Competition Award in 2006 at the American Public Health Association (APHA) meeting in Boston ("Regional Rural Injury Study - II: Children's Behavioral Traits and Risk of Agricultural Injury," Advisor: Dr. Gerberich). She also received the Harold R. Shipman Award for Outstanding Academic Achievement in Environmental and Occupational Health, University of Minnesota (U of M), Division of EHS, 2006.
- Doctoral candidate (OIPRTP), Denise Fedea, was elected to serve as the U of M campus liaison to the Student Assembly of the APHA. Campus liaisons advance the mission of the Student Assembly of APHA to enhance students' education and professional development.
- Doctoral student (IH), Rolando Gonzalez, received an award from the Association for Professionals in Infection and Control and Epidemiology Research Foundation's Student Grant Program for his research project titled, "Evaluating Factors Affecting the Performance of Airborne Infectious Isolation Rooms." (Advisors: Dr. Raynor, and Andrew Streifel, MPH). The investigators developed a methodology to evaluate airborne infection isolation room (AIIR) containment of contaminated air using carbon dioxide as a tracer gas.
- Occupational medicine resident, Eileen Greenwald, received the American College of Occupational and Environmental Medicine Residents Research Presentation Award for her study "Curvilinearity in an expiratory flow-volume curve and the severity of chronic obstructive pulmonary disease (COPD)" at the American Occupational Health Conference in New Orleans, LA, in May 2007.
- Doctoral candidate (OIPRTP), Starr Kelly Sage, (Advisor: Dr. Gerberich), was awarded the Minnesota Environmental Health Association's (MEHA) Mary Lauren Olson Memorial scholarship. Starr's primary research interest is in addressing the undue burden of injuries and hazardous exposures on persons of color and low-income individuals. She was recognized at the MEHA winter conference in January 2007.
- Doctoral student (OEHN), Maggie Stedman-Smith, (Advisor: Dr. McGovern) was awarded a fellowship for her dissertation research involving a needs assessment of pesticide exposures among women and children in the Red River Valley. The fellowship was awarded by the Society for Public Health Education, and the Agency for Toxic Substances and Disease Registry (ATSDR)
- Masters student (IH), Girard Griggs, (Advisor: Dr. Ramachandran) won the 2007 3M Industrial Hygiene Scholarship Award. Girard has also been awarded the 2007-2008 TSI/Arthur J. Abrams Memorial Scholarship by the Board of Trustees of the American Industrial Hygiene Association

4. Outcomes/Relevance/Impact

The purpose of the Midwest Center for Occupational Health and Safety (MCOHS) Education and Research Center (ERC) is to ensure an outstanding center that provides: 1) cutting-edge interdisciplinary academic and research training to prepare exceptional leaders who make significant contributions to the field of occupational health and safety, and (2) continuing education to prepare professionals in the field to address current and emerging threats to the nation's health and safety.

During the past five years, the academic programs have graduated 60 professionals who have acquired key positions in occupational safety and health that are integral to worker safety. During this same period, 108 students were enrolled in degree programs; of these, 74 were new trainees. Continuing education programs, including hazardous substance training and agricultural health and safety, involved a total of 223 courses that were attended by 5,885 participants. The Midwest Center's faculty and staff continued to provide outreach and service to educational institutions, professional organizations, governmental agencies, industry, and the general public throughout the Center's service area that includes Minnesota, Wisconsin, and North and South Dakota, as well as at the national and international levels; novel distance learning technologies also have served the needs of a diverse workforce. Cooperative working relationships developed with local, regional and national organizations have further enhanced delivery of occupational health and safety content and extended the impact of the Center's outreach and training activities.

An extensive number of externally-funded research grants ($n = 116$), in concert with center support, was generated by program faculty between 2002 and 2007 and provided strong support for the high quality of research production by the programs. During the past five years, resulting publications in peer-reviewed journals and professional presentations at the local, national and international levels, have addressed cutting-edge research in occupational health and safety. There have been a minimum of 163 peer-reviewed publications, involving both faculty and students. In addition, there have been a minimum of 350 faculty and student research presentations related to the programs. This includes research disseminated at local, regional, national and international professional meetings that have addressed work-related exposures that may result in injury (both unintentional and intentional) or acute or chronic disease; identification of the risk factors for these problems, based on quality data collection, serves as a basis for identification of appropriate intervention efforts. Disseminating these results to audiences, beyond our immediate MCOHS region, extends the reach, visibility, and reputation of our Center. Most importantly, many of these efforts have provided a basis for translation of research into practice (r2p) that are being used to impact worker protection. Examples of the impact on worker protection, based on faculty/student research and outreach activities, representing only a small proportion of the MCOHS activities, are identified at the following website: cpheo.sph.umn.edu/img/assets/9114/rtp.pdf

The MCOHS faculty and students have also received numerous prestigious awards during the past five years that have recognized their contributions to the field of occupational safety and health. These awards provide further evidence of the impact accomplished by the center efforts.

The MCOHS has continued to build upon its many strengths, including its extensive needs assessments, innovative educational methods, expanded evaluation techniques, strong faculty support, commitment to outreach, and its extensive regional, national and global network of cooperative working relationships. This Center is committed to continued excellence in occupational safety and health education and research for the Midwestern United States that is recognized globally, and will continue to produce the leaders who make important contributions to the safety and health of the nation's workforce.

5. Technical Reports

Midwest Center for Occupational Health and Safety
Director: Ian A. Greaves, B Med Sci, MB BS

A. Background

In response to the initial announcement by the National Institute for Occupational Safety and Health (NIOSH) in 1976 for training grants to create centers in occupational safety and health, the School of Public Health took the lead in creating the Midwest Center for Occupational Health and Safety (MCOHS) that has been a NIOSH Education and Research Center since 1977. Originally established as a consortium involving the: University of Minnesota, University of Iowa, Mayo Clinic, University of Minnesota – Duluth, and St Paul-Ramsey Medical Center, this consortium has contracted over the years to involve the University of Minnesota and Regions Hospital/Health Partners Medical Group in a comprehensive effort.

The MCOHS is located administratively in the Division of Environmental Health Sciences (formerly Environmental and Occupational Health), School of Public Health. Through June 30, 2007, Dr. Ian A. Greaves continued as the Center Director, providing administrative and budgetary oversight of the grant. He was assisted by Dr. Brosseau, Center Deputy Director, an Executive Committee comprised, of the program directors and primary faculty of the MCOHS, and the Center's Advisory Board.

The MCOHS has had a very productive five-year period in training occupational health and safety practitioners, translating research into practice, and collaborating on research and educational opportunities in numerous ways that impact the Occupational Health Practitioners in the immediate MCOHS region and beyond. During the past five years, many students successfully completed degrees: 35 Master's of Public Health (MPH); 15 Master's of Science (MS); 5 dual degree (MS/MPH); and 5 doctoral (PhD). These graduates have been most successful in acquiring excellent positions in the occupational safety and health field.

In addition, Occupational Health and Safety practitioners, who are alumni of the MCOHS were surveyed in 2006 and reported high rankings regarding their perceptions of how valuable they believed each key occupational health and safety competency to be and how proficient they were in these competencies as a result of their MCOHS training. These survey results confirmed that the MCOHS has made great strides in research and training; the feedback from these graduates also assists in strategic planning for the future of the Center.

The purpose of the MCOHS ERC is to provide outstanding academic and continuing education programs to professionals in the key disciplines of occupational health and safety, to conduct outreach to various stakeholders and community groups in areas of workplace health and safety, and to undertake research of occupational health and safety problems in keeping with priorities of the National Occupational Research Agenda of the National Institute for Occupational Safety and Health (NIOSH). Specific results related to these goals are presented below.

B. Specific Objectives (Accomplishments for the MCOHS, based on these objectives are identified in the Results and Discussion section, below.):

1. Provide outstanding academic education programs
2. Provide outstanding continuing education programs
3. Conduct outreach to various stakeholders and community groups
4. Undertake research of occupational health and safety problems in keeping with priorities of the National Occupational Research Agenda of the National Institute for Occupational Safety and Health

C. Results and Discussion

1. Provide outstanding academic education programs

During the past five years, the academic programs have graduated 60 Professionals. During this same period, 108 students were enrolled in degree programs; of these, 74 were new trainees.

- Within the MCOHS, the Occupational and Environmental Medicine, Industrial Hygiene, Occupational and Environmental Health Nursing and Occupational Injury Epidemiology and Control (OEM, IH, OEHN, and OIEC) programs updated prior surveys of alumni, which requested graduates from 1992-2005 to rate the value of, and personal proficiency in, core competencies for their respective disciplines. (There were no graduates in the OIP RTP doctoral program, prior to 2005, since that is a recently implemented program; the OHSRP had a similar situation.) The most recent survey, completed in 2006, provided findings that graduates of occupational health and safety programs continue to rank the general MCOHS ERC competency set as high in value and report high levels of proficiency in most competencies.

- OEM: Following leadership by Dr. Beth Baker, until December 2006, Dr. Heidi RoeberRice took over as director of this Occupational and Environmental Medicine Program residency program, which has been most successful and involves excellent support of faculty both within Regions Hospital and HealthPartners as well as in Environmental Health Sciences. Within this program, a total of 12 specialists graduated. All of these physician graduates are employed in positions in which they are working to protect the health and wellness of workers, mostly in the clinical practice of OEM; however many of these graduates serve as medical directors, as well.

For the OEM program, one of the major accomplishments has been the implementation of a new curriculum model. The OEM Residency Training Program offers a structured two-year training experience, combining an academic phase, leading to a Master's in Public Health (MPH) degree, with the practicum experience emphasizing practice and research in a variety of service settings to include corporations, government agencies, and private health care organizations. The curriculum modifications were addressed to reflect the updated requirements and recommendations of the American Council on Graduate Medical Education (ACGME), American Board of Preventive Medicine (ABPM), CEPH and NIOSH. The Preventive Medicine Residency Review Committee (RRC) approved this change in April 2006. Integrating these experiences throughout the two-year period facilitates earlier clinical exposure, provides increased flexibility to accommodate scheduling of all required courses and allow for more evenly distributed research time throughout the training program.

- IH: The IH program has successfully prepared occupational hygiene professionals at the Master's degree level for positions in industry, consulting companies, and governmental agencies, and at the doctoral level as leaders in industry. Over the past five years, 29 students earned Master's degrees (12 MPH; 17 MS degrees); one student completed a PhD. In 2006-2007, 12 Master's-level students enrolled (6 MPH, and 6 MS). Of these, one was a part-time trainee. There are currently five Ph.D students enrolled.

IH results from the MCOHS survey of alumni for their satisfaction with, and perceived value and proficiency in their academic training, relevant to discipline-specific and cross-cutting professional competencies, were as follows: 75% (46 of 61) of the IHs contacted participated; 72% were "highly satisfied" or "satisfied" (24%) with their graduate education in occupational safety and health (OSH) and 89% were working in OSH. Among those who responded, 79% had current certification as CIHs and 37% as CSPs. Of those whose primary role was not in OSH, 100% reported using the knowledge and skills learned in the graduate program in their current job.

- HSAT: Results of the alumni survey, involving the Hazardous Substances Academic Training Program (HSAT), a program within IH, indicated that 10 of 46 IH graduates also identified themselves as alumni of the HSAT Program. Findings revealed that most HSAT alumni were "very satisfied" (60%) or "somewhat satisfied" (30%) with their graduate education in OSH and 90% were currently working in OSH positions. Among those who responded, 3/10 had current certification as CIHs, 1/10 as a CSP, and 1/10 as a CHMM. The relatively low level of certification reported by HSAT alumni is due, in part, to 50% of the respondents receiving their degrees in 2003 or later.

- OEHN: The OEHN program led by Professor McGovern and supported by Dean Olson and Professor Nachreiner and other ERC faculty, has successfully prepared practitioners at the masters-level that function as administrative leaders in occupational health and safety in business, industrial or health care settings. Over the past five years, 14 students earned Master's degrees (10 MPH and 4 dual MS-MPH degrees); and one student completed a PhD. In 2006-2007, 10 master's-level students (6 MPH, and 4 dual degree) and one PhD student were enrolled.

OEHN results from the MCOHS survey of alumni for their satisfaction with, and perceived value and proficiency in their academic training, relevant to discipline-specific and cross-cutting professional competencies, were as follows: 73% (24) of the nurses contacted participated; 92% were "highly satisfied" and 8% were "satisfied" with their graduate education in occupational health and safety (OHS), and 63% were working in occupational health and safety. Among those whose primary role was not in OHS, 88% reported using the knowledge and skills learned in the graduate program in their current job.

Program research efforts have been strongly supported by externally funded grants that have resulted in 22 published or "in press" peer-reviewed papers and one dissertation and 50 oral or poster presentations at national, regional and local professional meetings – all involving students and faculty.

- The OHSRP program is led by Professors Dowd and McGovern and supported by excellent faculty from the divisions of environmental health sciences and health policy and management in the School of Public Health. The program prepares graduates for occupational health services research and policy positions in academic institutions, and public and private agencies. During this reporting period, five doctoral students were enrolled and one graduated and accepted employment as an assistant professor in health outcomes for a department of environmental health at the State University of New York, Brooklyn. As evidenced by the many

examples of research publications and papers in press (26) and presentations (34), new projects, courses, awards and promotions of faculty and students, and examples of impact on the field, this program continues to be both innovative and dynamic and positively influences the field for occupational health services research.

- **OIECP:** This program, led by Drs. Gerberich and Maldonado, provided a multifaceted approach to academic and research training in the prevention and control of injuries by utilizing an epidemiological framework that considered the worker, hazardous agents and energies, and the respective vehicles of these agents within the environment. The program further incorporated specific strategies involving engineering and technology, education, and legislative approaches in its overall framework; both doctoral and master's level degrees were offered. *With the implementation of a new doctoral training program in 2001 (OIPRTP), the OIEC program provided only masters' level training, until it was phased out in 2003.* Between 2002 and 2003, three students graduated with MPH degrees; resulting peer-reviewed publications from their masters' research efforts are identified in the Appendices. All of them acquired excellent positions that are important to the field.

From the 2006 alumni survey of graduates between 1995 and 2005, 11 graduates of the OIECP program participated. Findings revealed that OIECP alumni were "very satisfied" (64%) or "somewhat satisfied" (27%) with their graduate education in occupational safety and health (OSH). The findings on the interdisciplinary competencies addressing "recognition," "evaluation," "control," "communication," "behavior" and "management" revealed that almost all OIECP alumni rated most competencies as "very valuable" or "valuable". The competencies with the most frequent ratings of "very valuable" were: writing well (91%), understanding the relationship between occupational exposures and health outcomes (82%), and communicating effectively with a variety of stakeholders (e.g., management, labor) (82%). Alumni most frequently perceived themselves as "very proficient" in the following competencies: interpreting and applying scientific findings (64%), and functioning effectively on an interdisciplinary team (64%).

- **OIPRTP:** This doctoral program, led by Drs. Gerberich and Alexander and supported by numerous outstanding supporting faculty, incorporates advanced doctoral-level training through curriculum and research opportunities that involve multidisciplinary collaborations with experts in safety, occupational injury epidemiology, engineering and human factors/ergonomics, medicine, and the social sciences, including occupational psychology. Specific opportunities involving industry, labor, and the public sector, including workers' compensation programs, are also included. During this period, OIPRTP enrollment increased to eight full-time doctoral students; two graduated in 2006 and have acquired excellent positions, pertinent to occupational health and safety. The program research efforts have been strongly supported by numerous externally funded grants (n= 31) generated by the program faculty. During this period, numerous publications and presentations, involving students, resulted; this included 33 national and international publications and 75 presentations delivered at local, national and international professional meetings. (Refer to Publications and Presentations, Appendix.) Many additional publications and presentations by faculty, that did not involve students, are not identified. Students, as well as faculty, were also the recipients of many prestigious awards during the five-year period (OIPRTP Report, Technical Reports).

- **ASH:** The ASH program, led by Dr. John Shutske, and several excellent faculty and staff, is a supporting program that has collaborated with IH, OEHN, OEM, OIECP, and OIPRTP, thus, providing enhanced program opportunities for these students in agricultural safety and health as well as partial trainee support. During this period, there have been six students and five graduated. This program has been most successful in generating research grants that address unique agricultural populations. A total of 10 publications and five theses, as well as 37 presentations were identified.

2. Provide outstanding continuing education programs

Between July 1, 2002 and June 30, 2007, Continuing education programs, including hazardous substance training and agricultural health and safety, involved a total of 223 courses that were attended by 5,885 participants.

- The CE Program, in concert with ERC academic program directors, added to the successful NORA presentations in June 2007, by presenting a "Research-to-Practice (r2p)" Symposium (now available as a webcast); 45 participants were involved in this onsite program. All CE online programming is available free of charge and attracted 1,012 participants during the recent one year period, an increase from the previous year.
- The CE program has continued to offer important skill building courses such as Spirometry and Hearing Conservation, adding courses with current topical interest, such as the mold identification, aging workforce, and workforce impact of a pandemic, and by expanding the number and type of distance learning opportunities offered. In 2003, the CE Program commenced restructuring to ensure training in a format supportive of participant needs while being cost effective. This included the establishment of partnerships with other groups to provide educational opportunities that could no longer be offered through CE due to low enrollments.

- The CE Program continues to expand its strong tradition of collaboration, outreach and leadership with professional organizations. The Team Approach, a unique interdisciplinary effort – sponsored annually by the American Society of Safety Engineers – Northwest (ASSE-NW) chapter, American Industrial Hygiene Association-Upper Midwest section (AIHA-UM - Minnesota Association of Occupational Health Nurses (MAOHN), North Central Occupational and Environmental Medicine Association (NCOEMA), North Star Chapter of the Academy of Certified Hazardous Materials Managers, MCOHS and the Minnesota Safety Council (MSC), is one example of this. This cooperative resulted in a “Team Approach” website (<http://www.teamapproach.org>), established in 2000, where interdisciplinary activities are listed and each organization links its website to enhance communications among upper Midwest professionals in OSH. In the last five years over 500 professionals attended this course. Consistent with the effort to reach individuals using different learning formats, the 2006 Team Approach Program, “Pandemic: Are You Prepared?” was Web-cast and has been available online at no charge. This continues to garner interest and remains available for viewing. The 2007 TEAM APPROACH program had 71 face-to-face multidisciplinary participants.

Additional specific accomplishments, by CE, included the following:

- Two blended courses were offered: Comprehensive Industrial Hygiene Review (CIHR) and Case Management. Both programs were often used by participants as a review before sitting for certification examinations. Participants were provided with access to an online pre-test and a Datachem CD Rom, prior to the course, allowing them to identify areas of strength and areas to which they should pay particular attention, during the face-to-face instruction. CIHR participants also had access to a post course discussion site.
- Significant progress was made in distance-based education, visible in: 1) online course components available as part of the MCOHS Regents Certificate in OSH and three additional public health certificates; 2) modularized core OH&S program academic course content and developed into distinct web-based learning activities; 3) National Occupational Research Agenda (NORA) programs - expanded their reach with online webcast/video-streamed versions of face-to-face programs; 4) blended courses offered for two certification review courses; and 5) Team Approach program “Pandemic: Are You Ready”, captured and offered as a free web-cast serving 221 people in first two months online
- Three NORA initiatives were offered, designed to stimulate and disseminate research on workplace safety and health: 1) 2004 NORA Symposium – a 2.5 day program focusing on traumatic injury, occupational health services research, exposure assessment, musculoskeletal disease syndromes, and organization of work – a research poster session was included; 2) 2005 NORA Program Seminars – three evening lectures focusing on vulnerable working populations, viewing occupational and environmental issues separately, and the aging workforce; 3) 2007 one day NORA Symposium, involving two key national speakers and a research poster session of student and faculty research.
- A comprehensive needs assessment was conducted, employing multiple strategies such as interviews, surveys, focus groups, and professional association data, to assess the learning needs of OSH professionals.
- During 2002-2007, the Midwest Center exhibited HST course materials through venues with the following organizations: The American Occupational Health Conference; the American Industrial Hygiene Conference; and Minnesota Association of Occupational Health Nurses. The MCOHS participated through attendance and exhibit in the Minnesota Governor’s Homeland Security/Emergency Management Conference in March 2005 and 2006, the Minnesota Safety Council annual conference in May 2005 and 2006, the national meeting of the Waste Water Operators, June 2005, and the Minnesota Department of Health Community Health Services Conference in September 2005. During 2006-2007, face-to-face courses were marketed through a variety of new venues, including the Minnesota Fire Chief’s Association, the Minnesota Police Chief’s Association, the Minnesota Pollution Control Agency, the University of Minnesota’s Technical Assistance Program, the Minnesota State Fire Department Association, and the Minnesota Governor’s Conference on Emergency Preparedness. The addition of these new partnerships provided an opportunity to increase enrollment through students previously unfamiliar with course offerings of MCOHS. The HST program also maintained strong partnerships with the Minnesota Pollution Control Agency, MN OSHA, the Minnesota Department of Natural Resources, the Minnesota Department of Agriculture, the Minnesota Department of Public Safety, and Minnesota Department of Health. Hazardous Substance Training courses were marketed through regional professional organizations and through MCOHS and NIOSH ERC exhibits at national and local professional meetings. Individual courses have continually been promoted through direct mailings, the MCOHS homepage, and course announcements in selected newsletters.
- During this period, over 20 innovative courses were developed and offered, based on identified needs of the NIOSH HST target audience.

- During 2006-2007, HST-CE 22 face-to-face courses were offered to over 220 participants. Courses ranged from three hour hazwoper awareness trainings to 40 hour (5-day) emergency response. Courses were offered to a variety of audiences, including public health departments, tribal entities, fire departments and city public works departments, both at their location and at the CE training center. Twenty-three requests for HST tuition subsidies were received and support was provided for the courses.
 - Six new HST courses were developed during this time period.
3. Conduct outreach to various stakeholders and community groups:
- A new Medical Toxicology (MT) fellowship program accepted the first trainee at Regions/HealthPartners in July 2005. This training program is a joint venture between the Emergency Medicine and Occupational and Environmental Medicine Departments at Regions/HealthPartners and the Minnesota Regional Poison Center. Medical Toxicology Fellows complete clinical rotations in the OEM clinic with Dr. Beth Baker and Dr. Michael McGrail, developing expertise in complex clinical consultations related to occupational and environmental exposures to toxicants.
 - Interdisciplinary Graduate and C.E. "Research to Practice" Courses were developed. Professors McGovern and Gerberich, Dean Olson and the Centers for Public Health Education and Outreach (CPHEO), and Dr. Lisa Brosseau developed a NORA symposium May 26-27, 2004 and three NORA seminars in 2005. These events facilitated translation of "Research to Practice" (r2p), and provided C.E. or academic credit. The symposium, "NORA Health and Safety Priorities for the 21st Century," featured nationally known experts to identify research priorities and initiatives in OSH research, especially those related to injury prevention and control, health behavior change, health promotion and disease prevention, and occupational health services research. The following year's seminars included: Dr. Rosie Sokas, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations," February 24, 2005; Dr. Nick Ashford, "The Consequences of Thinking about Environmental and Occupational Health as Separate Entities," March 30; and Dr. David Wegman, "Health and Safety Issues: the Aging Workforce," April 21. The presentations can be accessed via <http://cpheo.sph.umn.edu/cpheo/events/NORA.html>. In 2007, a one day NORA Symposium, involving two key national speakers and a research poster session of student and faculty research, was also held.
 - The CE Program has developed extensive cooperative working relationships with federal, state, and local agencies, various industries, labor groups and professional organizations. During the past five years, the network of relationships included organizations dealing with public health (PH), PH preparedness, hazardous substances, environmental health, pollution prevention, tribal college issues, agriculture, and health care. The Center's history of outreach to other organizations, institutions, agencies and professional associations is substantial. This is facilitated by the adoption of outreach and service as a core value of the School of Public Health. During the most recent five-year period, numerous new alliances and outreach efforts were developed and existing alliances were expanded. Examples include the Center's involvement with: the Great Lakes OSHA Training Institute (OTI) Regional Education Center; new connections with Leech Lake Band of Ojibwe (resource relationship); Medi-Sota Inc. - a consortium of west-central Minnesota (MN) health care providers; Agricultural Safety and Health (ASH) program needs; St. Cloud Fire Department (40 hr emergency response); and American Crystal Sugar in Moorhead, MN (onsite OSH programs). In addition, to better serve OSH professionals, CE has an agreement with the Minnesota Safety Council (MSC) to collaborate on workforce development programs. In 2007, the role of the CE Program with the MSC expanded to not only active planning responsibilities but, also, the suggestion of a panel discussion on the topic of inclusion of culture in the workplace, which led to moderation of relevant panel discussion. The CE Program has also supported and participated in the two other out-state annual conferences sponsored by MSC; this is a first; and the plan is to expand the role for the 2007-2008 conferences.
 - Partnerships were initiated with the Central States Occupational Medicine Association (CSOMA) and MSC to offer education programs to OSH professionals. MCOHS is co-sponsoring a fall conference with CSOMA titled "Work, Pain, War: What good are they?" in Rochester, Minnesota and will be co-sponsoring the MSC spring conference, helping them to broaden their OSH audience by offering advanced level courses
 - Several agency partnerships with the Leech Lake Band of Ojibwe were established, bringing training to tribal workers across disciplines. These include the Leech Lake Department of Resource Management, tribal Police, Cass lake Volunteer Fire Department, tribal Ambulance/Emergency Medical Services, tribal Health, and the Community Education Department of Leech Lake Tribal College.
 - In partnership with the Occupational and Environmental Medicine core program and Regions Hospital, a monthly Occupational Medicine Community Grand Rounds (CGR) seminar has been offered to OSH professionals; the plan for 2008 is to expand this and provide the sessions online for all Health Partners healthcare providers, especially nurses and physicians.

- Four tailored three hour Hazardous Materials Awareness courses were presented to the City of White Bear Lake (January 23 and 24th, 2007); these courses reached over 120 participants from a variety of city sectors including police and fire departments and public works employees
- One three-hour Hazardous Materials High Pressure Awareness course, April 4, 2007, was offered in Federal Dam, Minnesota; 24 fire department volunteers attended, most from the neighboring Leech Lake Tribal Community in Northern Minnesota. This course was the second offering of an HST hazardous materials course to the Leech Lake Tribal Community in the past two years
- One toxic awareness and identification course was offered to a diverse neighborhood group in Minneapolis for 12 individuals, in August 2006, at their request.

4. Undertake research of occupational health and safety problems in keeping with priorities of the National Occupational Research Agenda of the National Institute for Occupational Safety and Health (NIOSH):

An extensive number of externally-funded research grants (approximately 116), in concert with center support, was generated by program faculty between 2002 and 2007 and provided strong support for the high quality of research production by the programs. During the past five years, resulting publications in peer-reviewed journals and professional presentations at the local, national and international levels, have addressed cutting-edge research in occupational health and safety. There has been a minimum of 163 faculty and student peer-reviewed publications. In addition, there have been a minimum of 350 faculty and student research presentations related to the programs; this includes research disseminated at local, regional, national and international professional meetings. Students were directly involved in a minimum of 78 publications and 93 presentations. Disseminating these results to audiences beyond our immediate MCOHS region extends the reach, visibility, and reputation of our Center. Most importantly, many of the papers and presentations have also provided a basis for translation of research into practice that are being used to impact worker protection. Examples of the impact on worker protection, based on faculty/student research and outreach activities, include the following that represent only a small proportion of the MCOHS activities. (Refer, also, to: cpheo.sph.umn.edu/img/assets/9114/rtp.pdf):

- Studies among agricultural household members on both agriculture and non-agriculture-related injuries, in five upper Midwest states, identified not only incidence and consequences of these injuries for all ages – but, also risk factors for agriculture-related injury among children; results have served as a basis for development of intervention efforts and dissemination to key professionals as well as the agricultural community.
- Results from evaluation of an exposure assessment method for incorporating professional judgment quantitatively into industrial hygiene decision-making, indicated that targeted training dramatically improves decision-making accuracy..
- Identification of risk factors for occupational violence in a large Midwestern health care system, provided a basis for interventions: redesign of a violent incident reporting surveillance system in order to target high risk areas/situations; development of fact sheets for managers and employees to enhance proactive activities and, thus, prevent adverse outcomes.
- Two major studies on work-related violence in populations of nurses and Kindergarten-12th grade educators enabled identification of the magnitude of the problem (physical and non-physical), and risk factors for physical assault. Many findings have been disseminated broadly to key decision-makers as well as the populations at-risk and are being used as a basis for focused intervention efforts.
- Identification of critical biosecurity control points to protect milk from intentional contamination complements strong educational program, outreach and research relationships with state and federal agencies to ensure safety of potentially exposed workers as well as the general public.
- A collaborative effort with two state agencies identified improved methods for assessment of methamphetamine vapor and aerosol in a former clandestine methamphetamine laboratory that enables improved safety for hazards remediation workers.
- Research, pertinent to agricultural worker and family safety of Asian immigrants, has directly led to efforts addressing the control of occupational health exposures from H5N1 Avian Influenza in Vietnam, Thailand, and in communities throughout the United States.
- Findings from a study of hospital negative-pressure isolation rooms, relevant to control of airborne bacteria or viruses exhaled by infected patients, are being used to guide improvements in isolation capabilities to protect workers and others against emerging diseases. Including H5N1 Avian Influenza.

- A study of occupational medicine physicians on the importance of specific core competencies required of their specialty, revealed findings that provide guidance for the content of training programs, including a need for greater emphasis on career development skills.
- A demonstration and evaluation project, pertinent to disability prevention, resulted in dissemination of disability prevention principles and practices through national medical journals, a workers' compensation website, and inclusion within the formal curricula of residency programs and the ACOEM Disability Prevention Guideline.
- Identification of pathways of pesticide exposures to the farmer, spouse and children, aged four to 17, serves as a basis for development of improved metrics in studies pertinent to health effects.

Key and Supporting ERC faculty have been extremely successful in generating externally funded research support that provides a basis for the MCOHS training efforts. Selected examples of recently funded projects for this reporting period follow.

Dr. Mandel joined the ERC's occupational and environmental medicine faculty in 2006 and has been instrumental in developing a new research project focused on the taconite mining industry in northeastern Minnesota. This is a collaborative effort with the Minnesota Department of Health that is a three-part investigation, including a cohort mortality study of employees in the taconite mining industry (n=72,000), a nested case-control study of mesothelioma cases occurring within this cohort, and a cross-sectional assessment of respiratory health within current and former miners of the taconite industry. Initial funding was provided by the University of Minnesota under special arrangement with the Minnesota Legislature. Other ERC faculty and staff collaborating with Dr. Mandel include Drs. Alexander, Ramachandran, Greaves, and Bender.

Dr. Jeff Mandel and Professor McGovern have been successful in implementing a Memorandum of Understanding in 2007 between HealthPartners and the School of Public Health, Division of Environmental Health Sciences (EHS) to collaborate on research endeavors. HealthPartners Research Foundation (HPRF), located in Bloomington, Minnesota, is the research arm of HealthPartners managed care organization. This integrated health care system consists of a large network of owned and contracted clinics, medical and dental centers that provide health care services and coverage to more than 650,000 members in the Twin Cities metro area. The HPRF has a professional support staff of over 90 members, including 20 career research scientists, 45 clinician researchers, and 11 programmer/analysts. This year, HPRF is conducting more than 170 research projects encompassing preventive care, clinical care, health services, outcomes, guideline evaluation, epidemiology and basic science. HPRF has dedicated research administration staff, a data collection center, and a human participant's protection staff. The memorandum formally acknowledges a collaborative effort between the two institutions for the conduct of research relating to the environment and its effect on human health. While researchers in both organizations have collaborated for many years on research of mutual interest, the intent of this memorandum is to set up a structure that will be deliberate in facilitating linkages and collaboration among researchers from these institutions. This creates a new opportunity to more easily access clinical data and cost information, and provides a strong research partnership. The HealthPartners Research Foundation may also have small amounts of money for pilot projects for students and junior faculty.

Drs. Raynor and Shutske are co-investigators on a new Centers for Disease Prevention and Control (CDC) funded Upper Midwest and Thailand Zoonotic Disease Cooperative Research Center. This Center, funded in the latter half of 2006, has been directed by Dr. Marguerite Pappaioanou (Division of Epidemiology and Community Health) and is focused on the ability of low-pathogenic avian and swine influenza viruses to be transmitted from animal hosts to humans. A key part of Dr. Raynor's effort is to measure the effect that hygiene and personal protection interventions have on the rates of virus transmission to persons working with infected animals. Dr. Raynor has also started a new collaboration with staff members of the Center for Infectious Disease Research and Policy on developing guidance documents for the response to actionable results from the national BioWatch airborne pathogen detection program. This activity is funded by the Department of Homeland Security.

Ms. Schermann, Agricultural Safety and Health (ASH), also has acquired funding to collect data from chicken and duck farmers, market managers, veterinarians and animal health workers, and local government officials in the Red and Mekong River Delta Regions of Vietnam. Goals are to: learn about the behaviors, practices, and beliefs of poultry producers related to HP Avian Influenza Virus (AIV) H5N1 transmission and prevention; learn from producers about current interventions and their ideas for new interventions for prevention; identify barriers to current interventions; learn about communication channels and perceived effectiveness; and learn about surveillance practices.

Dr. Ramachandran is serving as coinvestigator on a new project, funded by the National Science Foundation that is evaluating oversight models for active nanostructures and nanosystems. With funding from 3M Company in 2006-2007, Dr. Raynor has been working with Dr. Ramachandran to measure occupational exposures to nanoparticles and to determine the most appropriate metrics for

measuring exposure to nanoparticles in workplaces worldwide. Professor Ramachandran is also serving as coinvestigator on a new project titled, Healthy Homes Technical Studies Grant Program, funded by the United States Department of Housing/Urban Development (HUD). The project investigates the physical factors that affect the retention of allergens in settled dust in carpets. A fractional factorial experimental design is used to study environmental factors such as humidity, dust characteristics such as size distribution, electrostatic charge and allergen type (cat, cockroach, and dust mites), and carpet characteristics such as fiber diameter, fiber density and denier, cross-sectional shape of the fibers, and fiber material. These studies have applications to office workplace settings that typically have commercial carpeting of the type studied in this project.

Dr. McGovern was awarded funding from the Academic Health Center Health Disparities Research Program to support a qualitative investigation of women's perception of pesticide exposures in Minnesota's Red River Valley. Maggie Stedman Smith, (Occupational and Environmental Health Nursing (OEHN) and ASH doctoral student) has been using this data for her dissertation research. Collaborators on the project include: University of Minnesota Regional Sustainable Development Partnerships; the White Earth Tribal Community College; the Immigrant Development Center, Moorhead, Minnesota; the Women, Infant and Children Program, Quin Community Health Services, Hallock, Minnesota; and the MCOHS Continuing Education Program (Kathy Smith and Ruth Rasmussen).

Dr. Gerberich was awarded funding from NIOSH for a five-year study, "Consequences of Injuries among Children," in collaboration with research team colleagues (Drs. Alexander, Church, McGovern, Dowd, others), staff (A. Ryan), and OIP RTP doctoral student Q. Williams. The major goals of this research are to identify physical, psychosocial, and economic consequences of injuries that occur among children and youths living/working in agricultural operation households, in a five-state region; a unique design enables examination of potential changes between baseline and follow-up data, comparing injured and non-injured households while controlling for important factors including injury/illness experience among other household members. This study has been implemented in the Midwest region, involving Minnesota, Wisconsin, North and South Dakota, and Nebraska, in collaboration with the United States Department of Agriculture (USDA), National Agriculture Statistics Service, and agricultural extension representatives in each state.

Drs. Shutske and Raynor and student Peri Periakruppen were funded by the Minnesota Department of Agriculture and National Institute for Occupational Safety and Health to conduct a comprehensive, quantitative analysis of Minnesota's fluid milk system from the farm, to processors, through retail sales to consumers in an effort to identify critical control points and intervention strategies to protect against intentional contamination by terrorists or other individuals wishing to cause harm (including economic damage or harm to public health). A secondary objective was to identify risks to workers from their exposures to chemical or biological agents that could be used in a contamination event.

Dr. Shutske and staff (Schermann) have also collaborated with Goodwill/Easter Seals Minnesota in a USDA funded project which provides research-based information, on-site visits, individualized assessment, and education for Minnesotans with disabilities who have goals to safely continue farming and/or farm-related occupations. The project targets farmers, farm family members, agricultural workers, rural health care providers and agri-business leaders through educational presentations, regular mailings, collaborative service agreements, a peer support network, and on-site visits.

Dr. Shutske (Staff: Schermann; Rasmussen) was also funded by the USDA to develop a comprehensive, research-based assessment (titled "ERPIQ" – Emergency Response Plan IQ). Assessment data are used to build educational programs to improve the skills of growers and encourage specific actions and behaviors that will help growers improve their business and reduce risk. Data related to growers' perceptions of risk shows that growers are keenly aware of the potential devastating effects of events such as a foodborne illness outbreak from their products – but consider the probability low. They are much more concerned about weather-related issues, such as tornadoes and floods. This work is also tied to the risk-communication research team of the National Center for Food Protection and Defense.

Dr. Shutske, Dean Olson, and staff (Rasmussen) were funded by the Centers for Public Health Preparedness (CDC) for "FSI – Food Security Investigation." Evaluation results were analyzed from a series of educational workshops for the food industry and food regulatory community. The research surrounding this workshop series was structured to help evaluate performance of workshop educational objectives. Data from pre- and post-tests of knowledge, participant surveys, and activities to identify specific vulnerabilities and control strategies were used to assess the awareness level of participants. An increased awareness level across multiple professions on the pre/post tests and demonstrated competency in identifying food system vulnerabilities and control measure vulnerabilities was the project aim. Pre-post test comparisons indicated that many professionals working in our food system, who attended these workshops, had already attained a high basic awareness level for food protection and defense, as baseline pre-test scores were consistently high. Improvements in awareness levels measured by improved post-test scores were modest, suggesting that food safety and protection/defense professionals must be challenged into higher level training and skill building.

Dr. Alexander was funded by the CDC for a respiratory health screening study of a population with potential environmental exposures to asbestos from a vermiculite processing plant in northeast (NE) Minneapolis, Minnesota. The vermiculite used in this plant (as well as in hundreds of other processing plants throughout the United States) was mined in Libby, Montana. Studies of Libby vermiculite miners, family members, and town residents have shown a greatly increased risk of asbestos-related respiratory disease. The NE Minneapolis study is the first study to examine potential health outcomes at the community level from a vermiculite processing plant outside of Montana and the findings will be important in addressing the potential health risks in the hundreds of other communities that also processed Libby vermiculite.

The faculty and staff of the MCOHS have also been successful in the reporting period 2002-2007, as exemplified in the awards and honors listed below (refer, also, to individual program reports for additional information):

- Dr. Lisa Brosseau (IH), Associate Professor, was named the 2007 American Council of Governmental Industrial Hygienists (ACGIH) Meritorious Achievement Award recipient. This award is presented annually to members who have made an outstanding, long-term contribution to the field of occupational health and industrial hygiene. In 2006, she received the prestigious Alice Hamilton Award from the American Industrial Hygiene Association. This award, established in 1993, recognizes outstanding women for their achievements and contributions to the field of occupational hygiene.
- Dr. Susan Gerberich (OIPRTP), was appointed to Mayo Professor of Public Health, School of Public Health (SPH). This award is the school's highest recognition of its faculty members. The professorship recognizes the achievements of senior SPH faculty members who demonstrate excellence in research, teaching and outreach. Gerberich is best known for helping to found and being a major contributor to the field of injury prevention research. She also received the "Faculty Excellence Award" from the graduating class of 2006 in the Division of EHS.
- Dr. Patricia McGovern (OEHN and OHSRP) was promoted to the rank of full Professor in June 2007. She also received the "Faculty Excellence Award" from the graduating class of 2005 in the Division of EHS.
- Associate Dean Debra Olson (CPEHO) was inducted into the Fellows of the American Association of Occupational Health Nurses in recognition of occupational and environmental health nurses who have made significant contributions to the field of occupational and environmental health nursing in the areas of clinical practice, education, research, management, or policy (2007).
- Dr. John Shutske (ASH). Professor, received the "Superior Paper" award from American Society of Agricultural and Biological Engineers (ASABE), given to the top 2.5% of published journal articles in ASABE's three primary peer-reviewed journals, for the paper: Testing and Creation of a Safety System to Disengage the PTO of a Tractor. *Applied Engineering in Agriculture*. 22(1): 5-12.
- Dr. Nancy Nachreiner (OEHN), Assistant Professor, received the "Faculty Excellence Award" from the graduating class of 2007 in the Division of EHS.
- Andrew Ryan MS (OIPRTP and NORA), Program Analyst and Statistical Applications Research Fellow, received the School of Public Health (SPH) Academic Professional and Administrative (P&A) Excellence Award for outstanding initiative, skill, and commitment that he contributes to the mission of the school (2006).
- Doctoral candidate (OIPRTP), Kathleen Ferguson Carlson (Advisor: Dr. Gerberich), received the Injury Control and Emergency Health Services Section (ICEHS) Student Paper Competition Award in 2006 at the American Public Health Association (APHA) meeting in Boston ("Regional Rural Injury Study - II: Children's Behavioral Traits and Risk of Agricultural Injury," Advisor: Dr. Gerberich). She also received the Harold R. Shipman Award for Outstanding Academic Achievement in Environmental and Occupational Health, University of Minnesota (U of M), Division of EHS, 2006. (Refer, also, to OIPRTP report regarding additional awards.)
- Doctoral candidate (OIPRTP), Denise Feda, was elected to serve as the U of M campus liaison to the Student Assembly of the APHA. Campus liaisons advance the mission of the Student Assembly of APHA to enhance students' education and professional development. Additional honors and awards are noted in the OIPRTP report.
- Doctoral student (IH), Rolando Gonzalez, received an award from the Association for Professionals in Infection and Control and Epidemiology Research Foundation's Student Grant Program for his research project titled, "Evaluating Factors Affecting the Performance of Airborne Infectious Isolation Rooms." (Advisors: Dr. Raynor, and Andrew Streifel, MPH). The investigators developed a methodology to evaluate airborne infection isolation room (AIIR) containment of contaminated air using carbon dioxide as a tracer gas.

- Occupational medicine resident, Eileen Greenwald, received the American College of Occupational and Environmental Medicine Residents Research Presentation Award for her study "Curvilinearity in an expiratory flow-volume curve and the severity of chronic obstructive pulmonary disease (COPD)" at the American Occupational Health Conference in New Orleans, LA, in May 2007.
- Doctoral candidate (OIPRTP), Starr Kelly Sage, (Advisor: Dr. Gerberich), was awarded the Minnesota Environmental Health Association's (MEHA) Mary Lauren Olson Memorial scholarship. Starr's primary research interest is in addressing the undue burden of injuries and hazardous exposures on persons of color and low-income individuals. She was recognized at the MEHA winter conference in January 2007. She has also received additional awards as noted in the OIPRTP report.
- Doctoral student (OEHN), Maggie Stedman-Smith, (Advisor: Dr. McGovern) was awarded a fellowship for her dissertation research involving a needs assessment of pesticide exposures among women and children in the Red River Valley. The fellowship was awarded by the Society for Public Health Education, and the Agency for Toxic Substances and Disease Registry (ATSDR)
- Master's student (IH), Girard Griggs, (Advisor: Dr. Ramachandran) won the 2007 3M Industrial Hygiene Scholarship Award. Girard has also been awarded the 2007-2008 TSI/Arthur J. Abrams Memorial Scholarship by the Board of Trustees of the American Industrial Hygiene Association

D. Conclusions

The MCOHS has continued to build upon its many strengths, including its extensive needs assessments, innovative educational methods, expanded evaluation techniques, strong faculty support, commitment to outreach, and its extensive regional and national network of cooperative working relationships. The result is an outstanding center with a robust curriculum of high quality educational opportunities that trains an impressive number of participants annually who contribute significantly to worker safety and health.

One of the primary strengths has been the Center faculty and staff and their involvement and leadership in the OSH community. They have held and continue to hold leadership roles in the OHS community at the local and regional, as well as national and global levels, which helps them to identify learning needs and trends and gives them credibility and access to community faculty. Additional examples of leadership and outreach are the involvement in program initiatives with the Continuing Education Program that is an integral part of the Center for Public Health Education and Outreach (CPHEO) in the School of Public Health. The CPHEO has provided great strength and resources for the CE program and the MCOHS, overall.

Faculty commitment is another key ingredient to the Center's continued success. At least 250 faculty served in Center courses over the last five years. It is this outstanding level of University and community support which is the foundation of this excellent center. In addition Center faculty remain involved and actively engaged in the continuing education and outreach initiatives of the Program. The ongoing commitment and involvement of an expanded network of University/SPH faculty in teaching Center programs is a testament to the depth of support the MCOHS has built and sustained over the years. Perhaps most impressive is the extent to which the community supports the Center.

The Midwest Center for Occupational Health and Safety provides excellence in graduate and continuing professional education in occupational safety and health and incorporates novel distance learning technologies to serve the needs of a diverse workforce. Through these efforts, the MCOHS will produce the leaders who make important contributions to the safety and health of the nation's workforce. The Center assures excellence in occupational health and safety education and research for the Midwestern United States that is recognized globally.

5. A. Industrial Hygiene Program
Director: Gurumurthy Ramachandran, PhD

Industrial Hygiene Program
Director: Gurumurthy Ramachandran, PhD

A. Background

The Industrial Hygiene Program has been one of the core programs since the inception of the University of Minnesota Education and Research Center (the Midwest Center for Occupational Health and Safety) thirty years ago. Throughout this time, approximately 265 students have been enrolled for Master's and doctoral degrees. Many of these have gone on to become leaders in their field working in academic, industrial and government arenas. Roughly half of our graduates are employed in the upper Midwest region (MN, WI, IA, ND, and SD). Most applicants are recruited to the program through our website although alumni referrals also play an important role. Alumni are strong supporters of the program—they hire students as interns, provide sites for class field trips and student projects, lead and lecture in classes, and ultimately, hire graduates. They also provide important feedback to the program in response to surveys and as members of our program Advisory Board.

The mission of the Industrial Hygiene Master's Program is to produce graduates who, within three years of graduation are able to:

- Demonstrate a high level of technical and scientific competence in recognizing, evaluating and controlling occupational and environmental hazards.
- Solve complex problems through a combination of observation, literature review, measurement and data analysis.
- Communicate effectively both orally and in writing with a wide range of constituents.
- Design and develop long-range goals and programs.
- Act and behave responsibly and ethically according to the industrial hygiene professional code of ethics.
- Understand the limits of their profession and seek on-going education and work experience for their professional advancement leading to professional certification.
- Interact competently and professionally at all levels of an organization working as a fully-contributing member of a team and accepting independent work responsibilities with a high level of self-discipline.
- Use skills to benefit the community in recognizing work and environmental hazards and educating those responsible for eliminating these hazards.

To meet these educational objectives, the Industrial Hygiene Program is led by three highly qualified faculty with demonstrated teaching and research expertise. Their activities cover a broad range of interests covering the full spectrum of key subject areas (anticipation, recognition, evaluation, and control) of this field. All faculty hold tenured or tenure-track academic appointments. The Director of the program, Dr. Ramachandran is a Full Professor; Dr. Brosseau is an Associate Professor and Dr. Raynor is an Assistant Professor. Drs. Brosseau and Ramachandran are both Certified Industrial Hygienists. The three faculty have a combined total of more than 55 years of academic and working experience. Each is an established nationally-known researcher who has published more than 30 articles and book chapters, and each has received numerous grants and contracts to support their research activities. Each presently carries a full load of teaching and advising in addition to research activities. These three core faculty are active in a variety of service activities, including committee participation in the Division, University and professional organizations.

The Industrial Hygiene Master's (MPH and MS) programs are accredited (2002 to 2008) by the Accreditation Board for Engineering and Technology (ABET). Accreditation is an important element of the program, because it ensures applicants that the program is of high quality and that their education will prepare them for future employment and certification. In addition, it gives them a year toward their work experience requirement when applying for certification. Re-accreditation has been applied for and a site visit will occur on September 16-18, 2007. Many of our graduates (> 79%) have become certified in industrial hygiene (CIH). In addition, many of them have sought additional certifications, as safety professionals (CSP) and hazardous materials managers (CHMM).

Core Faculty

The three core faculty members, Drs. Gurumurthy Ramachandran, Lisa Brosseau, and Peter Raynor are regular faculty members in the Division of Environmental Health Sciences. Their involvement with trainees will include advising, classroom teaching, and supervision of research projects. They also bring strong research credentials and commitment. We have identified our core research expertise as lying in the broad focus areas of (1) exposure assessment methods and (2) control technology. These include exposure assessment for aerosols, gases and vapors, development of statistical methods for exposure estimation, and exposure control using engineering and other methods. A comparison of our program with other "top" IH programs in public universities in the US, shows that these areas span the mainstream of industrial hygiene.

Dr. Gurumurthy Ramachandran (Ph.D., CIH) is a Full Professor in the Division of Environmental Health Sciences in the University of Minnesota School of Public Health. He has directed the Industrial Hygiene program since 2004. His research and teaching interests focus on various aspects of occupational and environmental exposure assessment including retrospective exposure reconstruction for epidemiology, statistical and mathematical modeling, physical measurements, and industrial hygiene decision-making. The measurement and control of environmental exposures, especially those in work settings. He has been involved in several large community- and school-based exposure assessment studies of indoor allergens, VOCs, and urban studies of PM_{2.5} both in the US and in India. Recently, he has developed several research initiatives on nanoparticle risk assessment and policy development for nanotechnology oversight. He has served as a member of the Exposure Assessment Strategies Committee of the AIHA as well as its Modeling Sub-Committee since 1996. He is an Editorial Board member of the *Journal of Occupational and Environmental Hygiene*. He recently wrote a well-received textbook on *Occupational Exposure Assessment for Air Contaminants* (CRC Press-Taylor and Francis, 2005). He is lead instructor for required course PubH 6171 (*Exposure Assessment for Airborne Contaminants*) and PubH 6103 (*Exposure to Environmental Hazards*).

Dr. Lisa Brosseau (Sc.D, CIH), an Associate Professor in the Division of Environmental Health Sciences, has considerable research expertise in respiratory protection, filtration, aerobiology, aerosol sampling, intervention effectiveness and small business health and safety. She brings to the program particular expertise in workplace problem-solving. She has been a member of the ACGIH TLV Chemical Substance Committee since 1993 and was Chair of this committee from 1998 until 2005. Dr. Brosseau was Director of the IH Program from 1998 until 2001 and served as co-Director from 2001 until 2004. She has served as Deputy Director of the Midwest Center ERC. She also received the prestigious Alice Hamilton Award from the American Industrial Hygiene Association in 2006. Dr. Brosseau will continue to teach the primary course required of IH and HSAT students, PubH 6172 (*Industrial Hygiene Applications*). Furthermore, she will advise and supervise the research of students in the IH Program.

Dr. Peter Raynor (Ph.D) is an Assistant Professor in the Division of Environmental Health Sciences in the University of Minnesota School of Public Health. In addition to being a core IH faculty, he has directed the university's HSAT program since 2004. His primary research interests are in air filtration and other methods of air pollution control, in the evaluation of sampling methods used to assess human exposures to pollutants, and in the control of workplace hazards. Recently, he has developed a research program to study the measurement and control of airborne viruses and bacteria in response to concerns regarding bioterrorism and emerging infectious diseases. He is also working with the Minnesota Pollution Control Agency and Minnesota Department of Health on ways to better assess the cleanliness of former clandestine methamphetamine laboratories. He has served as Chair, Vice-Chair, and Secretary of the American Industrial Hygiene Association's Aerosol Technology Committee and is also a member of that organization's Nanotechnology and Methamphetamine Working Groups. Dr. Raynor is lead instructor for required course PubH 6174 (*Control of Workplace Exposure*) and PubH 6175 (*Industrial Hygiene Measurements Laboratory*) and co-instructor in PubH 6103 (*Exposure to Environmental Hazards*). He also teaches relevant elective courses including PubH 6173 (*Exposure to Physical Agents*) and several emergency preparedness classes in the annual University of Minnesota Public Health Institute. In addition, Dr. Raynor will advise and supervise the research of students in the IH Program.

Adjunct Faculty

The program has a strong group of active adjunct faculty who make substantial commitments to academic training. All of them enjoy national recognition through their consulting, institutional and corporate activities, and bring to the program the perspective of practical applications of students' knowledge and skills.

1. *John R. Mulhausen, PhD, CIH, Adjunct Assistant Professor*, a graduate of the industrial hygiene doctoral program and now Director of corporate industrial hygiene operations at 3M Company. *Dr. Mulhausen* currently serves on the Board of Directors of the American Industrial Hygiene Association, is president-Elect of the AIHA, and is co-editor of an important text on exposure assessment for industrial hygienists (*A Strategy for Assessing and Managing Occupational Exposures*, AIHA Press). He supports the program through his teaching in PubH 6171 (*Exposure Assessment for Airborne Contaminants*) and PubH 6170 (*Introduction to Occupational Health and Safety*), by contributing to the advising of master's and doctoral student research, and as an IH Advisory Board member. He works closely with Dr. Ramachandran on several research projects in areas of industrial hygiene decision-making and nanoparticle exposure assessment, and has co-authored a paper on Bayesian Decision Analysis.

2. *Gary Olmstead, PhD, CSP, CIH, Adjunct Assistant Professor*, is Director of Safety and Environmental Management at General Mills. He brings a well-rounded perspective from his broad responsibilities for environment, health and safety at General Mills. He provides substantial support to the program in teaching (in PUBH 6170: *Introduction to Occupational Health and Safety*), advising students, assisting with field experiences, serving as members of the program's Advisory Board, and providing invaluable sources of local

information and contacts. Dr. Olmstead has mentored IH Master's students as a participant in the School of Public Health mentorship program.

3. *Dr. Charles McJilton, Adjunct Assistant Professor*, has been a long-term supporter of the program. A previous full-time faculty member in the program, Dr. McJilton provides support to students as mentor and research project advisor; he also supports the academic program by providing access to his many local contacts for field locations, research projects, and internships.

4. *Dr. Gerhard Knutson, Adjunct Assistant Professor*, is an internationally-renowned expert on industrial ventilation. He consults widely on ventilation design and is a long-term member of the ACGIH Industrial Ventilation Committee. Dr. Knutson participates in the IH core course PubH 6174, Control of Exposure to Physical and Chemical Hazards, attending field trips to offer his practical knowledge and experience.

5. *Mr. Michael Austin (MS, JD)*, a working industrial hygienist in the University of Minnesota's Department of Environmental Health and Safety, is an Adjunct Instructor who participates regularly in several courses: PubH 6173 (Exposure to Physical Agents), PubH 6174 (Control of Workplace Exposure), and PubH 6175 (Industrial Hygiene Measurements Laboratory).

6. *Dr. Nicole Vars McCullough, Adjunct Assistant Professor*, is a recent graduate of the doctoral program and currently works in a research and development laboratory at 3M Company. Her particular area of expertise—biological aerosols and their control—is an important enhancement to the program. She plays important roles in the program as a course lecturer and curriculum advisor. She has also been both a lead and co-instructor of an elective course PUBH 5173: Hazard-Related Exposure to Physical Agents in the Environment that was the predecessor to the current elective PubH 6173 (Exposure to Physical Agents).

Supporting Faculty

Several supporting faculty are also important to the IH Program. These include faculty members from the Division of Environmental Health Sciences (EnHS) and other departments at the University of Minnesota. These include both regular and adjunct faculty who teach courses that are part of the IH curriculum and serve on examining committees. The faculty bring strong teaching and research credentials and commitment. Many of them collaborate extensively on research projects with the core IH faculty. All of the faculty from the EnHS Division and other Departments at the University of Minnesota pursue active research programs in addition to their teaching and advising of students. All have established far-reaching reputations in the state, nation and internationally as experts in their professions; many are widely published and sought after for participation on government agency scientific advisory boards and study sections, as peer reviewers, and as policy advisors. Many offer considerable time and expertise in service to scientific professional organizations.

B. Specific Objectives

The overarching goal of the industrial hygiene program is to provide a source of well-qualified, well-rounded professional industrial hygienists to meet the continuing needs of industry and society, both in the region served by the program and nationally. The specific objectives for the Industrial Hygiene program are:

a. Provide an academic curriculum that emphasizes the multi-disciplinary elements of Industrial Hygiene while maintaining a strong emphasis on practical applications and relevance to issues in occupational and environmental health.

The Industrial Hygiene (IH) Program is accredited by the Accreditation Board for Engineering and Technology. We have well-defined outcomes-based accreditation criteria including educational objectives (skills and knowledge expected within 3 years of graduation) and program outcomes (skills and knowledge expected at the time of graduation). The program curriculum is continually evaluated based on graduating student evaluations, end-of-year student assessments, annual student progress reviews, faculty retreats, and contacts with members of the IH Advisory Committee. The IH curriculum encompasses two years of coursework, internship and thesis project. The IH core courses are Properties and Measurement of Airborne Contaminants (PubH 6100-1), Advanced Human Exposure Assessment (PubH 6100-2), *Industrial Hygiene Applications* (PubH 6172), *Control of Workplace Exposures* (PUBH 6174), and *Industrial Hygiene Measurements Laboratory* (PubH 6175). In addition, IH trainees take at least 6 credits of elective coursework in relevant areas. Each of these courses address both theory and provide opportunities for "real world" problem solving through case studies and field trips to industrial locations.

Surveys of industrial hygiene and HSAT alumni graduating in the last 10-15 years are conducted regularly, the last in 2006, to assess suitability of coursework. A recent employer survey showed that employers' expectations of knowledge and skills for newly graduated and experienced Master's-trained industrial hygienists are properly aligned with the IH program's objectives and outcomes.

Students complete evaluation forms, which include both quantitative measures and qualitative remarks, at the end of each course; these are collated and analyzed by the School of Public Health. Statistical reports are then sent to the Division and lead faculty. An end-of-year focus group allows students to comment on their learning in the context of the IH and HSAT programs' educational objectives and expected outcomes. Most courses are offered in classrooms located in the School of Public Health (SPH) throughout the day and late afternoon/evening. Later classes offer convenience for non-traditional students who may have difficulty attending daytime classes. The core SPH courses are also offered in the summer and on-line. These opportunities are beneficial to both traditional and non-traditional students.

Description of the Masters program

The Industrial Hygiene Program attracts 4 to 6 new students each year, which yields a student: faculty ratio of approximately 3:1. This makes us a relatively small graduate program, allowing an adequate amount of one-on-one interaction between students and faculty. Most US citizens are provided with NIOSH funding for their tuition and varying amounts of stipends depending on whether they are first or second year students and whether they are full- or part-time students. International students either support themselves or are supported through Research or Teaching Assistantships.

The industrial hygiene Master's program offers both the Master of Public Health (MPH; School of Public Health) and Master of Science (MS; Graduate School) degrees. The differences in these degrees are in their requirements for master's projects and ethics coursework. Students taking the MS degree must register for PUBH 6742 Ethics in Public Health: Research and Policy, while those in the MPH degree must register for PUBH 6741 Ethics in Public Health: Professional Practice and Policy. Students in the MS degree program are required to submit a research paper to satisfy the requirements of PubH 7194 (Master's Project: Environmental Health). Students in the MPH program may submit either a research paper or a comprehensive literature review on a specific topic to meet the expectations for PubH 7194. Both programs require a bare minimum of 48 credits, although students frequently complete more. For a full-time student, the program is designed to be able to be completed in two academic years, from the beginning of Fall Semester in a given year to the conclusion of the spring semester two years later. Students usually pursue a required Field Experience: Environmental Health (PubH 7196) during the summer between their first and second years. They usually pursue their research project or literature review during their second year.

Students take courses in four core areas - Public Health (SPH), Environmental Health Sciences (EnHS), Occupational Health and Safety (OHS), Industrial Hygiene (IH) - each of which builds upon the other. At the base are the core requirements for all School of Public Health (SPH) students mandated for accreditation by the Council on Education for Public Health (CEPH). These requirements include classes in biostatistics (PubH 6414 or 6450), epidemiology (PubH 6320), ethics (PubH 6741 or 6742), behavioral science (PubH 6020), and management (PubH 6751 or 6752). Building upon the SPH core, a core of five courses is required for all Master's students in the Division of Environmental Health Sciences (EnHS). These courses include PubH 6103 (Exposure to Environmental Hazards), PubH 6104 (Environmental Health Effects: Introduction to Toxicology), and PubH 6105 (Environmental and Occupational Health Policy). The Master's Project (PubH 7194) and the Field Experience (PubH 7196) are also part of the EnHS core. The third core required of all Occupational Health and Safety (OHS) students includes PubH 6170 (Introduction to Occupational Health and Safety), PubH 6130 (Occupational Medicine), and PubH 6150 (Interdisciplinary Evaluation of Occupational Health and Safety Field Problems). Finally, four core courses are required of all students in the Industrial Hygiene (IH) program: PubH 6171 (Exposure Assessment for Air Contaminants), PubH 6172 (Industrial Hygiene Applications), PubH 6174 (Control of Workplace Exposures), and PubH 6175 (Industrial Hygiene Measurements Laboratory).

As part of the last accreditation of the IH Program by ABET, the IH core faculty developed a list of desired program outcomes for Master's-level students. More specifically, this program is designed to develop knowledge and skills in the six key areas of Recognition, Evaluation, Control, Communication, Behavior and Management. They also mapped those outcomes to the learning objectives for the courses required for the programs.

An objective of the IH Program, and the ERC as a whole, is to provide students with a broad, interdisciplinary experience. The integrated, layered approach (SPH, EnHS, OHS, IH) to the curriculum leads students to, by necessity, meet and interact formally and informally with students in other ERC programs, other tracks within the Division of Environmental Health Sciences, other divisions within the School of Public Health, and frequently other colleges at the University of Minnesota. Many courses require students to work in interdisciplinary teams on in-class exercises and group projects. In PubH 6150 (Interdisciplinary Evaluation of Occupational Health and Safety Field Problems), occupational health and safety students work together on multi-disciplinary (industrial hygiene, medicine, nursing, and injury prevention) teams to recognize and evaluate potential hazards in real workplaces and recommend solutions.

Students gain additional experience with interdisciplinary occupational health and safety during their field experiences and sometimes as they work on their Master's projects, depending on the topic they pursue.

Laboratory Facilities

The Industrial Hygiene Laboratory is shared by all three core IH faculty. The laboratory is located in Boynton Health Service, a building adjacent and connected to the Mayo Building. The lab consists of a large room occupied by a wind tunnel, a calm-air chamber, a filter tester, and two biological safety cabinets; two wet-chemistry laboratories with three laboratory hoods; and several smaller work, storage, and office spaces. Space is available for laboratory teaching as well as student and faculty research. The IH Laboratory is equipped with the basic equipment expected of an industrial hygiene training program, including personal and area sampling pumps, balances, spectrophotometers, light and phase contrast microscopes, filters and charcoal tubes, Dräger pumps and tubes, noise dosimeters, a flammable storage cabinet, velometers, manometers, pressure gages, pitot tubes, a micromanometer, and dataloggers. The laboratory also has considerable equipment for generating and measuring aerosols, including a light scattering photometer, a spinning disk generator, a variety of nebulizers, a condensation nuclei counter, an electrostatic classifier, a time-of-flight spectrometer, and a Foxboro direct-reading FID/PID and calibration kit.

Additional equipment is available from the Midwest Center Continuing Education Program. Such equipment includes direct readings instruments and samplers for gases, vapors and aerosols, as well as personal protective equipment, including respirators, gloves, and suits for various levels of protection. This equipment is regularly maintained and calibrated. The University of Minnesota's Department of Environmental Health and Safety, which protects the health and safety of university employees, students, and neighbors, also shares equipment with the IH Program as needed.

Doctoral Program Training

A Ph.D. program in Environmental Health focuses on research, supplemented with advanced coursework and developed under the guidance of a faculty adviser and a Ph.D. committee. Advanced coursework is selected in consultation with the advisor. This may include courses beyond the minimum Master's' equivalent coursework or advanced coursework in Biostatistics, Epidemiology, or Environmental Engineering. There is no minimum number of credits specified for the major field (this is determined on an individual basis). All doctoral students are required to pass a written examination in the major field. This examination covers all work completed in the major field and may include any work fundamental to this field. Students take a preliminary oral examination after completing a substantial portion of their coursework and passing the preliminary written examination. This examination is administered by a committee consisting of at least five members: three from the major field and two from the minor field or supporting program. The program involves substantial, independent effort by the candidate. A typical doctoral degree takes at least three and usually four years of full-time study. Doctoral students are expected to develop greater knowledge in their chosen discipline and contribute to the peer-reviewed literature in their field. The Ph.D. thesis must demonstrate the student's originality and ability for independent investigation, and the results of the research must constitute a contribution to knowledge.

All doctoral students are required to successfully defend their theses in a final oral examination. The final oral examining committee must consist of at least five members: three from the major field and two from the minor field or supporting program. The final oral examination consists of a seminar in which the candidate presents the thesis and to which the scholarly community is invited. Upon completion of the examination, a formal vote is taken. To be recommended for the award of the doctoral degree, candidates must receive a vote with no more than one dissenting member of the total examining committee.

Doctoral students are generally supported by research grants throughout most of their program. These may be grants obtained by their advisor or other faculty; they may also be grants or scholarships obtained directly by the student. Thus, the majority of a doctoral student's program is usually supported by extramural funding. The funding from this training grant, however, provides tuition support for required coursework and stipend support when research funding has either not yet been received or has ended. Generally, doctoral students spend the first year of the program taking coursework, writing a thesis proposal, and pursuing research funding. The training grant provides support during this year. In addition, students often require at least one year to prepare their thesis—the training grant monies are very helpful in providing a small amount of support to students as they complete their analysis and writing.

Students have been and continue to be involved in faculty research projects and are encouraged to publish and present their results in a variety of venues. Selection of students' dissertation topics is a function of ongoing faculty research projects, student interest and funding. Sook Ja Cho's thesis is on the subject of carpet dust allergens in indoor environments. Her advisor is Dr. Ramachandran. Dr. John Adgate (a supporting faculty member) is a co-advisor and funding for her work came from a 2-year grant from the Department of Housing and Urban Development. Seung Won Kim's research is on developing a better vapor/aerosol dichotomous sampler. His

advisor is Dr. Raynor and funding has come from sponsored research grants from multiple sources. Perry Logan's research deals with professional judgment in industrial hygiene decision-making (Advisor: Dr. Ramachandran. Committee members include Dr. John Mulhausen, an adjunct faculty and Dr. Alexander, a supporting faculty). While his doctoral work is being sponsored by 3M Company, the ideas and preliminary data from his work have led to funding from NIOSH of a 3-year RO1 grant. Another doctoral student Monika Vadali is being supported through that grant. Ji Young Park (Advisor: Dr. Ramachandran. Committee members include Dr. Raynor and Dr. Mulhausen) is working on nanoparticle exposure assessment in workplaces and part of her work was supported by NORA funds.

b. Provide opportunities for field experience and Master's project (research) work that enable students to develop their practical professional and investigative skills

Students have a wide range of opportunities for field experience at a number of locations locally and nationally. During the past five years, students have worked at CDC/NIOSH, large and medium scale manufacturing companies (e.g., 3M Company, and Honeywell Corp), consulting companies, the Minnesota Department of Health, Minnesota Pollution Control Agency, and county departments of health. Alumni play an invaluable role in both identifying opportunities and hiring students.

Students can also pursue a broad variety of master's projects. Students undertake laboratory-, field-, and literature-based research projects. In most cases, students are encouraged to pursue projects related to faculty research interests. However, they may also undertake projects in areas of particular interest to them, with assistance from Program and adjunct faculty. The extensive laboratory facilities used by the core IH faculty members are available for educational and research experiences. The labs are in Boynton Health Service on the University of Minnesota Twin Cities campus. They are equipped with up-to-date instrumentation to conduct research on measurement and control of workplace hazards. Computing facilities within the School of Public Health and EnHS Division are available for student use, as are a wide variety of library and research facilities within the University. Students are expected to be able to describe how their research is relevant to the recognition, evaluation, and control of occupational hazards when they write their Master's Project paper and when they make an oral presentation of their research. The results of some of these studies are usually presented at the Student Poster sessions at the annual American Industrial Hygiene Conference and Exposition, and some are published as articles in peer-reviewed journals.

PubH 7196 (Field Experience: Environmental Health)

All IH students are required to participate in a field placement experience, which provides an opportunity for them to learn first-hand about an organization and its operations. Industrial hygiene students must discuss their field experience plans with their academic advisor to assure that it meets expectations. In general, it is expected that a field experience should offer some variety in activities (a mixture of office and in-plant work) that encompass the full range of typical industrial hygiene principles (anticipating, recognizing, evaluating, and controlling hazards). An example of an appropriate field experience is one which offers a student an opportunity to (a) participate in exposure sampling, (b) measure or design ventilation systems or other controls, (c) write reports in which they describe results and make recommendations, (d) participate in decision-making and other opportunities which help them understand the role of an industrial hygienist in the organization, (e) observe and evaluate a variety of hazards, (f) interact with workers, engineers, management and health and safety professionals in the company, (g) think creatively and apply their learning to specific problems and situations, and (h) practice and learn new skills appropriate to the field.

Students are expected to complete a Record of Student Field Experience in Environmental Health, which should include a discussion of how this experience meets the expectations described above. Upon completion of the field experience, students must submit a 2-3 page report to their academic advisor that describes, in detail, how their work experience fulfilled the expectations described above and met the statement of activity in their completed Record form. Recent IH students have held internships with companies such as 3M, Honeywell, Intel Corp., Pace Analytical Services. Other field experiences have included work at government agencies such as the Minnesota Department of Health.

PubH 7194 (Master's Project: Environmental Health)

IH students are required to perform a capstone project in collaboration with a research advisor. The research advisor may be a student's academic advisor, another faculty member in the IH program, another faculty member in EnHS, or a faculty member external to EnHS with an appropriate affiliation to the Division. Other faculty members and experts outside the University of Minnesota may be consulted for advice and input to the project. Students pursuing the MS degree must prepare a Research Paper, while students pursuing an MPH degree may prepare a Research Paper or a Literature Review. In the case of a Research Paper, students must select a theme relevant to the key principles of industrial hygiene (anticipating, recognizing, evaluating and controlling hazards). They must carry out a review of the original literature and address a specific problem. The project may be modeling-, lab- or field-based and

should involve some aspect of data gathering followed by statistical or descriptive analyses. Students must prepare a paper that includes an Abstract, Introduction (statement of the problem, review of literature, statement of research questions or hypotheses, purpose of study), Methodology (study design, sample selection, data description, analytic methods used), Results (presentation and analysis of data), Discussion (limitations, biases, consistency with prior research), References, Tables, Figures, and Appendices. After the project is completed, the written report is reviewed by the research advisor for approval. The paper is presented to a committee in an oral examination before credit is awarded for PubH 7194. The committee typically comprises the research advisor, another faculty member within EnHS, and a faculty member outside EnHS. Once the paper is considered acceptable to the research advisor, it is sent to the other committee members, usually about two weeks before the oral examination. At the oral examination, which typically lasts about 1-2 hours, students present an overview and results of the project.

c. Maintain an active advisory board that includes representation from stakeholders

The IH Program's Advisory Board, consisting of diverse stakeholders in the Program, meet with the Program faculty annually to participate in the Program's development and review the educational requirements. The advisory group comprises representatives from industry (3M Company, HB Fuller Co., St. Paul Co., Honeywell, General Mills, TSI, Inc., Gopher Recycling), consulting companies (EHS Mgmt Partners, Knutson Ventilation), labor (United Transportation Union), state and local agencies (MN OSHA, Minnesota Pollution Control Agency, Metro Transit, Metro Council Environmental Services), and other organizations (University of Wisconsin and University of Minnesota Department of Environmental Health and Safety). The membership of the Advisory Board is periodically updated to provide fresh insights while maintaining a balance of stakeholder perspectives and continuity.

d. Maintain student enrollment into the Master's and doctoral student program

The goal is to recruit diverse applicants with a strong background in the natural sciences or engineering who display the motivation and potential to become outstanding professional practitioners and leaders in the field of industrial hygiene. This will be achieved by providing tuition and stipend support to a minimum of three full-time equivalent students in the program, including incoming students each year. We also aim to admit at least one PhD student every year. The primary means of recruitment are 1) the EnHS Division web page (<http://enhs.umn.edu>) and 2) alumni contacts with prospective students. Each of these avenues contributes to the diversity and the high caliber of our students. Of the students enrolled in the program in the last five years, more than 50% were women and more than 25% were from other countries, including Korea, India, China, and the Philippines. Most applicants to the program indicated that the web site was an important source of information about the program. The web site contains the program's educational objectives and program outcomes, as well as the industrial hygiene course syllabi. The website also includes alumni profiles that illustrate their range of work activities and professional affiliations. Strategies also include providing guest lectures to area undergraduate students, informally promoting the program at all professional presentations, continuing to publish in the *Journal of Occupational and Environmental Health* and *The Annals of Occupational Hygiene* to maintain visibility in the IH community.

We continue to emphasize the personal nature of student recruitment. One of the program faculty personally contacts applicants by telephone or email to answer questions and send materials. The Program Director, Dr. Ramachandran, is also the Chair of the Division's Admissions Committee. Faculty may also ask current students or alumni to contact these candidates about the program. Financial offers, where applicable, are made as quickly as possible. All of the Program faculty take an active role in prospective student open houses and information sessions, which are arranged by the Division or the School of Public Health Student Services Office. The credentials of admitted students are consistently high. Typically, about one-half of the applicants to the Program are admitted and enrolled.

e. Support the Midwest Center's continuing education mission by providing training sessions and course content to persons outside the Center interested in Industrial Hygiene.

Working cooperatively with representatives of the Midwest Center's CE, IH core faculty frequently find themselves with opportunities to make presentations in Minnesota or surrounding states regarding issues related to occupational hygiene. Faculty have made presentations on a variety of topics including clean up of methamphetamine labs, uses of expert judgment in industrial hygiene, indoor mold and carpet allergens among others. All three core faculty will also continue teach regularly in the Prep Course for the CIH exam that is offered by Midwest Center's CE. The faculty sometimes have the chance to help develop on-line training modules that can be used to reach large numbers of students on-line through the University of Minnesota Centers for Public Health Education and Outreach (CPHEO). In addition, faculty also regularly teach in Professional Development Courses (PDCs) offered at the annual American Industrial Hygiene Conference and Exposition (AIHCE). Previous courses have been on topics such as Nanoparticle sampling and measurement, mathematical modeling of workplace exposures, and Bayesian decision analysis. These activities will continue in the foreseeable future.

Dr. Raynor has developed three courses that are offered during the summer Public Health Institute. PubH 7200, Section 128 (Personal Protective Equipment and Respiratory Protection) focuses on how to choose personal protective equipment and respiratory protection for those responding to emergencies, treating infectious patients, handling hazardous materials, or facing known workplace contaminants. PubH 7200, Section 129 (Preparedness for Buildings) focuses on assessing threats and hazards for large buildings and discuss measures that can be taken to improve building security and protect building occupants. Elements of heating, ventilating, and air-conditioning (HVAC) systems and ways to minimize exposures to hazardous agents are included. PubH 7200, Section 133 (Workers as Partners in Emergency Preparedness and Response) focuses on incorporating workers into plans for avoiding and coping with terrorism or other emergencies, provides management and worker perspectives on this topic, and establishes preparedness competencies for workers. Dr. Ramachandran's expertise in nanoparticle exposures and risk assessment led to the development of a course PubH 7200 (Nanoparticle exposures and hazards: What should the occupational health and safety professional do?) that focuses on physical and chemical properties of nanoparticles that create the potential for health effects, human exposures through multiple routes, their deposition in the human respiratory tract, monitoring methods and instrumentation.

C. Results and Discussion

The Industrial Hygiene (IH) program has successfully prepared occupational hygiene professionals at the Master's' degree level for positions in industry, consulting companies, and governmental agencies, and at doctoral level as leaders in industry. Over the past five years, 29 IHs have earned Master's' degrees (12 MPH; 17 MS degrees), and 1 student earned a PhD. In 2006-2007, 12 Master's-level students enrolled (6 MPH, and 6 MS). Of these, one was a part-time trainee. There are currently 5 Ph.D students enrolled.

a. Accreditation of the Industrial Hygiene Program by ABET

The Industrial Hygiene Master's (MPH and MS) programs are accredited (2002 to 2008) by the Accreditation Board for Engineering and Technology (ABET). Accreditation is an important element of the program, because it ensures applicants that the program is of high quality and that their education will prepare them for future employment and certification. In addition, it gives them a year toward their work experience requirement when applying for certification. Re-accreditation is currently being applied for and a site visit has been scheduled for Sept 16-18, 2007. The ABET review team was very complimentary about the program's curriculum, students and faculty at its first site visit in 1995 and the second site visit in 2001. Minor concerns related to applicant assessment, required course load, and employer expectations were adequately addressed. The Program received accreditation for an additional 6 years. Most importantly, new outcomes-based accreditation criteria encouraged faculty to define the educational objectives (skills and knowledge expected within 3 years of graduation) and program outcomes (skills and knowledge expected at the time of graduation). The program curriculum (courses and other learning activities) was carefully evaluated in light of the program outcomes; course objectives were assessed to ensure both adequate coverage and limited overlap. This process led to changes in both the Division and the Occupational Health and Safety core courses—in both content and credit requirements. The Program's core requirements were also carefully considered, to ensure appropriate depth and breadth of knowledge and skills. The results of these assessments led to a lessening in required courses, freeing students to enhance their specialized skills and knowledge in relevant elective areas—for example, occupational safety and ergonomics.

b. Faculty Membership in Editorial Boards of Scientific Journals and NIOSH Study Sections/Special Emphasis Panels

All three industrial hygiene faculty have achieved a high level of professional recognition nationally. Drs. Ramachandran and Brosseau are editorial board members of the *Journal of Occupational and Environmental Hygiene*, the premier industrial hygiene journal in the US. Dr. Raynor is an editorial board member of *Aerosol Science and Technology*, the premier journal in the field of aerosol science in the US. Dr. Brosseau is a regular member of the NIOSH study section (SOH-1) for reviewing extramural research proposals. Dr. Ramachandran is an *ad hoc* member of the same study section as well as a reviewer for NIOSH intramural proposals.

c. Board of Scientific Counselors (BSC), NIOSH

Dr. Ramachandran was appointed to the BSC, NIOSH in 2007 for a four-year period.

d. Alice Hamilton Award

Dr. Lisa Brosseau is the 2006 Alice Hamilton Awardee from the American Industrial Hygiene Association. This award, established in 1993, recognizes outstanding women for their contributions to occupational hygiene.

e. Academy of Industrial Hygiene

Dr. John Mulhausen, an Adjunct Faculty member became elected as the President-Elect for the AIH in 2007.

f. Develop Interdisciplinary Graduate and C.E. "Research to Practice" Courses.

Professors McGovern and Gerberich, Dean Olson and the Centers for Public Health Education and Outreach (CPHEO), and Dr. Lisa Brosseau developed a NORA symposium May 26-27, 2004 and three NORA seminars in 2005. These events facilitate translation of "Research to Practice" (r2p), and provide C.E. or academic credit. The symposium, "NORA Health and Safety Priorities for the 21st Century," featured nationally known experts to identify research priorities and initiatives in OSH research, especially those related to injury prevention/ control, health behavior change, health promotion/disease prevention, and occupational health services research. The following year's seminars included Dr. Rosie Sokas, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations," February 24, 2005; Dr. Nick Ashford, "The Consequences of Thinking about Environmental and Occupational Health as Separate Entities," March 30; and Dr. David Wegman, "Health and Safety Issues: the Aging Workforce," April 21. The presentations can be accessed via <http://cpheo.sph.umn.edu/cpheo/events/NORA.html>.

Significant outcomes and impact on the field with respect to program objectives

a. Alumni Survey

In 2006, the MCOHS surveyed alumni for their satisfaction with, and perceived value and proficiency in their academic training in regards to discipline-specific and cross-cutting professional competencies. All alumni graduating between 1992 and 2005 were mailed a self-administered survey; 75% (46 of 61) of the IHs contacted participated. Findings revealed that IH alumni were "highly satisfied" (72%) or "satisfied" (24%) with their graduate education in occupational safety and health (OSH) and 89% were working in OSH. Among those who responded, 79% had current certification as CIHs and 37% as CSPs. Of those whose primary role was not in OSH, 100% reported using the knowledge and skills learned in the graduate program in their current job.

The findings on the interdisciplinary competencies addressing "recognition," "evaluation," "control," "communication," "behavior" and "management" reveal that almost all IH alumni rated most competencies as "very valuable" or "valuable". The interdisciplinary competencies with the most frequent ratings of "very valuable" were: identifying health and safety hazards of worksite processes and operations (93%), understanding relationship between occupational exposures and health outcomes (80%), knowing health and safety laws and regulations (78%), gather, manage and evaluate data (82%), interpreting and applying scientific findings (78%), designing and implementing changes in the work environment (76%), designing and implementing work process interventions (64%), and measuring and evaluating programs (64%). Alumni most frequently perceived themselves as "proficient" or "very proficient" in the following discipline-specific competencies: identifying health and safety hazards of work site processes and operations (96%), understanding relationships between occupational exposures and health outcomes (98%), knowing health and safety laws and regulations (80%), designing and initiating research (86%), gathering, managing and analyzing data (98%), assessing population health risks (91%), interpreting and applying scientific findings (98%), measuring and evaluating programs (75%), designing and implementing work process interventions (89%), and designing and implementing changes in the work environment (91%).

The discipline-specific competencies with the most frequent ratings of "very valuable" were: identifying hazards associated with specific sources and processes (87%), describing physical, chemical and biological aspects of the generation of hazards (89%), knowing health and safety laws and regulations (78%), gather, manage and evaluate data (82%), assessing aspects of exposure assessment, dose response and risk characterization (80%), designing and implementing an appropriate exposure assessment strategy (69%), understanding basic principles of sampling and its use for evaluating exposures and controls (87%), prioritizing hazards and exposures and the actions necessary for eliminating or controlling them (74%), recommending, evaluating and implementing appropriate engineering, administrative and personal protective controls (87%), selecting the most appropriate control methods for a given situation (83%), and validating the effectiveness of selected control methods (77%). In all the above competencies, the IH alumni perceived themselves as "proficient" or "very proficient" in the following discipline-specific competencies as follows: identifying hazards associated with specific sources and processes (95%), describing physical, chemical and biological aspects of the generation of hazards (96%), assessing aspects of exposure assessment, dose response and risk characterization (100%), calculating, interpreting and applying statistical and epidemiological data (88%), designing and implementing an appropriate exposure assessment strategy (91%), understanding basic principles of sampling and its use for evaluating exposures and controls (95%), prioritizing hazards and exposures and the actions necessary for eliminating or controlling them (93%), recommending, evaluating and implementing appropriate engineering, administrative and personal protective controls (93%), selecting the most appropriate control methods for a given situation (93%), and validating the effectiveness of selected control methods (93%). Other proficiencies included understanding the relationship of OSH professionals with management and employees (86%), managing hazardous materials and waste (75%), and demonstrating familiarity with and being able to use a professional code of ethics (95%).

b. Employer Survey.

In spring-summer 2002, we conducted an employer survey to assess employer expectations of knowledge and skills for newly graduated and experienced Master's-trained industrial hygienists. The results of this survey were published in the *Journal of Occupational and Environmental Health*. Certified industrial hygienists with recent hiring experience were surveyed about their expectations of competencies when hiring entry-level master's-trained industrial hygienists. Results were used to affirm educational objectives and program outcomes required by new program accreditation criteria. We received 129 completed surveys from 179 eligible participants agreeing to participate. Most of the respondents were employed in very large companies (>500 employees) and were evenly distributed in manufacturing, services, and public administration. Eleven topics were identified by 70% or more of the respondents as essential for entry-level, master's-trained industrial hygienists. These 11 fall entirely within the categories of recognition, evaluation, and control. While hazard recognition was listed as essential by almost all respondents (95%), the only specific hazards thought to be essential by most respondents were noise and chemicals (gases and vapors). Knowledge areas identified as essential by less than 25% of all respondents included environmental topics, management topics, and other topics such as occupational medicine, behavioral science, policy, and modeling. Personnel management, resource allocation, and outdoor air pollution received the highest number of "not necessary" responses. Of the competencies expected of newly graduated Master's-trained industrial hygienists, the 19 essential competencies are almost entirely in the categories of recognition, evaluation, control, and communication. The competencies thought to be the least essential (identified by less than 50% of the respondents) fall largely within the management category. More than 85% of the respondents thought that communication; ethical behavior; technical competence in recognition, evaluation, and control of hazards; working within a team and solving complex problems through observation; literature review; measurement; and data analysis were essential skills for *experienced* master's-trained industrial hygienists. Understanding the limits of their education and seeking ongoing education and work experience for professional experience was thought to be essential by 76% of the respondents. Only 40% of the respondents thought that experienced industrial hygienists should be able to use their skills to benefit the community or design long-range goals and programs. These results allowed us to identify core competencies, which must be addressed in required courses, as well as additional knowledge and skills that could be achieved through elective classes. The results have also been useful in developing course and program evaluations and in advising students about employer expectations.

c. Employer Focus Groups.

In November 2005, we conducted four focus groups with individuals responsible for IH and OSH professionals in firms of various sizes in the manufacturing, government, and consulting sectors. Each group was asked to address five key questions: 1) In your organization, what are the current needs for industrial hygienists or individuals with health and safety responsibility? 2) What do you think are the future needs for industrial hygienists or individuals with health and safety responsibility? 3) What are your organization's expectations about training and qualifications when hiring IHs and OSH professionals? 4) How does your organization find and hire IHs or OSH professionals? 5) When you hire IHs, does it matter if they come from an ABET-accredited program? While group participants framed their needs differently by sector, there were many areas of agreement across sectors. In general, individuals representing these employment sectors foresee a continuing future demand for IHs in their organizations. They seek IH and OSH professionals with broad knowledge and skills, with the expectation that specialization will occur after hiring. All groups consistently emphasize the importance of good communication skills, both verbal and written. They also agree that "hard" or basic science knowledge and technical skills are a prerequisite to hiring. In addition, some groups made comments about the ability to get students hired as an important measure of program success.

Effects of the Program on Curriculum and/or Research Directions

Our program evaluation efforts (matching curriculum syllabi to discipline-specific competencies, the alumni survey, and the employer survey) reveal that the majority of alumni perceive their training as valuable, feel proficient in the identified professional competencies and apply their training in their respective work settings.

(a) *Evening Classes*: The need to attract working professionals to industrial hygiene coursework offered by MCOHS has led to most of the required courses being offered in the evenings. This has proved to be a successful move and a number of professionals working in local companies have taken courses such as PubH 6103 (co-taught by Dr. Ramachandran and Dr. Raynor), and PubH 6171 (instructor: Dr. Ramachandran).

(b) *Evaluating professional competencies*: The specific effects of this IH training program on the curriculum include the ongoing research and evaluation of professional competencies that was published in a peer-reviewed journal as described above (Brosseau et al., 2005).

(c) *New specialty courses offered in summer Public Health Institute*: Dr. Raynor's expertise in respiratory protection and building safety and ventilation led to the development of three courses that are offered during the summer Public Health Institute. PubH 7200, Section 128 (Personal Protective Equipment and Respiratory Protection) focuses on how to choose personal protective equipment and

respiratory protection for those responding to emergencies, treating infectious patients, handling hazardous materials, or facing known workplace contaminants. PubH 7200, Section 129 (Preparedness for Buildings) focuses on assessing threats and hazards for large buildings and discusses measures that can be taken to improve building security and protect building occupants. Elements of heating, ventilating, and air-conditioning (HVAC) systems and how they can be used to minimize exposures to hazardous agents are included. PubH 7200, Section 133 (Workers as Partners in Emergency Preparedness and Response) focuses on incorporating workers into plans for avoiding and coping with terrorism or other emergencies, provides management and worker perspectives on this topic, and establishes preparedness competencies for workers. Dr. Ramachandran's expertise in nanoparticle exposures and risk assessment led to the development of a course PubH 7200 (Nanoparticle exposures and hazards: What should the occupational health and safety professional do?) that focuses on physical and chemical properties of nanoparticles that create the potential for health effects, human exposures through multiple routes, their deposition in the human respiratory tract, monitoring methods and instrumentation. (d) *Development of Textbook*: Dr. Ramachandran developed a textbook based on the required industrial hygiene course (PubH 6171) that he teaches called *Occupational Exposure Assessment for Air Contaminants* (Taylor and Francis/CRC Press, 2005).

D. Conclusions

The industrial hygiene program has a strong group of core and adjunct faculty with international and national recognition. The Masters' and PhD curriculum emphasizes the multi-disciplinary elements of Industrial Hygiene while maintaining a strong emphasis on practical applications and research of relevance to issues in occupational and environmental health. There are opportunities for field experience and Master's project (research) work that enable students to develop their practical professional and investigative skills. The program maintains an active advisory board that includes representation from stakeholders. Over the past five years, 29 IHS have earned Master's degrees (12 MPH; 17 MS degrees), and 1 student earned a PhD. In 2006-2007, 12 Master's-level students enrolled (6 MPH, and 6 MS). Of these, 1 was a part-time trainee. There are currently 5 Ph.D students enrolled. The program is accredited by the Accreditation Board for Engineering and Technology (ABET). Faculty members are on the editorial boards of scientific journals, NIOSH Board of Scientific Counselors, and study sections. Alumni surveys, employer surveys and focus groups indicate a high degree of satisfaction with the value of and proficiency in their academic training.

5. B. Occupational and Environmental Health Nursing Program
Director: Patricia M. McGovern, PhD

Occupational and Environmental Health Nursing Program
Director: Patricia M. McGovern, PhD

A. Background

This Occupational and Environmental Health Nursing (OEHN) Program has provided excellent interdisciplinary education in occupational health and safety for nurses for the past 30 years. In 2005 the faculty changed the program's name from Occupational Health Nursing to Occupational and Environmental Health Nursing, based on the importance of environmental health to the field of occupational health nursing, this program's curriculum based in environmental health sciences, and demand from current and prospective students. The OEHN advisory board discussed and approved this name change (June 16, 2005). The OEHN program's faculty, students, academic training and research are integrated into the Division of Environmental Health Sciences in the School of Public Health, and the program is one of nine specialty tracks within the Division. This integration enriches the program's opportunities to offer interdisciplinary training in academic coursework, research training, and field experiences. The OEHN faculty regularly collaborate with School of Nursing (SON) faculty for purposes of academic training, research, continuing education and outreach. All OEHN faculty (McGovern, Olson and Nachreiner) hold adjunct appointments in the SON. Two of the SON public health nursing faculty (Kerr and O'Boyle) that regularly collaborate with the program hold adjunct appointments in the School of Public Health, Division of Environmental Health Sciences. For the period of interest, July 1, 2002 to June 30, 2007, this program offered three masters degree options including a Master of Public Health (MPH) degree, a dual degree (i.e., an MPH and a Master of Science degree, MS, with a major in Nursing), a Master of Science degree (with a major in Environmental Health), and a Doctor of Philosophy (Ph.D.) in Environmental Health, and a Public Health Certificate in Occupational Health and Safety.

Through the various program plans all masters-level nurses are prepared to function as administrative leaders in occupational health and safety with the capacity to investigate occupational health and safety problems at a basic level. The MPH curriculum prepares qualified nurses to function in a managerial capacity as occupational health specialists in business, industrial or health care settings. This option entails two years of full-time enrollment and completion of a minimum of 42 semester credits. The MPH-MS (dual degree) curriculum prepares qualified nurses for occupational health specialist positions in public health agencies, and is required for students whose long-term goal is a faculty role in a nursing school (after completion of doctoral studies). The dual degree option entails two and one-half years of full-time enrollment and completion of a minimum of 55 semester credits. The MS degree, with an environmental health major, is an option for OEHNs pursuing doctoral education in public health. It is an adaptation of the MPH-MS program plan including more coursework in epidemiology and biostatistics, and less coursework in management and nursing theory. It requires two and one half years of enrollment and completion of 42-52 semester credits, plus electives. In addition, a minor in agricultural health and safety (designed by Dean Olson and Professor John Schutske, Program Director, Agricultural Health and Safety) is available to students from any of the above degree options. All masters-level students complete a plan B research paper or masters thesis that they defend orally to a three-person committee of the faculty.

Training at the doctoral level has been available since 1996. Through the doctoral-level education, OEHNs are prepared as researchers and educators who will contribute to the knowledge base of the field and help prepare the OEHNs of the future. Having completed all the occupational health and safety core content at the masters level, OEHN doctoral students take additional coursework in epidemiology and biostatistics and apply them to issues of occupational and environmental health nursing and the broader field of occupational health and safety. Students who have already earned a masters degree focused in occupational health nursing must complete a minimum of 48 required semester credits, in addition to electives that support their dissertation research. Students complete written and oral preliminary examinations as well as a final examination of their dissertation research project, which they defend orally to a four-person committee of the faculty.

Within the School of Public health, all OEHN students are admitted into the Division of Environmental Health Sciences (EHS). The MS, MS-MPH and PhD degree students are also admitted to the Graduate School, and the MS-MPH degree students are also admitted to the School of Nursing.

All program plans include substantial interdisciplinary coursework –a minimum of 28 semester credits. This includes required courses in public health such as epidemiology (minimally 3 credits), biostatistics (minimally 3 credits), management (2 credits), social and behavioral science (3 credits), and public health ethics (1 credit). All program plans also include required courses in environmental and occupational health such as Exposure to Environmental Hazards (PubH 6103, 3 credits), which includes content in general environmental health and industrial hygiene, Environmental Health Effects: Introduction to Toxicology (PubH 6104, 2 credits), and Environmental and Occupational Health Policy (PubH 6105, 3 credits), which provides a survey of environmental and occupational health policy, and the public policy process in the United States, including content on risk assessment. Other required courses include:

Introduction to Occupational Health and Safety (PubH 6170, 3 credits), which addresses the interrelatedness of public health, government and the labor movement to the goals of occupational health and safety; recognition and assessment of occupational health and safety hazards; health promotion/prevention and protection concepts; a conceptual framework for practice, and prevention and control strategies; Occupational Medicine: Principles and Practice (PubH 6130, 2 credits) which addresses how to detect toxic agents and physical hazards that cause disease among workers; and Interdisciplinary Evaluation of Occupational Safety and Health Field Problems (PubH 6150, 3 credits), which provides theory and practice regarding the roles and functions of occupational safety and health professionals, team approaches to assessment and evaluation of a worker health and safety in the workplace, and concepts of hazard recognition, evaluation and control.

Students in the program have an opportunity to acquire discipline-specific knowledge in courses taught by OHN faculty such as Introduction to Occupational Health and Safety (PubH 6170, 3 credits) and Interdisciplinary Evaluation of Occupational Safety and Health Field Problems (PubH 6150, 3 credits) described above. They acquire public health nursing content through required courses such as Advanced Public Health Nursing (Nurs 8600, 2 credits) and Research in Nursing (Nurs 8600, 2 credits).

In addition, OEHN students synthesize and apply coursework to their future practices through internships or field experiences (PubH 7196, Field Experience in Environmental Health, 4 credits) and masters-level research projects. (PubH 7194, Environmental and Occupational Health Masters Project: 3-5 credits), which increase the OEHN curriculum content and experiential learning for students. The field experience is composed of two rotations. One credit involves a clinical rotation at Region's Occupational and Environmental Medicine (OEM) Clinic that is taken upon completion of "Introduction to Occupational Health and Safety" (PubH 6170), and "Occupational Medicine" (PubH 6130). The students observe staff physicians and residents evaluate, diagnose and treat patients; review patient charts; and discuss patient management decisions. The clinic's caseload includes a variety of presenting problems. Each student also works with a physician to select a patient's case to research and present at a residency case conference. These case presentations enable students to apply occupational health sciences to clinical problems.

Students also must complete a minimum of three credits of field experience for PubH 7196 as an individualized learning experience designed to apply and synthesize their coursework to a "real world" setting. Students investigate a variety of occupational health and safety employment settings and OEHN roles, and gain expertise on an issue of interest. OEHN faculty arrange a nursing mentor for each student and meet with all involved parties to develop individualized learning objectives, necessary resources, and expected outcomes and measures of evaluation for each rotation. Recent examples have included: developing and implementing personal preparedness education for hospital and clinic staff at a major medical center; conducting a literature review investigating best practices for developing and staffing emergency response teams for a fortune 500 corporation; conducting a needs assessment and business feasibility plan for a travel health clinic; designing and implementing a quality improvement process (Six Sigma) on occupational health surveillance for a major health care provider; developing and pilot-testing a template medical record for low back strain encounters by occupational medicine clinic providers to enhance quality of care; and developing and implementing a health promotion/disease prevention health fair for a manufacturing facility.

Additionally all students are required to attend a minimum of five sessions of Community Grand Rounds, which are clinical case conferences presented by OEM staff and residents and community physicians (for continuing professional education, not academic credit). The conferences are an excellent opportunity to learn how OEM physicians assess individual clinical cases and also for professional networking. Recent topics included: mold health effects; disability management of a welder with a cold finger; blood lead screening in pregnancy; low-dose benzene and risk of pregnancy; child labor and lead; the multiple sequelae of low voltage electrical burns; hand surgery for non-surgeons; Cytochrome P450 and glutathione transferase polymorphisms as biomarkers of risk for disease; an osteopathic approach to the diagnosis and management of acute low back pain; and physical fitness and injury rates in the Minneapolis Police Department.

All masters-degree students work with a research advisor to complete a research paper (PubH 7194, Environmental and Occupational Health Masters' Project: 3-5 credits). Students produce a formal written scholarly report that demonstrates writing proficiency, and the abilities to critically approach a topic relevant to the field of OEHN, and to synthesize, interpret and successfully convey information to the appropriate audience. The final project may involve a literature review, data analysis at a basic, applied level, or other research effort. The final product is a formal, written scholarly report that is evaluated by the research advisor, and a final oral examining committee involving at least two other faculty members. Doctoral students must produce a scholarly thesis that makes a contribution to the body of knowledge in environmental and occupational health and withstands the scrutiny of a five member committee including the research advisor.

Faculty

Patricia McGovern, PhD, MPH, RN (Professor) has successfully directed this program in Occupational and Environmental Health Nursing since 1985. She is prepared in public and occupational health nursing at the masters-level, and in health services research and policy at the doctoral-level. Her research expertise addresses policy and program evaluation in occupation and environmental health. Current projects address: the postpartum health of employed women; the effects of flexible work arrangements on health and health services use; work-related violence prevention and control; environmental justice and risk communication; and the consequences of agricultural injuries. She teaches the division's required course, "Occupational and Environmental Policy" (PubH 6105, 2 credits), and arranges the majority of students' field experiences (PubH 7196), including the one credit rotation with residents at Region's OEM Clinic. She collaborates with Dr. Gerberich and Alexander for selected sessions of PubH 8120, Occupational Injury Prevention Research Training Seminar, required for OEHN PhD students. She also serves as co-director of the Occupational Health Services Research and Policy Program (OHSRP), Director of Graduate Studies (DGS) for the School of Public Health's minor in public health and director of the School's Interdisciplinary Concentration in Public Health Policy.

The core faculty for this OEHN program includes Debra Olson, Associate Dean for Public Health Practice Education, and Nancy Nachreiner, Assistant Professor. All of the faculty teach, conduct occupational safety and health (OSH) research, and advise students.

Dean Debra Olson, MPH, COHN-S (Associate Dean for Public Health Practice Education), has expanded her role to include the greater public health community including issues of public health preparedness, and distance learning, as well as research on professional competencies in relation to curriculum development and program evaluation. These activities enrich the OEHN program, and provide unique learning opportunities for students. Dean Olson's courses include "Issues in Environmental and Occupational Health," PubH 6102 (3 credits), offered to students in nursing, public health and health care administration, and "Issues in Environmental and Occupational Health," PubH 3102 (3 credits) currently co-taught with a community faculty Dr Paul Allwood, Environmental Health Sciences, Boynton Health Service, University of Minnesota. This latter undergraduate option meets the requirements of the Council on Liberal Education to help inform pre-nursing and liberal arts students of a possible career option in environmental and occupational health. Offered on the Internet, it allows for regional access to potential candidates

Nancy Nachreiner, PhD, MPH, COHN-S (Assistant Professor) graduated from the OEHN program June 30, 2002, and has been hired as a faculty member. Her dissertation, "Work-related Assault: Impact of Training and Policy" resulted in several publications and presentations (see Appendices 2 and 3). She teaches two courses required for occupational health and safety students: PubH 6150: "Interdisciplinary Evaluation of Occupational Safety and Health Field Problems" (3 credits), and PubH 6170: "Introduction to Occupational Health and Safety" (3 credits, online, and in-person). In addition to conducting injury prevention research in work-related violence, and return-to-work issues for cancer survivors, Dr. Nachreiner is also the Membership Chair for the Injury Control and Emergency Health Services (ICEHS) section of the American Public Health Association, a reviewer for Research in Nursing and Health, the International Journal of Nursing Studies, and General Hospital Psychiatry; and a faculty member of the Powell Center for Women's Health, and the University of Minnesota's Cancer Center.

Additional Program Faculty

This OEHN faculty participates in a highly interdisciplinary division where they can easily draw upon the expertise of specialties in medicine, injury prevention, occupational epidemiology, industrial hygiene, toxicology, and biostatistics. They also collaborate with faculty from the Nursing School, College of Veterinary Medicine and Biosystems and Agricultural Engineering in the College of Food, Agriculture, and Natural Resources Sciences.

Bruce Alexander, PhD (Associate Professor; Program Director, Occupational Epidemiology) is an epidemiologist; his work addresses the occupational determinants of reproductive health, cancer and traumatic injury, and the use of biological markers in disease. He co-teaches the "Occupational Injury Prevention Research Training Program Research Seminar" (PubH 8120) with Dr. Gerberich (primary instructor), and collaborates with Dr. McGovern and OEHN PhD student, Maggie Stedman-Smith on research (e.g., a health feasibility study for the Prairie Island Indian community, and the study of farm family exposures to pesticides). He also collaborated with Professor Nachreiner on her study of return to work among cancer survivors.

Heidi RoeberRice, MD, MPH (Director, Occupational Medicine Residency) is an occupational medicine physician located at the OEM Clinic at Fairview Riverside Hospital. She has worked with Dr. McGovern to host the OEHN students in the required 1 credit field experience (PubH 7196) and Occupational and Environmental Medicine (OEM) clinical rotation. She also facilitates monthly Community Grand Rounds in OEM and guest lectures in PubH 6170, and assists with student groups in PubH 6150. She collaborated with Professor McGovern and others on a research project "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis" involving Professors McGovern, Dowd, Alexander, Gerberich and Rada Dagher, MPH (PhD candidate, non-trainee taking OSH courses).

Jean Bey, MPH, RN, COHN-S (Adjunct Clinical Instructor) is the Occupational Health Manager, Corporate Occupational Medicine, 3M, St. Paul. An alumna of this program Ms. Bey has mentored OEHN students in field experiences, serves on the advisory board, has hired several OEHN alumni, and refers 3M nurses to this training program.

Tim Church, PhD (Professor, EHS) is an expert in biostatistical methods including the design, management and analysis of clinical trials and epidemiological studies. He collaborates with Drs. Nachreiner and McGovern on the study "Violence against Teachers: Etiology and Consequences," (PI: Dr. Gerberich). He teaches "Occupational and Environmental Epidemiology" (PubH 6140), a required class for OEHN PhD students.

David Cossi, JD, MS (Adjunct) is an expert in employment law addressing the Americans with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA) and work-related violence. He co-teaches with Dr. McGovern "Environmental and Occupational Health Policy" (PubH 6105) and co-authors articles.

Mary Findorff, PhD, RN (Adjunct Assistant Professor) and Project Director, School of Nursing. She teaches an elective, "Violence Prevention and Control: Theory, Research, and Application" (PubH 6123) and a required course for the dual degree, Research in Nursing (Nurs 8170). Dr. Findorff and Dr. Nachreiner also collaborate on several research papers regarding fall injuries, based on the Fall Evaluation and Prevention Program (PI Jean Wyman, School of Nursing).

Susan Goodwin Gerberich, Ph.D. (Professor and Principal Investigator, MCOHS, 7/1/2007-6/30/2008) is an international expert in injury epidemiology with studies addressing occupational injuries including work-related violence, agricultural trauma and injury surveillance methods. She collaborates with faculty on her NIOSH-funded research projects (e.g., "Violence Against Teachers: Etiology and Consequences," and the "Consequences of Agricultural Injuries") and teaches the doctoral research seminar (PubH 8120) required for PhD students, and a valuable elective, "Injury Prevention in the Workplace, Community, and Home" (PubH 6120). She served as Nancy Nachreiner's dissertation advisor and Mary Findorff's co-advisor.

Linda Glazner, Dr PH, RN, COHN-S, CCM, FAAOHN (MCOHS Continuing Education faculty). Dr. Glazner is a consulting OEHN with extensive experience supervising case management services. She was formerly an assistant clinical professor at the University of California, Los Angeles. She has taught a 3-day case management class, which was recently redesigned as a one credit class.

Ian Greaves, B Med Sci, MB BS (Associate Professor, and Principal Investigator, MCOHS, 7/1/2002-6/30/2007) is an occupational medicine physician whose research interests have addressed lung disorders caused by occupational airborne exposures and international issues in OSH. He teaches "Occupational Medicine: Principles and Practice" (PubH 6130, 3 credits).

Jean Johnson, PhD (Adjunct Assistant Professor), is a Principal Epidemiologist, Minnesota Department of Health, Division of Chronic Disease and Environmental Epidemiology. She guest lectures on Superfund regulations and risk communication in "Environmental and Occupational Health Policy" (PubH 6105), and mentors students' field experiences.

Madeline Kerr, PhD, RN (Associate Professor, School of Nursing) co-advises dual degree students, and involves them in research on intervention effectiveness, and occupational hearing loss. She teaches "Interventions for the Health of Populations," (Nurs 8601) required for MS-MPH students, and is an advisory board member.

William Lohman, MD (Director, Program in Public Health Medicine, School of Public Health) is an occupational medicine physician, and medical consultant to the Minnesota Department of Labor and Industry. He lectures in "Environmental and Occupational Health Policy" (PubH 6501) on workers' compensation, and ergonomics. He also serves on the OEHN Advisory board.

George Maldonado, PhD (Associate Professor, EOH) is an epidemiologist and expert in the evaluation of the validity of epidemiological studies. He teaches "Validity Concepts in Epidemiologic Research" (PubH 8140), and Epidemiologic Uncertainty Analysis (PubH 8142), which are recommended classes for PhD students.

Rita Messing, PhD (Graduate Adjunct Faculty), toxicologist, Minnesota Department of Health, Supervisor, Site Assessment Unit, provides guest lectures on environmental exposures, and risk communication in "Occupational and Environmental Health Policy" (PubH 6105), and has mentored students in field experiences.

Carol O'Boyle, PhD, RN (Associate Professor, School of Nursing) co-advises students, conducts research on infection control, and collaborates with Dean Olson on public health preparedness training. She has taught courses taken by dual degree students: "Population Focused Health Care Systems" (Nurs 8242); "PHN Leadership Practicum" (Nurs 8603), and "Public Health Nursing Leadership" (Nurs 8600).

Gurumurthy Ramachandran, PhD (Program Director, Industrial Hygiene) has expertise in occupational and ambient exposure assessment, Bayesian methods in retrospective exposure assessment, and aerosol measurements. He provides consultation related to exposure assessment and industrial hygiene, and co-teaches in the required course, "Exposure to Environmental Hazards," (PubH 6103).

John Shutske, PhD (Professor; Program Director, Agricultural Safety and Health) is an agricultural safety engineer whose expertise addresses agricultural and food industry safety and public health, emergency preparedness, biosecurity, safe design of machinery and processes, human factors, evaluation of injury prevention efforts and child protection in the workplace. He teaches "Safety and Environmental Health Issues in Plant and Animal Production and Processing" (BAE 5212), and advises OEHNs who focus in Agricultural Safety and Health.

Elizabeth Wattenberg, PhD (Associate Professor, Director of Graduate Studies) is a toxicologist whose primary expertise is in molecular toxicology, but also includes risk assessment and environmental regulation. She teaches a required course "Environmental Health Effects: Introduction to Toxicology" (PubH 6104).

B. Goals and Objectives

- 1) Maintain student enrollment into the masters-level and doctoral degree programs
- 2) Implement a Dual Degree (MPH-MS) option
- 3) Maintain an active advisory board with representation from industry, labor, the Minnesota Department of Health and the Minnesota Department of Labor and Industry
- 4) Continuously evaluate and refine the learning experience of OEHNs as they participate in a highly interdisciplinary curriculum.
- 5) Facilitate the development of innovative, interdisciplinary graduate and continuing education offerings
- 6) Promote leadership development for OEHNs
7. Design and implement interdisciplinary "Research to Practice" seminars and short courses

C. Results and Discussion

Progress on the OEHN training program goals and objectives is described below and followed by discussion of new program developments, selected research projects and faculty and student awards as evidence of impact of the program on the field of occupational and environmental health nursing.

- 1) Maintain student enrollment into the masters-level and doctoral degree programs

Over the past five years, 14 OEHNs have earned masters' degrees (10 MPH; 4 dual degrees or MPH-MS). Additionally, one OEHN earned a PhD, two OEHNs earned certificates in occupational health and safety (PHCert-OHS), and one MPH alumni, with a focus in public health nursing, completed a year of occupational health and safety (OHS) coursework in advance of the development of the PHCert-OHS. Graduates have taken leadership roles in industry, health care and education. Ten additional masters-level OEHNs (6 MPH, and 4 dual degrees) and one PhD student who completed supporting coursework in Agricultural Safety and Health (ASH) have also been enrolled during this same period and are either completing coursework or research requirements.

- 2) Implement a Dual Degree (MPH-MS) Option

This OEHN program has successfully offered a dual degree through a collaborative agreement with the School of Nursing for many years and it was formalized in a Memorandum of Agreement, July 2006. This effort increased opportunities for collaborative efforts between schools in recruitment, program planning and administration. Between July 1, 2002 and June 30, 2007 four students elected this option and graduated. One of these students subsequently enrolled in the OEHN doctoral program and is completing her preliminary examinations. Two additional dual degree students are currently enrolled and completing their plan B research projects.

This program option at the University of Minnesota will no longer be offered as of Fall 2007 as the University of Minnesota's SON will now offer the Doctorate of Nursing Practice (DNP) as its "terminal" degree option, in lieu of the MS degree, and consistent with many schools of nursing nationwide. The University's SON enrolled the first cohort of DNP students fall, 2006 with faculty member, Debra Olson, as a member of the inaugural class.

3) Maintain an active advisory board with representation from industry, labor, the Minnesota Department of Health, and the Minnesota Department of Labor and Industry

Advisory board meetings have been held annually with facilitation by Professor McGovern. Members provide valuable input on curriculum, host field experiences, hire graduates, refer employees for education, and provide continuing education classes.

4) Continuously evaluate and refine the learning experience of OEHNs as they participate in a highly interdisciplinary curriculum.

Dean Olson has taken a lead role for the MCOHS in designing and implementing alumni evaluations to assess the goodness of fit between the competencies acquired during graduate training and the alumni's professional practice upon graduation. Survey results have been used by the MCOHS faculty to refine curriculum and identify needs for continuing education courses (e.g., developing a course on case management). The results of these efforts have provided models for other Education and Research Centers and have been published as noted below (with a student coauthor's name underscored and faculty and staff names in bold font). Additionally, another survey of alumni was conducted in 2006, and Dr. Nachreiner has coauthored a manuscript on the results of this survey, which is currently in review.

- Hart PA, Olson DK, Fredrickson AL, McGovern PM: [2006]. Competencies most valued by employers: Implications for master's prepared OEHNs, AAOHN 54: 327-335.
- Olson DK, Lohman WH, Brosseau LM, Frederickson AL, McGovern PM, Gerberich SG, Nachreiner NM: [2005]. Crosscutting Competencies for Occupational Health and Safety Professionals. *Journal of Public Health Management and Practice* 11: 235-243.

5) Facilitate the development of innovative, interdisciplinary graduate and continuing education offerings

The OEHN faculty continue to develop creative interdisciplinary graduate courses and work to increase the use of distance-based learning options. Through Dean Olson's leadership the Centers for Public Health Education and Outreach (CPHEO) creates and maintains over 40 online course offerings and hundreds of online modules that include the School's entire core public health curriculum. Key courses already online include "Introduction to Occupational Health and Safety" (PubH 6170, 3 credits; Dr. Nachreiner), and "Environmental Health and Nursing," (eight, 3-hour modules, Dean Olson). This later offering is under development for "Environmental Health Online" series for an interdisciplinary audience due to national demand for continuing education in this field. Dean Olson and Dr. Paul Allwood have also offered two internet courses on issues in environmental and occupational health that allow regional access to graduate and undergraduate students. Dean Olson and an OEHN student, Linda Carlson, developed free online modules (A Glimpse into Occupational Health and Safety; History of Occupational Health and Safety) as an introduction to occupational health. These modules have been used by undergraduate programs to introduce environmental and occupational health into their curriculum. These modules are the first in a series of 12 online modules under development in occupational health and safety available free to a national audience. Finally, Dr. McGovern and Dean Olson were awarded funding from the University's Digital Media Center to develop an online version of "Occupational and Environmental Health Policy" (PubH 6105), which was successfully launched in 2006-2007 such that students could elect to take the class in-person, completely online or a combination of the two modalities.

Another innovative option is the Public Health Institute, offered for the past five years through the School of Public Health. This annual event (offered May-term) has evolved into a forum for discussion of emerging public health issues. At the latest annual PHI (2007) 9 universities and 39 community organizations partnered with the UMN to offer 59 courses attended by 302 students from 28 states. Focus areas included: culturally responsive public health practice; environmental health (e.g., "Ergonomics and Prevention of Workplace Hazards;" "Personal Protective Equipment and Respiratory Protection"); evaluation methods; food safety and biosecurity; infectious disease epidemiology; public health leadership and public health preparedness, response and recovery. This Institute is a vehicle for enrolling students in cutting edge public health courses and has been the forum for offering the Public Health Certificate in Occupational Health and Safety (PH Cert-OHS). The certificate was a program in the Public Health Practice Major, and was awarded upon completion of a minimum of 13 credits (16 credit minimum for students new to the field of OHS). While two nursing students completed the certificate in 2005, there has been insufficient demand over time to justify continuing this option in 2007.

6) Promote Leadership Development for OEHNs

The faculty has closely worked with the American Association of Occupational Health Nurses (AAOHN) to promote leadership development among members. In 2006 Dr. McGovern facilitated a continuing education (C.E.) program, "Fundamentals of NIH Peer Review," featuring Dr. Michael Micklin, Chief, Risk, Prevention, and Health Behavior Integrated Review Group, Center for Scientific Review, National Institutes of Health, for educators/researchers at the Symposium and Expo in Albuquerque. In 2005 Dean Olson and Dr. McGovern served as chair and educational co-chair, respectively, of the Local Coordinating Committee (LCC) for AAOHN's

inaugural Symposium and Expo held in Minneapolis; 1500 OEHNs attended. Minnesota alumni presented posters. (See Appendix 2, Presentations.)

7). Design and Implement Interdisciplinary "Research to Practice" Seminars and Short Courses

Over the past several years the Professors McGovern, Gerberich, and Brosseau collaborated with Dean Olson and the CPHEO to host innovative seminars and symposium that promote the translation of "Research to Practice (r2p)" on the priorities of the National Occupational Research Agenda (NORA). The CPHEO have provided C.E. or academic credit for these efforts, and adapted the live programs to an online format (<http://cpheo.sph.umn.edu/cpheo/events/NORA.html>) as follows.

- June 13, 2007 two seminars focused on the theme "Occupational Health and Safety Research to Practice." Speakers and topics included: Laura Punnett ScD, Professor, Department of Work Environment, University of Massachusetts Lowell and Jane Lipscomb PhD, RN, FAAN, Professor and Director, University of Maryland Baltimore (UMAB) School of Nursing, Work and Health Research Center. Professor Punnett presented: "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs," and Professor Lipscomb presented: "Evaluation of Workplace Violence Prevention Interventions."
- July 18, 2006 Dr. Jim Collins from the NIOSH Division of Safety Research presented his NORA award winning studies "Research on Safe Patient Lifting and Slip, Trip, and Fall Prevention in Health Care Workers," and his colleague, Dr. Harlan Amandus, presented, "Directions for Future Workplace Violence Research"
- February 24, 2005 Dr. Rosie Sokas presented "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations"
- March 30, 2005 Dr. Nick Ashford presented "The Consequences of Thinking about Environmental and Occupational Health as Separate Entities"
- April 21, 2005 Dr. David Wegman presented "Health and Safety Issues: the Aging Workforce"
- May 26 - 27, 2004 was the launch of a full day symposium "NORA Health and Safety Priorities for the 21st Century." It featured nationally known experts to identify research initiatives in OSH research, especially those related to injury prevention/control, health behavior change, health promotion/disease prevention, and occupational health services research.

Students and faculty have contributed to the growth of knowledge in the field of occupational health and safety through publication in the peer-reviewed literature (22 published or in press articles and 2 dissertations), presentations of research (50 oral and poster presentations), and outreach as detailed in the OEHN Appendices (2-4). There have also been a number of new program developments, significant research endeavors and awards to faculty and students that reveal the impact of programming through this innovative program in occupational and environmental health nursing as identified below.

New program developments

Funds were provided for interdisciplinary research in 2006-2007, through the ERC, to Professors McGovern and Dowd, Dr. RoeberRice and Rada Dagher, doctoral student (non-trainee taking OSH classes), that resulted in a completed research effort, now in preparation for a peer-reviewed publication, "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis." This study combined theoretical perspectives from the fields of sociology and occupational health psychology to explain the risk and protective factors of postpartum depression among employed women during the first year after childbirth and has implications for prevention efforts.

Dr. Jeff Mandel, (Occupational and Environmental Medicine) and Professor McGovern have been successful in implementing a Memorandum of Understanding in 2007 between HealthPartners and the School of Public Health, Division of Environmental Health Sciences (EHS) to collaborate on research endeavors. HealthPartners Research Foundation (HPRF), located in Bloomington, Minnesota, is the research arm of HealthPartners managed care organization. This integrated health care system consists of a large network of owned and contracted clinics, medical and dental centers that provide health care services and coverage to more than 650,000 members in the Twin Cities metro area. The HPRF has a professional support staff of over 90 members, including 20 career research scientists, 45 clinician researchers, and 11 programmer/analysts. This year, HPRF is conducting more than 170 research projects encompassing preventive care, clinical care, health services, outcomes, guideline evaluation, epidemiology and basic science. HPRF has dedicated research administration staff, a data collection center, and a human participant's protection staff. The memorandum formally acknowledges a collaborative effort between the two institutions for the conduct of research relating to the environment and its effect on human health. While researchers in both organizations have collaborated for many years on research of mutual interest, the intent of this memorandum is to set up a structure that will be deliberate in facilitating linkages and collaboration among researchers from these institutions. This creates a new opportunity to more easily access clinical data and cost information, and

provides a strong research partnership. The HealthPartners Research Foundation may also have small amounts of money for pilot projects for students and junior faculty.

A new regional research project is being conducted by Dr. McGovern and OEHN/ASH doctoral student, Maggie Stedman Smith, in collaboration with the University's Regional Partnership for Sustainable Development (UMN Partnerships) to conduct a needs assessment of women's perceived exposure to pesticides in the Red River Valley (RRV). Collaborators on the project include the: University of Minnesota Regional Sustainable Development Partnerships; White Earth Tribal Community College; Immigrant Development Center, Moorhead, Minnesota; Women, Infant and Children Program, Quin Community Health Services, Hallock, Minnesota; and the MCOHS Continuing Education Program (Kathy Smith and Ruth Rasmussen). Preliminary project findings were presented at the Upper Midwest Rural Health Policy Summit, August 17, 2007, University of Minnesota, Crookston, Minnesota. Dr. McGovern was also awarded funding from the Academic Health Center Health Disparities Research Program to support Ms. Stedman Smith using this data for her dissertation research.

Former OEHN-ASH students Penny Bartz (2005) and Ruth Rasmussen (2002), worked with faculty Professor Shutske and staff member, Michele Schermann, on research related to Asian immigrant agricultural worker and family safety. This past work has led to current outreach efforts by Dr. Shutske and his the ASH program addressing the control of occupational health exposures from H5N1 Avian Influenza in Vietnam, Thailand, and throughout the U.S

Dr. Shutske, Dean Olson, and CE staff member, Ruth Rasmussen, were funded by the Centers for Public Health Preparedness (CDC) for "FSI – Food Security Investigation," involving a series of educational workshops for the food industry and food regulatory community. The goal of the program was to create an increased awareness level across multiple professions and demonstrated competency in identifying food system vulnerabilities and control measure vulnerabilities.

Dean Olson also serves as co-principal investigator of a new "Genomics Project" with Environmental Health Sciences (EHS) division head, Professor William Toscano. Through a partnership with the Division of EHS, the Minnesota Department of Health, the CPHEO has been developing academic credit courses on the principles, ethics/legal issues and implications of genomics to public health practice for on-campus and online delivery that will be implemented and evaluated in the near future. On behalf of the School of Public Health, she also collaborated with Hennepin County, the City of Minneapolis, and Ramsey County Public Health, on a multidisciplinary effort funded by a National Association of County and City Health Officials (NACCHO) Advanced Practice Center Support Proposal and was awarded support for digital delivery of advanced content, defining the role of environmental health in emergency response.

Research Projects

Among the many research projects conducted over the past five years the following examples reveal areas of excellence in interdisciplinary research for the OEHN program.

□ Work-related Violence in Health Care and Education

Internationally known for her research, Professor Gerberich has led two major studies to identify risks for work-related violence against nurses and educators, respectively, that have been utilized for collaborative, multidisciplinary research efforts in the past year. A large team of ERC faculty including Drs. Nachreiner, Church, and McGovern, staff member, Andy Ryan, and several Occupational Injury Prevention Research Training Program (OIPRTP) students have collaborated on these efforts. The students have utilized the research opportunities to develop their dissertation research proposals that have enabled them to present their work at professional meetings and complete first-authored papers for peer-review publication. Dr. Nachreiner's dissertation work using data from this same study investigated the association of training and organizational policies on work-related assaults among nurses. Her efforts also led to a consulting role developing a training intervention for nurses on work-related violence.

□ Professional Education and Competencies

Occupational and environmental health nursing (OEHN) student, Pam Hart, faculty, Dean Olson and Dr. McGovern, and staff member, Ann Fredrickson assessed how employers' value professional competencies when hiring masters-level occupational health nurses that resulted in a publication in the AAOHN Journal and provides a model for other ERCs (Appendix 1). Additionally, OEHN student, Mary Navara, faculty member, Dean Olson and CPHEO staff member, Mary Hoepfner assessed the impact on the public health workforce and amplification of contacts as a return on investment for the University of Minnesota Public Health Institute funded in part by the CDC Center for Public Health Preparedness.

□ Women's Postpartum Health and Employment

Professors McGovern and Dowd have collaborated on a study investigating women's health after childbirth and their return to work. Doctoral students participating in these studies have included both NIOSH trainees, Mira Grice, and students taking ERC courses, but

not on traineeship, Rada Dagher. Students' presentations were made at both the American Public Health Association and AcademyHealth and resulted in awards for the students. Two MPH OEHN students, Heather Vedders (2005) and Raquel Buclear (2005), also used this data set for their plan B research papers. Dr. McGovern's most recent research findings from the study are forthcoming in *Annals of Family Medicine* and were recently published as an online Research Brief for the School of Public Health, "After Birth: Women's Health and Return to Work at 11 Weeks Postpartum" and e-mailed to approximately 1500 faculty, students and alumni (<http://www.sph.umn.edu/aboutpubs/brief/home.html>). Finally, an interdisciplinary research project was funded through the Administrative Core in 2006-2007, "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis" with collaborators including Professors McGovern, Dowd, RoeberRice, Alexander and Gerberich, and doctoral candidate, Rada Dagher.

- Injury Prevention Studies

Dr. Gerberich was awarded funding from NIOSH for a five-year study, "Consequences of Injuries among Children," in collaboration with an interdisciplinary team (Drs. Alexander, Church, McGovern, Dowd, others), staff (Andy Ryan), and OIPRTP doctoral student, Q. Williams. The major goals of this research are to identify physical, psychosocial, and economic consequences of injuries that occur among children and youths living/working in agricultural operation households, in a five-state region; a unique design enables examination of potential changes between baseline and follow-up data, comparing injured and non-injured households while controlling for important factors including injury/illness experience among other household members. This study has been implemented in the mid-west region, involving Minnesota, Wisconsin, North and South Dakota, and Nebraska, in collaboration with the United States Department of Agriculture (USDA), National Agriculture Statistics Service, and agricultural extension representatives in each state.

Awards/Promotions

Faculty and students have earned several awards for their meritorious research, teaching, outreach and service during this reporting period. Selected examples include the following.

- Dr. McGovern was promoted to the rank of full Professor in June 2007, received the "Faculty Excellence Award" from the graduating class of 2005 in the Division of EHS, and was named a Consortium Scholar, University of Minnesota, Consortium on Law and Values in Health, Environment and the Life Sciences, 2003.
- Dean Olson was inducted into the Fellows of the American Association of Occupational Health Nurses in recognition of occupational and environmental health nurses who have made significant contributions to the field of occupational and environmental health nursing in the areas of clinical practice, education, research, management, or policy (2007).
- Assistant Professor Nancy Nachreiner received the "Faculty Excellence Award" from the graduating class of 2007 in the Division of EHS.
- Doctoral student, Maggie Stedman-Smith, (Advisor: Dr. McGovern) was awarded a fellowship for her dissertation research involving a needs assessment of pesticide exposures among women and children in the Red River Valley. The fellowship was awarded by the Society for Public Health Education, and the Agency for Toxic Substances and Disease Registry (ATSDR), 2006-2007.

D. Conclusions

During the period July 1, 2002 and June 30, 2007 14 MPH students were enrolled and 10 graduated; six dual degree (MPH-MS) students enrolled and four graduated; two doctoral students were enrolled and one graduated, two certificate students enrolled and completed their program of study; and one post-masters student completed a concentration in occupational health nursing in advance of the development of the certificate program. Graduates of the masters-level educational options are prepared to function as administrative and managerial leaders in occupational and environmental health nursing, with the capacity to investigate occupational health and safety problems at a proficient level of performance. Students and faculty have contributed to the growth of knowledge in the field of occupational health and safety through publication in the peer-reviewed literature (22 published or in press articles and 2 dissertations), presentations of research (50 oral and poster presentations), and outreach as detailed in the OEHN Appendices (2-4). This cadre of OEHNs will work to decrease the nation's burden of occupational illness and injury and promote and protect the health of its workforce. As evidenced by the many examples of numerous research publications and presentations, new projects, courses, awards and promotions of faculty, staff and students, the OEHN program continues to be both innovative and dynamic and positively influences the field for occupational health practitioners, both in the local region and beyond.

5. C. Occupational and Environmental Medicine Program

Directors: Beth Baker, MD, MPH (through December 2006); Heidi RoeberRice, MD, MPH (December 2006 – Present)

Occupational and Environmental Medicine Program

Directors: Beth Baker, MD, MPH (through December 2006); Heidi RoeberRice, MD, MPH (December 2006 – Present)

A. Background

The Occupational Medicine Residency Training Program is located within the Department of Occupational and Environmental Medicine of the HealthPartners Medical Group, and is affiliated with the University of Minnesota, School of Medicine and the School of Public Health. Within the latter is The Midwest Center for Occupational Health and Safety (MCOHS), which is a collaborative effort between the Occupational Medicine Residency and the University of Minnesota, School of Public Health (SPH) where the required academic training is provided through the Division of Environmental Health Sciences. The goal of the OEM program is to train physicians who will improve the health and safety of workers and be able to practice in a wide range of venues including government agencies, corporate health departments, clinical practice, or academia. Central to this training has been an emphasis on providing a solid clinical basis for the practice of occupational medicine and the management of patients with work-related health problems, as well as the identification and remediation of occupational risks and hazards in the workplace.

The OEM program continues to receive substantial support from the Regions-HealthPartners Institute for Medical Education and the local occupational medicine community. Of the program strengths, the clinical and practicum experiences have been particularly notable in previous reviews. Particular emphasis during the five-year grant period has been focused upon program development, interdisciplinary training and education, and enhancement of resident and staff research opportunities.

The Occupational and Environmental Medicine (OEM) Residency Program was last reviewed by the ACGME in October 2003, with full accreditation for five additional years. The OEM program offers PGY-2 and PGY-3 level training for three residents per year but, due to the extraordinary educational opportunities available, was approved by the Preventive Medicine Residency Review Committee (RRC) in 2006 to expand to four residents per year.

B. Specific Objectives for the period covering July 2002-June 2007

1. Expand occupational and environmental toxicology activities

The success of the OEM program with respect to this objective was first demonstrated in the coordination of a seminar on system biology and proteomics entitled "New Frontiers in Environmental Health." The seminar was jointly sponsored by the OEM program, 3M and the University of Minnesota, School of Public Health and this course was held at 3M Corporate Headquarters in October 2003. Given the community interest in issues of environmental exposure, a jointly sponsored Environmental Exposure grand rounds commenced in 2007 — a joint venture between the HealthPartners OEM program, the SPH at the University of Minnesota and Minnesota Department of Health.

A new Medical Toxicology (MT) fellowship program accepted the first trainee at Regions/HealthPartners in July 2005. This training program is a joint venture between the Emergency Medicine and Occupational and Environmental Medicine Departments at Regions/HealthPartners and the Minnesota Regional Poison Center. Medical Toxicology Fellows complete clinical rotations in the OEM clinic with Dr. Beth Baker and Dr. Michael McGrail, developing expertise in complex clinical consultations related to Occupational and Environmental exposure to toxicants. Approximately 150 cases yearly are evaluated in the OEM clinic by OEM residents and MT fellows—cases that require the application of skills and knowledge of medical toxicology as well as principles of industrial hygiene and risk assessment. Additionally as a part of this collaboration, the OEM residency program sponsors an Occupational and Environmental Toxicology Conference each month. Faculty and residents from the OEM and Emergency Departments as well as PharmD trainees and medical students from the University of Minnesota attend these conferences, which highlight toxicology and environmental issues.

As a fellow of the American College of Medical Toxicology (ACMT), Dr. Baker has been involved in the educational outreach effort in her position as the co-Director of the ACMT spring medical toxicology conferences for 2006 and 2007—a course which provides an opportunity for medical toxicologists such as PharmDs, poison center staff and physicians in multiple specialties from around the country to develop awareness about issues of toxicology related to occupational and environmental exposures.

2. Continue development of exceptionally strong and relevant clinical training experiences

The clinical and practicum experiences continue to be among the greatest strengths of the residency program, and members of our faculty are often included as "Top Docs" in the community including Dr. Michael McGrail and Dr. Ralph Bovard in 2007 (Mpls/St. Paul Magazine). In addition to the HealthPartners OEM clinics, residents began a clinical OEM rotation with the Park Nicollet Airport clinic in 2007 to provide additional breadth of experience in caring for workers in other areas of the community.

The Public Health Rotation at St. Paul-Ramsey County Health Department has been increased to two months to augment residents' exposure to preventive medicine and community health outreach. The residents have an opportunity to work together with family medicine residents and a presentation is expected of the OEM residents to educate their family medicine colleagues about the importance of OEM in the protection of their working patient's health.

Residents have helped draft smoking cessation campaigns, addressed community environmental contamination and investigated epidemics of communicable disease in the transportation industry with practicum rotations at 3M, Northwest Airlines and General Mills. HealthPartners OEM clinics, Fairview Employee Health, and Minnesota OSHA provide residents with additional robust exposure to the practical application of OEM. During the past year, resident participation in department work site visits to participate in the evaluation of specific patient and worksite issues has been encouraged which has resulted in a greater number of site visits for our trainees.

The Twin Cities area is home to many recently settled populations and the Somalian, Eastern European, Hispanic, and Southeast Asian communities are vibrant and growing contributors to the community work force. This phenomenon has presented us over the previous five-year period with an exciting challenge and opportunity to address the issues relating to cross-cultural care of the working population. Fozia Abrar, M.D., MPH, who is the Occupational Medicine Department Chair, is involved extensively in this effort.

3. Expand and develop additional research opportunities and doctoral program collaborations

During the last five years the OEM Program has increased its focus on research training as part of the residency experience, with methodical collaboration between academic institutions and various private and government agencies. All residents must complete an independent research project as a requirement for completing the residency. The faculty works with residents in the development and design of research projects which was supported with the addition of CJ Zheng, MD, PhD who joined the residency staff in July 2004. With a doctorate in epidemiology, Dr. Zheng's biostatistics background and past research experience continues to be utilized in development of new research areas. He has begun the process of establishing occupational/environmental health ties internationally, specifically with the People's Republic of China, where he has an existing network in the science community. As advisor to trainee Dr. Eileen Greenwald, her research entitled; "Curvilinearity in an expiratory flow-volume curve and the severity of chronic obstructive pulmonary disease (COPD)" received the ACOEM Residents Research Presentation Award at the American Occupational Health Conference in New Orleans, LA, on May 7, 2007.

In another significant step for this program, Dr. Jeffrey Mandel was appointed in 2006 as a faculty member in the Division of Environmental Health Sciences, School of Public Health. He is board certified in internal medicine and occupational medicine, a fellow in the American College of Occupational and Environmental Medicine, and has published in Occupational and Environmental Medicine, Environmental Health Perspectives, the Journal of Occupational and Environmental Medicine, American Journal of Industrial Medicine, the Journal of Rural Health, and other peer-reviewed publications. He has worked extensively with faculty and residents to increase research opportunities, and serves also as a member of the Residency's Advisory Committee. Bruce Alexander, PhD, Lisa Brosseau, Sc.D., CIH, Susan Gerberich, PhD, Patricia McGovern, PhD, David Parker, M.D., MPH, and William Toscano, PhD. have been appointed as adjunct faculty to serve as research mentors and provide increased educational opportunities for residents. Dr. Baker continues working with Dr. Alexander and the Minnesota Department of Health on an ATSDR funded study of community exposure to vermiculite, which may yield future resident research opportunities. Dr. Nachreiner, Dr. Baker, Dr. Gerberich, Dr. Alexander and Dr. McGovern received a Midwest Center NORA grant to explore return to work issues in cancer and trauma patients.

To further enhance research opportunities, Dr. Jeff Mandel and Professor McGovern have been successful in implementing a Memorandum of Understanding in 2007 between HealthPartners and the School of Public Health, Division of Environmental Health Sciences (EHS) to collaborate on research endeavors. HealthPartners Research Foundation (HPRF), located in Bloomington, Minnesota, is the research arm of HealthPartners managed care organization. This integrated health care system consists of a large network of owned and contracted clinics, medical and dental centers that provide health care services and coverage to more than 650,000 members in the Twin Cities metro area. The HPRF has a professional support staff of over 90 members, including 20 career research scientists, 45 clinician researchers, and 11 programmer/analysts. This year, HPRF is conducting more than 170 research projects encompassing preventive care, clinical care, health services, outcomes, guideline evaluation, epidemiology and basic science. HPRF has dedicated research administration staff, a data collection center, and a human participant's protection staff. The memorandum formally acknowledges a collaborative effort between the two institutions for the conduct of research relating to the environment and its effect on human health. While researchers in both organizations have collaborated for many years on research of mutual interest, the intent of this memorandum is to set up a structure that will be deliberate in facilitating linkages and collaboration among researchers from these institutions. This creates a new opportunity to more easily access clinical data and cost information, and

provides a strong research partnership. The HealthPartners Research Foundation may also have small amounts of money for pilot projects for students and junior faculty.

4. Expand interdisciplinary and educational outreach activities

Interdisciplinary activities are a key component of residency training throughout the duration of the two-year period. Over the course of the previous five years, the implementation of a new curriculum model integrating the academic and practicum experiences has been successful in maximizing the opportunity for interdisciplinary efforts to our program. SPH coursework in statistics, epidemiology, and environmental health now involves students from all four core disciplines. Our trainees in the Occupational Medicine: Principles and Practice course (PUBH 6131) are joined by occupational and environmental health nursing (OEHN), industrial hygiene (IH), occupational injury prevention and occupational health policy students, who work collaboratively in multidisciplinary teams on various projects and presentations. The program has also contributed critical expertise in occupational and environment medicine to core academic courses including: Occupational Medicine: Principles and Practice, PubH 6130, Introduction to Occupational Health and Safety, PubH 6170, and Interdisciplinary Evaluation of OHS Field Problems, PubH 6150. In addition, the OEM Program contributes a valuable clinical component to the OEHN Program by providing a venue for participation in the Regions OEM Clinic for the Field Experience in Environmental Health, PubH 7196. In this setting, they work with staff or resident physicians to see patients and collaborate on an oral presentation of a patient's case at a clinical care conference.

This interdisciplinary collegial relationship with occupational health and safety professionals has been cultivated during the past five years throughout each of our practicum experiences across corporate and government settings. Through these various training experiences, the OEM resident also learns to interact with numerous other professional groups important to occupational health and safety. Given the diversity of exposures, our residents interact with corporate management, rehabilitation specialists, allied health personnel, insurers, medical/surgical specialists, industrial hygienists, safety professionals, toxicologists, occupational health nurses, labor representatives, policy analysts, regulators, lawyers, and legislators.

During the five-year grant period, the OEM program has provided invaluable outreach through clinical rotation experiences offered to University of Minnesota and Hennepin County Medical Center Family Medicine and Internal Medicine residents. The OM faculty has continued to provide instruction twice yearly in the University of Minnesota's Occupational Medicine Conference course for family practice residents, which involves 8 family practice residency programs in Minneapolis and St. Paul. Additionally, numerous faculty members are involved in other outreach activities. Dr. Baker is a member of the Education Committee and Long Range Planning Committee of the American College of Medical Toxicology. She has been requested as a speaker on a variety of topics at regional as well as national meetings. Dr. Zheng is working on a collaborative arrangement with China NIOSHA. He presented on "Care of Work Comp Patients" at China NIOSH in June of 2006. Dr. Zheng also presented his research project, "A Proposed Spirometric Index for Evaluating Patients with Airflow Obstruction", as a slide presentation at AOHC in 2004. Dr. RoeberRice, in addition to speaking at the Family Medicine educational conferences, participates in local educational outreach efforts through presentations at conferences for a variety of disciplines where occupational and environmental medicine is an important consideration, such as internal medicine, podiatry, emergency medicine and industrial hygiene meetings.

Finally, the program continues to enhance our Community grand rounds in Occupational Medicine, a monthly interdisciplinary conference with invited speakers on topics related to worker safety. In 2007, the first collaborative Environmental Exposure Conference was jointly sponsored by the Minnesota Department of Health, School of Health Division of Environmental Health Sciences and HealthPartners Institute for Medical Education.

C. Results and Discussion

Results:

One of the major accomplishments during the past five-year period is the implementation of a new curriculum model. The OEM Residency Training Program offers a structured two-year training experience combining an academic phase, leading to an MPH, with the practicum experience, emphasizing practice and research in a variety of service settings to include corporations, government agencies, and private health care organizations. The curriculum modifications were addressed to reflect the updated requirements and recommendations of the American Council on Graduate Medical Education (ACGME), American Board of Preventive Medicine (ABPM), CEPH and NIOSH. The Preventive Medicine Residency Review Committee (RRC) approved this change in April 2006. Integrating these experiences throughout the two year period will facilitate earlier clinical exposure, provide increased flexibility to accommodate scheduling of all required courses and allow for more evenly distributed research time throughout the training program,

The academic curriculum at the School of Public Health has also become increasingly robust during the five-year grant period, with the addition of required courses in ergonomics and industrial hygiene. The amount of clinical training during the academic year has increased with the addition of clinical rotations during summer months and school breaks in 2006.

During the prior five-year period, the OEM program has experienced a significant improvement in the number of qualified residency applicants. The diversity of clinical faculty has allowed the program to increase minority recruitment over the past five years, as our director of research and department chair provide excellent role models for the professional practice of OEM in an expanding and inclusive community. Primary care training in OEM is provided at the OEM Clinics at Regions Hospital and Riverside Clinic, where trainees care for injured and ill workers and attain competency in preplacement examinations, medical screening, specialty consultations and site visits.

A total of twelve specialists in OEM graduated from the program between July 2002 and June 2007. All of these physician graduates are employed in positions where they are working to protect the health and wellness of workers, mostly in the clinical practice of OEM, however many of these graduates serve as medical directors as well.

Discussion:

As identified in the Institute of Medicine publication, "Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel" (National Academy Press, 2000), there continues to be a need for robustly trained OEM physicians who understand hazardous exposures, the adverse health effects of those exposures, and the interaction between general health conditions and the work environment. This program has continued over the previous five years to address a shortage of residency-trained OEM specialists in private practice and corporate settings, as well as in academic and government positions.

Occupational medicine and industrial hygiene faculty (Professors Baker, RoeberRice, Greaves, and Brosseau) and resident physician trainees (Dodd and Katyal) have published papers during the previous five year period, evaluating residency education and the application of core competencies in occupational medicine practice. The data collected during this period from program graduates describes the professional competencies acquired during graduate training. The results of each of these needs assessments have identified focus areas within the OEM curriculum to better serve the needs of employers, physicians and workers and the results of this effort will be used to improve graduate curriculum throughout the Center.

During the previous five years, leadership transition has led to reevaluation of curriculum needs and program improvements. Heidi RoeberRice, MD, MPH joined the OM faculty in July 2006. She was subsequently appointed Assistant Program Director and assumed the role of Program Director when Dr. Baker resigned from that position January 1, 2007. She has worked closely with Dr. Baker to transfer program leadership responsibilities and continues to work closely with Drs. McGrail, Mandel and Greaves for all programming matters including: staff development, teaching, research, accreditation and funding issues.

Twelve highly trained OEM physician trainees graduated during the previous five-year period, entering positions of clinical and administrative leadership as Occupational Health professionals.

D. Conclusions

Over the past five years, our residents have been highly successful in completing the residency program, achieving board certification, and assuming impressive clinical, corporate, administrative, or governmental positions relating to occupational medicine practice. We continue to recruit strong applicants to meet a strong regional and national demand for well-trained OEM physicians.

Our recent national surveys of OEM physicians randomly selected from the Occupational and Environmental Medicine (ACOEM) directory indicate that the clinical knowledge skills are the most highly rated competencies for OEM practice—an area of great strength for this program. The past five years have presented an opportunity to demonstrate gains and successes as we consider our objectives of increasing outreach and research. The progress achieved during the this period, particularly the strategic planning process, has solidified strategies and collaborative relationships to facilitate clinical research and has resulted in a list of potential topics, faculty resources and funding possibilities. Faculty and residents have demonstrated the ability to contribute to both the science and practice of occupational and environmental medicine. Through its graduate and continuing education efforts, this program will continue to produce leaders in occupational health and safety who will make important contributions to the health and safety of the nation's workforce.

5. D. Occupational Health Services Research and Policy Program
Co-Directors: Bryan Dowd, PhD and Patricia M. McGovern, PhD

Occupational Health Services Research and Policy Program
Co-Directors: Bryan Dowd, PhD and Patricia M. McGovern, PhD

A. Background

The Divisions of Environmental Sciences and Health Policy and Management (formerly named Health Services Research and Policy) at the University of Minnesota's School of Public Health were funded to establish a joint doctoral-level education program in occupational health services research and policy, July 1, 2000. In 2005 the program was funded for two additional years in association with a successful competitive renewal application. The decision to award two additional (rather than five) years of funding (through June 30, 2007) was based on a preference of the National Institute for Occupational Safety and Health (NIOSH) to have all training programs at each Education and Research Center (ERC) be on the same budgetary cycle. The program's funding was subsequently renewed for three additional years, July 1, 2007 to June 30, 2010, consistent with all of the existing academic programs sponsored by the Midwest Center for Occupational Health and Safety (MCOHS). Professors Bryan Dowd and Pat McGovern serve as co-directors for this training program.

This program in Occupational Health Services Research and Policy (OHSRP) builds on the doctoral programs already being offered by both the Divisions of Environmental Sciences (EHS) and Health Policy and Management (HPM). The program has focused on preparing graduates for occupational health services research and policy positions in academic institutions and public and private agencies. The program emphasizes quantitative methods and analytic methodologies applied to the fields of health services research and occupational health and safety. Additionally, the program incorporates social science disciplinary perspectives, including economics, sociology, and policy analysis.

Students may enter the training program through either division. All students take a rigorous two-year program of coursework that is tailored to their background, interests and division of enrollment. Coursework includes content in research design, sampling, survey methodology, biostatistics or econometrics, health economics or cost benefit analyses, exposure to environmental hazards, environmental health effects, environmental and occupational health policy, an introductory interdisciplinary course on occupational health and safety, at least one elective in occupational health and safety, and ethics in research and policy. Doctoral students enrolled in EHS complete a supporting program¹ in health policy and management. Doctoral students enrolled in HPM² complete supporting course work in environmental health sciences and occupational health and safety. Students undergo formal evaluation by passing preliminary written and oral examinations and final oral examinations on their dissertation research with their department of enrollment. Students complete a dissertation project based on original research that makes a significant contribution to knowledge in the field of occupational health services research, and earn a Doctor of Philosophy degree.

Formal coursework in both divisions is augmented with seminars provided by our faculty and by seminars with outside speakers. Through the Division of HPM there are in-house seminars that usually are work-in-progress presentations with extensive discussion of methodological issues and the practical aspects of research projects including gaining access to data, protecting human subjects and data confidentiality. The outside speakers are the top researchers in the country and cover the broad range of disciplinary perspectives represented in our curriculum. Through the Division of EHS there is a doctoral seminar, PubH 8120 "Occupational Injury Prevention Research Training Program Research Seminar," (to be renamed "Occupational Health and Safety Research Seminar"). This interdisciplinary class, developed by Dr Gerberich and co-taught with Dr. Alexander, critiques methodological issues as applied to projects in progress as well as those from the literature. Guest lecturers, including Dr. Dowd and Dr. McGovern, have joined the class from various departments within the University (e.g., Biostatistics, Health Policy and Management, Mechanical Engineering, Psychology), and from outside the University.

Table A-1 (below) describes the curriculum for students entering the program from the Division of EHS, and Table A-2 (below) describes the curriculum for students entering the program from the Division of HPM. Each program plan includes a minimum of 21 interdisciplinary course credits through course content in occupational health and safety, environmental health sciences, biostatistics and bioethics as detailed below.

¹ The Graduate School at the University of Minnesota establishes the requirement for a supporting program at twelve semester credits. Students in the OHSRP training program typically complete more than the minimum credits.

² The official name of the doctoral program in HPM is "Health Services Research, Policy and Administration." For brevity, we refer to this program as the HPM doctoral program throughout this report.

Each division has its own set of qualifying exams before students can progress to their dissertation. In HPM students must pass three qualifying written exams in research methods, health policy, and either economics or sociology. In EHS students must complete a written examination upon completion of their dissertation proposal. All students undergo formal evaluation of their research plan and findings by passing preliminary and final oral examinations with their department of enrollment. All students work with their advisors to organize a dissertation committee, minimally composed of four faculty, of which two must be from outside of the division of enrollment. Students complete a dissertation project based on original research that makes a significant contribution to knowledge in the field of occupational health services research and policy, and earn a Doctorate of Philosophy. The OHSRP program generally requires a minimum of two full-time years of coursework, and two additional years for examinations and dissertation research. Professor McGovern reviews students' academic program plan to ensure consistency with expectations for the OHSRP program. The student's primary academic and research advisor(s) reviews the program plan to ensure sufficient preparation for dissertation work and career objectives.

Students' selection of a dissertation topic is a function of ongoing faculty research projects, student interest and funding. As one example, Mira Grice, MS, became interested in research by Professors McGovern, Dowd and others addressing the postpartum health of employed women when developing a manuscript as part of the requirements for "Applied Analysis in Occupational Health Data" (PubH 8100, Lead Instructor, Dr. Alexander). Her paper, "Giving birth and returning to work: The impact of work-family conflict on women's health after childbirth" is forthcoming, Annals of Epidemiology. Her dissertation is entitled "The Impact of Work-Family Conflict on Maternal Health One Year after Childbirth: A Longitudinal Analysis." She received the School of Public Health's 2006 Delta Omega Award for the best abstract, "The Impact of work-family conflict on maternal health six months after childbirth." She was one of 20 national Delta Omega award winners that presented their research at the American Public Health Association Meeting, November 2006.

The students worked with key faculty and the OHSRP co-directors to develop their research questions, study design and dissertation committees. Key faculty work with students to obtain additional funding specific to their dissertation work from other sources, such as external research grants and contracts. For example, Ms. Grice has had funding from multiple sources, in addition to the NIOSH traineeship, such as working as a research or teaching assistant. She published a paper in association with her work as a research assistant with Professor Bruce Alexander, "Self-Reported Medical Conditions in Perfluorooctanesulfonyl Fluoride Manufacturing Workers," published in JOEM, 2007. Students' publications and presentations are identified in Appendices 2 and 3.

Table A-1
PhD Curriculum
FOR STUDENTS ADMITTED TO EHS

Core Subject Areas	# of Courses	# of Credits	Course Title
Statistics	2	8	PubH 6450 Biostatistics I (4) PubH 6452 Biostatistics II (4)
Epidemiology	3	7	PubH 6341 Epidemiologic Methods I (3) PubH 8140 Validity Concepts in Epidemiological Research (2) PubH 8142 Epidemiology and Uncertainty Analysis (2)
Research Methods	1 (ongoing)	2 (minimum)	PubH 8120 Occupational Injury Prevention Research Training Program Research Seminar (to be renamed Occupational Health and Safety Research Seminar)(1)

Core Subject Areas	# of Courses	# of Credits	Course Title
Environmental Health Sciences	3	6 (minimum)	PubH 6103 Exposure to Environmental Hazards (2) PubH 6104 Environmental Health Effects: Introduction to Toxicology (2) PubH 6105 Environmental and Occupational Policy (2)
Occupational Health & Safety	2	6	PubH 6170 Introduction to Occupational Health and Safety (3) PubH xxxx Occupational Health and Safety Electives (1, 2-3 credits)
Ethics	1	1	PubH 6742, Ethics in Public Health: Research and Policy (1)
TOTAL	12	30	
Additional Requirements	# of Courses	# of Credits	Comments
Supporting Program	Variable	14 -16	Supporting Program is developed by the student with the assistance of their advisor.
Economics	1	2-3	PubH 6862 Cost Effectiveness in Health Care (2) OR PubH 6832 Economics of the Health Care System (3) PubH 8805 Sociological Theory in Health Services Research (3) OR PubH 6855 Medical Sociology (3)
Social/Psychological Theories to Health	1	3	PubH 8801 Health Services Policy Analysis: Theory (3)
Health Care Policy Electives	1	3	Student choice in concert with advisor's recommendations
	2 (minimum)	6	
Dissertation	None	24 Thesis Credits	Student writes dissertation on topic selected by student and approved by faculty.
TOTAL CREDITS		68 - 73	

Table A-2
PhD Curriculum
FOR STUDENTS ADMITTED TO HPM

Core Subject Areas	# of Courses	# of Credits	Course Title
--------------------	--------------	--------------	--------------

Core Subject Areas	# of Courses	# of Credits	Course Title
Statistics	2	8	PubH 7400 Fundamentals of Biostatistical Inference (4) PubH 7400-2 Biostatistical Modeling and Methods (4)
Health Services Research Methods	4	10	PubH 8810 Research Studies in Health Care (3) PubH 8811 Seminar: Health Services Research Methods (3) PubH 8830 Research Project in Health Care (1) PubH 8831 Research Project in Health Care (1)
Economics of Health Care	2	6	PubH 6832 Economics of the Health Care System (3) PubH 8820 Health Economics I (3)
Social/Psychological Theories to Health	2	6	PubH 6855 Medical Sociology (3) OR PubH 8806 Sociology of Health Care Occupations and Organizations (3) PubH 8805 Sociological Theory in Health Services Research (3)
Health Care Policy	2	5	PubH 8801 Health Services Policy Analysis: Theory (3) PubH 8802 Health Services Policy Analysis: Applications (2)
Ethics	1	1	PubH 6742, Ethics in Public Health: Research and Policy (1)
TOTAL	13	36	

Additional Requirements	# of Courses	# of Credits	Comments
Supporting Program	Variable	12-16	Supporting Program is developed by the student with the assistance of their advisor.
Environmental Health Sciences	3	6	PubH 6103 Exposure to Environmental Hazards (2) PubH 6104 Environmental Health Effects: Introduction to Toxicology (2) PubH 6105 Environmental and Occupational Policy (2)
Occupational Health and Safety	2 (minimum)	6 -10	PubH 6170 Introduction to Occupational Health and Safety (3) PubH xxxx Occupational Health and Safety Electives (2-3 each)

Dissertation	None	24 Thesis Credits	Student writes dissertation on topic selected by student and approved by faculty.
TOTAL CREDITS		72 -76	

Examples of potential elective courses, dependent on student's interest, dissertation topic, and career goals include those listed below.

- PubH 6120 Injury Prevention in the Workplace, Community and Home
- PubH 6130 Occupational Medicine: Principles and Practice
- PubH 6140 Occupational and Environmental Epidemiology
- PubH 6420 Introduction to SAS Programming
- PubH 6864 Conducting Health Outcomes Research
- PubH 8100 Applied Analyses of Occupational Health Data
- PubH 8813 Measurement of Health-Related Social Factors
- PubH 8142 Epidemiology and Uncertainty Analysis.

Faculty

Professors Bryan Dowd and Pat McGovern provide the leadership for the Occupational Health Services Research and Policy (OHSRP) program, and the institutional linkage needed for programmatic success. They have successfully collaborated on research and academic training programs since 2000, and will continue their efforts.

Dr. Dowd is a tenured professor in Health Policy and Management (HPM), and has just stepped down as the Director of Graduate Studies for the doctoral program in Health Services Research, Administration and Policy after serving for seven years in that position. He continues as principal investigator for the AHRQ / NRSA doctoral training grant in the HPM Division. During the past year he chaired the School's Appointment, Promotion and Tenure (APT) committee. He teaches health policy and advanced health services research methods (PubH 8801: Health Policy and PubH 8811, "Seminar: Health Services Research Methods"). He currently serves as chair of AcademyHealth's Methods Council, a national committee of experts in health services research methods. His primary research interests are markets for health insurance and health care services, and the application of econometric methods to health service research problems. His recent research includes studies of the cost-impact of a disability prevention program, evaluation of the HIFA Medicaid waivers, insurance theory, causal modeling, health plan choice, enrollment and disenrollment in Medicare HMOs, Medicare reform, and the Medicare Part D drug benefit. He has published over 100 articles in peer-reviewed journals and coauthored the book, *Competitive Pricing for Medicare*, with HPM colleagues. He served for four years on the health services research grant review panel of the Agency for Healthcare Research and Quality (AHRQ), and regularly reviews research proposals for AHRQ, Centers for Medicaid and Medicare Services (CMS, formerly Health Care Financing Administration), and the Robert Wood Johnson Foundation, and is a referee for all of the major health services journals. He is on the editorial board of *Medical Care Research and Review*.

Dr. McGovern was promoted to full professor as of July 1, 2007. She also holds an adjunct faculty appointment in the School of Nursing. She serves as Program Director of the Occupational and Environmental Health Nursing (OEHN) Program. She is the Director of the School's Interdisciplinary Concentration in Public Health Policy, and the Director of Graduate Studies for the School's minor in public health. She teaches a required course for EHS masters and doctoral students, "Environmental and Occupational Health Policy" (PubH 6105). Dr. McGovern focuses her work in health services research and policy as applied to occupational health and safety issues. Her recent research includes studies of employed women's postpartum health, work-related violence prevention, the social and economic consequences of agricultural injuries to children, evaluation of professional competencies in occupational health and safety education, and qualitative research methods applied to issues of environmental justice. Over the last decade she has served many times as a peer reviewer for NIOSH ERC site visits, and most recently participated on NIOSH special emphasis panel for Centers of Excellence to Promote a Healthier Workforce. She has published 50 peer-reviewed articles or has manuscripts in press, and serves as a reviewer for the following journals: Health Services Research, Annals of Family Medicine, International Journal of Behavioral Medicine, Journal of Agromedicine, Journal of Epidemiology and Community Health, American Journal of Public Health, Scandinavian Journal of Psychology, Social Science and Medicine, Medical Care, and Women's Health Issues.

Additional Program Faculty

One of the strengths of this program is that between the Divisions of Health Policy and Management and Environmental Health Sciences, there is a wealth of productive, research-oriented faculty to draw upon. While potentially any faculty member in either division could participate in the proposed program, the faculty whose expertise is most relevant to occupational health services research are identified below. Professors Dowd and McGovern will work with faculty to elicit their involvement with student training and advising. The faculty from EHS have expertise in the occupational health and safety disciplines (e.g., occupational medicine and nursing, injury prevention, industrial hygiene and toxicology); related methods (e.g., occupational and environmental epidemiology and biostatistics); or specialty areas such as exposure assessment. The faculty from HPM have expertise in quantitative methods and analytic methodologies applied to the health services field, and core social science disciplinary perspectives, including economics, sociology, and policy analysis. The key faculty from both divisions are described below.

Bruce Alexander, PhD (Associate Professor, EHS; Program Director, Occupational Epidemiology) is an epidemiologist, whose work addresses the occupational determinants of reproductive health, cancer and traumatic injury, and the use of biological markers in disease. He co-teaches the "Occupational Injury Prevention Research Training Program Research Seminar" (PubH 8120) with Dr. Gerberich (primary instructor), and Applied Analyses of Occupational Health Data (PubH 8100), an important elective for students as a prelude to dissertation work. He also collaborates with Dr. McGovern and OHSRP student, Mira Grice on her dissertation research, and is a coauthor on two of her published papers (Appendix 1).

Kathleen Thiede Call, PhD (Associate Professor, HPM) recently became Director of Graduate Studies for the doctoral program in health services research, policy and administration, taking over for Dr. Dowd. Dr. Call is a sociologist whose research interests address access to care and health status among vulnerable populations: minority, immigrants, poor, young, and chronically ill populations. She is co-principal investigator on the State Health Access Data Assistance Center funded by the Robert Wood Johnson Foundation, which assists other states in monitoring rates of coverage and using data to improve access. Dr. Call teaches "Sociological Theory in Health Services Research" (PubH 8805).

Tim Church, PhD (Professor, EHS) is an expert in biostatistical methods including the design and analysis of clinical trials and epidemiological studies. He collaborates with Dr. McGovern and others on the study, "Violence Against Teachers: Etiology and Consequences," (PI: Dr. Gerberich), and has coauthored publications from the study, "Risk Factors for Violence against Nurses," (PI: Dr. Gerberich), which also involved Professors McGovern and Nachreiner. He teaches "Occupational and Environmental Epidemiology" (PubH 6140), a recommended class for PhD students.

David Cossi, JD, MS (Adjunct faculty, EHS) is an employment law expert on the Americans with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA) and work-related violence. He teaches classes and has co-authored articles with Dr. McGovern.

Susan Goodwin Gerberich, PhD (Professor, EHS) is an international expert in injury epidemiology with studies addressing occupational injuries including work-related violence, agricultural trauma and injury surveillance methods. She invites collaboration from ERC faculty on her NIOSH-funded research projects (e.g., "Violence against Teachers: Etiology and Consequences," and the "Consequences of Agricultural Injuries." The latter study includes Professors McGovern, Dowd and Alexander on the research team. She also teaches the doctoral research seminar (PubH 8120) required for PhD students, co-instructs in the recommended class, "Applied Analyses of Occupational Health Data" (PubH 8100), and teaches an important elective, "Injury Prevention in the Workplace, Community, and Home" (PubH 6120).

William Lohman, MD (Director, Program in Public Health Medicine, School of Public Health, and Adjunct Assistant Professor) is an occupational medicine physician and medical consultant to the Minnesota Department of Labor and Industry. He lectures in "Environmental and Occupational Health Policy" (PubH 6105) on workers' compensation regulations and ergonomics guidelines. He is assisting in creating selected online modules addressing workers compensation and medical care reform, and ergonomics for "Occupational and Environmental Health Policy (PubH 6105). He also serves on the OHSRP Program advisory board.

George Maldonado, PhD (Associate Professor, EHS) is an epidemiologist and expert in the evaluation of the validity of epidemiological studies. He teaches "Validity Concepts in Epidemiologic Research" (PubH 8140), and "Epidemiology and Uncertainty Analysis" (PubH 8142), both recommended classes for OHSRP students.

Ira Moscovice, PhD is Interim Division Head of HPM, and Director of the University's Rural Health Research Center, funded by the federal Office of Rural Health Policy. He has written extensively on the use of health services research to improve health policy decision-making in state government, and is a nationally recognized expert in rural health policy analysis. Currently, he is examining quality of care and patient safety issues in rural hospitals. He teaches doctoral-level HPM classes in health policy and research methods.

Nancy Nachreiner, PhD, MPH, COHN-S (Assistant Professor, EHS) is an occupational and environmental health nurse whose research has focused on injury prevention, particularly work-related violence, and return-to-work issues for cancer survivors and traumatic injury survivors. She teaches "Introduction to Occupational Health and Safety" (PubH 6170), which is required for all OHSRP students. Dr. Nachreiner is also the Membership Chair for the Injury Control and Emergency Health Services (ICEHS) section of the American Public Health Association, and a faculty member of the Powell Center for Women's Health.

John Nyman, PhD (Professor, HPM) is an economist whose research addresses the theory of health insurance, cost-effectiveness and cost-benefit analysis, and physician behavior. His research and theory papers have appeared in almost all of the prominent health economics and health services research journals. Dr. Nyman teaches "Economics of the Health Care System" (PubH 6832), and "Cost-Effectiveness Analysis in Health Care" (PubH 6862); OHSRP students must take at least one of his courses.

Gurumurthy Ramachandran, PhD (Professor, EHS and Director, Industrial Hygiene) has expertise that includes occupational and ambient exposure assessment, Bayesian methods in retrospective exposure assessment, and aerosol measurements. He provides consultation related to exposure assessment and industrial hygiene, and is co-instructor for "Exposure to Environmental Hazards" (PubH 6103), which is required for all OHSRP students.

Todd Rockwood, PhD (Associate Professor, HPM) is a sociologist whose expertise is focused on health outcomes research including the conceptualization and measurement of clinical outcomes, and the use of survey research in the measurement of health status. He directs HPM's Survey Center, and teaches "Measurement of Health-Related Social Factors" (PubH 8813), a recommended class for OHSRP students.

Beth Vernig, PhD, MPH (Associate Professor, HPM) is an epidemiologist who specializes in studies of health care utilization. Her expertise addresses access and quality of care, cancer care, and differences in care between the Medicare fee-for-service and managed care systems. She is co-leader of the Patterns of Care working group for the University's Cancer Center. Dr. Vernig teaches "Foundations of Public Health" (PubH 6700) and coordinates the analytic concentration for the Public Health Administration major.

Elizabeth Wattenberg, Ph.D. (Associate Professor, EHS and Director of Graduate Studies) is a toxicologist whose primary expertise is in molecular toxicology, but also includes risk assessment and environmental regulation. She teaches "Environmental Health Effects: Introduction to Toxicology" (PubH 6104) which is required for all OHSRP students.

B. Goals and Objectives

The goal of this training program is to prepare doctoral students with expertise in both occupational health and safety and health services research and policy. Graduates of the program will be the future experts and leaders in the emerging field of occupational health services research and policy, working in academia, governmental agencies, industries and health plans.

- 1) Maintain enrollment of a minimum of three full-time equivalent students in the program
- 2) Admit a minimum of one new student each year
- 3) Introduce all students to the principles of other occupational safety and health core and allied disciplines through enrollment in "Introduction to Occupational Health and Safety," PubH 6170
- 4) Maintain an active advisory board that meets at least one time per year
- 5) Provide one OHSRP seminar per year to students, faculty and advisory board members
- 6) Continue students and faculty involvement in the distance-based OHSR Journal Club
- 7) Develop one to two web-based modules relevant to OHSRP
- 8) Introduce selected principles of health services research into Dr. Alexander's course "Applied Analysis of Occupational and Environmental Data" (PubH 8100).

C. Results and Discussion

Progress on the OHSRP training program's objectives is described below, followed by discussion of new program developments, selected research projects, faculty and student awards and promotions, and evidence of the impact of the program on the field of occupational health services research.

- 1) Maintain enrollment of a minimum of three full-time equivalent students in the program
Five students were enrolled between July 1, 2002 to June 30, 2007, and one graduated July 2007.
- 2) Admit a minimum of one new student each year
One student per year, on average, has been admitted.
- 3) Introduce all students to the principles of other occupational safety and health core and allied disciplines through enrollment in "Introduction to Occupational Health and Safety," PubH 6170
All current OHSRP students have successfully completed "Introduction to Occupational Health and Safety" (PubH 6170, formerly PubH 5170).
- 4) Maintain an active advisory board that meets at least one time per year
The board has met annually. It includes representation of industry, labor, state agencies, and health insurance plans. The faculty invites the board's insights on trends in occupational health services research and policy, academic program planning, student recruitment and job placement for graduates.
- 5) Provide one OHSRP seminar per year to students, faculty and advisory board members
The annual seminar has featured a national expert in OHSRP, and has been jointly sponsored by the Divisions of Environmental Health Sciences and Health Management and Policy. Beginning in 2005 Professor McGovern collaborated with other ERC faculty to combine the seminars with those intended for all ERC students.

Laura Punnett ScD, Professor, Department of Work Environment, University of Massachusetts Lowell and Jane Lipscomb PhD, RN, FAAN, Professor and Director, University of Maryland Baltimore (UMAB) School of Nursing, Work and Health Research Center. Professor Punnett presented: "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs," and Professor Lipscomb presented: "Evaluation of Workplace Violence Prevention Interventions." June 13, 2007

Dr. Jim Collins presented his award-winning (i.e., National Occupational Research Agenda or NORA awards) studies "Research on Safe Patient Lifting and Slip, Trip, and Fall Prevention in Health Care Workers," and Dr. Harlan Amandus presented, "Directions for Future Workplace Violence Research" July 18, 2006.

Dr. Glenn Pransky, Director, Liberty Mutual's Center for Disability Research, and Associate Professor, University of Massachusetts, Medical School, presented "Disability Prevention: Innovative Approaches," May 25, 2005.

Dr. David Wegman, Professor, Department of Work Environment, Engineering College, University of Massachusetts, Lowell presented "Health and Safety Issues in the Aging Workforce," April 21, 2005.

Nicholas Ashford, JD, PhD, Associate Professor of Technology and Policy, Massachusetts Institute of Technology presented, "The Consequences of Thinking About Environmental and Occupational Health as Separate Entities (Pathways to Sustainable Development)," March 30, 2005.

Dr. Rosemary Sokas, Director of Environmental and Occupational Health Sciences, School of Public Health, University of Illinois, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations," February 24, 2005.

Ben Amick, III, PhD, Associate Professor, University of Texas at Houston, School of Public Health, presented, "Interventions, Policies and Practices [office ergonomics]: Welcome to Reality Science," May 27, 2004.

Tom Wickizer, PhD, MPH, Professor, University of Washington, School of Public Health, Department of Health Services, presented, "Do Drug-Free Workplaces Prevent Occupational Injuries? Evidence from Washington State," October 20, 2003.

David Weil, PhD, Associate Professor, Boston University and the John F. Kennedy School of Government presented, "The Future of Workplace Safety Regulation and OSHA: a Second Look," January 29, 2003.
- 6) Continue students and faculty involvement in the distance-based OHSR Journal Club
This journal club originally involved collaborative efforts with faculty and students from OHSR training programs from Harvard University-University of Massachusetts, and the University of Washington, with six sessions per year. Each institution hosted two sessions per year via conference calls. This objective was successfully met in academic years 2002-2005. Given declining NIOSH

resources for OHSR programs there was only one journal club session in 2005-2006, which involved PhD student Mira Grice presenting her dissertation proposal, "The Impact of Work-Family Conflict on Maternal Health One Year After Childbirth: A Longitudinal Analysis." Breeze technology was employed so that participants at remote sites could see and hear her presentation. Ms. Grice received helpful feedback, and subsequently passed her oral preliminary examination. Despite the success of this initiative collaborating institutions subsequently declined further participation due to OHSR training program funding constraints.

7) Develop one to two web-based modules relevant to OHSRP

Dr. McGovern worked with technical consultants to adapt one to two modules per year from "Environmental and Occupational Health Policy" (PubH 6150) into online modules to gradually develop an online alternative to the in-person class. The two modules created in 2004-2005 included "Overview of Occupational Health and Safety Policy" (Dr. McGovern), and "The Development of Occupational Health and Safety Standards," (Dr. Ramachandran, Director, Industrial Hygiene Training Program, Mr. Alden Hoffman, Minnesota OSHA, and Dr. McGovern). In 2005-2006 a module was developed, "The Americans with Disabilities Act (ADA) and Policy Evaluation," (Dr. McGovern and Mr. David Cossi, J.D, Adjunct Assistant Professor). In 2006-2007 modules were created on "Bioterrorism, Public Health Preparedness and Risk Communications" (Dr. Richard Danila, Adjunct Professor, Section Chief, Acute Disease Investigation and Control, Minnesota Department of Health and Dr. Pat McGovern), and "Institutionalized Violence: When Does Care Giving Become Submission to Violence?" (Dr. McGovern and Mr. David Cossi, J.D, Adjunct Assistant Professor).

8) Introduce selected principles of health services research into Dr. Alexander's course "Applied Analysis of Occupational and Environmental Data" (PubH 8100).

Dr. Alexander's course has been taught in alternate years depending on the number of available doctoral students. In 2004-2005 Dr. Alexander taught PubH 8100, with Dr. McGovern and Dr. Gerberich, who made existing data sets available for students to analyze. Professor McGovern introduced selected study design and survey methods into the course from her study of employed women, "The Impact of Total Workload on Maternal Postpartum Health," involving Dr. Dowd, and others as co-investigators. She worked closely with students who used data from the project to prepare manuscripts as noted below. In 2006-2007 none of the OHSRP students were in the class given their status on their program plans. (Students' names are underscored below).

Grice MM, Feda D, McGovern, PM, Alexander B, McCaffrey DJ, and Ukestad, LK: [2007] Giving birth and returning to work: The impact of work-family conflict on women's health after childbirth. *Annals of Epidemiology* 17: 791-798

Dagher R, McGovern PM, Alexander BH, Dowd B, Ukestad LK, McCaffrey DJ. The Psychosocial Work Environment and Maternal Postpartum Depression (in review).

Additional Program Results

Students and faculty have contributed to the growth of knowledge in the field of occupational health and safety through publication in the peer-reviewed literature (26 articles), presentations of research (34 oral and poster presentations), and outreach as detailed in the Appendices (2 to 4). There have also been a number of new program developments, significant research endeavors and awards to faculty and students, and initiatives that impact the field of occupational health services research through this innovative program as identified below.

New program developments

Funds were provided for interdisciplinary research in 2006-2007, through the ERC under its prior leadership, to Professors McGovern, Dowd, Alexander, Gerberich, Dr. RoeberRice, and Rada Dagher, doctoral student (non-trainee taking OSH classes), that resulted in a completed research effort that is in preparation for a peer-reviewed publication, "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis." This study combined theoretical perspectives from the fields of sociology and occupational health psychology to explain the risk and protective factors of postpartum depression among employed women during the first year after childbirth and has implications for prevention efforts.

Dr. Jeff Mandel, (Occupational and Environmental Medicine) and Professor McGovern have been successful in implementing a Memorandum of Understanding in 2007 between HealthPartners and the School of Public Health, Division of Environmental Health Sciences (EHS) to collaborate on research endeavors. HealthPartners Research Foundation (HPRF), located in Bloomington, Minnesota, is the research arm of HealthPartners managed care organization. This integrated health care system consists of a large network of owned and contracted clinics, medical and dental centers that provide health care services and coverage to more than 650,000 members in the Twin City metro area. The HPRF has a professional support staff of over 90 members, including 20 career

research scientists, 45 clinician researchers, and 11 programmer/analysts. This year, HPRF is conducting more than 170 research projects encompassing preventive care, clinical care, health services, outcomes, guideline evaluation, epidemiology and basic science. HPRF has dedicated research administration staff, a data collection center, and a human participant's protection staff. The memorandum formally acknowledges a collaborative effort between the two institutions for the conduct of research relating to the environment and its effect on human health. While researchers in both organizations have collaborated for many years on research of mutual interest, the intent of this memorandum is to set up a structure that will be deliberate in facilitating linkages and collaboration among researchers from these institutions. This creates a new opportunity to more easily access clinical data and cost information, and provides a strong research partnership. The HealthPartners Research Foundation may also have small amounts of money for pilot projects for students and junior faculty.

A recent initiative with organized labor involved Professors McGovern, Brosseau, Nathan Barleen (OHSRP student), and Ann Fredrickson (Administrative Core) to conduct a literature review of the cost-effectiveness of worksite interventions for safe patient lifting in the nursing home environment, and diabetes education in the worksite for United Transportation Union and United Food and Commercial Workers, Local 789. In spring semester 2007 Mr. Barleen, Dr. McGovern, and Ann Fredrickson met with the union representatives for Nathan Barleen to present his research, which was very favorably received.

Research Projects

Among the many research projects conducted over the past five years the following examples reveal areas of excellence in interdisciplinary research for this program's faculty, students and staff.

□ Work-related Violence in Health Care and Education

Internationally known for her research, Professor Gerberich has lead two major studies to identify risks for work-related violence against nurses and educators, respectively, that have been utilized for collaborative, multidisciplinary research efforts in the past year. A large team of ERC faculty including Drs. Nachreiner, Church, and McGovern, staff member, Andy Ryan, and several Occupational Injury Prevention Research Training Program (OIPRTP) students have collaborated on these efforts. The students have utilized the research opportunities to develop their dissertation research proposals that have enabled them to present their work at professional meetings and complete first-authored papers for peer-review publication.

□ Women's Postpartum Health and Employment

Professors McGovern and Dowd have collaborated on a study investigating women's health after childbirth and their return to work. Doctoral students participating in these studies have included both NIOSH trainees, Mira Grice, and students taking ERC courses, but not on traineeship, Rada Dagher. Students' presentations were made at both the American Public Health Association and AcademyHealth and resulted in awards for the students. Dr. McGovern's most recent research findings from the study are forthcoming in *Annals of Family Medicine* and were recently published as an online Research Brief for the School of Public Health, "After Birth: Women's Health and Return to Work at 11 Weeks Postpartum" and e-mailed to approximately 1500 faculty, students and alumni (<http://www.sph.umn.edu/about/pubs/brief/home.html>). Additionally, an interdisciplinary research project using this same database was funded through the Administrative Core in 2006-2007, "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis" with collaborators including Professors McGovern, Dowd, RoeberRice, Alexander and Gerberich, and doctoral candidate, Rada Dagher.

□ Injury Prevention Studies

Dr. Gerberich was awarded funding from NIOSH for a five-year study, "Consequences of Injuries among Children," in collaboration with an interdisciplinary team (Drs. Dowd, McGovern, Church, Alexander and others), staff (Andy Ryan), and OIPRTP doctoral student, Quintin Williams. The major goals of this research are to identify physical, psychosocial, and economic consequences of injuries that occur among children and youths living/working in agricultural operation households, in a five-state region; a unique design enables examination of potential changes between baseline and follow-up data, comparing injured and non-injured households while controlling for important factors including injury/illness experience among other household members. This study has been implemented in the mid-west region, involving Minnesota, Wisconsin, North and South Dakota, and Nebraska, in collaboration with the United States Department of Agriculture (USDA), National Agriculture Statistics Service, and agricultural extension representatives in each state.

Awards/Promotions

Faculty and students have earned several awards for their meritorious research, teaching, outreach and service during this reporting period. Selected examples include the following.

- Bryan Dowd was named the Mayo Professor of Public Health in 2002. This is the school's highest recognition of its faculty members. The professorship recognizes the achievements of senior SPH faculty members who demonstrate excellence in research, teaching and outreach.
- Pat McGovern was promoted to the rank of full Professor in June 2007 and named a Consortium Scholar, University of Minnesota, Consortium on Law and Values in Health, Environment and the Life Sciences
- Mira Grice, OHSRP trainee, received the Delta Omega Award for the best abstract from the School of Public Health, "The Impact of work-family conflict on maternal health six months after childbirth," from her dissertation research, and she was one of 20 national Delta Omega award winners who presented their research at the Annual American Public Health Association Meeting in November, 2006. She also received the School's Community Partner Star Award at an annual ceremony, October 3, 2006. She accepted a position as an assistant professor at State University of New York, Brooklyn, New York, July 2007.

Impact

In an effort to build synergy and community across NIOSH funded-training programs in Occupational Health Services Research, Dr. McGovern invited all NIOSH funded program directors to meet at the annual meeting for the Academy for Health Services Research, Washington DC, June 24, 2002. Faculty agreed to jointly work on promotion of the field, and identified strategies including organizing a panel presentation for the 2003 meeting of the American Public Health Association, San Francisco, California. Dr. McGovern took the lead role in organizing a panel presentation, "Occupational Health Services Research: Evaluating the Outcomes, Cost and Quality of Care among Employees," and included presentations noted below. Dr. McGovern also worked with Dr. Wickizer to have a panel with doctoral students from the Universities of Washington and Minnesota. Mary Findorff, (OEHN doctoral student and Dr. McGovern's advisee) presented "Predictors of Reporting Violence."

"Evaluating the Cost Impact of a Coordinated Health Care and Disability Prevention Program," Bryan Dowd PhD (co-director, OHSRP, University of Minnesota)

"Patient Satisfaction and Its Relationship to Treatment Outcomes Among Injured Workers Receiving Care Through the Washington State Workers' Compensation System", Dr. Wickizer (co-director, OHSR, University of Washington),

"Predictors of Successful Work Role Functioning Following Carpal Tunnel Release Surgery," Professor Ben Amick III (Associate Professor, University of Texas-Houston, and co-chair of the NORA OHSR team)

In May 2004 Professors McGovern and Gerberich, and Dean Olson developed a symposium, "The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century." It featured nationally known experts to identify research initiatives in occupational health and safety research, especially those related to injury prevention and control, health behavior change, health promotion and disease prevention, and occupational health services research as noted below. Major presentations are noted below. As a result of the discussions generated from the Symposia, Professors McGovern and Dowd worked with one of the OHSRP doctoral students, Tamara Schult, MPH, and Dr. Nico Pronk (keynote speaker) to write an article, " The Future of health promotion /disease prevention programs: The Incentives and barriers faced by stakeholders" that was subsequently published in JOEM (Appendix 1). Additionally, the content from the symposia is available online (<http://cpheo1.sph.umn.edu/nora/index.html>) and has been integrated into the Introduction to "Occupational Health and Safety" (PubH 6170, 3 credits) taught by Dr. Nachreiner.

"NORA at Nine: Looking Back and Looking Forward" presented by Marilyn Fingerhut, PhD, NIOSH International Coordinator and NORA Coordinator, National Institute for Occupational Safety and Health.

"Priorities for Occupational Injury Surveillance: The Need to Improve Information for Non-Fatal Injuries," Gordon S. Smith, MD, MPH, Senior Research Scientist, Center for Safety Research, Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts.

"Economic Incentives for Health Behavior Change" Nico Pronk, PhD, Vice President, Center for Health Promotion, HealthPartners, Minneapolis, Minnesota. Panel discussants included: Sheryl Niebuhr, PhD, Manager, 3M Total Health and Productivity Services, Minneapolis, Minnesota, "A Story from 3M," and Professor Bryan Dowd, PhD, Co-Director, OHSRP, "Worksite Health Promotion and Disease Prevention Programs: An Economic Perspective. "

"Musculoskeletal Disorders: Interventions, Outcomes and Proposals: Welcome to 'Reality Science' "Benjamin C. Amick III, PhD, Associate Professor, School of Public Health, University of Texas Health Sciences Center, Houston, Texas. Panel discussants included William Lohman, MD, Medical Consultant, Minnesota Department of Labor and Industry, "Ergonomic Risks and The Risks of Ergonomics," and Mr. Peter Benner, Executive Director, AFSCME Council 6 - AFL-CIO, Minneapolis, Minnesota, "Labor's Perspective."

"The Clinical and Occupational Correlates of Work Productivity Loss Among Employed Patients with Depression," Debra Lerner, PhD, MS, Director, The Health Institute's Program on Health, Work and Disability, Tufts-New England Medical Center, Boston, Massachusetts.

Within the University, Dr. McGovern has developed a strong working relationship with the Hubert Humphrey Institute (HHI) of Public Affairs, and its Center for Woman and Public Policy. Since June 2000 she has worked with faculty University-wide to develop educational case studies that focus on women's issues and building women's leadership capacities. Professor McGovern co-authored a case study and teaching notes addressing work-related violence. "Institutionalized Violence: When Does Care Giving Become Submission to Violence? Work-Related risks for Health Care Providers" Professor McGovern collaborated with Dave Cossi J.D., adjunct faculty (EnHS) and Ms. Findorff (OEHN doctoral student) to write the case; it is available on-line (http://www.hhh.umn.edu/centers/wpp/case_studies.html#mcgovern). It is referenced on the federal OSHA website in regards to training resources for work-related violence (http://www.osha.gov/SLTC/workplace_violence/otherresources.html). Dr. McGovern and Mr. Cossi co-teach the case in the environmental and occupational health policy class (PubH 6105) and Professor Sally Kenney (political science) teaches the case to HHI public affairs students (Case Studies in Women and Public Policy, PA 5690).

Dr. McGovern's most recent collaborative efforts with the HHI included developing a workshop disseminating research from her NIOSH funded project "The Impact of Total Workload on Maternal Postpartum Health" and from others' research on women's health and the historical, social, political and economic issues of family and medical leave policies in the US, Europe and Australia. Entitled "After Birth: Policies for Healthy Women, Families and Workplaces" the conference was funded by the HHI and the Consortium on Law and Values in Health, Environment and the Life Sciences, October 1, 2004. The conference was very successful and generated a crowd of more than 200 students, faculty and community members. The proceedings have been published (<http://www.hhh.umn.edu/centers/wpp/afterbirth/index.html>) and selected presentations are incorporated into the "Environmental and Occupational Health Policy" course on the applications of the Family and Medical Leave Act to occupational health.

Professor Dowd has provided guest lectures on econometric methods in PubH 8120 (OIPRTP Research Seminar, to be renamed Occupational Health Research Seminar). This class provides an interdisciplinary venue for students and faculty to present and discuss current research projects and innovative research methods. Recent topics included causal modeling and Directed Acyclic Graphs, Factor Analysis, and Latent Variable Modeling. Faculty and students typically represent OIPRTP, OHSRP, and OEHN.

Professor Dowd also was asked to chair the first health services research Methods Council, organized by AcademyHealth. The Council's first meeting was in Washington, D.C. in October 2006. The Council will assess and provide resources to health services research professionals and training programs that are seeking to improve their analytic skills

D. Conclusions

During the reporting period five doctoral students were enrolled and one graduated (2007) and accepted employment as an assistant professor working in health outcomes for a department of environmental health, tenure track, State University of New York, Brooklyn, New York. Two additional students are projected to graduate summer 2008. The program has focused on preparing graduates for occupational health services research and policy positions in academic institutions, and public and private agencies. This cadre of occupational health services researchers will work to decrease the nation's burden of occupational illness and injury and promote and protect the health of its workforce through research and education. As evidenced by the many examples of research publications and papers in press (26) and presentations (34), new projects, courses, awards and promotions of faculty and students, and examples of impact on the field, this program continues to be both innovative and dynamic and positively influences the field for occupational health services research.

5. E. Occupational Injury Epidemiology and Control Program
Co-Directors: Susan Goodwin Gerberich, PhD and George Maldonado, PhD

Occupational Injury Epidemiology and Control Program
Co-Directors: Susan Goodwin Gerberich, PhD and George Maldonado, PhD

A. Background

The Occupational Injury Epidemiology and Control Program (1993-2003), that was developed to meet existing needs at the regional and national levels.(1,2) was built on extensive training and research experiences dating back to 1980. This program, recognized nationally and internationally, provided numerous opportunities through interdisciplinary graduate education to prepare professional leaders who work to prevent and control hazardous and injurious occupational problems.

Unintentional injuries continue to rank number one in terms of working years-of-life lost in the United States. Combined sources of injury data, for 2005, (3) indicated that occupational injuries accounted for four percent of all deaths from all unintentional injuries and 15 percent of all disabling injuries; these injuries resulted in 80 million lost workdays during 2005, and an estimated 65 million future lost workdays. The total direct and indirect costs of work-related injuries were conservatively estimated at \$181.6 billion and accounted for 29 percent of all unintentional injury costs (3). Workers in agriculture, mining, construction, and the transportation/public utilities industries are at greatest risk for occupational injuries.

Intentional injuries are also recognized as a major problem in the work environment, accounting for the fourth major cause of occupational death, overall, exceeded only by motor vehicle, fall-related, and struck-by deaths (4). Limited data have been available from population-based studies of non-fatal intentional injuries. However, evidence from recent research conducted by some of the OIECP and other ERC faculty and students, has revealed significant problems pertinent to non-fatal violence among certain occupational groups that result in major physical, psychological, and sociological consequences to the victims, and high financial costs both to the victims and to the employers (5-8).

This program provided a multifaceted approach to academic and research training in the prevention and control of injuries by utilizing an epidemiological framework that considers the worker, hazardous agents and energies, and the respective vehicles of these agents within the environment. The program further incorporated specific strategies involving engineering and technology, education, and legislative approaches in its overall framework. Degree options, that were available at the masters' and doctoral levels, enabled students to build on their basic knowledge and skills through course work, field work, specific projects and research endeavors. *With the implementation of a new doctoral training program in 2001, this program provided only masters' level training, until it was phased out in 2003.*

This graduate program was administered through the Division of Environmental and Occupational Health (currently Environmental Health Sciences) under the administration of the Director, Dr Gerberich, and Co-Director, Dr Maldonado and supported by staff in the division. An advisory board was involved in the ongoing review and evaluation of the program.

Faculty – Core (current titles are identified)

Susan Goodwin Gerberich PhD (Mayo Professor of Public Health, Environmental Health Sciences) served as a Co-Director for OIECP as well as a center director. She has a national and international reputation in the area of injury epidemiology and control, and has consulted for local and national agencies, including the Centers for Disease Control and Prevention's (CDCP) National Center for Injury Prevention and Control (NCICP) and National Institute for Occupational Safety and Health (NIOSH). Dr Gerberich has continued to be involved in a broad range of research investigations through the Regional Injury Prevention Research Center that attract national and international attention; these address numerous work-related problems identified as high priorities by NIOSH (e.g., musculoskeletal injuries, amputations, traumatic deaths; special populations including children and youth, women, and the elderly; high risk industries, including agriculture). She has also been successful in directing the Center for Violence Prevention and Control and several associated studies integral to this center; in particular, her focus within this Center is on work-related violence. She publishes extensively in national and international peer-reviewed journals, and participates regularly in national and international conferences. In addition to advising and other major teaching responsibilities for the program, she has participated with other program faculty in the weekly research seminars that enable students to develop and carry out required projects for completion of their degrees.

George Maldonado, Ph.D. (Associate Professor, Environmental Health Sciences; Co-Director), has expertise in epidemiology methodology and has been responsible for developing course work and facilitating seminars pertinent to research methods that aid students in the design, conduct, and analysis of epidemiologic studies. His involvement, including the advising of students, has been important for growth in the scientific rigor of training. Dr. Maldonado has a national reputation for his approaches to the design and study of occupational injury problems and has been responsible for teaching courses, including Validity Concepts (PubH 8140) and the Doctoral Seminar (PubH 8150), and facilitating seminars that enable students to develop and carry out required projects for their

degree requirements; in particular, he has advised program students in research methodology and statistical applications. In collaboration with the other faculty, he has also participated in the research seminar (PubH 8120) that has been critical to the students in facilitating their projects/research efforts.

Bruce Alexander, Ph.D. (Associate Professor, Environmental Health Sciences) has expertise both in occupational injury and disease epidemiology and has published in both the national and international literature. He has served as Principal Investigator for several epidemiological studies and Co-Investigator on three major occupational injury epidemiological studies with Dr. Gerberich. He has been successful in generating federal agency research funding, including a study of agricultural injuries and served as a Fellow in the Bush Faculty Development For Excellence and Diversity in Teaching. His involvement in teaching and participation in research efforts, with faculty and students, including advising activities, provided important strength to the program. He has also participated in incorporating advanced injury epidemiology content into the research seminar.

Timothy Church, Ph.D. (Professor, Environmental Health Sciences) has unique expertise in biostatistics and application of special techniques to ascertain the potential degree of bias in research studies. To this time, such application has been extremely rare in this field and, thus, has provided an important opportunity to greatly enhance the quality of student projects and research efforts. Dr. Church also has extensive experience as a Principal Investigator in major population-based epidemiological studies and has collaborated with Dr. Gerberich on four major occupational injury epidemiological studies. He has also been involved in numerous advising activities and in co-teaching, with Dr. Maldonado, the Doctoral Research Seminar (PubH 8150).

Arthur Erdman, Ph.D. (Professor, Mechanical Engineering and Head of Bioengineering) has an extensive national and international reputation, with particular expertise in mechanical design analysis and bioengineering. His continued research and development in the area of computer-aided design, an approach essential to the study of human responses to physical energies as well as the study of machinery and alternative designs, has been extremely important to the program. His publications, presentations, and involvement on professional committees, continue to be extensive. Dr. Erdman designed a course for students without an engineering background to provide a basic understanding in physics and kinetics -- areas critical to understanding injurious outcomes. He has participated in the Occupational Safety Seminar (PubH 6122) and collaborated with *Drs. Gerberich and Shutske* in major studies that served as a basis for training students as well as serving on student committees and as an advisor.

Debra K. Olson, M.P.H. (Instructor, Environmental Health Sciences and Associate Dean, School of Public Health), has expertise in the injury field and has developed critical linkages within the community and professional organizations; she has taught in relevant courses and participated in the continuing education and outreach efforts of this program. Responsibilities have included: coordination of activities and communication among faculty, staff and OIECP Advisory Board members; responsibility for facilitating recruitment activities including advertising and follow-up of potential applicants; and dissemination of the program brochure and booklets as well as comprehensive informational materials.

Gary Olmstead, Ph.D., C.S.P., C.I.H. (Adjunct Assistant Professor, Environmental Health Sciences and Director of Safety and Environmental Programs, General Mills) has extensive experience in development and administration of corporate health and safety programs and at the national level relevant to standards setting. His expertise has been especially important in providing the context for administration of safety programs and integrating academic knowledge with practice. He has taught in PubH 6120 and 6122 among others in which our students participated. In addition, he was involved in facilitating internship opportunities for students in the program.

David Parker, M.D., M.P.H. (Adjunct Assistant Professor, Environmental Health Sciences) is an occupational medicine physician and epidemiologist who has been a significant contributor to the academic and research training programs, participated in several courses (PubH 6120, 6122, and 8120), and collaborated in projects/research efforts with Dr. Gerberich and her colleagues, involving students.

Faculty – Supporting

Tarold Kvålseth, Ph.D. (Professor, Mechanical Engineering) who has expertise in the area of ergonomics, taught IE 5511 (Human Factors and Work Analysis) and IE 5513 (Engineering Safety), which were required courses for the OIECP students and necessary to their understanding of the interaction of the host/worker within the environment, in concert with the epidemiological model. He also served in an advisory capacity to those students who wished to pursue projects or research efforts in this area and has collaborated with other faculty on relevant projects and to ensure integrity of the program.

William Lohman, M.D. (Adjunct Associate Professor, Family Medicine and Community Health), has taught in the required injury epidemiology course, PubH 6120, and co-advised students in collaborative efforts with Dr. Gerberich. Through collaboration, he has also continued to facilitate relevant projects/research efforts through the Department of Labor and Industry.

Patricia McGovern, Ph.D. (Professor, Environmental Health Sciences) teaches the required PubH 6105 Environmental Policy course that enables students to understand the importance and process of translating research into policy. She and Dr. Gerberich have collaborated on several research projects and have co-advised students who are involved in work-related violence and other efforts.

John Shutske, Ph.D. (Professor, Bioproducts and Biosystems Engineering) has provided training through the Agricultural Health and Safety Program. He has a background in safety and has worked with machine designers and operators to introduce equipment changes to reduce relevant hazards. Dr. Shutske has collaborated with Dr. Gerberich and colleagues on several population-based studies. He has taught IEOR 5513 (Engineering Safety) in collaboration with Dr. Kvalseth and AgET 5212 (Safety and Health Issues in Agricultural Work Environments) which our students have taken; this course included system safety in the form of Fault Tree Analysis and Basic Hazard Analysis plus Job Safety Analysis. The hierarchy of injury control was addressed and included personal protective equipment and Occupational Safety and Health Administration requirements related to this. Applied physics, related to injury and trauma, included analyses of relevant forces.

In addition, Dr. Lisa Brosseau and other Industrial Hygiene faculty have provided training through the required Industrial Hygiene course and Dr. William Toscano and colleagues have provided training through the required Toxicology course.

These faculty members, with teaching and research expertise in the program area, contributed a strong and unique combination that provided great breadth and depth pertinent to the academic and research training. They contributed, significantly, to the continued growth, enhancement, and evaluation of the program.

B. Specific Objectives

The primary goal of the *Occupational Injury Epidemiology and Control Program* was to prevent and control occupational injuries through the training of professionals who: can lead injury prevention programs in academia, business, industry, labor, government, or insurance; are skilled in the development of effective programs and design strategies for the purpose of reducing the incidence and severity of occupational injuries; can implement state-of-the-art approaches to minimize occupational injury hazards; have a strong knowledge base of human-machine-environment interactions as a key to risk reduction; can help to increase company's productivity and control health care costs; can aid in compliance with governmental health and safety regulations; and are skilled in working as part of a multidisciplinary team.

The following were identified as the primary objectives for the OIECP (accomplishments associated with these objectives are discussed in respective paragraphs in the Results Section):

- Maintain vigorous recruitment
- Enhance OIECP development
- Provide opportunities for student projects and theses
- Disseminate research and relevant project findings
- Provide outreach activities
- Promote job opportunities for graduates of the OIECP.

C. Results and Discussion

Although this program was initially funded July 1, 1993, there were five to seven full-time students enrolled at the Master's level and seven to eight at the Doctoral level (until 2001) as a result of recruitment efforts. Recruitment strategies involved: national and local advertising in selected journals and publications; dissemination of brochures and comprehensive program booklets at national and international injury conferences, safety meetings, American Public Health Association; and through colleagues in the field. In addition to the Directors' and core faculty efforts and those by the Advisory Board, the School of Public Health Dean's office and the Midwest Center Continuing Education Program staff were continually involved in dissemination activities. Activities that also enhanced inquiries and applications, involved internet dissemination. A website, developed for the Midwest Center that provided information on each program and a website that identifies activities of the Regional Injury Prevention Research Center and the Center for Violence Prevention and Control, together with the OIECP, were successful in attracting potential applicants. There were also recruitment endeavors through collaboration with the Center for American Indian and Minority Health and the Indian Health Service to attract qualified students to the OIECP. One of the most important sources for recruitment was the OIECP alumnae who directed and encouraged highly qualified applicants to the program.

Course work requirements were further strengthened to provide a sound scientific base for training. In concert with the comprehensive program effort, faculty were involved in establishing liaisons with a variety of industries and agencies to ensure quality internships and to provide opportunities for unique projects that could impact the occupational injury problem.

The OIECP faculty were funded for numerous research efforts and projects that provided training opportunities for students and addressed numerous occupational injury problems specific to NIOSH NORA priorities. Dr Gerberich and her colleagues developed a five-state (Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska) network through the Regional Injury Prevention Research Center, enabling several occupational studies that have served as a basis for training; these have included studies of: machinery-related injuries; tractor-related injuries; fall-related injuries; injuries among children and adolescents; general agriculture-related injuries; and injury surveillance efforts. The development of the Center for Violence Prevention and Control also enabled several endeavors in which students were involved pertinent to work-related violence. Both of these Centers have had a major commitment to interdisciplinary collaboration in graduate education and quality research and served as excellent resources for the OIECP training efforts.

Students also made important contributions to the protection of workers through their research and internship projects. Examples included: identification of risk factors for agricultural operation-related injuries; impact of falls (both agriculture- and non-agriculture-related) on the overall agricultural operation; identification of machinery-related injury risk factors; magnitude and consequences of injuries to firefighters. Collaborative efforts with the NIOSH Division of Safety Research, the Minnesota Department of Health and numerous agencies and institutions facilitated many of those efforts; a collaboration with the Center for American Indian and Minority Health and the Indian Health Service has further enabled us to address additional NIOSH priorities through the OIECP training efforts. Data from many of the efforts identified were presented at major professional meetings and used to develop recommendations for specific prevention and control efforts.

Both students and faculty were actively involved in authorship in peer-reviewed publications and the presentation of research findings at major professional meetings at the local, national and international levels, accounting for important presentations and publications. (Refer to publications and presentations, Appendix.)

Relevant to Outreach, OIECP faculty were involved in presentations, lectures, and seminars at the local, national, and international levels, with a large proportion of these being invited. Extensive consultations, largely unpaid, were provided for various corporations, agencies, and institutions at the local and national levels. These included recommendations and presentations to several local industrial firms, based on projects conducted. In addition, the program faculty contributed significantly through their involvement with committees at the local, regional, national, and international levels that provided important recognition and visibility for the OIECP. (Refer, also, to Outreach Activities in Appendix.)

Efforts in identifying job opportunities were consistently positive with all graduates obtaining significant positions relevant to the field; these include positions in major corporations, health agencies, academic, and other institutions. Dissemination of job announcements on a regular basis by Dr. Gerberich, as well as other resources, was integral to these efforts.

From the 2006 alumni survey of graduates between 1995 and 2005, 11 graduates of the OIECP program participated. Findings revealed that OIECP alumni were "very satisfied" (64%) or "somewhat satisfied" (27%) with their graduate education in occupational safety and health (OSH). The findings on the interdisciplinary competencies addressing "recognition," "evaluation," "control," "communication," "behavior" and "management" revealed that almost all OIECP alumni rated most competencies as "very valuable" or "valuable". The competencies with the most frequent ratings of "very valuable" were: writing well (91%), understanding the relationship between occupational exposures and health outcomes (82%), and communicating effectively with a variety of stakeholders (e.g., management, labor) (82%). Alumni most frequently perceived themselves as "very proficient" in the following competencies: interpreting and applying scientific findings (64%), and functioning effectively on an interdisciplinary team (64%).

D. Conclusions

The uniqueness of the OIECP has been evidenced not only by the highly qualified faculty and expertise essential to this endeavor but, also, by the quality of the academic and research training programs that were developed to provide a comprehensive approach to occupational injury epidemiology and control. This program maintained a strong record in related research that involved presentations at national and international levels and publications in peer-reviewed journals. In addition, research efforts, supported by other sources of funding, provided a strong base for the research and education/training activities identified for this program. Most important, were the excellent academic and research training opportunities. Through this program, a unique, multidisciplinary approach enabled a significant contribution to the field.

References

1. Institute of Medicine: Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel. [2000] Washington, D.C.: Institute of Medicine.
2. Bonnie RJ, Fulco CE, and Liverman CT: [1999] Editors, Institute of Medicine, Committee on Injury Prevention and Control: Reducing the Burden of Injury: Advancing Prevention and Treatment, Washington, D.C.: National Academy Press.
3. National Safety Council: Injury Facts. [2007] 2007 Edition, Chicago: National Safety Council.
4. United States Department of Labor, Bureau of Labor Statistics: [2007] accessed September 2007: <http://www.bls.gov>.
5. Duhart DT: [2001] Violence in the workplace, 1993-1999, National Crime Victimization Survey, Bureau of Justice Statistics Special Report, U.S. Department of Justice, Office of Justice Programs.
6. Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD: [2004] An epidemiological study of the magnitude and consequences of work-related violence: The Minnesota nurses' study, *Occupational and Environmental Medicine*, 61:495-503.
7. McGovern P, Kochevar L, Lohman W, Zaidman B, Gerberich SG, Nyman J and Findorff-Dennis M: [2000] The cost of work-related assaults in Minnesota, *Health Services Research*, 35(3): 663-686.
8. International Labor Organization: [2006] The cost of violence and bullying at work, accessed September 2, 2006: <http://www.ilo.org/public/english/protection/safework/violence/costof.htm>.

5. F. Occupational Injury Prevention Research Training Program
Co-Directors: Susan Goodwin Gerberich, PhD and Bruce H. Alexander, PhD

Occupational Injury Prevention Research Training Program
Co-Directors: Susan Goodwin Gerberich, PhD and Bruce H. Alexander, PhD

A. Background

The Occupational Injury Prevention Research Training Program (OIPRTP) builds on extensive high quality training and research experiences dating back to 1980 that have achieved national and international recognition. In particular, this program, designed to train occupational injury prevention researchers and educators, was built on a prior successful program that trained both masters- and doctoral-level students. In particular, the OIPRTP affords an opportunity to greatly strengthen the doctoral training efforts that had not been possible, previously, due to seriously limited funding for this type of training. This program incorporates advanced doctoral-level training through curriculum and research opportunities that involve multidisciplinary collaborations with experts in safety, occupational injury epidemiology, engineering and human factors/ergonomics, medicine, and the social sciences, including occupational psychology. Specific opportunities involving industry, labor, and the public sector, including workers' compensation programs, are also included. Overall, the OIPRTP enhances the visibility, effectiveness, and reputation of the MCOHS, by addressing the deficiencies identified nationally and regionally pertinent to the occupational injury problem (1,2); these include the serious deficiencies identified in the 2000 Institute of Medicine report, "Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel."(1)

The OIPRTP, located within the Division of Environmental Health Sciences (EHS), in the School of Public Health, University of Minnesota, complements and is integrated within the Midwest Center for Occupational Health and Safety (MCOHS) Education and Research Center (ERC) activities that involve other programs, including occupational medicine, industrial hygiene, hazardous substances, agricultural safety and health, occupational health nursing, and occupational health services research and policy. All students complete a rigorous curriculum, including occupational safety engineering and science courses, epidemiology, injury/occupational epidemiology, biostatistics, advanced epidemiology methods, research and design courses, occupational psychology, and coursework that provides both breadth and depth in environmental and occupational health as the context for their research efforts. Upon successful completion of the program, the Graduate School awards a Ph.D. in Environmental Health.

Recent Institute of Medicine publications (1,2), identified a serious deficiency in doctoral level preparation in injury prevention within Occupational Safety and Health education and training; yet, such preparation is considered essential in reducing the burden of occupational injury which accounts for a major proportion of lost work days and overall costs to employers as well as significant consequences to the injured employees. Numbers of personnel trained to conduct research and serve as academic faculty in the occupational injury prevention area are totally inadequate to meet existing needs at the regional and national levels (1,2).

The OIPRTP incorporates components of occupational injury epidemiology and occupational safety engineering and science, within an overall public health model. The numbers of quality professional leaders who address the occupational injury problem through positions in a variety of settings, including academic and other research settings, has been increased – reflecting one of the most successful efforts in the country. The OIPRTP reflects the next step in addressing the needs in occupational injury prevention to provide an interdisciplinary and multifaceted approach to research training in the prevention and control of injuries by utilizing an epidemiological framework (3,4). This framework considers the worker, hazardous agents and energies, and the respective vehicles of these agents interacting dynamically within the environmental context; specific intervention strategies involving engineering and technology, education, and legislative approaches are incorporated into this framework to address relevant exposures and identified risk factors. This doctoral program enables students to build on their basic knowledge and skills through course work, fieldwork, specific projects and research endeavors.

Unintentional injuries continue to rank number one in terms of working years-of-life lost in the United States. Combined sources of injury data, for 2005, (5) indicated that occupational injuries accounted for four percent of all deaths from all unintentional injuries and 15 percent of all disabling injuries; these injuries resulted in 80 million lost workdays during 2005, and an estimated 65 million future lost workdays. The total direct and indirect costs of work-related injuries were conservatively estimated at \$181.6 billion and accounted for 29 percent of all unintentional injury costs (5). Workers in agriculture, mining, construction, and the transportation/public utilities industries are at greatest risk for occupational injuries.

In addition to these considerations, there is a need to recognize the true boundaries of the work environment. For example, the fact that up to 40 percent of all occupational fatalities in the United States are associated with motor vehicle crashes, the major cause of occupational death, identifies a need for occupational injury prevention and control programs that incorporate a scope beyond the physical confines of a workplace.(5) Of further concern is the fact that time lost from off-the-job injuries is frequently a greater problem than for injuries incurred on-the-job (a ratio of 9:1) and, also, results in significant costs to both the employers and employees (5).

There is also evidence that children and adolescents experience occupational injuries disproportionately. While the Fair Labor Standards Act, which includes federal provisions for child labor protection, generally applies to those under the age of 16 years, 14 and 15 year-olds can be employed in many retail and service jobs (6). In agriculture, children under the age of 12 years can work on their parents' farms or on farms small enough to be excluded from the provisions of the act, and in certain seasonal work (6-9). Women (8-14) and workers of color, among others (14), are also at high risk in certain occupations.

Intentional injuries are also recognized as a major problem in the work environment, accounting for the third major cause of occupational death, overall, exceeded only by motor-vehicle and fall-related deaths; it is also the second major cause of occupational fatality for women (15). Limited data have been available from population-based studies of non-fatal intentional injuries. However, evidence from recent research conducted by some of the OIPRTP and other ERC faculty and students, has revealed significant problems pertinent to non-fatal violence among certain occupational groups that result in major physical, psychological, and sociological consequences to the victims, and high financial costs both to the victims and to the employers (10,16-19).

Intentional injuries are also recognized as a major problem in the work environment, accounting for the fourth major cause of occupational death, overall, exceeded only by motor vehicle, fall-related, and struck-by deaths (15). Limited data have been available from population-based studies of non-fatal intentional injuries. However, evidence from recent research conducted by some of the OIPRTP and other ERC faculty and students, has revealed significant problems pertinent to non-fatal violence among certain occupational groups that result in major physical, psychological, and sociological consequences to the victims, and high financial costs both to the victims and to the employers (16-19).

It is apparent that there has been a major deficiency in trained personnel who can develop injury prevention and control programs, based on sound scientific principles, to address these occupational problems adequately. The OIPRTP, designed to train highly qualified leaders, is among the few programs in the country that can provide unique training opportunities to meet the needs for academicians and other researchers who can ultimately impact this deficiency.

Faculty - Core

In concert with Dr. Gerberich, only Drs. Alexander, Church, and Maldonado and Mr. Ryan, who have been supported with NIOSH funding, are identified as Core Faculty. However, the Supporting Faculty, identified below, are also integral to the program and provide significant contributions to ensure a comprehensive, quality program.

Susan Goodwin Gerberich, Ph.D., Mayo Professor of Public Health, Environmental Health Sciences, Co-Director, injury and violence centers, and Faculty, Interdisciplinary Human Factors/Ergonomics program, has a national and international reputation in the area of injury epidemiology and control, and has consulted for local and national agencies, including the Centers for Disease Control and Prevention (CDC), NIOSH, and National Institutes of Health. Dr. Gerberich has been involved in a broad range of research investigations that attract national and international attention. She has been funded through numerous RO1 grants, including a new major regional effort to identify consequences of injuries among children in the agricultural community and a state-wide effort to determine the etiology and consequences of violence against teachers, both of which serve as a basis for doctoral research. She has published extensively in national and international peer-reviewed journals, and participates frequently in both national and international professional conferences. Her teaching responsibilities for the program have included injury/occupational injury courses (PubH 6120, PubH 6121, PubH 6122, PubH 6123). With Drs. Alexander, Church, McGovern, Nachreiner, Maldonado, and other faculty (Ward, Erdman, Hansen), she leads the weekly research seminars each semester (PubH 8120) that enables students to develop and carry out required projects for their doctoral degrees and advises students regularly on their projects (Student Data Table). She also collaborates with Drs. Alexander and McGovern in the course PubH 8100, "Applied Analyses of Occupational Health Data."

Bruce H. Alexander, Ph.D. (Associate Professor, Environmental Health Sciences; Co-Director, OIPRTP) has expertise both in occupational injury and disease epidemiology and has published in both the national and international literature. He has been a Principal Investigator for several epidemiological studies and has served as a Co-Investigator on major occupational injury epidemiological studies with Dr. Gerberich. He continues to be successful in generating federal agency and other research funding. His involvement in teaching (Doctoral Research Seminar, PubH 8120; Global Health Seminar, PubH 6100; Occupational and Environmental Epidemiology, PubH 6140; Applied Analysis of Occupational Health Data, PubH 8100; Environmental Health, PubH 6101; and the new MCOHS Centerwide Seminar Series) and participation in research efforts, with faculty and students, including extensive advising activities, lends important strength to the program. He has continued to participate by incorporating advanced injury epidemiology content into the research seminar, and further integrating the OIPRTP, OHSRP, and other center students into a multi-disciplinary format. The PubH 8100 course, that he developed, has continued to provide training in applied research that enables students to develop research designs and analyze and interpret data pertinent to major injury and other problems using large

databases that involve team projects and result in publication-quality papers. This experience has served as a basis for strengthening individual research proposals and thesis efforts that have been conducted on various NORA priorities (22).

Timothy Church, Ph.D., Biostatistician (Professor, Environmental Health Sciences) has unique expertise in biostatistics and application of special techniques to ascertain the potential degree of bias in research studies. Until recently, such application had been extremely rare in this field; thus, Dr. Church's involvement has provided an important opportunity to greatly enhance the quality of OIPRTP research. Dr. Church also has extensive experience as a Principal Investigator for major population-based epidemiological studies and has been collaborating with Dr. Gerberich on two major occupational injury epidemiological studies. He has also been integrally involved in advising activities with Dr. Gerberich and other program faculty. Dr. Church is also involved in teaching PubH 6140, Occupational and Environmental Epidemiology and in co-teaching, with Dr. Maldonado, the Doctoral Research Seminar (PubH 8141); he also contributes regularly to the program research seminar (PubH 8120) in collaboration with the other faculty identified. In particular, Dr. Church and Dr. Maldonado have collaborated closely with Dr. Gerberich and other program faculty to facilitate the comprehensive application, by doctoral trainees, of causal modeling using directed acyclic graphs (21) and incorporation of sensitivity analyses to further enhance the quality of their thesis efforts.

George Maldonado, Ph.D. (Associate Professor, Environmental Health Sciences) has expertise in epidemiology methodology and has been responsible for developing course work and facilitating seminars pertinent to research methods that aid students in the design, conduct, and analysis of epidemiologic studies. His involvement, which includes advising students, is important for growth in the scientific rigor of research training. Dr. Maldonado brings a creative viewpoint and talented mind to the investigation of injuries and hazardous events among working populations and has a national reputation for his approaches to the design and study of occupational injury problems. He is responsible for teaching courses, including Validity Concepts in Epidemiologic Research (PubH 8140), Epidemiologic Uncertainty Analysis (PubH 8142) and the Doctoral Research Seminar (PubH 8141), and facilitating seminars that has enabled students to develop and carry out required projects for their degree. Of further importance, he has advised OIPRTP students in research methodology in collaboration with the other faculty.

Andrew Ryan, MS (Research Fellow and Research/Statistical Applications Specialist, Environmental Health Sciences) has expertise as an applications programmer and has continued to collaborate with faculty and be involved in instructing students in the intricacies of data management, programming, and analysis relevant to the massive and complex data sets that are utilized as a basis for research training. He has extensive experience in advising students and participating on a variety of research projects, and has contributed significantly to the research seminar (PubH 8120) and in directed statistical applications for the course, Applied Analysis of Occupational Health Data (PubH 8100). This position has greatly strengthened the OIPRTP capabilities in being able to facilitate students' progress on their research efforts; his involvement receives rave reviews not only from the faculty but, also from the students who were, in part, responsible for his 2006 School of Public Health (SPH) Academic Professional and Administrative (P&A) Excellence Award.

Faculty - Supporting

Jo-Ida Hansen, Ph.D. (Professor, Psychology) has been involved in research, published nationally and internationally, that addresses stressors and dynamic interactions in work-related environments of many diverse, including minority, populations; in particular, she has extensive experience and expertise in measurement techniques pertinent to these factors that are integral to the research training. She also developed a course, Psy 5501, Vocational and Occupational Health Psychology, required for the program, that addresses issues related to the work environment, including aspects of stress, violence, etc. She has also provided an important addition through participation in the graduate research seminar (PubH 8120) that provides a forum for research training. Most recently, she has collaborated with the program to assist Evette Pinder, doctoral student, in her thesis effort on work-related violence and serves as a member of her examining committee. It is also planned to collaborate further on a research effort that examines the relation between overtime, long hours of work, or demanding work schedules and risks to worker safety.

Patricia McGovern, Ph.D., MPH, RN (Professor, Environmental Health Sciences, Director of Occupational and Environmental Health Nursing [OEHN], and Co-Director, Occupational Health Services Research and Policy Program [OHSRP]), has expertise and experience in policy and program evaluation in occupation and environmental health and has developed a national and international reputation for her research and associated publications and presentations. Her projects have addressed: the postpartum health of employed women; the effects of flexible work arrangements on health and health services use; work-related violence prevention and control with Drs. Gerberich, Church and Nachreiner and Mr. Ryan as well as three OIPRTP doctoral students (Fedea; Sage; Pinder); environmental justice and risk communication; and the consequences of agricultural injuries with Drs. Gerberich, Church, Dowd, and Nachreiner and Mr. Ryan as well as one OIPRTP doctoral student (Williams). She has also taught the division's required course,

"Occupational and Environmental Policy" (PubH 6105) and has collaborated with Drs. Gerberich and Alexander for selected sessions of PubH 8120, Occupational Injury Prevention Research Training Seminar, required for OEHN PhD students.

Michael McGrail, MD, MPH (Associate Medical Director, Primary Care, HealthPartners Medical Group, HealthPartners Corporate, Adjunct Faculty, and former Director of the OEM Program) is a board certified occupational and environmental medicine physician and teaches in required Midwest Center courses, PubH 6150 and 6130; he also teaches in Dr. Gerberich's PubH 6120, Injury Prevention course. Dr. McGrail's professional and research interests include occupational and environmental medicine, toxicology, disability prevention, and clinical outcomes analysis and have served as a basis for advising students in collaborative research efforts.

Nancy Nachreiner, Ph.D., MPH (Assistant Professor, Environmental Health Sciences) teaches two courses required for all occupational health and safety students: PubH 6150, "Interdisciplinary Evaluation of Occupational Safety and Health Field Problems" and PubH 6170, "Introduction to Occupational Health and Safety" (online, and in-person). In addition to conducting injury prevention research in work-related violence (with Drs. Gerberich and McGovern, Mr. Ryan and three OIPRTP doctoral students [Feda; Sage; Pinder] and return-to-work issues for cancer survivors and traumatic injury survivors (with Drs. McGovern, Alexander, Baker [OEM], and Gerberich), Dr. Nachreiner has also served as the Membership Chair for the Injury Control and Emergency Health Services (ICEHS) section of the American Public Health Association, a reviewer for Research in Nursing and Health, and as a faculty member of the Powell Center for Women's Health.

Gary Olmstead, Ph.D., C.S.P., C.I.H. (Adjunct Assistant Professor, Environmental Health Sciences and Director of Safety and Environmental Management, General Mills) has extensive experience in development and administration of corporate health and safety programs and, at the national level, relevant to standards setting. His expertise is especially important in providing the context for administration of safety programs and integrating academic knowledge with practice. He has taught in the injury/occupational safety courses, PubH 6120 and 6122, and the course, PubH 6170, Introduction to Occupational Health and Safety. In addition, he has continued to be involved in facilitating relevant internship experiences.

Debra K. Olson, MPH. (Associate Dean for Public Health Practice Education, School of Public Health, Director, Midwest Center for Life-Long-Learning in Public Health, Principal Investigator and Center Director, University of Minnesota Center for Public Health Preparedness) has expertise in the injury field and has developed critical linkages within the community and professional organizations as Chair of the new Public Health Practice major in the School of Public Health; she has continued to teach in relevant courses and participate in the continuing education and outreach efforts relevant to this program (Appendices). Dean Olson has expanded her role to include the greater public health community, including issues of public health preparedness, and distance learning, as well as research on professional competencies in relation to curriculum development and program evaluation (23). These activities have enriched the OIPRTP program, and provided unique learning opportunities for students. Dean Olson's courses have included PubH 3012, "Issues in Environmental and Occupational Health," which is an undergraduate option that meets the requirements of the Council on Liberal Education and provides an opportunity for recruitment of students. Offered online, this course allows for regional access to potential candidates.

John Shutske, Ph.D. (Professor, Biosystems and Agricultural Engineering) provides training through the Agricultural Health and Safety Program. He has a background in safety engineering and risk control and has worked with machine designers and operators to introduce equipment changes to protect against relevant hazards such as entanglement from rotating equipment and fires on self-propelled machines. Dr. Shutske has served as Principal Investigator of several pertinent research efforts, including a study of the risks of Hmong children in agricultural settings and the development of sensor systems to prevent traumatic injury. He has also collaborated with Dr. Gerberich and colleagues on several population-based studies and has been involved in assisting with advising of students and serving on dissertation committees. He teaches IE 5513 (Engineering Safety), required for OIPRTP and teaches BAE 5212 (Safety and Environmental Health Issues in Plant and Animal Production and Processing) which many of our students have elected to take.

Nicholas Ward, Ph.D. (Associate Research Professor, Mechanical Engineering) is Director of the HumanFIRST (Human Factors Interdisciplinary Research in Simulation and Transportation) Program, within the Intelligent Transportation Systems Institute. In particular, Dr. Ward has extensive expertise and experience that has gained him an outstanding national and international reputation; he has also had an extensive history of funded research, publications and presentations. A collaborative Minnesota population-based proposal, pertinent to transportation-related injuries and deaths, and the major cause of occupational injury death, resulted in a funded research grant that involves both Drs. Gerberich and Alexander and will provide additional training opportunities. He, together with relevant staff, has participated in the graduate research seminar (PubH 8120) that provides a forum for research training as well as PubH 6122, Occupational Safety Seminar course.

Elizabeth Wattenberg, Ph.D. (Associate Professor, Environmental Health Sciences) is a toxicologist with background in molecular biophysics and biochemistry. She has taught in the required course, PubH 6104, Environmental Health Effects: Introduction to Toxicology. Of further importance is that she has served as Director of Graduate Studies for our division and has been a wonderful advocate in working with OIPRTP in recruitment and retention of graduate students.

Allan Williams, Ph.D., MPH (Adjunct Faculty member and Epidemiologist at the Minnesota Department of Health) has had numerous funded occupational injury epidemiology RO1 grants and has been committed to involvement of students in collaborative research training efforts; in particular, one of his major research grants has served as a basis for doctoral student's thesis (Deborah Merchant Langner). He has been a significant contributor to the academic and research training programs, and has frequently participated in several program courses and on doctoral committees.

These faculty members, with teaching and research expertise in the program area, have provided a strong and unique combination resulting in great breadth and depth pertinent to occupational injury prevention research training. They have contributed, significantly, to the continued growth, enhancement, and evaluation of the program.

Curriculum

Required program coursework has included the following, that is supplemented with relevant elective courses, according to the needs of the respective students (Refer, also, to website for comprehensive information - <http://enhs.umn.edu/oiprtp>):

School of Public Health Requirements:

Epidemiology (3 credits needed):

PubH 6341 Epidemiology I: Epidemiologic Methods (3 credits) Refer, also, to OIPRTP required courses.

Biostatistics (2 credits needed):

PubH 6450 Biostatistics I (4 credits) Refer, also, to OIPRTP required courses.

Ethics:

PubH 6742 Ethics in Public Health: Research and Policy, or equivalent (1 credit)

Division of Environmental Health Sciences Core Course Requirements:

PubH 6103 Exposure to Environmental Hazards (2 credits)

PubH 6104 Environmental Health Effects: Introduction to Toxicology (2 credits)

PubH 6105 Environmental and Occupational Health Policy (2 credits)

PubH 8888 Thesis Credit: Doctoral Dissertation (24 credits)

OIPRTP Course Requirements:

PubH 6120 Injury Prevention in the Workplace, Community, and Home (2 credits)

PubH 6121 Topics: Injury Prevention in the Workplace, Community, and Home (1-2 credits)

PubH 6122 Seminar: Safety in the Workplace (1 credit)

PubH 6140 Occupational and Environmental Epidemiology (2 credits)

PubH 6150 Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3 credits)

PubH 6170 Introduction to Occupational Health and Safety (3 credits)

PubH 6325 Data Processing with PC-SAS (1 credit)

PubH 6342 Epidemiology II: Epidemiologic Methods (3 credits)

PubH 6343 Epidemiology III: Epidemiologic Methods (4 credits)

PubH 6451 Biostatistics II (4 credits)

PubH 8100 Topics: Environmental and Occupational Health Research (1-8 credits)

PubH 8100 (002) Applied Analyses of Occupational Health Data (3 credits)

PubH 8120 Occupational Injury Prevention Research Seminar (1 credit every semester)

PubH 8140 Validity Concepts in Epidemiologic Research (2 credits)

PubH 8141 Doctoral Seminar in Observational Inference (2 credits per semester; at least 2 semesters)

GRAD 8101 Teaching in Higher Education (3 credits)

IE 5511 Human Factors and Work Analysis (4 credits) or HumF 5001 Foundations of Human Factors/Ergonomics (3 credits)

IE 5513 Engineering Safety (4 credits)

Psy 5501 Vocational and Occupational Health Psychology (3 credits)

ERC Interdisciplinary Seminar Series (new proposed seminar)

Grant Writers' Seminars and Workshops, L.L.C.: Write Winning Grants (2 days)

TOTAL CREDITS: 74 (plus 24 Dissertation Credits) required, plus electives in consultation with advisor.

B. Program Objectives (Accomplishments for the OIPRTP, based on training program goals and objectives are identified in the Results section.):

- Apply the Public Health Model to occupational injury prevention
- Provide opportunities for student research projects and theses
- Disseminate research findings
- Employ effective recruitment and retention strategies
- Provide a high quality curriculum that provides a strong foundation for occupational injury prevention research training
- Enhance OIPRTP development
- Promote job opportunities for graduates of the OIPRTP
- Provide continuing education and outreach
- Ensure interdisciplinary research training activities

C. Results and Discussion

1. Apply the Public Health Model to occupational injury prevention

The Public Health Model (20) is fundamental to the comprehensive OIPRTP, providing a framework for research training, in concert with the epidemiological model (3). This involves the need to: a) Identify and prioritize problems; b) quantify and prioritize risk factors; c) identify existing or develop new strategies to prevent injuries; d) implement and evaluate to determine the most effective injury control measures; and e) monitor the results of the intervention efforts. As part of the OIPRTP, each student develops an RO1-type proposal as a basis for their research by incorporating knowledge acquired from their coursework and relevant experiences. This includes: identifying a problem of importance; developing rigorous methods to address the problem, including a *causal model* (21) and relevant analytical plan; conducting the analyses to identify pertinent risk/protective factors that, in turn, serve as a basis for developing/implementing relevant intervention efforts that must be monitored for efficacy. This proposal serves as the written examination, enabling the student to continue on to the oral preliminary examination, given an approval "pass" vote by a review committee of relevant faculty.

2. Provide opportunities for student research projects and theses

The OIPRTP faculty have been funded for numerous research efforts (n = 31) that provide research-training opportunities for students (refer to Publications and Presentations). Students have participated on two of our major study research teams on a weekly basis that include OIPRTP program and other faculty from disciplines pertinent to the respective research.

3. Disseminate research findings

Students and faculty have been actively involved in dissemination of research findings at numerous major national and international professional meetings (n = 75 presentations) and through peer-reviewed publications (n = 33); several of these also involved awards, as noted. (Refer to Publications and Presentations, Appendices.)

4. Employ effective recruitment strategies

During this period, OIPRTP enrollment increased to eight full-time doctoral students. Recruitment of highly qualified students for the OIPRTP has involved several successful strategies: national and local advertising; dissemination of brochures at national and international injury conferences, safety meetings, and through colleagues. The OIPRTP website has also greatly enhanced inquiries and applications (<http://enhs.umn.edu/oiprtp>). New recruitment endeavors have been implemented to attract qualified minority students, accounting for 38% currently. Alumnae and current students also continue to direct highly qualified applicants to the program, as well, and are our best advocates. Important, also, is a strong emphasis on retention. It is essential for all students that faculty members interact frequently with students to determine progress as well as any potential problems that need to be addressed. Within the OIPRTP, we have found that our research seminars and informal meetings and social interactions, involving all OIPRTP students as

well as those from other disciplines, are essential to the establishment and maintenance of camaraderie that will more likely ensure successful progress of the student, as well as retention.

5. Provide a high quality curriculum that provides a strong foundation for occupational injury prevention research training

Continued efforts have been made to ensure a high quality research-training program. A new course, successfully developed and implemented in 2003, involves program faculty (Alexander, Gerberich, McGovern [OEHN and OHSRP] and Ryan). This course, "Applied Analyses of Occupational Health Data," provides training in applied research that addresses NORA priorities, using large databases; students develop research questions, relevant proposals, conduct analyses, and write publication-quality papers. Manuscripts, generated from this endeavor, have resulted in presentations at professional meetings and have been published (Ferguson; Langner); one presentation, in Vienna, June 2004, by Kathleen Ferguson and Deborah Merchant Langner, doctoral students, won the Best Poster award at the 7th World Conference on Injury Prevention and Safety Promotion (OIPRTP faculty were co-authors); this was selected from over 2,000 posters submitted by all participants. Additional presentations and publications also resulted from this course offering.

Advanced occupational injury research content has also been incorporated into the seminars, including study design, development of causal models, pertinent to specific injury problems, application of sensitivity analyses and development of RO1-type proposals. Students also participate each year in leadership and teaching institutes that enable them to develop and apply important teaching concepts in teaching activities.

6. Enhance OIPRTP development

Faculty members continually interact with OIPRTP students to discuss various aspects of the program and obtain feedback that is utilized for ongoing changes to further enhance the program. This includes discussion of their coursework within the division as well as that in other departments; it also includes a variety of other potential issues, related to their overall academic experience. In particular, the addition of the applied analysis course, identified above, has been extremely important in facilitating doctoral thesis progress and has provided excellent visibility through resulting presentations and publications.

The OIPRTP has also been fortunate to have access to three scholarship/fellowship funds, managed through the Minnesota Medical Foundation (MMF), that facilitate recruitment and/or provide awards for outstanding performance. These include: the Nancy A. Robertson Endowed Graduate Fellowship in Injury Prevention (provided by Dr. and Mrs. Leon Robertson); Susan Goodwin Gerberich Scholarship in Injury Epidemiology and Prevention; and the Mary Lauren Olson Award, provided by the Minnesota Environmental Health Association. While the funds are relatively small at this time, the value increases annually and is matched by the Graduate School.

7. Promote job opportunities for graduates of the OIPRTP

Efforts in identifying job opportunities for graduates have been consistently positive. Dr. Gerberich and program faculty receive job opportunity notices weekly that are immediately forwarded to the students; in addition, our faculty members have major national networks among faculty and other professionals who contact us to assist in filling a variety of positions. Prior doctoral graduates (from a previously funded program) have obtained significant positions, including academic and research positions in universities, major corporations, health agencies, and other institutions. Two new OIPRTP graduates, Muree Larson-Bright and Kathleen Ferguson Carlson both acquired excellent positions that were identified in advance of their respective graduation dates (07/31/06 and 08/31/06); refer to subsequent narrative.

8. Provide continuing education and outreach

Specific accomplishments and objectives for recent continuing education and outreach activities are identified in the Appendices. The OIPRTP has been involved in extensive activities over the past five years.

9. Ensure interdisciplinary research training activities

Dr. Gerberich has provided a lead role in coordinating the interdisciplinary efforts of the research-training program in concert with the Co-Director and all associated faculty. Division faculty interact with the other faculty and students from the respective departments involved in coursework, internships, research seminars, and research activities that provide the underpinnings for this program. A minimum of 74 course credits, plus the specific research projects, enables extensive opportunities for interdisciplinary interaction. Of the numerous funded projects that have supported research, nearly all involved investigators from multiple disciplines.

Impact

Eight full-time students have been enrolled, during this period; one was admitted in fall, 2005; two graduated in 2006. All have conducted research on funded projects. Among the eight doctoral students, seven were female (5 White, 2 African American); one was male (African American):

Kathleen Ferguson Carlson, MS, PhD Graduated: 08/31/06 (Research Mentor: Gerberich)
(Examining Committee: Drs. Gerberich, Alexander, Church, Shutske, and Masten)

Dissertation: Environmental and Behavioral Determinants of Children's Agricultural Injury

This analytical work was conducted from major population-based studies that involved surveillance of agricultural injuries (and other injuries), including nested case-control studies, among agricultural household operation members in Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska (<http://enhs.umn.edu/riprc/riprc.html>, research). Dr. Carlson worked as a Research Assistant/Project Coordinator on these efforts. Numerous publications and presentations are identified in the Appendix.

Position: Post-Doctoral Fellow, Veteran's Administration Hospital, Minneapolis, Minnesota: Research on Traumatic Brain Injury/Polytrauma and Blast Injuries Among Veterans (She also was awarded an NIH NRSA postdoctoral fellowship, involving a research effort in the Division of Epidemiology, University of Minnesota; however, she made a difficult decision to decline the grant for this position.)

Teaching Activities:

Teaching Assistant, University of Minnesota School of Public Health, Minneapolis, Minnesota

Interdisciplinary Evaluation of Occupational Health and Safety Field Problems, January – May 2006

Guest Lecturer, Injury Prevention in the Workplace, Community, and Home (PubH 6120), University of Minnesota School of Public Health, Minneapolis, Minnesota, 2003; 2004; 2005; 2006; 2007.

Instructor, University of Minnesota Center for Teaching and Learning Services, Minneapolis, Minnesota

Orientation for New TAs: Resources, Policies, and Classroom Climate, August 2005

Teaching Assistant, PubH 6120, Injury Prevention, Spring 2005, Division of Environmental Health Sciences

Awards:

Best Paper Award, American Public Health Association, Injury Control and Emergency Services Student Paper Competition, Boston, Massachusetts, 2006

Gerberich Scholarship in Injury Epidemiology and Control (2006)

Harold R. Shipman Award for Outstanding Academic Achievement in Environmental and Occupational Health, University of Minnesota Division of Environmental Health Sciences, 2006

Community Partner Star Award, University of Minnesota School of Public Health, 2005

Best Poster Award, 7th World Conference on Injury Prevention and Safety Promotion; Vienna, Austria, 2004

Best Student Abstract, American Public Health Association Delta Omega Chapter; San Francisco, California, November 2003

Scholarships: Friends of Public Health Lawrence R. Foster Memorial, 2000 – 2002

Mary Lauren Olson Scholarship, Minnesota Environmental Health Association, 2002

Muree Larson-Bright, MPH, PhD Graduated: 07/31/06 (Research Mentors: Gerberich; Alexander)
(Examining Committee: Drs. Gerberich, Alexander, Church, Gurney, and Masten)

Dissertation: Parents' Safety Beliefs, Children's Work Practices, and Childhood Agricultural Injury

This work was conducted from major population-based studies that involved surveillance of agricultural injuries (and other injuries), including nested case-control studies among agricultural household members in Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska. As shown, below, two papers prepared for publication were generated from her thesis and one is in press; one of the papers was approved for oral presentation at the American Public Health Association meeting in Boston, 2006.

Position: State Program Administrative Principal, DHS Data Warehouse, Performance

Minnesota Department of Human Services, St. Paul, Minnesota. Responsible for: developing databases and research files; conducting analyses, including occupational injury data; developing research/reporting applications, and writing position papers.

Teaching Activities: Teaching Assistant, College of Liberal Arts, University of Minnesota, during initial year

• Deborah Merchant Langner, MS, Ph.D. Candidate (Research Mentor: Gerberich)
(Examining Committee: Drs. Gerberich, Alexander, Shutske, and Williams)

Dissertation: Risk Factors of Injury Among Rural Minnesota Adolescents: Analysis of the Childhood Agricultural Evaluation Systems Ms. Langner's analyses, based on data she collected from a cohort of rural schools and respective students in Minnesota,

considers various exposures of interest associated with adolescent sleep patterns and risk of work-related injury. One of the papers within her dissertation is titled "Impact of sleep on injury events among adolescents in rural Minnesota: Analysis of the Childhood Agricultural Trauma Evaluation System." Ms. Langner is currently completing her dissertation analyses, with expected defense in 2007-2008. (Refer, also, to Publications and Presentations, Appendix.)

Position: Her position (Project Director), associated with this effort (surveillance grant (R01-OH004265), as Epidemiologist Senior, Minnesota Department of Health (2000-2004), involved organizing efforts to identify work patterns, injury experiences and risk factors for injury among young adults in rural Minnesota high schools. Activities included: survey design and implementation; developing recruitment materials; leading focus groups; creating documentation for Human Subjects' approval; facilitating and maintaining communication with 41 high school surveillance partners; data analysis writing reports; preparing presentations

• Leslie D. Nordgren, MPH, Ph.D. Candidate (Research Mentors: Gerberich; Alexander)
(Examining Committee: Drs. Gerberich, Alexander, Church, and J. Bender)

Dissertation: The Etiology and Consequences of Injuries to Veterinary Technicians

This involved a major two-phase study (comprehensive and case-control studies) among all Veterinary Technicians in Minnesota to identify: 1) incidence and consequence of injuries; and 2) risk factors for bite-related injuries. Ms. Nordgren is currently completing her analyses (expected defense, 2007-2008).

Positions: Ms. Nordgren was involved in the following part-time positions during her academic program:

Project Manager in the Quality Measurement and Analysis Department for Allina Hospitals and Clinics
Research Assistant, University of Minnesota to evaluate the effects of mass media messages

Teaching Activities:

Teaching Assistant, PubH 6122, Occupational Safety Seminar, Spring 2007, Division of Environmental Health Sciences

Awards acquired in connection with position at Allina Hospital and Clinics:

Excellence in Research (2003); Minnesota Alliance for Patient Safety (2003)

• Denise M. Feda, MPH, Ph.D. Candidate (Research Mentors: Gerberich; Alexander)
(Examining Committee: Drs. Gerberich, Alexander, Church, and Forster)

Dissertation: Impact of Written Policies and Assault Deterrents on Risk of Occupational Physical Violence This is based on a major study, "Violence Against Teachers: Etiology and Consequences," and involves a major two-phase study (comprehensive and case-control studies) among all teachers in Minnesota to identify: 1) incidence and consequence of injuries; and 2) risk factors for assault injuries. Ms. Feda is currently completing her dissertation (expected defense, 2007). (Refer to Publications and Presentations, Appendix).

Position: Her position associated with this effort is the following: Coordinator, Violence Against Teachers study, June 2004-2006, University of Minnesota, Division of Environmental Health Sciences.

Additional Positions: The following research positions were held during her academic training:

• Internship French Institute for Research and Development, Cameroon (International Training and Research Exchange Program in Infectious Disease Epidemiology [INTREPID] scholarship)

• Research Assistant, September 2002 – January 2003, University of Minnesota, Division of Epidemiology

• President, Student Council, School of Public Health (2006-2007) and Council of Graduate Students Member, University of Minnesota (2005-2007)

• University of Minnesota campus liaison to the Student Assembly of the APHA. Campus liaisons advance the mission of the Student Assembly of APHA to enhance students' education and professional development (2006-2007)

Teaching Activities:

Teaching Assistant, PubH 6120, Injury Prevention, Spring 2006, Division of Environmental Health Sciences

Awards acquired during her academic training period are:

Nancy A. Robertson Endowed Graduate Fellowship in Injury Prevention 2004-2006

• Evette Pinder, MPH, Ph.D. Candidate (Research Mentor: Gerberich)
(Examining Committee: Drs. Gerberich, Alexander, Church, Hansen)

Dissertation: Occupational Stress and Burnout: The Risk of Work-Related Violence

This is based on a major study, "Violence Against Teachers: Etiology and Consequences," and involves a major two-phase study (comprehensive and case-control studies) among all Teachers in Minnesota to identify: 1) incidence and consequence of injuries; and 2) risk factors for assault injuries. Ms. Pinder is currently completing her dissertation (expected defense, 2007-2008). She is identified as a co-author on study presentations.

Position: Her position associated with this effort was the following:

Research Assistant, Violence Against Teachers study, June 2004-2006, Division of Environmental Health Sciences

Teaching Activities:

Teaching Assistant, PubH 6120, Injury Prevention, Spring 2007, Division of Environmental Health Sciences

Teaching Assistant Epidemiology introduction course, 2006, Division of Epidemiology

Awards:

Gerberich Scholarship in Injury Epidemiology and Control (2003-2005)

• Starr Kelley Sage, MPH, Ph.D. Student (Research Mentor: Gerberich)

(Examining Committee: Drs. Gerberich, Alexander, Church, McGovern, other)

Dissertation: Impact of School Resources on Educators' Risks of Physical Assault

This is based on a major study, "Violence Against Teachers: Etiology and Consequences," and involves a major two-phase study (comprehensive and case-control studies) among all Teachers in Minnesota to identify: 1) incidence and consequence of injuries; and 2) risk factors for assault injuries. Ms. Sage completed her preliminary examinations and is completing her research analyses (Expected defense, 2007-2008). She is identified as a co-author of several relevant presentations for the overall study.

Position: Her position associated with this effort is the following: Research Assistant, Violence Against Teachers study, September 2006-present, University of Minnesota, Division of Environmental Health Sciences

Additional Positions:

Graduate Research Assistant (2002-2003), Office of Multicultural Affairs, School of Public Health, University of Minnesota; 2002-2004,

Assistant to Epidemiologists, Minnesota Department of Health

Other Experience:

Council of Graduate Students Member, University of Minnesota (2005-Present); Health Sciences Policy and Review Council Member, University of Minnesota (2005-Present); Student Diversity Action Committee Member, School of Public Health, University of Minnesota (2006-Present)

Awards (during academic training period):

Hearst Foundation Fellowship (2004-2006)

Nancy A. Robertson Endowed Graduate Fellowship in Injury Prevention - 2006-2007

Minnesota Environmental Health Association's (MEHA) Mary Lauren Olson Memorial scholarship

• Quintin Williams, BS, Ph.D. Student (Research Mentors: Gerberich; Alexander)

(Examining Committee: Drs. Gerberich, Alexander, Church, Shutske, Nachreiner)

Dissertation Proposal: Analyses of Bystanding as a Risk Factor for Agricultural Injury Among Children on Family Operations

Position: As background for developing his research proposal, and to provide further research experience, he has been working with our new research team on a major five-state study (16,000 agricultural operations), "Agricultural Injury Consequences: Regional Rural Injury Study – III."

Additional Positions:

Internship (IMHOTEP Scholar), National Institute for Occupational Safety and Health (NIOSH) Spokane, Washington, Project IMHOTEP, May-August 2005. Assignment: Researched prevalence of musculoskeletal disorders found amongst operating engineers (construction workers, miners, heavy machine operators)

Other Experience:

Health Research Associate April 2006 to Present, Park Nicollet Institute, St. Louis Park, Minnesota Responsible for assessing workplace sites with regard to machinery use and guarding

Awards: (during academic training period):

Captain Derek Dunn Memorial Award - August 2005, Derek E. Dunn Memorial Award, McMicken College of Arts and Sciences Alumni Association; award for students demonstrating tenacity in public health service with outstanding academic ability

Diversity of Views and Experiences Fellowship - 2005-2006

The DOVE Fellowship promotes diversity through recruitment and support of academically excellent students with diverse ethnic, racial, economic, and educational backgrounds and experiences.

Nancy A. Robertson Endowed Graduate Fellowship in Injury Prevention - 2005-2006

The National Dean's List - May 2005, honors high-achieving college students nationwide

In addition to the OIP RTP students, identified above, Dr. Gerberich also served as an advisor to an occupational and environmental health nursing doctoral student who graduated during this period: Mary Findorff, MPH, Ph.D. (Gerberich – Co-Advisor for dissertation).

(Refer to relevant Publications and Presentations, Appendix). In 2006, she also served as a mentor to a visiting faculty member from a university in Ankara, Turkey, with whom she has collaborated on three publications.

Beyond the awards received by students, staff and core and supporting faculty received the following awards:

- Andrew Ryan MS, Program Analyst and Statistical Applications Research Fellow, received the School of Public Health (SPH) Academic Professional and Administrative (P&A) Excellence Award for outstanding initiative, skill, and commitment that he contributes to the mission of the school (2006).
- Dr. Susan Gerberich, was appointed to Mayo Professor of Public Health, School of Public Health (SPH). This award is the school's highest recognition of its faculty members. The professorship recognizes the achievements of senior SPH faculty members who demonstrate excellence in research, teaching and outreach. Gerberich is best known for helping to found and being a major contributor to the field of injury prevention research. Dr. Gerberich also received the "Faculty Excellence Award" from the graduating class of 2006 in the Division of EHS.
- Dr. Patricia McGovern was promoted to the rank of full Professor in June 2007.
- Dean Olson was inducted into the Fellows of the American Association of Occupational Health Nurses in recognition of occupational and environmental health nurses who have made significant contributions to the field of occupational and environmental health nursing in the areas of clinical practice, education, research, management, or policy (2007).
- Professor John Shutske received the "Superior Paper" award from American Society of Agricultural and Biological Engineers (ASABE), given to the top 2.5% of published journal articles in ASABE's three primary peer-reviewed journals, for the paper: Testing and Creation of a Safety System to Disengage the PTO of a Tractor. *Applied Engineering in Agriculture*. 22(1): 5-12.
- Dr. Nancy Nachreiner, Assistant Professor received the "Faculty Excellence Award" from the graduating class of 2007 in the Division of EHS.

D. Conclusions

The uniqueness of this doctoral-level occupational injury prevention research training program is evidenced not only by the highly qualified faculty, who have experience and expertise essential to this endeavor but, also, by the quality of the curriculum and student research opportunities that have been developed to provide a unique and comprehensive approach to occupational injury prevention and control. Program students have clearly met the criteria of having demonstrated a high level of competency. The evidence of a strong record in related research that has been presented at national and international levels and published in peer-reviewed journals, in concert with ongoing research efforts that has been supported by other sources of funding, have provided a strong base for the distinctive research training activities identified for this program. Through this program, a unique, multidisciplinary approach has enabled a significant contribution to the field by preparing exceptional leaders who can make significant contributions to occupational injury prevention.

References

1. Institute of Medicine: Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel, Washington, D.C.: Institute of Medicine, 2000.
2. Bonnie RJ, Fulco CE, and Liverman CT., Editors, Institute of Medicine, Committee on Injury Prevention and Control: Reducing the Burden of Injury: Advancing Prevention and Treatment, Washington, D.C.: National Academy Press, 1999.
3. Robertson LS: Injury Epidemiology: Research and Control Strategies, Third Edition, New York: Oxford University Press, in press, 2006.
4. Christoffel T and Gallagher SS: Injury Prevention and Public Health: Practical Knowledge, Skills, and Strategies, Gaithersburg, Maryland: Aspen Publishers, Inc., 2006.
5. National Safety Council: Injury Facts, 2007 Edition, Chicago: National Safety Council, 2007.
6. U.S. Department of Labor (USDOL): Child Labor Requirements in Agriculture Under the Fair Labor Standards Act. *Child Labor Bulletin No. 102*. Washington, D.C.: U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division. WH Publication 1295. U.S Government Printing Office: 1989-241-406/06551, 1984.

7. Gerberich SG, Gibson RW, French LR, Renier CM, Lee T-Y, Carr WP, Schutske J.: Injuries among children and youth in farm households: Regional Rural Injury Study-I. Injury Prevention 7(2):117-120, 2001.
8. Gerberich SG, Gibson RW, French LR, Church TR, Alexander BH, Shutske J, Masten AS, Renier CM, Mongin SJ, Ryan A, Ferguson KR, Zhang X, Jensen KE: Etiology and Consequences of Injuries among Children in Farm Households: A Regional Rural Injury Study. (RO1 CCR514375), Technical Report, Centers for Disease Control and Prevention. Minneapolis: Regional Injury Prevention Center, University of Minnesota, 2003.
9. Gerberich SG, Alexander BH, Church TR, Masten AS, Renier CM, Mongin SJ, Ryan A, Ferguson KR: Regional Rural Injury Study – II, Phase 2: Agricultural Injury Surveillance. (RO1/OHO4270), Technical Report, Centers for Disease Control and Prevention. Minneapolis: Regional Injury Prevention Center, University of Minnesota, 2004.
10. National Institute for Occupational Safety and Health: Occupational Injuries: Occupational Violence, accessed September 2, 2006: <http://www.cdc.gov/niosh/injury/traumaviolence.html>.
11. Lee, SH, Gerberich SG, Waller L, Anderson A, McGovern P: Work-related assault injuries among nurses, Epidemiology, 10(6):685-691, 1999.
12. Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD, Jurek A: Risk factors for work-related assaults on nurses, Epidemiology. 16(5): 704-709, 2005.
13. Gerberich SG, Church TR, McGovern PM, Nachreiner NM, Geisser MS, Ryan, AD, Watt G, Fedra D, Pinder E, Sage SK: Violence Against Teachers: Etiology and Consequences, study in progress, 2006.
14. NIOSH Publication No. 2004-146: Worker Health Chartbook 2004, accessed September 2006: <http://www2.cdc.gov/NIOSH-Chartbook/ch5/ch5-1.asp>.
15. United States Department of Labor, Bureau of Labor Statistics, accessed September 2007: <http://www.bls.gov>.
16. Duhart DT: Violence in the workplace, 1993-1999, National Crime Victimization Survey, Bureau of Justice Statistics Special Report, U.S. Department of Justice, Office of Justice Programs, 2001.
17. Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD: An epidemiological study of the magnitude and consequences of work-related violence: The Minnesota nurses' study, Occupational and Environmental Medicine, 61:495-503, 2004.
18. McGovern P, Kochevar L, Lohman W, Zaidman B, Gerberich SG, Nyman J and Findorff-Dennis M: The cost of work-related assaults in Minnesota, Health Services Research, 35(3): 663-686, 2000.
19. International Labor Organization: The cost of violence and bullying at work, accessed September 2, 2006: <http://www.ilo.org/public/english/protection/safework/violence/costof.htm>.
20. Mercy J, Rosenberg ML, Powell KE, Broome CV, Roper WL: Public Health Model of a Scientific Approach to Prevention, in Public health policy for preventing violence, Health Affairs, Winter 1993.
21. Greenland S, Pearl J, and Robins J: Causal diagrams for epidemiologic research. Epidemiology. 10(1): 37-48, 1999.
22. National Institute for Occupational Safety and Health: National Occupational Research Agenda, Accessed September 2, 2006: <http://www.cdc.gov/niosh/nora/>.
23. Olson DK, Lohman WH, Brosseau LM, Fredrickson AL, McGovern PM, Gerberich SG, and Nachreiner NM: Crosscutting competencies for occupational health and safety professionals. Journal of Public Health Management and Practice, 11(3), 235-243, 2005.

5. G. Hazardous Substances Academic Training Program
Director: Peter Raynor, PhD

Hazardous Substances Academic Training Program
Director: Peter Raynor, PhD

A. Background

The Hazardous Substances Academic Training (HSAT) Program is a specialty within the Industrial Hygiene (IH) Master's Program of the Education and Research Center. The program has successfully prepared industrial hygienists at the Master's-degree level to develop, implement, and manage hazardous waste and materials programs since 1993. In the past four years, 7 HSAT students have earned masters' degrees (5 MS degrees; 2 MPH degrees) and one PhD student supported by the HSAT Program in a previous project period completed a PhD degree. Three additional students (2 MS; 1 MPH) supported during the 2006-2007 academic year are continuing to work toward their degrees. Graduates in the past five years have decided to pursue careers in industry, consulting, and the health care sector.

The following addresses progress made by the HSAT Program on a variety of fronts during the period July 1, 2002 to June 30, 2007. The leadership of the HSAT Program has passed from having Co-Directors Dr. Lisa Brosseau and Dr. Claudiu Lungu in 2002 to having a single Director, Dr. Peter Raynor, in 2004. Dr. Brosseau assumed the position of Deputy Director for the Midwest Center ERC from 2004-2007, relinquishing leadership in the IH and HSAT Programs. She remains an active faculty member in the HSAT Program. Dr. Lungu left the University of Minnesota for a faculty position at the University of Alabama-Birmingham in 2005.

B. Specific Objectives

The following specific objectives guided the HSAT Program during the 2002-2007 award period:

- (1) Better understand the role industrial hygienists can play in the area of environmental management in order to ensure the educational curriculum is well-suited to this role.
- (2) Assure that training received by students in the hazardous substance program is relevant to their future work as industrial hygienists and environmental specialists and that specialty courses prepare them for work in the field of environmental management.
- (3) Assure that the coursework pursued by the HSAT program students addresses relevant problems and issues in both occupational and environmental health.
- (4) Expand the awareness of hazardous substances throughout the industrial hygiene and environmental health curriculum
- (5) Attract the best students possible to this program and to provide full support to at least two first-year students each year. If possible, tuition support is provided to second-year students to encourage the completion of their degrees.
- (6) Ensure that faculty involvement in this program serves the needs of the students and supports the continued development of the program.
- (7) Ensure that the HSAT program remains up-to-date and responsive to students' needs.
- (8) Seek additional support for this program from other sources.

C. Results and Discussion

The accomplishments of the HSAT Program will be discussed in context of the specific objectives for the program during the 2002-2007 award period.

- (1) Better understand the role industrial hygienists can play in the area of environmental management in order to ensure the educational curriculum is well-suited to this role.*

The HSAT Program employs a variety of methods for staying up-to-date about the environmental aspects of industrial hygienists' work. An HSAT Program Advisory Board meets annually to review program course and other requirements. Alumni play active roles in the program, including serving as members of the Program Advisory Board, teaching in classes, supervising students in field experiences, conducting tours of their work sites, and building connections with environmental groups that have health and safety needs. The HSAT Advisory Board met during this project period in 2002, 2003, 2004, and 2005. Discussions centered on hazardous materials and waste management training needs for industrial hygiene students, program educational objectives, program evaluation, and student recruitment.

In 2002, we conducted an employer survey to assess employer expectations of knowledge and skills for newly-graduated and experienced masters-trained industrial hygienists. Drs. Brosseau, Raynor, and Lungu published the results of this survey in 2005.⁽¹⁾ Certified industrial hygienists with recent hiring experience were surveyed about their expectations of competencies when hiring entry-level master's-trained industrial hygienists. We received 129 completed surveys from 179 eligible participants agreeing to participate. Most of the respondents were employed in very large companies (>500 employees) and were evenly distributed in manufacturing, services, and public administration. Eleven topics were identified by 70% or more of the respondents as essential for entry-level, master's-trained industrial hygienists. These 11 fall entirely within the categories of recognition, evaluation, and control. While hazard recognition was listed as essential by almost all respondents (95%), the only specific hazards thought to be essential by most respondents were noise and chemicals (gases and vapors). Hazardous materials and waste management was rated as "essential" by about 23% of respondents, "useful but not essential" by 66%, and "not necessary" by 10%. Clearly, most potential employers see value in perspective industrial hygiene employees having competency related to hazardous substances. These results allowed us to identify core competencies, which must be addressed in required courses, as well as additional knowledge and skills that could be achieved through elective classes. The results have also been useful in developing course and program evaluations and in advising students about employer expectations.

The core course in the HSAT Program (PubH 6176: Hazardous Wastes and Materials Management) was taught by Dr. Brosseau in Spring Semester 2003, Fall Semester 2004, and Fall Semester 2006. With feedback from Program Advisory Board members and contacts in the industrial hygiene community, the topics covered by this course are adjusted each time the class is taught.

(2) Assure that training received by students in the hazardous substance program is relevant to their future work as industrial hygienists and environmental specialists and that specialty courses prepare them for work in the field of environmental management.

The relevance of the training received by IH and HSAT Program students has been evaluated by an Alumni Survey.

In 2006, MCOHS surveyed alumni for their satisfaction with and the perceived value and proficiency of their academic training in regards to discipline-specific and cross-cutting professional competencies (see Center Administration section for details). All alumni graduating between 1992 and 2005 were mailed a self-administered survey; 75% (46 of 61) of the IHS contacted participated. Ten of these IH graduates also identified themselves as alumni of the HSAT Program. Thus, survey responses were analyzed separately for HSAT alumni. Findings revealed that most HSAT alumni were "very satisfied" (60%) or "somewhat satisfied" (30%) with their graduate education in occupational safety and health (OSH) and 90% were currently working in occupational health and safety positions. Among those who responded, 3/10 had current certification as CIHs, 1/10 as a CSP, and 1/10 as a CHMM. The relatively low level of certification reported by HSAT alumni is due, in part, to 50% of the respondents receiving their degrees in 2003 or later.

The findings on the interdisciplinary competencies addressing "recognition," "evaluation," "control," "communication," "behavior," and "management" reveal that at least 80% of HSAT alumni respondents rated each of the competencies as "very valuable" or "valuable". Interdisciplinary competencies with the most frequent ratings of "very valuable" were: writing well (100%), identifying health and safety hazards of work site processes and operations (90%), knowing health and safety laws and regulations (90%), and communicating effectively with a variety of stakeholders (90%). At least 9 out of the 10 HSAT alumni respondents perceived themselves as "proficient" or "very proficient" in 23 of 29 interdisciplinary competencies. 60% of respondents believed they were not proficient in managing financial resources effectively even though 100% believed this competency was valuable or very valuable.

For IH-specific competencies, all 10 HSAT alumni considered each of the competencies valuable or very valuable with the exception of one respondent who did not consider "demonstrating familiarity with and being able to use a professional code of ethics" as being valuable. All 10 of the respondents considered themselves proficient or very proficient in each of the competencies with the exception of "select the most appropriate control methods for a given situation", in which 9/10 of the respondents considered themselves proficient or very proficient, and "manage hazardous materials and waste", in which 8/10 of the respondents considered themselves proficient or very proficient. Combined with responses from other portions of the survey, our hypothesis is that the HSAT alumni not feeling proficient on hazardous materials and waste managements issues may believe they do not know enough about specific regulations governing management of hazardous substances. Regulations will be a stronger emphasis in PubH 6176, the core course for the HSAT Program, in future years.

Overall, the survey results show clearly that the vast majority of recent alumni from the HSAT Program believe that the training they received from the Midwest Center ERC has provided them with the knowledge, skills, and attitudes to succeed in their careers.

(3) Assure that the coursework pursued by the HSAT program students addresses relevant problems and issues in both occupational and environmental health.

In government agencies, consulting firms, and manufacturing companies, the duties of an industrial hygienist frequently include both occupational health (worker health and safety) and environmental health (health and safety for the community and the environment). Because industrial hygienists receive comprehensive training in the anticipation, recognition, evaluation, and control of hazards, additional duties of compliance with and awareness of environmental regulations are a logical extension of "traditional" industrial hygiene roles. For example, most industrial hygienists are responsible for assuring worker training in hazards ("right-to-know") and emergency response. In addition, industrial hygienists frequently develop and manage programs to mitigate the effects of new chemicals, control and report air and water pollution, design, storage and transportation systems for hazardous materials and wastes, and respond to spills. The HSAT Program was designed to train Master's-level students to be able to extend themselves beyond the traditional occupational health focus of their roles into the more comprehensive role of an environmental health specialist. The HSAT Program has typically supported three students pursuing a Master's degree during each year of funding. In most years, this has meant that either one or two new students have joined the program.

As a specialty within the IH Program, the HSAT Program shares the bulk of its requirements with the IH Program. Like the IH Program, the HSAT Program offers both the Master of Public Health (MPH; School of Public Health) and Master of Science (MS; Graduate School) degrees. The differences in these degrees are in their requirements for Master's Projects and ethics coursework. Students taking the MS degree must register for PubH 6742 Ethics in Public Health: Research and Policy, whereas those working on the MPH degree must register for PubH 6741 Ethics in Public Health: Professional Practice and Policy. Students in the MS degree program are required to submit a research paper to satisfy the requirements of PubH 7194 (Master's Project: Environmental Health). Students in the MPH program may submit either a research paper or a comprehensive literature review on a specific topic to meet the expectations for PubH 7194. Both programs have required a bare minimum of 48 credits, although students frequently complete more. For a full-time student, the program is designed to be able to be completed in two academic years, from the beginning of Fall Semester in a given year to the conclusion of the spring semester two years later. Students usually pursue a required Field Experience: Environmental Health (PubH 7196) during the summer between their first and second years. They usually pursue their research project or literature review during their second year. HSAT students are also required to complete a 40-hr Hazardous Waste Worker or Emergency Response Training course. This requirement is usually fulfilled by taking courses offered by the University of Minnesota Center for Public Health Education and Outreach (CPHEO) or the Minnesota Safety Council. Both the Field Experience and the Master's Project must provide training relevant to hazardous materials and waste management.

HSAT students pursue coursework in four core areas (SPH, EnHS, OHS, HSAT). At the base are the core requirements for all School of Public Health (SPH) students mandated for accreditation by the Council on Education for Public Health (CEPH). These requirements include classes in biostatistics (PubH 6414 or 6450), epidemiology (PubH 6320), ethics (PubH 6741 or 6742), behavioral science (PubH 6020), and management (PubH 6751 or 6752). Building upon the SPH core, a core of five courses is required for all Master's students in the Division of Environmental Health Sciences (EnHS). These courses include PubH 6103 (Exposure to Environmental Hazards), PubH 6104 (Environmental Health Effects: Introduction to Toxicology), and PubH 6105 (Environmental and Occupational Health Policy). The Master's Project (PubH 7194) and the Field Experience (PubH 7196) are also part of the EnHS core. The third core required of all Occupational Health and Safety (OHS) students includes PubH 6170 (Introduction to Occupational Health and Safety), PubH 6130 (Occupational Medicine), and PubH 6150 (Interdisciplinary Evaluation of Occupational Health and Safety Field Problems). Finally, at least 8 courses are required of students to fulfill specific requirements for the HSAT Program. Several of these courses are also requirements for the IH Program curriculum: PubH 6171 (Exposure Assessment for Air Contaminants), PubH 6172 (Industrial Hygiene Applications), PubH 6174 (Control of Workplace Exposures), and PubH 6175 (Industrial Hygiene Measurements Laboratory). PubH 6176 (Hazardous Materials and Waste Management) is the key course for the HSAT Program. HSAT students must also take either PubH 6190 (Environmental Chemistry) or Civil Engineering 4561 (Solid Hazardous Wastes). In addition, the HSAT students must also take an additional elective related to industrial hygiene. The 40-hour Hazardous Waste Worker or Emergency Response Training course is also required for completion of the HSAT Program.

The Summary Statement by the Special Emphasis Panel (SEP) reviewing the 2001 competitive renewal application for the HSAT Program recommended (i) tightening the criteria for choosing hazardous substances elective courses, (ii) placing the required biostatistics course earlier in the course plan to allow for increased rigor and quality in the Industrial Hygiene Measurements Laboratory

course and the Master's Project, and (iii) having few specialized courses offered by the faculty relevant to hazardous substances. These specific criticisms were addressed as follows during the past five years:

- i. At the time of the previous application, courses that fulfilled the HSAT elective requirement included PubH 6190 (Environmental Chemistry), Civil Engineering 4561 (Solid Hazardous Wastes), Civil Engineering 4562 (Remediation Technology), Civil Engineering 5591 (Environmental Law for Engineers), or another course approved by a student's academic advisor. The reviewers were concerned about the rigor of CE 5591 and about the open-endedness of allowing any other course approved by an advisor. Therefore, CE 5591 is no longer an option for fulfilling the HSAT elective and the option to select another course not listed has been eliminated. In addition, CE 4562 was removed from the list because it has not been offered in several years. Thus, the elective has been reduced to a choice between PubH 6190 and CE 4561. However, as most of the HSAT students have chosen one of these two courses for their elective anyway because the content was most appropriate for their careers, the reduced selection makes sense.
- ii. The recommended course plan for HSAT students now includes PubH 6414 (Biostatistical Methods I) in the fall semester for entering first-year students. The current suggested sequence now has HSAT students studying biostatistics a semester before taking PubH 6175 (Industrial Hygiene Measurements Laboratory) and nearly a full year before most students will perform statistical analyses on their Masters Project data.
- iii. Several courses have been developed or reorganized in the past several years to provide more information on topics relevant to HSAT students. Required course PubH 6171 (Exposure Assessment for Air Contaminants) has been modified from a course focused primarily on evaluation and measurement of aerosol exposures to a comprehensive course that includes sampling of vapors more commonly associated with hazardous materials or waste spills. This course is taught by Dr. Ramachandran. PubH 6173 (Exposure to Physical Agents), a highly recommended elective course led by Dr. Raynor, has been revived and contains lectures on measurement and control of radioactive materials, including radioactive waste. An elective topics course, PubH 7200-128 (Personal Protective Equipment and Respiratory Protection), covers respiratory protection and chemical protective clothing necessary to cope with hazardous materials and waste. This course, offered during the Public Health Institute immediately after the spring semester concludes, is taught by Dr. Raynor. He also discusses the impact of hazardous substance releases on workers and surrounding communities during another Public Health Institute topics course, PubH 7200-133 (Workers as Partners in Emergency Preparedness and Response). Taken together, these improved, revived, and new course offerings demonstrate that more courses are offering material relevant to the needs of HSAT students.

Many working industrial hygienists and environmental health specialists wish to pursue advanced degrees through the IH and HSAT Programs. However, many must support families and need to continue to work full time or almost full time while pursuing a degree. Therefore, many of the required courses in the HSAT curriculum have been moved from daytime slots to late afternoon/evening periods. This has proved to be a successful move and a number of professionals working in local companies have taken courses such as PubH 6103, PubH 6104, PubH 6171, PubH 6173, and PubH 6174.

Dr. Raynor's expertise in personal protection, emergency preparedness, and building safety and ventilation led to the development of three courses that are offered during the summer Public Health Institute. PubH 7200-128 (Personal Protective Equipment and Respiratory Protection) focuses on how to choose personal protective equipment and respiratory protection for those responding to emergencies, treating infectious patients, handling hazardous materials, or facing known workplace contaminants. PubH 7200-129 (Preparedness for Buildings) focuses on assessing threats and hazards for large buildings and discusses measures that can be taken to improve building security and protect building occupants. Elements of heating, ventilating, and air-conditioning (HVAC) systems and how they can be used to minimize exposures to hazardous agents are included. PubH 7200-133 (Workers as Partners in Emergency Preparedness and Response) focuses on incorporating workers into plans for avoiding and coping with terrorism or other emergencies, provides management and worker perspectives on this topic, and establishes preparedness competencies for workers.

An objective of the HSAT Program, and the ERC as a whole, is to provide students with a broad, interdisciplinary experience. The integrated, layered approach (SPH, EnHS, OHS, HSAT) to the curriculum leads students to, by necessity, meet and interact formally and informally with students in other ERC programs, other tracks within the Division of Environmental Health Sciences, other divisions within the School of Public Health, and frequently other colleges at the University of Minnesota. Many courses require students to work in interdisciplinary teams on in-class exercises and group projects. In PubH 6150 (Interdisciplinary Evaluation of Occupational Health and Safety Field Problems), occupational health and safety students work together on multi-disciplinary (industrial hygiene, medicine, nursing, and injury prevention) teams to recognize and evaluate potential hazards in real workplaces and recommend solutions.

Students gain additional experience with interdisciplinary occupational health and safety during their field experiences and sometimes as they work on their Master's projects, depending on the topic they pursue.

Several key courses specific to the HSAT curriculum are described below.

PubH 6176 (Hazardous Materials and Waste Management)

The objectives of the required course for HSAT students, PubH 6176, are to:

- Build knowledge of hazardous materials and wastes with respect to definitions, regulations, communication of health effects, prioritization and prevention of releases, response to releases, emissions to soil, air and water, transportation, treatment, disposal, storage, and minimization.
- Build problem solving and communication skills for managing hazardous materials and wastes, particularly in terms of recognizing dangerous situations, prioritizing and recommending management actions, and writing and speaking clearly about problems and solutions.
- Apply knowledge and problem solving and communication skills to specific problems in order to practice the role of health and safety professionals in managing hazardous materials and wastes.

Specific topics addressed in this course include:

- Historical case studies of hazardous wastes and materials situations (Bhopal and Love Canal)
- Basics facts about laws and regulations, toxicology, epidemiology, fate and transport, exposure limits, physical and chemical properties of chemicals, definitions, and methods for identifying wastes
- Communicating hazards to a variety of audiences (e.g. workers, community)
- Hazard analysis techniques (process safety and risk management)
- Emergency planning and response (including measurement and personal protection)
- Controlling and managing air and water emissions (engineering controls, permits, etc.)
- Managing, treating, transporting, and disposing of hazardous waste; managing and transporting hazardous materials
- Pollution prevention
- Environmental management (ISO 14001)

This course utilizes case studies, lectures, visiting specialists, videotapes, field trips, and class discussions as teaching methods. Students are required to respond to questions based on weekly reading assignments. A mid-term exam and a final project (written and oral) are also required. Weekly class evaluations provide timely feedback on course progress.

PubH 6190 (Environmental Chemistry)

PubH 6190, one of two elective course options to fulfill unique requirements of the HSAT program, is a survey course that describes atmospheric, water, and soil chemistry principles, in particular as the chemistry relates to current challenges to air, water, and soil environments. The last third of the course focuses on understanding the linkages and interactions of these three environmental media, and on gaining a quantitative understanding of how pollutants behave in the environment. The objectives of the class are for students to be able to:

- Name and describe the major environmental issues in our state, region, country, and on a global scale.
- Describe the chemistry of the major environmental threats to our air, water, and soil, including ozone depletion, photochemical smog, global climate change, groundwater pollution, eutrophication, agricultural impacts to water and soil, and others.
- Differentiate between natural cycles of chemicals and those exacerbated by human activities, e.g. sources of mercury to the environment.
- Describe, using chemistry concepts, how environmental problems are multimedia and why.
- Construct a box model that describes the mass budget of an organic pollutant, including all the major sources, sinks, and pathways.
- Critically review news articles from the media on environmental chemistry issues and evaluate the accuracy of the science presented in the story.

The course is a lecture class primarily, using interactive teaching as much as possible. Some sessions require group interactions, and the final project is a group project.

Civil Engineering 4561 (Solid Hazardous Wastes)

CE 4561 is the other elective option to fulfill requirements specific to the HSAT program. This course is designed to give a comprehensive overview of the evaluation and characterization of solid hazardous waste. The topics covered in this course include:

- Solid and hazardous waste characterization
- Regulatory legislation
- Waste minimization
- Resource recovery
- Chemical, physical, and biological treatment
- Thermal processes
- Disposal practices
- Analysis and design of systems for treatment and disposal

The course is taught primarily in a lecture format.

PubH 7196 (Field Experience: Environmental Health)

HSAT students are required to participate in a field experience, which allows them to put knowledge and skills gained from courses into practice and learn first-hand about an organization and its operations. A student must discuss field experience plans beforehand with her or his academic advisor to ensure that the plans meet expectations. A field experience should offer a variety in activities that encompass the full range of typical industrial hygiene practice in anticipating, recognizing, evaluating, and controlling hazards. An optimal field experience will afford an HSAT student an opportunity to:

- address hazardous materials and waste management issues
- participate in exposure sampling
- measure or design ventilation systems or other controls
- write reports in which they describe results and make recommendations
- participate in decision-making and other opportunities which help them understand the role of an industrial hygienist in the organization
- observe and evaluate a variety of hazards
- interact with workers, engineers, management, and health and safety professionals in the company
- think creatively and apply their learning to specific problems and situations
- practice and learn new skills appropriate to the field

Recent HSAT students have held internships with companies such as 3M, Caterpillar, and Pace Analytical Services. Other field experiences have included work at consulting firms and government agencies.

Students are expected to complete the form, Record of Student Field Experience in Environmental Health, which should include a discussion of how this experience meets the expectations described above. Upon completion of the field experience, the student must submit a 1-2 page report to the advisor describing how her or his work experience fulfilled the expectations described above.

PubH 7194 (Master's Project: Environmental Health)

HSAT students are required to perform a capstone project in collaboration with a research advisor. The research advisor may be a student's academic advisor, another faculty member in the IH or HSAT programs, another faculty member in EnHS, or a faculty member external to EnHS with an appropriate affiliation to the Division. Other faculty members and experts outside the University of Minnesota may be consulted for advice and input to the project. Students pursuing the MS degree in the HSAT Program must prepare a Research Paper, whereas MPH students may prepare either a Research Paper or a Literature Review. In the case of a Research Paper, students must select a theme relevant to the key principles of industrial hygiene: anticipating, recognizing, evaluating and controlling hazards. They must carry out a review of the original literature and address a specific problem, completing the steps necessary to solve that problem. The project may be conducted in the laboratory or the field and should involve some aspect of data gathering followed by a statistical or descriptive analysis. Students must prepare a paper that includes an Abstract, Introduction, Methodology, Results, Discussion, and Conclusion with references, tables, figures, and appendices as appropriate. In the case of a Literature Review, students must prepare a written report that should include an Abstract, Introduction, Conceptual Framework, Methodology, Comprehensive Literature Review, Conclusions, and Recommendations.

The paper is presented to a committee in an oral examination before credit is awarded for PubH 7194. The committee is typically comprised of the research advisor, another faculty member within EnHS, and a faculty member outside EnHS. Once the paper is considered acceptable to the research advisor, it is sent to the other committee members, usually about two weeks before the oral examination. The committee members read the paper and prepare questions before the exam. At the oral examination, which typically lasts about 1-2 hours, students present an overview and results of the project. Committee members examine the student on the specifics of their project and on subjects from his or her course of study.

Projects that HSAT students conduct should include elements of hazardous materials or waste management. If this is not the case, they must undertake an additional independent study project, culminating in a paper that addresses a topic in this area.

(4) Expand the awareness of hazardous substances throughout the industrial hygiene and environmental health curriculum

PubH 6176, the Hazardous Materials and Waste Management course taught for this program, is attractive to students not in the HSAT Program. In the Spring 2003 semester, 2 students who were not part of the HSAT Program took the course. In Fall 2004 and Fall 2006, respectively, 10 students and 4 students who were not part of the HSAT Program took the course.

The Public Health Institute course on Personal Protective Equipment and Respiratory Protection developed by Dr. Raynor has been taken by a total of approximately 20 students, only one of whom has been an HSAT student. This course focuses heavily on the use of PPE for emergency response to hazardous substances.

(5) Attract the best students possible to this program and to provide full support to at least two first-year students each year. If possible, tuition support is provided to second-year students to encourage the completion of their degrees.

Students are recruited primarily through alumni referrals and via the Division web site. Industrial hygiene applicants are sent information about the program as well. IH enrollees who express special interest in hazardous substances and have the best academic records are asked to join the HSAT Program. The HSAT Program Advisory Board also serves as an excellent recruitment tool, both as individual members share information about the program with others and as the members bring information about curriculum and educational needs to Advisory Board meetings.

These recruitment efforts have typically allowed us to have 3 full-time HSAT students during each academic year. At least one new HSAT student entered the program during each academic year in the 2002-2007 award period.

(6) Ensure that faculty involvement in this program serves the needs of the students and supports the continued development of the program.

Two core faculty members, Drs. Peter Raynor and Lisa Brosseau, have the greatest contact with trainees in the HSAT Program. They are regular faculty members in the Division of Environmental Health Sciences and also comprise 2/3 of the core faculty of the ERC's IH Program. Their involvement with trainees includes advising, classroom teaching, and supervision of research projects. Several supporting faculty are also important to the HSAT Program. These include both regular and adjunct faculty who teach courses that are part of the HSAT curriculum and serve on examining committees. The faculty members who contribute to academic training in hazardous substances bring strong teaching and research credentials and commitment, as summarized in the text below.

The core faculty each have an office in the Mayo Memorial Building, which is also the primary home of the Division of Environmental Health Sciences and the School of Public Health administrative offices. Each office has at least one personal computer linked to the University's ethernet backbone. Computer resources in the university community are extensive. Dr. Raynor, in particular, has an account with the University of Minnesota Supercomputing Institute located in Walter Library on campus. Libraries in the University's Twin Cities system include, among others, the Biomedical Library, Walter Library (engineering, physical sciences, education, psychology), and Wilson Library (social sciences, business). The faculty and students have access to an extensive collection of electronic journals through the library system.

The Industrial Hygiene Laboratory, which is the home to most HSAT-related research, is shared by Dr. Raynor and Dr. Brosseau with Dr. Ramachandran from the IH Program. The laboratory is located in Boynton Health Service, a building adjacent and connected to the Mayo Building. The lab consists of a large room occupied by a wind tunnel, a calm-air chamber, a filter tester, and two biological safety cabinets; two wet-chemistry laboratories with three laboratory hoods; and several smaller work, storage, and office spaces. Space is available for laboratory teaching as well as student and faculty research. The IH Laboratory is equipped with the basic equipment expected of an industrial hygiene training program, including personal and area sampling pumps, balances, spectrophotometers, light and phase contrast microscopes, filters and charcoal tubes, Dräger pumps and tubes, noise dosimeters, a flammable storage cabinet, velometers, manometers, pressure gages, pitot tubes, a micromanometer, and data loggers. The HSAT

Program has a Foxboro direct-reading FID/PID and calibration kit purchased with prior training grant funds. The laboratory also has considerable equipment for generating and measuring aerosols, including a light scattering photometer, a spinning disk generator, a variety of nebulizers, a condensation nuclei counter, an electrostatic classifier, and a time-of-flight spectrometer.

Additional equipment is available from the Midwest Center Continuing Education Program, which conducts a variety of hazardous substances and emergency response courses. This equipment can be used by students and faculty for sampling projects and classroom and laboratory demonstrations. Such equipment includes direct readings instruments and samplers for gases, vapors and aerosols commonly encountered in emergency response and hazardous waste situations, as well as personal protective equipment, including respirators, gloves, and suits for various levels of protection. This equipment is regularly maintained and calibrated. The University of Minnesota's Department of Environmental Health and Safety, which protects the health and safety of university employees, students, and neighbors, also shares equipment with the HSAT Program as needed.

Core Faculty

Dr. Peter Raynor (Ph.D.) is an Assistant Professor in the Division of Environmental Health Sciences in the University of Minnesota School of Public Health. He has directed the university's HSAT program since 2004. Dr. Raynor's research and teaching interests focus on the measurement and control of environmental exposures, especially those in work settings. Recently, he has developed a research program to study the measurement and control of airborne viruses and bacteria in response to concerns regarding bioterrorism and emerging infectious diseases. He has served as Chair, Vice-Chair, and Secretary of the American Industrial Hygiene Association's Aerosol Technology Committee and is also a member of that organization's Nanotechnology and Methamphetamine Working Groups. Dr. Raynor is lead instructor for required course PubH 6174 (Control of Workplace Exposure) and PubH 6175 (Industrial Hygiene Measurements Laboratory) and co-instructor in PubH 6103 (Exposure to Environmental Hazards). He also teaches relevant elective courses including PubH 6173 (Exposure to Physical Agents) and several emergency preparedness classes in the annual University of Minnesota Public Health Institute. In addition to administering the HSAT Program, Dr. Raynor advises and supervises the research of approximately 1/2 of the students in the HSAT Program.

Dr. Raynor's background as a chemical engineer and his leadership of the HSAT Program has helped create a research partnership with the Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Health (MDH) to try to understand levels of airborne methamphetamine that workers and residents may be exposed to when they dispose of furnishings or perform remediation work in former clandestine methamphetamine labs. The relationships with MPCA and MDH may lead to larger studies that benefit students in the HSAT Program by providing opportunities for research studies and field experiences.

Dr. Lisa Brosseau (Sc.D., CIH), an Associate Professor in the Division of Environmental Health Sciences, has considerable research expertise in respiratory protection, filtration, aerobiology, aerosol sampling, intervention effectiveness and small business health and safety. She brings to the program particular expertise in workplace problem solving. She has been a member of the ACGIH TLV Chemical Substance Committee since 1993 and was Chair of this committee from 1998 until 2005. Dr. Brosseau was Director of the University of Minnesota HSAT Program from its inception in 1993 until 2001 and served as co-Director from 2001 until 2004. She has served as Director of the ERC's IH Program and as Deputy Director of the Midwest Center ERC. Dr. Brosseau teaches the primary course required of HSAT students at the University of Minnesota, PubH 6176 (Hazardous Materials and Waste Management), and PubH 6172 (Industrial Hygiene Applications), a course required for all trainees in both the IH and HSAT Programs. Furthermore, she advises and supervises the research for approximately 1/2 of the students in the HSAT Program.

In 2006, Dr. Brosseau was given the prestigious Alice Hamilton Award from the American Industrial Hygiene Association. This award, established in 1993, recognizes outstanding women for their achievements and contributions to the field of occupational hygiene. Part of the reason for giving the award to Dr. Brosseau cited during the presentation was her work to establish and run the HSAT Program at the University of Minnesota. In 2007, Dr. Brosseau was awarded the Meritorious Achievement Award by the American Conference of Governmental Industrial Hygienists (ACGIH). The award is given to members of ACGIH who have made an outstanding, long-term contribution to the field of occupational health and industrial hygiene.

The core faculty has collaborated together on research in the past and continues currently. Drs. Brosseau and Raynor have published together on an evaluation of an industrial hygiene employer survey. They were also collaborators on a proposal to the United Auto Workers and General Motors to assess particle exposures in automobile assembly plants.

The core faculty members have achieved a high level of professional and scientific recognition nationally. Dr. Raynor is an editorial advisory board member of *Aerosol Science and Technology*, the premier journal in the field of aerosol science in the United States. Dr. Brosseau is an editorial board member of the *Journal of Occupational and Environmental Hygiene*, the premier industrial hygiene

journal in the United States. Dr. Brosseau is a regular member of the NIOSH study section (SOH-1) for reviewing extramural research proposals.

Supporting Faculty

Dr. Gurumurthy Ramachandran (Ph.D., CIH) is a Full Professor in the Division of Environmental Health Sciences and Director of the IH Program. His research expertise is in the areas of occupational exposure assessment, exposure modeling, statistical methods for assessing historical exposures, development of aerosol samplers, indoor air pollution, and urban environmental air pollution. He has been a member of the Exposure Assessment Strategies Committee of the American Industrial Hygiene Association since 1998. Dr. Ramachandran is lead instructor for two courses required of all IH and HSAT students, PubH 6103 (Exposure to Environmental Hazards) and PubH 6171 (Exposure Assessment for Air Contaminants). In addition to his teaching duties within the IH and HSAT programs, Dr. Ramachandran serves on examining committees and sometimes supervises HSAT student research.

Many faculty members from the Division of Environmental Health Sciences (EnHS) and other departments at the University of Minnesota are important supporters of the HSAT Program as course instructors in required courses or frequently-taken elective courses and as members of examining committees. Dr. Craig Hedberg is an Associate Professor and environmental microbiologist in EnHS who lectures several times in PubH 6103 (Exposure to Environmental Hazards), a core course required for all EnHS students. Dr. Elizabeth Wattenberg, an EnHS environmental toxicologist and Associate Professor, is the lead instructor in PubH 6104 (Environmental Health Effects: Introduction to Toxicology), the second core course required for EnHS students. The third EnHS core course, PubH 6105 (Environmental and Occupational Health Policy) is taught by Dr. Patricia McGovern, an occupational health nursing and health policy expert in EnHS who is an Associate Professor and both the new Deputy Director of the Midwest Center and the Director of the Occupational Health Nursing program within the ERC. Two courses required for all Master's-level occupational health and safety students, PubH 6170 (Introduction to Occupational Health and Safety) and PubH 6150 (Interdisciplinary Evaluation of Occupational Health and Safety Field Problems), are taught by Dr. Nancy Nachreiner, an EnHS Assistant Professor and member of the Occupational Health Nursing program faculty. The other required course for occupational health and safety students is PubH 6130 (Occupational Medicine: Principles and Practice) taught by Dr. Ian Greaves, an Associate Professor in EnHS and the former Director of the ERC.

Other faculty members are involved in courses taken frequently by IH and HSAT students. Dr. Deborah Swackhamer, a Full Professor in EnHS, teaches PubH 6190 (Environmental Chemistry), an elective class taken by many HSAT trainees. Dr. Paige Novak, an Associate Professor in the Department of Civil Engineering, teaches CE 4561 (Solid Hazardous Wastes), another course taken by many HSAT students as an elective. During the 2007-2008 academic year, EnHS Associate Professor Dr. Matt Simcik, an environmental chemist, will become a co-instructor in PubH 6175, Industrial Hygiene Measurement Laboratory. Dr. John Adgate, an EnHS Associate Professor with expertise in exposure assessment, has worked with HSAT students many times in classroom and research settings.

Additional faculty members who serve as lecturers or participants on required research projects come from a variety of departments at the University of Minnesota. The faculty in the Department of Mechanical Engineering has particularly close ties to all of the IH/HSAT faculty, sharing research interests, projects, and students. Dr. David Pui, a Full Professor in Mechanical Engineering, is an aerosol physicist who has assisted students and faculty in the IH and HSAT programs by sharing equipment from his world-renowned Particle Technology Laboratory and with occasional financial support through the Center for Filtration Research, which receives funding from a variety of companies and organizations. Dr. Thomas Kuehn, also a Full Professor in Mechanical Engineering, is an expert in thermal engineering and building ventilation who has participated in several joint research studies with faculty and students from the IH and HSAT programs and has served on many examining committees for HSAT students. Dr. Kuehn is a co-author with Drs. Brosseau and Raynor on published papers and manuscripts currently under review.

The IH and HSAT Programs have a strong group of active adjunct faculty who make substantial commitments to academic training. Dr. John Mulhausen (PhD, CIH), a graduate of the industrial hygiene doctoral program and now a manager of the industrial hygiene staff at 3M Company, and Dr. Gary Olmstead (PhD, CSP, CIH), Director of Environment, Health and Safety at General Mills, are both Adjunct Assistant Professors who provide substantial support to the program in teaching, advising students, assisting with field experiences, serving as members of the IH Program's Advisory Board, and providing invaluable sources of local information and contacts. Both also participate in the Continuing Education program as curriculum advisors and course instructors. Dr. Mulhausen was also recently appointed to the Environmental Health major's graduate faculty. Dr. Olmstead has mentored industrial hygiene Master's students as a participant in the School of Public Health mentorship program. Dr. Nicole McCullough, another Adjunct Assistant Professor, is a graduate of the IH doctoral program and currently works in a research and development laboratory at 3M

Company. Her particular area of expertise, biological aerosols and their control, is an important enhancement to the program. She plays important roles in the program as student advisor, course lecturer, and curriculum advisor. Dr. Gerhard Knutson, also an Adjunct Assistant Professor, is an internationally-renowned expert on industrial ventilation. He consults widely on ventilation design and is a long-term member of the ACGIH Industrial Ventilation Committee. Dr. Knutson participates in the IH/HSAT core course PubH 6174 (Control of Workplace Exposure), by lecturing on the economics of ventilation design and attending field trips to offer his practical knowledge and experience. Mr. Michael Austin (MS, JD), a working industrial hygienist in the University of Minnesota's Department of Environmental Health and Safety, is an Adjunct Instructor who participates regularly in several courses: PubH 6173 (Exposure to Physical Agents), PubH 6174 (Control of Workplace Exposure), and PubH 6175 (Industrial Hygiene Measurements Laboratory).

(7) Ensure that the HSAT program remains up-to-date and responsive to students' needs.

The HSAT Program and its elements have been evaluated in several manners during 2002-2007 project period. Individual courses are evaluated by students. The IH and HSAT faculty members gather feedback from IH and HSAT students at the end of each academic year on their views of the programs. Annual meetings with the HSAT Advisory Board provide the chance for specialists working with hazardous materials and waste to provide feedback on the content and structure of the program. The 2006 IH alumni survey allowed the opinions of HSAT graduates to be analyzed separately for the first time. Input is solicited from supporting faculty, guest lecturers, and field experience supervisors regarding their interactions with trainees. Finally, an annual meeting among the IH and HSAT core faculty allows for integration of data from all sources of program evaluation and provides an opportunity to make adjustments to the structure and content of the program, if necessary. Each of these feedback sources will be discussed briefly below.

Course Evaluations

At the end of courses, students complete evaluations that include quantitative ratings and qualitative remarks. The evaluations are collated and analyzed by the School of Public Health. Results are reported to the Division of Environmental Health Sciences and the lead instructor(s) of the course. Evaluation criteria include the instructor's teaching ability, knowledge of the subject matter, respect and concern for students, the physical environment for the course, and the overall amount of learning accomplished. Additional feedback is provided on assignments, the use of technology, and grading practices. The course evaluations are the main feedback that instructors use to spur changes in course content and structure. They are also a critical component of evaluations of faculty effectiveness for the purposes of promotion and tenure.

The HSAT core and supporting faculty review course evaluations for required and elective courses in the curriculum and make changes to courses as necessary. In addition to the formal end-of-semester evaluations, many faculty members request written feedback several times during a course or even at the end of every class session. These additional surveys provide information that instructors can use to improve a course during the semester.

Student Meetings

The IH and HSAT faculty meet most years with all IH and HSAT students collectively at the end of the spring semester to solicit feedback on the Programs. The meetings usually take place over the lunch hour. Although students are not required to attend, their presence is encouraged with a simple lunch provided by the faculty as an incentive.

These meetings have been conducted several times during the current project period. They have been particularly successful when the core faculty members have a set list of questions for which feedback is requested. Discussions during these meetings have helped the core faculty learn which courses have substantial overlap with others and which courses do not cover topics considered relevant by the students. For example, after discussions at one of these meetings, requirements were changed so that IH and HSAT students now have to take PubH 6130 (Occupational Medicine) for 2 credits rather than the 3 credits required for Occupational Medicine and Occupational Health Nursing trainees because the last credit focuses on clinical methods not utilized by industrial hygienists.

Before these annual meetings with students, the HSAT core faculty members assemble a manageable list of questions from which to solicit feedback from the students. These questions may be based on previous informal discussions among faculty and students and on ERC, Division, School, and University needs. Each meeting allows time for open-ended feedback from students as well.

HSAT Advisory Board Meetings

The HSAT core faculty meet with the IH/HSAT Advisory Board annually to solicit feedback on the program. The meetings include a review of the curriculum highlighting changes, a review of student progress, and a discussion of important issues affecting the School, Division, ERC, and HSAT Program. The core faculty develop a list of questions for which feedback is needed from the Advisory Board. For example, at the 2005 meeting, a key question for the Board was whether they believed it was important that the IH and HSAT

Programs should apply to maintain ABET accreditation in 2007. The sense of the Board was that the IH and HSAT Programs should be careful before allowing the accreditation to lapse. In response to the concerns, the IH and HSAT faculty has pursued reaccreditation in 2007. Open-ended discussion relevant to training needs for industrial hygienists in the area of hazardous substances are also encouraged.

The IH/HSAT Advisory Board includes industrial hygienists and environmental health specialists whose work includes hazardous materials management. New members with expertise in hazardous substances are added periodically as local and national experts interact with HSAT Program students and faculty members.

Alumni Surveys

Surveys have been conducted of recent graduates of the IH Program in 2001 and 2006. HSAT Program graduates are included in these surveys because they are also IH students. In 2006, the feedback of HSAT students was analyzed separately for the first time as discussed previously. The HSAT alumni viewed their learning experiences at the University of Minnesota as being quite valuable.

Input from External Parties

Supporting faculty interact with HSAT students as lead instructors in their own courses. Experts serving as guest lecturers talk with HSAT students in required and elective courses. Hazardous materials and waste specialists supervise HSAT students during their field experience training. Each of these groups can offer insight into the effectiveness of HSAT training.

The supporting faculty are queried informally about the abilities of HSAT students in their courses to assess the preparedness of the students for their academic work. Similarly, guest lecturers in HSAT required and elective courses are typically called after their sessions to seek their insight about how well HSAT students have been prepared to comprehend the material presented during the session. Field experience supervisors can often offer the best feedback on the effectiveness of HSAT training: they witness students in real-life working situations. Supervisors for an HSAT student are contacted by the student's academic advisor after the conclusion of the field experience to find out how well the student performed her or his role on the job and whether any obvious gaps in training were apparent.

Annual IH/HSAT Core Faculty Meeting

The IH and HSAT core faculty members have many opportunities to interact on an almost daily basis. Drs. Raynor, Brosseau, and Ramachandran have offices on the same hallway and communicate with one another frequently about research, teaching, and program development. However, these discussions do not typically take a global look at all input regarding IH and HSAT Program strengths and weaknesses. Therefore, the IH and HSAT core faculty members meet during the summer each year to evaluate the input from all sources mentioned above, integrate that input, identify particular strengths and any glaring or looming weaknesses in the program, and decide how to remedy the weaknesses without sacrificing the strengths. Findings and decisions have been documented.

(8) Seek additional support for this program from other sources.

Linkages with the Minnesota Pollution Control Agency (MPCA) and Minnesota Technical Assistance Program (MnTAP) have been productive in terms of student projects and internships. Projects with these groups have included a review of household hazardous waste recycling sites throughout Minnesota and the development of a sampling protocol for testing waste minimization in the reinforced plastics industry. Students have also worked in field experiences with consulting companies and industry. For example, one Masters student during the 2002-2007 period worked for a large-vehicle manufacturer and had responsibilities that include finding appropriate methods for disposing of hazardous materials. This internship led to the student's first job after graduation.

Dr. Raynor developed a research project in conjunction with MPCA to measure environmental methamphetamine exposures in buildings formerly housing clandestine methamphetamine labs. He is also involved in a project that aims to assess background levels of airborne bacteria and viruses that might be present in the air of large buildings that could be subject to bioterrorist attacks. These assessments will be used to help determine the need for clean up activities in the buildings. Dr. Raynor is also a participant in the University of Minnesota's Center for Public Health Preparedness with responsibility for leading the Center's Occupational Health and Safety Preparedness program. Research efforts by Dr. Brosseau are focused on developing and testing the effectiveness of health and safety and environmental interventions in small businesses. For example, Dr. Brosseau is publishing results from a completed 4-year, collaborative intervention effectiveness study in small woodworking businesses. These research efforts provide opportunities for additional funding for IH and HSAT students and are a common source for Masters Project topics.

The director of MnTAP, Cindy McComas, has given invited lectures on pollution prevention in industrial hygiene and HSAT courses (Industrial Hygiene Applications, Hazardous Wastes and Materials Management) as well as in the Division of Environmental Health

Sciences. She has also been instrumental in finding field locations that involve both environmental and occupational health issues. Her interaction with the HSAT program has encouraged her to include occupational health assessments in the pollution prevention activities undertaken by MnTAP in small businesses throughout the state.

D. Conclusions

During the 2002-2007 project period, the HSAT Program met its primary goal of preparing industrial hygienists at the Master's-degree level to develop, implement, and manage hazardous waste and materials programs. The program has met each of its specific objectives for the period. Particular achievements include tightening the program requirements, providing new research opportunities in hazardous materials and waste management, and improving program evaluation methods.

Reference

- (1) L.M. Brosseau, P.C. Raynor, and C. Lungu, "Employers' Expectations of Knowledge and Skills of Master's-Trained Industrial Hygienists", *Journal of Occupational and Environmental Hygiene*, 2(1):1-7 (2005)

5. H. Agricultural Safety and Health Program
Director: John Shutske, PhD

Agricultural Safety and Health Program
Director: John Shutske, PhD

A. Background

The Agricultural Safety and Health (ASH) academic training minor and continuing education program within the MCOHS from 2002-2007 was designed to provide academic training, outreach, and targeted research opportunities for students, faculty, and community members interested in the prevention of work-related disease and injury in the food and fiber industries.

Traditionally farming and ranching had been the primary targets for work done within the ASH program. Production agriculture continues to play a vital role in the economies of those states served by the Center. The proposed work during the five-year period also included further expansion into directly related industries including food processors and larger-scaled production operations that are part of a vertically integrated production chain. This included providing education, outreach, and applied research to engage and benefit agricultural operations within all aspects of production, processing, marketing, and input supply as part of an integrated system.

The program has two distinct parts. First is the supporting minor program for students participating the ERC in approved educational program areas such as industrial hygiene and occupational and environmental health nursing. The academic program is structured to provide students interested in agricultural safety and health with specialized and focused learning opportunities in this field as well as research opportunities that include connecting to the unique occupational health and safety needs of agricultural communities.

The continuing education program is largely targeted at health professionals and public health staff who serve rural and agricultural communities. Specific activities target physicians, nurses, EMS providers, first responders, and others with health and injury related interests.

B. Objectives

The original objectives for the 2002-2007 application cycle included the following:

Academic Program

1. Continue the ASH minor program at the MS/MPH level for students studying fundamental public health issues, but who also have the desire to target a portion of their knowledge, academic training, and future professional practice toward the prevention of agricultural injury and illness.
2. Restructure coursework by the development of new one-credit courses including a "frameworks" course to provide baseline information on frameworks for understanding and controlling agricultural injury and disease plus a series of hazard-specific courses on issues such as confined spaces and pesticides as well as a specific course on unique needs of special populations.
3. Develop all coursework in a parallel modular format allowing eventually for the creation of additional online learning opportunities and allowing for additional outreach activity to other non-academic audiences.
4. Promote all ASH coursework to non-ERC audiences in other domains of engineering, agriculture, public health and veterinary medicine.

Outreach Program

1. Offer modularized courses in agricultural safety and health through the Public Health Institute (at that time, simply referred to in the 02-07 application as the May session)
2. Provide health professional education and outreach through physician education dealing with agricultural injury and illness prevention and treatment through ongoing courses, training programs, and other venues.
3. Promote web-based CEU module dealing with the North American Guidelines for Children's Agricultural Tasks (NAGCAT) will be promoted to nurses and other health care professionals throughout the state and Upper Midwest region.
4. Day-long continuing education visits held at regional hospitals and clinics in Minnesota and adjoining states each year.
5. Build content on existing Farm Safety and Health Information Clearinghouse web page content including Powerpoint slides and selected handouts from the ASH courses within the minor will be added to this web site as support information on various topics.

6. Create one additional 2.5 contact hour module each year to support distance-based education for health professionals, using the same model developed during the creation of the NAGCAT CEU module created in 1999-2000 using supplemental funding from NIOSH.

C. Results and Discussion

Results:

Academic Program

The initial objectives of the 2002-2007 application were modified following the review and site visit that preceded the funding for this grant cycle. Program leadership was particularly attentive to the reviewer comments expressed during SEP and other external reviewers of the application.

In response to comments related to having perhaps too low of a program enrollment to justify additional "modular" courses (and also in response to receiving far fewer funds than originally requested, the core course for the ASH minor was increased from two semester credits to three. However, the original spirit of the original proposal was kept in place, and the course now includes ALL of the content originally proposed in the 02-07 application and is structured in a modular format. This modular structure allows for pieces to be taken out and used more effectively in other courses, guest lectures, etc. In addition, a significant recruiting effort was undertaken to increase course enrollment, which typically was between five and seven per semester. During the last three semesters (2003-2007), enrollment has averaged 17-18 students, now making BAE 5212 one of the highest enrollment courses in BAE with 87 total students in the new three-credit course from 2002-2007.

Besides tripling course enrollment, additional depth is now provided to students pursuing the ASH minor focus in several ways. For several students, a special problems (BAE 5095) course has been offered, allowing them to deepen their focus in agricultural safety and health areas as had been suggested by SEP reviewers.

Additional courses offered by Dr. Shutske in the Public Health Institute (PHI) (including Workplace Design for Safety, and Food System Biosecurity Action Planning) have included agricultural worker safety/health content. Plus, there are other additional PHI courses that have direct implications and focus on agricultural/food system public health issues. More intense consultation has occurred with ASH program students to assure that their coursework (including SPH and other electives) provides them with classroom and field experience-based exposure to key agricultural hazards and concepts.

We have developed other ways to leverage ASH program resources including the newly designed, modularly structured content in BAE 5212. This facilitated the ability to have significant additional program impact for the academic program with audiences that go beyond SPH students.

In 2004, administrative leaders in the Department of Mechanical Engineering met with Drs. Shutske and Chaplin (also of BAE) to discuss assuming the teaching responsibilities in the four-credit course "Engineering Safety" (IE 5513). One assumption was that we could build upon the library of newly designed modules and teaching materials initially developed for BAE 5212, while expanding the scope of the course to meet safety engineering needs of other industries. Drs. Shutske and Chaplin assumed the responsibility of teaching IE 5513 in spring semester of 2005, and the course is now offered every semester.

IE 5513 has drawn 292 students since that time, including mainly engineering students (both undergraduate and graduate) from various disciplines in the Institute of Technology (IT). This is the ONLY course in the Institute of Technology (IT) with a safety engineering focus. Several public health students have also completed IE 5513. While the safety engineering concepts taught are targeted at multiple industries, many agricultural examples and exercises are used. The courseware originally designed for BAE 5212 makes up about 25% of this course's foundation though the instructors go into greater depth on several topics including agricultural and food industry applications of systems safety analysis, ergonomics, and engineering safety standards. IE 5513 is now a potential elective course for the any of the NIOSH-funded students who pursue the ASH minor.

Five students have completed the ASH program minor in the current project cycle. Thus, the mean number of annual graduates more than doubled in this cycle.

Still, enrollment was an ongoing challenge. Program resources (student support) are limited as they are with all programs. Funds have been available since 2002 for two students at any given time. We have had as many as four ASH students in the program at one time during this cycle (other funding sources were used for the additional students).

Early in this five-year project cycle (in 2002 and 2003), we actually had no ERC-funded ASH students; yet, there was considerable interest in the program, particularly among students enrolled in BAE 5212 when ASH program was discussed with the 16 students in the 2003 semester. Several of these were students in non-NIOSH approved public health programs. Some were senior or graduate students in engineering and veterinary medicine. In fall 2003, conversations occurred with NIOSH about submitting an off-cycle competing application to allow the Biosystems and Agricultural Engineering graduate program to be a "NIOSH-approved" program within the ERC. We chose not to pursue a mid-cycle reapplication, largely because there was an influx of student interest shortly, thereafter, among students who were eligible for the minor program. As of the start of the 2007-2012 grant cycle, the BAE engineering program was approved to as a graduate program to support NIOSH funded students through its MS level graduate program.

Drs. Steve Kirkhorn and Mark Purschwitz now are involved in teaching portions of BAE 5212. Their role will be continued throughout project grant cycle. Ms. Michele Schermann has also been active in developing teaching materials and conducting guest lectures and in helping to supervise student projects, field research, and in coordinating manuscript preparation on student projects. Many faculty previously not involved in ASH-related programs for students have also been engaged. Drs. Peter Raynor and Lisa Brosseau recently provided research project oversight and support for Tricia Carmody, the program's most recent graduate. Dr. Raynor was also involved in Peri Periakaruppan's research focusing on worker exposure to bioterrorism agents given various possible scenarios in which a dairy farm or dairy processing facility could become the target of an intentional terrorist attack to our fluid milk supply. Drs. McGovern, Gerberich, Alexander, and others have also served as ASH program students' advisors or advisory committee members and mentors.

The scope of research projects available to students in the ASH minor program also expanded from 2002-2007. Projects included as examination of air contaminant issues and exposures to workers who would encounter a former "methamphetamine lab" such as what might be found in an abandoned farm building or home; documentation of risk related to a farm worker's exposure to a potential bioterrorism attack to our fluid milk system; and an evaluation of an innovative method for teaching Hmong farming families in a culturally and linguistically appropriate way. The latter project stemmed from a NIOSH-funded RO1 project also completed during this project period.

Continuing Education and Outreach Program

A significant number of community and campus collaborations were initiated and/or enhanced during this period. These include but are not limited to Center for Animal Health and Food Safety, College of Veterinary Medicine, College of Agriculture, Food and Environmental Sciences, Department of Food Science and Nutrition, University of Minnesota; Coastal Seafoods, Cub Foods, Dean Foods, HMS Host, Minneapolis-St. Paul Airport, J and J Distributing, LaLoma Tamales, Minnesota West Community and Technical College, Minnesota Area Health Education Centers, Minnesota Board of Animal Health, Minnesota Department of Agriculture, Minnesota Department of Health, National Center for Food Protection and Defense, Seward Coop, and SuperValu, Inc.

Clinic based programs shifted from the full-day conference format of the 2000 and 2001 "Caring For Farm Families" events, to a half-day format of "Healthy Farm Families." "Healthy Farm Families" used components from the ASH academic program, the Minnesota Agrability Project and other content recommended by host sites in Paynesville (April 2003), Moorhead (November 2003) and Rochester (March 2004). Recognizing the need for host site flexibility in course content, a topics menu was made available statewide and a new partnership with Medi-Sota, Inc., a consortium of health care facilities working together to provide continuing education for staff in Willmar, MN hosted a March 2005 course "Rural Jeopardy" covering the nurse's role in food system emergency response and the nurses' role in working with aging farmers. Several short courses have been successfully conducted as well including the 1.5 hour "Responding to Farm Injuries and Rural Emergencies" held in Moorhead in 2003 and Rochester in 2004 for emergency medical technicians, law enforcement, fire and rescue personnel and first responders. In early 2007, the ASH CE staff and faculty partnered with a large regional hospital in Worthington, Minnesota to deliver continuing education to nurses and other health professionals. Topics included injury, childhood asthma, farm-related disability, and zoonotic disease. These workshops attracted approximately 40 people.

The Public Health Institute at the University of Minnesota has been an innovative venue for health care and safety professionals to access such ASH courses as "Public and Environmental Health Problem Solving" in 2002 and "Worker Health in Food Production and Processing", "Overview of Workplace Safety and Health In Food Processing", and "Designing for Safety" in 2003. "Designing for Safety" was held again at the Institute in 2004. Participants choose to take these courses for CE or academic credit. These courses were designed to help participants recognize that workers are key in any efforts to prevent an intentional or unintentional breach in security and food safety and that efforts to incorporate worker safety and health into food safety and food system protection are complementary to one another.

"A Nurses' Guide to Children's Agricultural Tasks" is the web-based course that was launched in 2003 and was successfully promoted in this project period. This course is based on the North American Guidelines for Children's Agricultural Tasks (NAGCAT). It was extensively marketed to nurses, who have been the majority of the participants, and has been available online to a broad range of health care as well as occupational health and safety professionals.

Three additional educational programs for health care professionals working with farm families were offered on October 4, 2005, November 17, 2005, and March 8, 2006. Topics were to include current research, resources, and positions on methamphetamine production crisis, infectious diseases related to animal production, animal antimicrobial resistance and its relationship to human health, effects of aging on older workers in agricultural settings, and other environmental and public health concerns of rural workforce populations. Unfortunately, these courses were canceled due to low enrollment.

The Interface of Rural Family Practice and Farm Families was held September 2001, February, September 2002, February, September 2003, February, September 2004, February, September 2005, and February 2006. This course is a 1.5-hour ongoing workshop for family practice residents participating in their Community Health rotation. This workshop is a synopsis of key agricultural safety and health issues that affect agricultural workers and their families. The focus is on awareness building and presenting five specific recommendations for a health professional's involvement in recognizing, treating, and community-based interventions.

Emergency response in the area of agricultural worker safety turned to preparedness as we watched the nation respond to the terrorist event of September 11, 2001. Bridging food system preparedness and agricultural safety and health led to three successful ASH CE courses in Spring 2006 held in partnership with the University of Minnesota Center for Public Health Preparedness. "Retail Food System Worker Issues" (March 30, 2006), "Food Production and Processing Worker Issues" (April 13, 2006) and "Food Distribution Worker Issues" (April 20, 2006) were successfully conducted. These courses were designed to bring the specific realities of food system operation and public health protection into practical focus. Each workshop was unique, multidisciplinary and designed to build preparedness competencies and enhance practical emergency response linkages. Participants were given opportunities to discover important local, regional and global interconnections within our food system, identify control strategies for food system hazards and vulnerabilities at production, processing, distribution and retail sites, describe elements of food system worker issues and employee protection strategies, and discuss effective food system emergency response protocols.

The ASH CE program continues to compete for audience share with health care systems that generate their own staff trainings and with the current plethora of online units of continuing education available at no charge to many licensed physicians, nurses and allied health personnel, including occupational health and safety professionals. ASH certification or licensure is required in very few organizations and with limited industry and health service safety and health training budgets, potential CE participants have not selected agricultural health and safety trainings over those that will be supported financially by their employers or that will lead to wage or salary increases. Listening to our audiences who have indicated that a variety of educational program offerings including face-to-face and web based would be preferred, we will attempt to continue to enhance both venues for our ASH CE program.

Discussion:

As was described in the program plan and previous sections of the progress report, productivity as measured by students engaged in portions of the ASH program has increased dramatically. This includes those participating directly in the ASH minor as well as students enrolled in BAE and other programs where ASH program content is being widely used. All graduates of the BAE program are now very well grounded in issues related to agricultural health and safety and are going to work for multi-national companies like John Deere, Cargill, Toro, and others. ASH minor students are being employed in diverse areas (such as 3-M, Intel, various healthcare-related fields, and education). Evaluation scores including the questions related to "How much have you learned in this class" are regularly above the overall university averages for courses BAE 5212, IE 5513, and the Public Health Institute courses which have helped to support the minor. Evaluation scores for continuing education events such as the family practice residency workshop on agricultural/rural health and safety consistently rank near the top out of 12 to 15 sessions for "amount learned" as measured by pre- and post-tests during sessions.

The existence of the ASH minor and the course developed to support it (BAE 5212) has led to substantial integration of agricultural safety and health content in the BAE undergraduate program including several courses where materials are used extensively (such as the two primary "design" courses in the department). This helps BAE easily fulfill its ABET requirements related to safety, health, ethics, and other topics. Similarly, course materials from BAE 5212 helped form the foundation for the revised Industrial Engineering course IE 5513 - Engineering Safety that is now led by Drs. Shutske and Chaplin and which routinely fills to capacity every semester at 70-80 students per semester (now 140-160 students per year).

Agricultural safety and health is now also a key part of the family practice residency program and the Community Health rotations that include multi-day lecture and workshop sessions. ASH content has been included in every Community Health lecture series (two per year) since fall 1993, and more than 800 physicians have had exposure to this content.

ASH content is also included in several SPH courses that ERC students participate in. This includes guest lectures, field trips to agricultural sites, and connections to students via advisory committees for MPH and PhD programs and projects.

D. Conclusions

The program director, affiliate faculty, and students are grateful for NIOSH's support of this program. ASH provides a unique opportunity for students to connect to a key workplace health and safety issue. Agricultural safety and health is actually growing in its level of importance, especially as one looks at the needs of workers on a global basis. Nearly 1.3 billion people worldwide work in production agriculture. Through our educational program funded through this center, we will continue to have an impact into the future through our program graduates and educational program participants.

5. I. Continuing Education and Outreach Program
Director: Kathleen Smith, MSN

Continuing Education and Outreach Program
Director: Kathleen Smith, MSN

A. Background

The Continuing Education (CE) Program of the Midwest Center for Occupational Health and Safety (MCOHS) completed its twenty-eighth year of operation June 30, 2007. Since 1978, over 44,764 students have enrolled in CE courses in the MCOHS. A majority of students are from Midwestern states, the Center's service region. The CE program serves participants from the continental US, Canada, and other countries. Over the last five years, the program offered between 35 and 73 short courses annually. MCOHS continues to maintain its local and national reputation for high-quality education, significant enrollments, curriculum development, faculty commitment, unique and innovative approaches, and substantial outreach efforts. The CE Program of the MCOHS houses both the HST and ASH CE programs. The HST CE program has conducted training in hazardous substances since 1984. In 1988, the Midwest Center was awarded a NIOSH Hazardous Substances Training grant that supports the Center's offering of mandatory and innovative hazardous substance training courses. The continuing education program in Agricultural Safety and Health (ASH) has been an integral part of the University of Minnesota's Education and Research Center for the past 14 years. ASH CE offerings target a range of health professionals including nurses, physicians, and emergency medical services personnel along with educators, rural leaders, Extension Educators, and others who work in a public health/safety setting in rural areas of the state.

As a part of the Centers for Public Health Education and Outreach (CPHEO), MCOHS has access to a full complement of educational and development delivery mechanisms and the expertise of education and digital learning specialists who assist in the creation and implementation of CE programs. CPHEO is the administrative home of six multi-disciplinary training initiatives that serve as a venue for delivery of innovative public health training and education. The co-location of these six Centers, which include the NIOSH Midwest Center for Occupational Health and Safety, OSHA Great Lakes Training Consortium, NIEHS Hazardous Materials Worker Training initiative, HRSA Midwest Center for Life-Long-Learning in Public Health, HRSA Minnesota Emergency Readiness Education and Training Center (MERET), CDC University of Minnesota Center for Public Health Preparedness, allows for synergy of resources and diminishes the potential for development of trainings that are duplicative in nature. This structure also allows the MCOHS CE Program to benefit from a concentration of expertise in needs assessment, instructional design, web development, technology-enhanced learning, educational meeting planning, program accreditation and evaluation as well as providing program support for registration, record keeping, materials production, marketing, course promotion, course budgeting and financial management.

The new Digital Learning Group (DLG), brought on board in 2005, demonstrates a commitment to alternative learning strategies. The DLG includes ten technology professionals, including: a Project Manager/Team Leader, two Instructional Designers, a Multimedia Producer, two Multimedia Programmers, two Data Analysts/Programmers, a Distance Education Coordinator, and a Web Master. The DLG has the capability/expertise to design and create interactive online learning products. They draw upon and leverage the University's robust technology infrastructure to create a truly dynamic online learning experience by offering an enhanced web presence, pod/vodcasting, and state of the art web conferencing to our partners.

A pioneer of unique approaches, such as the Public Health Institute (PHI), Occupational Health Nursing Symposium, and Online Core Curriculum, MCOHS is constantly seeking innovative ways to meet the changing needs of OSH professionals. The MCOHS CE Program is closely aligned with the mission and goals of CPHEO. CPHEO's mission is to promote access to lifelong learning that bridges academic and public health practice communities through education/training for practicing public health professionals. CPHEO works with faculty and staff to build community linkages and support diverse continuing education efforts such as short courses, workshops, institutes, conferences, certificate programs, technology-enhanced learning initiatives, and degree programs for working professionals.

These unique teaching methods and learning opportunities are designed to engage participants and to encourage critical thinking and skill-building through methodologies such as hands-on workshops, simulations, case studies, content-specific games and point counter-point presentations. MCOHS is highly regarded for the broad spectrum of courses it offers in both general core and specialty areas. Needs assessments (NA), including feedback from advisory boards and community Occupational Health and Safety (OHS) practitioners, help guide the selection of relevant, topical subjects for course development. Attention is paid to participant preferences for educational format and methodologies. This ongoing effort to assess educational needs from a variety of perspectives as well as serving as a regional educational resource center has led to attendance figures that consistently exceed the National Institute for Occupational Safety and Health (NIOSH) requirements.

CE Program leadership, faculty and staffing

The MCOHS CE Program is unique in the depth and multi-disciplinary expertise of its staff. CE staff work collaboratively with the education specialist coordinators, technical directors and support staff on the complementary programs, Hazardous Substance Training (HST) and Agriculture Safety and Health (ASH). In addition, all NIOSH initiatives have access to a full complement of staff expertise and support from the MCOHS administrative home, CPHEO. The Associate Dean for Public Health Practice Education, Debra Olson, is an active member of the CE staff as executive officer of CPHEO, overseeing training and outreach activities for the SPH.

Key OSH Program staff are profiled below:

- Iris Staubus, MEd, RN, provides direction for the Continuing Education program. She has a Master's Degree in Adult Education from the University of Minnesota and Regents Certificates in both Adult Education and Human Resource Development. Ms. Staubus brings 18 years of experience in the adult education arena, 3 years in Occupational Health and Safety, 4 years in health promotion and 11 years managing and implementing human resource development programs for employees, at all levels, in a mid-size manufacturing firm.
- Kathleen Smith, MSN, Education Specialist, will provide direction for the NIOSH program 2007 – 2011. She is a Registered Nurse with over 25 years experience. In 1998 she earned a MSN with a Family Nurse Practitioner focus. Most recently, she earned a Public Health Practice Certificate in Occupational Health and Safety from the University of Minnesota. She has worked with diverse populations, including the agricultural and migrant communities. She has taught professionals and non-professionals in a variety of settings; she also participated on the preparedness (hurricane) team for outpatient dialysis facilities in three large counties in Florida. Her last five years were with the College of St. Catherine in an Assistant Professor of Nursing position.
- Tamara Hink, MBA, Core Services Coordinator, is responsible for registration, mailing list functions, and financial management.
- Lois Harrison, MPH, and Ruth Rasmussen, MPH, are Continuing Education Specialists, responsible for needs assessment, curriculum development and program coordination.
- Chris Western, Assistant Education Coordinator and McKinzie McClay Woelfel, Program Associate, provide logistical support.
- Sara Hurley, MFA, Web Coordinator, supports the program with web/technology and enhanced learning skills.

B. Objectives:

Each program under continuing education has its own goals; the following are generalized to all CE programs.

- Expand collaboration, outreach and leadership activities with professional organizations and groups
- Increase the use of multiple learning formats
- Increase the availability of distance learning programming
- Support the NORA initiatives and expand outreach for such programs
- Expand offerings to occupational medicine physicians thus increasing the numbers reached in this discipline.

C. Results/Discussion:

The Special Emphasis Panel (SEP) review, in Oct 2001, observed that MCOHS CE was offering quality programs, had extremely well qualified personnel, and excellent support from faculty and administration. In addition, the panel noted that course delivery resources were adequate, extensive needs assessments were conducted to provide program focus and that advisory boards provided valuable input on regional needs. Currently, the primary MCOHS audience is located in the upper Midwestern states; however, most programs are marketed regionally and nationally using a variety of communication formats, including brochures, postcards, newsletters, websites (our own and others), professional organizations, and catalogs. One recommendation received was for MCOHS to place additional focus on distance learning to provide broader access to educational resources. In response to this suggestion, feedback from OSH professionals and needs assessments which show the trend to be for individuals to seek short courses from a local provider or in a distance learning format, MCOHS has increased the number and type of programs offered online. Online interdisciplinary programs now account for over 50% of CE Program participants and are showing the highest program growth (Table 1). Two recently added online learning activities include a podcast seminar delivered to a multidisciplinary audience in July 2006 by NIOSH presenters Drs. Amandus and Collins; this has been accessed by over 700 participants. The recently (2/07), added Glimpse and History of Occupational Health and Safety modules, are directed at those who may be looking for a new career field or looking to change career

fields; these have been accessed by 166 participants. There are an additional 10 OSH modules under development, based on an academic course entitled an "Introduction to Occupational Health and Safety". The ASH CE program has recorded three programs that are in the development stage for online delivery. The HST CE program has had discussion with both the technical directors and the advisory committee and in the next year programming will be developed for on-line delivery in the area of chemical hazard awareness.

The CE Program added to the successful NORA presentations in June 2007, by presenting "Research to Practice (r2p)"; there were 45 face-to-face participants and this program is now available as an archived web-cast. All online programming is available free of charge; the number reached by this delivery mode was 1,012 participants during the one year period between July 2006 and June 2007 which is an increase from the previous one year period.

The CE program has increased participant numbers each year by continuing to offer important skill building courses such as Spirometry and Hearing Conservation, adding courses with current topical interest, such as the mold identification, aging workforce, and workforce impact of a pandemic, and by expanding the number and type of distance learning opportunities offered.

Correspondingly, we are making significant strides in increasing the quantity and type of MCOHS online course offerings. These online course offerings in addition to face-to-face offerings conducted in our service area, has increased accessibility to educational offerings. The specialty distribution for face-to-face and blended courses is shown below in Table 1. All online courses were interdisciplinary and are shown separately to reflect a significant increase in online course participation. In terms of face-to-face programs, the center's success in this area can be partly attributed to contract courses conducted in the following locations: Northfield, St. Cloud, Paynesville, White Bear Lake and Cass Lake MN, Fargo and East Grand Forks ND, and Shanghai, Beijing, and Guangzhou China. Open enrollment courses were held in Mankato, Brooklyn Park, Moorhead, Rochester, Willmar and Bemidji MN.

Table 1: Continuing Education Courses - 2006-2007

Category	Percentage of Trainees (face-to-face and blended courses)	Number of Trainees (face-to-face blended courses)	
Industrial Hygiene	19%	119	
Occupational Health Nursing	21%	128	
Occupational Health Medicine	31%	189	
Occupational Safety	7%	40	
Multidisciplinary	22%	138	
Subtotal face-to-face and blended courses	100%	614	
	Percentage of Trainees (Online vs. Total Trainees)	Trainees	Online
Multidisciplinary (online)	51%	Courses	1012
Grand Total Participants *		1976	

* Excludes HST Trainees (242) and Agricultural Safety Trainees 108)

As noted in the table there has been an increase in the number of Industrial Hygiene and Occupational Medicine participants, which is reflective of the efforts to attract these participants.

The CE Program has developed extensive cooperative working relationships with federal, state, and local agencies, various industries, labor groups and professional organizations. During the past five years, the network of relationships included organizations dealing with public health (PH), PH preparedness, hazardous substances, environmental health, pollution prevention, tribal college issues, agriculture, and health care. The Center's history of outreach to other organizations, institutions, agencies and professional associations is substantial. This is facilitated by the adoption of outreach and service as a core value of the SPH. During this most recent five-year period, numerous new alliances and outreach efforts were developed and existing alliances were expanded. Examples include the Center's involvement with the Great Lakes OSHA Training Institute (OTI) Regional Education Center, new connections with Leech Lake Band of Ojibwe (resource relationship), Medi-Sota Inc. - a consortium of west central MN health care providers (Agricultural S and H (ASH) program needs), St. Cloud Fire Department (40 hr emergency response), and American Crystal Sugar in

Moorhead, MN (onsite OSH programs). In addition, to better serve OSH professionals, CE has an agreement with the Minnesota Safety Council (MSC) to collaborate on workforce development programs. In 2007 the role of the CE Program with the MSC expanded to not only active planning responsibilities but also the suggestion of a panel discussion on the topic of inclusion of culture in the workplace, which led to moderation of said panel discussion. The CE Program is also supporting and participating in the two other out-state annual conferences sponsored by MSC; this is a first and the plan is to expand the role for the 2007-08 conferences.

The CE Program continues to expand its strong tradition of collaboration, outreach and leadership with professional organizations. The Team Approach, a unique interdisciplinary effort sponsored annually by the American Society of Safety Engineers – Northwest (ASSE-NW) chapter, American Industrial Hygiene Association-Upper Midwest section (AIHA-UM - Minnesota Association of Occupational Health Nurses (MAOHN), North Central Occupational and Environmental Medicine Association (NCOEMA), North Star Chapter of the Academy of Certified Hazardous Materials Managers, MCOHS and the MSC – is one example of this. This cooperative resulted in a "Team Approach" website (<http://www.teamapproach.org>), established in 2000 where interdisciplinary activities are listed and each organization links its website to enhance communications between upper Midwest professionals in OSH. In the last five years, over 500 professionals attended this course. Consistent with the effort to reach individuals using different learning formats, the 2006 Team Approach Program, "Pandemic: Are You Prepared?" was Web-cast and is available online at no charge. This continues to garner interest and remains available for viewing. The 2007 TEAM APPROACH program had 71 face-to-face multidisciplinary participants.

CE courses are targeted to meet the needs of occupational medicine physicians, family practice physicians, other primary care physicians, occupational health nurses, industrial hygienists, safety professionals, local, state and federal health and safety personnel, labor and management personnel. As the OSH community has matured and diversified, so has the Center's long-standing commitment to training in the core disciplines as well as multidisciplinary, multilevel and, now, online training. Programs cover a wide spectrum of interests and levels, including: introductory; advanced; interdisciplinary; hazard-specific; industry specific; and review and update courses. Course lengths vary from one- to three-week courses, to one-hour updates, during the Public Health Institute (PHI). Formal and informal needs assessment feedback shows that many individuals are looking for learning opportunities that minimize cost and time away from work while providing information on emerging issues and other topics with direct relevance and application to the workplace.

Examples of the range and type of accomplishments follow:

- Developed/updated the national ERC Website/online catalog, brochure, and national ERC Needs Assessment. The Website functions as an online catalog, listing courses offered by each ERC and provides access to their Websites via hyperlink. Each of the 16 ERCs populate their own course data, contact and program information, providing up-to-date course information throughout the year. The redesigned Website has a contemporary look and includes a key word search, search by topic function, and contact and resource information. The opportunity to provide feedback via a brief national needs assessment is prominently displayed throughout the site to encourage feedback from site visitors. The Website is complemented by a four-page brochure that steers OSH professionals to the ERC CE Website or individual ERC Websites and tells about the Centers — the roles they play, and the OSH topics they offer.
- Offered two blended courses - Comprehensive Industrial Hygiene Review (CIHR) and Case Management. Both programs were often used by participants as a review before sitting for certification exams. Participants were provided with access to an online pre-test and a Datachem CD Rom prior to the course, allowing them to identify areas of strength and areas to pay particular attention to, during the face-to-face instruction. CIHR participants also had access to a post course discussion site.
- Made significant progress in distance-based education visible in 1) online course components available as part of the MCOHS Regents Certificate in OHS and three additional public health certificates; 2) Core OH&S program academic course content modularized and developed into distinct web-based learning activities; 3) National Occupational Research Agenda (NORA) programs, expanded their reach with online webcast/video-streamed versions of face-to-face programs; 4) Blended courses offered for two certification review courses; and 5) Team Approach program "Pandemic: Are You Ready" captured and offered as a free web-cast serving 221 people in first two months online.
- Offered three NORA initiatives both designed to stimulate and disseminate research on workplace safety and health: 2004 NORA Symposium – a one day program focusing on traumatic injury, occupational health services research; exposure assessment; musculoskeletal disease syndromes; and organization of work and 2005 Program Seminars – three evening lectures focusing on vulnerable working populations; viewing occupational and environmental issues separately; and the aging workforce. In 2007, a one day NORA Symposium, "Translation of Research to Practice," involved two key national

speakers, Dr. Jane Lipscomb, "A Model For Implementing, Evaluating And Translating Violence Prevention Intervention Research In The Health Care And Social Service Workplace" and Dr. Laura Punnett, " Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs." A research poster session of student and faculty research, was also held.

- Completed a comprehensive needs assessment employing multiple strategies such as interviews, surveys, focus groups and professional association data to assess the learning needs of OH&S professionals. The assessment has been analyzed and the insights provided will be considered when planning future courses.
- Initiated partnerships with the Central States Occupational Medicine Association (CSOMA) and MSC to offer education programs to OH&S professionals. MCOHS is co-sponsoring a fall conference with CSOMA titled "Work, Pain, War: What good are they?" in Rochester MN; and will be co-sponsoring the MSC spring conference, helping them to broaden their OHS audience by offering advanced level courses
- Established several agency partnerships with the Leech Lake Band of Ojibwe bringing training to tribal workers across disciplines. These include the Leech Lake Department of Resource Management, tribal Police, Cass lake Volunteer Fire Department, tribal Ambulance/EMS, tribal Health, and the Community Education Department of Leech Lake Tribal College.
- In partnership with the Occupational Medicine core, and Regions Hospital, a monthly Occupational Medicine Community Grand Rounds (CGR) seminar is offered to OSH professionals and the plan, in 2008, is to expand this and make the sessions available online for all Health Partners healthcare providers, especially nurses and physicians.

Other CE activities

Building upon the commitment to serve all populations, and impact the OSH profession, CE Program members serve as course coordinators. In this role the CE Program considers the needs and desires of potential participants in scheduling and delivery of valuable programs offered by MCOHS. Many of the CE Program activities have been discussed throughout the document, therefore our intention is to highlight some and present some additional programming plans.

CE program members participate on advisory and planning boards to provide program support, feedback and/or direction, for programs such as the Team Approach. As the ERC develops several pilot project activities during the next grant period the CE Program will provide logistical and technical support as required for a successful program. In an effort to inform the OSH practitioners of upcoming events the CE Program will inform through poster presentations, and provision of training schedules throughout the year, in such venues as: MAOHN Vendor Fair, MSC annual safety conference, and the National Safety Congress.

The CE Program will continue to explore opportunities to collaborate with our neighboring Education and Research Centers (ERCs). Collaborating with neighboring ERCs provides an opportunity to share insights on emerging trends, combine resources and disseminate information to a larger audience. This information is useful for practice integration and curricula inclusion. The CE Program provides curriculum materials and consultation to other institutions by conducting presentations to inform organizations like 3M about education options available for OSH professionals with interest in different levels of educational development (i.e., CE, academic, Regents Certificates, Certifications like CIH, Masters and PhD programs).

Cooperation and collaboration with professional and scientific associations, and delivery of OSH awareness seminars to those in undergraduate programs, secondary education, labor, business groups, and community organizations are of significant importance to the CE Program. To support these groups the CE Program will explore developing a relationship with Council on Certification of Health Environmental and Safety Technologists (CHEST) to understand their needs and explore options to collaborate or partner around common topics of interest for OSH professionals in this organization. The CE Program recognizes the varied and changing needs of the OSH professional in an ever-changing environment and seeks to reach professionals in a variety of settings.

D. Conclusions

The Continuing Education (CE) Program of the Midwest Center for Occupational Health and Safety (MCOHS) completed its twenty-eighth year of operation June 30, 2007. Since 1978, over 44,764 students have enrolled in CE courses in the MCOHS. A majority of students are from midwestern states, the Center's service region. As a part of the Centers for Public Health Education and Outreach (CPHEO), MCOHS has access to a full complement of educational and development delivery mechanisms and the expertise of education and digital learning specialists who assist in the creation and implementation of CE programs. The MCOHS CE Program is closely aligned with the mission and goals of CPHEO. CPHEO's mission is to promote access to lifelong learning that bridges academic and public health practice communities through education/training for practicing public health professionals. CPHEO works

with faculty and staff to build community linkages and support diverse continuing education efforts such as short courses, workshops, institutes, conferences, certificate programs, technology-enhanced learning initiatives, and degree programs for working professionals. The new Digital Learning Group (DLG), incorporated in 2005, demonstrates a commitment to alternative learning strategies and the DLG team includes ten technology professionals. The CE Program offers many varied and well-received programs and is well poised for continued success.

5. J. Hazardous Substances Training Continuing Education Program
Director: Kathleen Smith, MSN

Hazardous Substances Training Continuing Education Program
Director: Kathleen Smith, MSN

A. Background

The Continuing Education Program of the Midwest Center (MCOHS) has conducted training in hazardous substances since 1984. In 1988, the Center was awarded a NIOSH Hazardous Substances Training grant that supports the Center's offering of mandatory and innovative hazardous substance training courses. Ongoing needs assessment is part of all curricula development. The HST staff reviews existing data and literature related to trends in hazardous substance training and needs.

The MCOHS also conducts ongoing key informant interviews to determine hazardous substances training needs and new trends. During the last five year grant period, agencies surveyed include: Minnesota Fire Chiefs Association; Leech Lake Tribal Government; Minnesota Pollution Control Agency (MPCA); Minnesota OSHA (Department of Labor and Industry); Minnesota Department of Agriculture; Metro-County Hazardous Waste Regulatory Agencies (Hennepin, Ramsey, Dakota, Scott, Washington, Carver, and Anoka counties); Minnesota Department of Transportation (MNDOT); Minnesota Department of Natural Resources (DNR); Minnesota Department of Public Safety; Minnesota Technical Assistance Program (MnTAP); and the Minnesota Department of Employee Relations (MN DOER).

An HST Advisory Group, comprised of sixteen people from relevant environmental health firms, public safety, industrial hygiene, business, and education entities, has met annually to review progress and make recommendations on new training opportunities.

B. Goals and Objectives:

The mission of the MCOHS CE Hazardous Substance Training (HST) program is to improve occupational/environmental health and safety through transmission of relevant hazardous substance training to individuals responsible for hazardous materials identification, management and remediation in their workplaces. This includes persons engaged in hazardous materials response at the local, state, county, tribal and state levels.

C. Results and Discussion:

Over 2700 students have been trained with NIOSH HST funds since the inception of the grant in 1988. During the 2006-2007 year, 23 students received NIOSH HST tuition subsidies to attend courses ranging from three hours to five days in length. In 2006-2007, a total of \$8310 in tuition support was awarded under this program. These funds were to subsidize course tuition fees (generally in the amount of 70-85% of the tuition fee), for eligible state and local government personnel who request this subsidy to attend open enrollment hazardous substance training courses.

Program Plan/Leadership

The Hazardous Substance Training Program is administered through the Program in Continuing Education at the Midwest Center for Occupational Health and Safety, University of Minnesota, School of Public Health. The Lead Technical Director is *Peter C. Raynor, PhD*. Dr. Raynor is Director of the HSAT program, and a faculty member in the IH program. His areas of interest include: air filtration; air pollution control; measurement of volatile aerosols; metalworking fluids; aerosol physics; biological aerosols and exposure assessment. Dr. Raynor devotes 2% of his time to the HST grant. The Co-Technical Director is *Lisa M. Brosseau, M.S.; ScD*. Dr. Brosseau is a member of the IH and HSAT faculty and lead instructor of the academic course PubH 6176, Hazardous Materials and Wastes Management. Dr. Brosseau devotes 2% of her time to the HST grant.

Iris Staubus, MEd, RN, serves as the Interim Director for the Continuing Education program. She has a Masters Degree in Adult Education from the University of Minnesota and Regents Certificates in both Adult Education and Human Resource Development. Ms Staubus brings 18 years of experience in the adult education arena — three years in Occupational Health and Safety, four years in health promotion and 11 years managing and implementing human resource development programs for employees, at all levels, in a mid-size manufacturing firm.

Kathleen Smith, MSN, RN, Education Specialist, joined the center in May 2006. Ms. Smith is a Registered Nurse with over 25 years experience. She received her initial nursing education at Cook County School of Nursing. She continued her education at the University of Miami, earning a MSN with a Family Nurse Practitioner focus. Most recently, she earned a Public Health Practice Certificate in Occupational Health and Safety from the University of Minnesota and has been involved in the development and delivery process of courses for the Occupational Health and Safety professionals at MCOHS. She has worked with diverse populations during

her career including the agricultural and migrant communities. Ms. Smith's breadth of experience with a wide range of industry, managerial experience and administrative expertise are integral to the administration of this grant.

Lois M. Harrison, MPH, is the program coordinator on the Hazardous Substance Training grant and serves as an Education Specialist within the Midwest Center. Ms. Harrison is a graduate of San Diego State University's Graduate Program in Occupational Health and has worked professionally as a safety coordinator, state health department grant manager, and injury prevention specialist. She brings to this position, expertise in the areas of adult education, occupational health and curriculum and faculty development.

Additional HST program staff includes: Christine Western, full-time Assistant Education Specialist, with responsibilities for course logistics, course outreach/promotion, compiling course materials, and publicity; Carla Nathan, Program Associate, has direct responsibilities for course administration, and assistance with student recruitment; Sue Swartz, Registrar, provides registration and course tracking expertise. As mentioned earlier, an advisory group of sixteen representatives from business, industry, governmental agencies, academic institutions, and professional groups has provided long-range structure, leaderships and program direction guidance

Faculty Reputation and Strength

The HST program has a strong caliber of faculty and instructional staff with expertise at both the academic and community level. At the University of Minnesota School of Public Health, Dr Lisa M. Brosseau has provided program direction for the grant since its inception. Dr. Peter Raynor has provided technical expertise at both the academic and community levels. Dean Debra Olson, RN, MPH, is the Associate Dean of Public Health Practice Education and Instructor in the Division of Environmental Health Sciences. Dean Olson has provided broad oversight to the program and its connection to School of Public Health Outreach Initiatives.

Three new community faculty members with backgrounds in emergency preparedness were added to the training staff during the last five years. Other community instructors that have contributed to the program and taught HST courses during the last grant period include:

David Abrams, MS, CIH, ARS Environmental. Mr. Abrams serves as a course instructor for Minnesota, New York, New Jersey and North Carolina ERCs on topics related to work with hazardous materials.

Michael Nevala, MS, course instructor, is a Principal Environmental Scientist, Metropolitan Council Environmental Services in St. Paul, Minnesota who teaches site safety and remediation planning

Edward J. Leier, course instructor, serves as Fire Chief for the City of Vadnais Heights, Minnesota

Daryl Korpela, M.S., C.I.H., course instructor is President, Kettering and Associates, Lakeville, Minnesota.

Additional professional faculty will continue to provide course development and instruction.

Coordination with Agencies and Organizations

The HST program has a strong reputation for partnership with other agencies and programs. The University of Minnesota School of Public Health served as a partner in the Great Lakes OSHA Training Consortium and works collaboratively to provide training including Respiratory Protection-OSHA 2225. The MCOHS has been closely involved with the Minnesota Pollution Control Agency, MN OSHA, the Minnesota Department of Natural Resources, the Minnesota Department of Agriculture, the Minnesota Department of Public Safety, and Minnesota Department of Health, as well as several county agencies and city departments.

During 2002-2007, the Midwest Center exhibited HST course materials through venues with the following organizations: The American Occupational Health Conference; the American Industrial Hygiene Conference; and Minnesota Association of Occupational Health Nurses. The MCOHS participated through attendance and exhibits in the: Minnesota Governor's Homeland Security/Emergency Management Conference in March 2005 and 2006; the Minnesota Safety Council annual conference in May 2005 and 2006; the national meeting of the Waste Water Operators, June 2005; and the Minnesota Department of Health Community Health Services Conference in September 2005. During 2006-2007, face-to-face courses were marketed through a variety of new venues, including the Minnesota Fire Chief's Association, the Minnesota Police Chief's Association, the Minnesota Pollution Control Agency, the University of Minnesota's Technical Assistance Program, the Minnesota State Fire Department Association, and the Minnesota Governor's Conference on Emergency Preparedness. The addition of these new partnerships provided an opportunity to increase enrollment through students previously unfamiliar with course offerings of MCOHS. The HST program also maintained strong partnerships with the Minnesota Pollution Control Agency, MN OSHA, the Minnesota Department of Natural Resources, the Minnesota

Department of Agriculture, the Minnesota Department of Public Safety, and Minnesota Department of Health. Hazardous Substance Training courses were marketed through regional professional organizations and through MCOHS and NIOSH ERC exhibits at national and local professional meetings. Individual courses are promoted through direct mailings, the MCOHS homepage and course announcements in selected newsletters. These outreach activities provided an excellent opportunity for discussion and identification of training needs and private industry trends in hazardous substance identification.

Course offerings

Through June 2007, core courses designed to meet mandatory training requirements outlined in the Hazwoper Standard, 29CFR 1910.120 included: *24 and 40-Hour Safety and Health Training for Hazardous Waste Site Personnel*, *the 24 and 40 hour Emergency Response Training*, *the 8-Hour Hazardous Waste Site and Emergency Response Refreshers*, and *the 3-hour Hazardous Materials Awareness course*. One hundred ninety HST funded students participated in courses offered during the 2001-2007 period.

During this period, over 20 innovative courses were developed and offered, based on identified needs of the NIOSH HST target audience that included: *Plans Into Action: Clandestine Drug Lab Response*; *Evacuation Coordination Train the Trainer*; *Chemistry of Hazardous Materials*; *Persistent Biological Toxins*, *Respiratory Protection and Respirator Fit Testing*; *Current Issues in Respiratory Protection*; *NIOSH Filter Selection*; *OSHA Final Rule for Respiratory Protection*; *Overview of the Minnesota Incident Management System*; *An Overview of the Hazwoper Standard for State and Local Government Personnel*; and *Hazwoper Awareness for government personnel*. *Biological hazards have been addressed in courses that include: Current Challenges to Employee Health and Safety in Health Care Settings*; *the Occupational Health and Safety Breakfast Series*; *the Occupational Health Nursing Review*; *Home Health Care: Controlling Worker Risk*; *Hazard Recognition in Production Agriculture and Food Processing*.

During 2006-2007, the HST CE program addressed the following program objectives:

1. Responded to the needs of broad-based, diverse HST professional audiences by developing relevant courses throughout the year:

During 2006-2007, HST-CE 22 face to face courses were offered with over 220 participants. Courses ranged from three-hour hazwoper awareness trainings to 40-hour (5 day) emergency response. Courses were offered to a variety of audiences, including public health departments, tribal entities, fire departments and city public works departments, both at their location and at our training center. Twenty three requests for HST tuition subsidies were received and support was provided for the courses.

Six new HST courses were developed during this time period:

- Four tailored three hour Hazardous Materials Awareness courses were presented to the City of White Bear Lake (January 23 and 24th, 2007). The four courses reached over 120 participants from a variety of city sectors, including police and fire departments and public works employees.
- One three hour Hazardous Materials High Pressure Awareness course, April 4, 2007, was offered in Federal Dam, Minnesota. Twenty-four fire department volunteers attended, almost all from the neighboring Leech Lake Tribal Community in Northern Minnesota. This course was the second offering of an HST hazardous materials course to the Leech Lake Tribal Community in the past two years.
- One toxic awareness and identification course was offered to a diverse neighborhood group in Minneapolis for 12 individuals in August 2006, at their request.

2. Maintained high-quality course offerings through continued course and instructor evaluations and participant feedback.

The annual HST instructor advisory meeting was held in January 2007. Several members of the business community and state agency representatives attended and provided valuable insights to improving our course selections and evaluations of instructors. All instructors receive a written evaluation summary for each course. Within NIOSH HST Programs, students evaluate each course for content, format, and facilitation. Course ratings are typically in the 4.0 - 4.7 range on a scale from 1 (lowest) to 5 (highest). The Center's Continuous Quality Improvement program mandates that a quality improvement plan be developed for any course that rates less than a 4.0 overall and 4.2 for CE organization. Participants evaluate the current course offering, make suggestions for improvement, and identify additional needs. Student learning is evaluated through written exams, group activities and performance measures, pre- and post-tests and faculty evaluation. Program evaluations have been uniformly strong during the 2006-2007 year. In addition, an instructor with specific expertise in disaster planning was hired in June 2007 to develop a tailored questionnaire of

participants' experience in emergency response and incident command, following course participation in emergency response and incident command courses.

3. Collaborated with community groups and professional continuing education licensure boards to offer relevant continuing education for professionals and the emerging workforce

During 2006-2007, the HST coordinator sought new continuing education credit for sanitarians and firefighters. CE credit was offered and approved for Industrial Hygienists, Safety Officers, Sanitarians and Peace Officers. In addition, the HST and NIOSH CE coordinator participated in a Health Careers Festival at a local high school in May 2007 to highlight the opportunities in health and safety continuing education, reaching at least fifty students from a variety of diverse backgrounds. The HST coordinator presented HST course information to the National Association of Graduate Women in Science at their national conference in Minneapolis in June 2007. During 2007-2008, additional CE credit and outreach opportunities will be explored for new workers, hospital professionals and first responders in 2007-2008 course offerings.

D. Conclusions

The Continuing Education Program of the Midwest Center (MCOHS) has conducted training in hazardous substances since 1984. In 1988, the Center was awarded a NIOSH Hazardous Substances Training grant. The mission of the MCOHS CE Hazardous Substance Training (HST) program is to improve occupational/environmental health and safety through transmission of relevant hazardous substance training to individuals responsible for hazardous materials identification, management and remediation in their workplace. This includes persons engaged in hazardous materials response at the local, state, county, tribal and state levels. Over 2700 students have been trained with NIOSH HST funds since the inception of the grant in 1988. During the 2006-2007 year, 23 students received NIOSH HST tuition subsidies to attend courses ranging from 3 hours to 5 days in length.

During the 2002-2007 period, over 20 innovative courses were developed and offered based on identified needs of the NIOSH HST target audience. Courses included: *Plans Into Action: Clandestine Drug Lab Response; Evacuation Coordination Train the Trainer; Chemistry of Hazardous Materials; Persistent Biological Toxins; Respiratory Protection and Respirator Fit Testing; Current Issues in Respiratory Protection; NIOSH Filter Selection; OSHA Final Rule for Respiratory Protection; Overview of the Minnesota Incident Management System; An Overview of the Hazwoper Standard for State and Local Government Personnel, and Hazwoper Awareness for government personnel. Biological hazards have been addressed in courses that include: Current Challenges to Employee Health and Safety in Health Care Settings; the Occupational Health and Safety Breakfast Series; the Occupational Health Nursing Review; Home Health Care and Controlling Worker Risk; Hazard Recognition in Production Agriculture and Food Processing.*

The HST program met the following 2006-2007 program objectives:

1. Responded to the needs of broad-based, diverse HST professional audiences by developing relevant courses throughout the year

22 face to face courses were offered with over 220 participants, six new HST courses were developed including four tailored courses

2. Maintain high-quality course offerings through continued course and instructor evaluations and participant feedback

An annual instructor advisory meeting was held in January 2007; course evaluations were reviewed and participants provided valuable insight as it relates to course development, selection and evaluation

3. Collaborate with community groups and professional continuing education licensure boards to offer relevant continuing education for professionals and the emerging workforce

The HST coordinator sought new continuing education credit for sanitarians and firefighters. CE credit was offered and approved for Industrial Hygienists, Safety Officers, Sanitarians and Peace Officers.

The HST CE program is well established with faculty that bring expertise and valuable experiences to HST CE training courses.

5. K. Agricultural Safety and Health Continuing Education Program
Director: Kathleen Smith, MSN

Agricultural Safety and Health Continuing Education Program
Director: Kathleen Smith, MSN

A. Background

The continuing education program in Agricultural Safety and Health (ASH) has been an integral part of the University of Minnesota's Education and Research Center for the past 14 years. CE offerings target a range of health professionals including nurses, physicians, EMS personnel, along with educators, rural leaders, Extension Educators, and others who work in a public health/safety setting in rural areas of the state. Agricultural safety and health is also a key part of the University of Minnesota's family practice residency program and their Community Health rotations.

B. Goals and Objectives:

The ASH CE program goal is to offer responsive face-to-face training as seminars or workshops, initiated by ASH CE staff or as requested by partner organizations.

Program Plan and Leadership

The principal faculty in the Department of Biosystems and Agricultural Engineering (BAE), the School of Public Health (SPH), and the University of Minnesota Extension Service (UMES) contribute to the Agricultural Safety and Health Program and include the following:

John Shutske, PhD, Program Director is a Professor in the Department of Biosystems and Agricultural Engineering, in the College of Agriculture, Food, and Environmental Sciences. He is responsible for the overall management of the ASH Program. His present research focus is in agricultural injury prevention, including development of prototype electronic sensors and engineering control systems to prevent entanglement of rotating farm equipment, determination of lost production costs resulting from agricultural injuries. Dr. Shutske has taught numerous courses in the ASH-area in both academic and continuing education programs and also in safety engineering and design and brings cutting edge expertise to the ASH CE program.

Michele Schermann, RN, BSN, MS, has been an Extension Educator within the Agricultural Safety and Health Program since 1994 and is currently a Research Fellow. Using her health care background and knowledge gained from a BS degree in horticulture, Ms. Schermann has blended together her knowledge of agricultural production with strong healthcare research and program development/evaluation background, and has provided primary leadership on several research and outreach efforts including the development of the web-based CEU offering covering the NAGCAT child safety guidelines. She is a co-investigator on the following grants: USDA grant, working with the Minnesota AgrAbility Project; United States Forest Service, working on safety communications with Hmong farmers; and a grant from Cornell to promote good agricultural practices with Hmong farmers. Ms Schermann brings current and relevant issues in ASH CE to all courses offered.

Ruth Rasmussen, MPH, MS, RN, has been a Continuing Education Specialist with the Centers for Public Health Education and Outreach since January 2004 and is the ASH CE program coordinator for the Midwest Center. Prior to that, she worked as a Research Fellow with Dr. Shutske for six years in Agricultural Safety and Health continuing education program development and delivery. She has extensive work experience in nursing, community education and project coordination and skills in teaching, communication, project management and program leadership. Ms. Rasmussen plans, develops, and coordinates courses with other faculty, community partners and appropriate venues with Dr. Shutske's direction and oversight. Ms. Rasmussen also works collaboratively with the Digital Learning Group, the registrar, program associates, marketing and accounting personnel with the Centers for Public Health Education and Outreach and community partners involved in each course. Ms. Rasmussen reports directly to the CE Director who reports to the Principal Investigator of the MCOHS grant.

This faculty, staff and others have a very positive impact on the quality of courses offered and leadership of the ASH programs. Their timely and relevant work in occupational health and safety research is well translated into continuing education opportunities for professionals working in agricultural safety and health related fields.

The ASH CE program continues to compete for audience share with local health care systems that generate their own staff trainings and with the current plethora of online units of continuing education available at no charge to many licensed physicians, nurses and allied health personnel, including safety professionals. ASH certification or licensure is required in very few organizations, and with limited industry and health service safety and health training budgets, potential CE participants have not selected agricultural health and safety trainings over those that will be supported financially by their employers or that will lead to wage or salary increases. Listening to our audiences, who have indicated that a variety of educational program offerings, including face-to-face and web-based would be preferred, we are enhancing both venues for the ASH CE program.

C. Results/Discussion:

Coordination with agencies and Organizations

A significant number of community and campus collaborations were initiated and/or enhanced during this reporting period. These include but are not limited to: Center for Animal Health and Food Safety; College of Veterinary Medicine; College of Agriculture, Food and Environmental Sciences, Department of Food Science and Nutrition, University of Minnesota; Minnesota Area Health Education Centers; Minnesota Department of Agriculture; Minnesota Department of Health; Worthington Regional Hospital; and Minnesota Fruit and Vegetable Growers Association. These partnerships are significant because they represent a broader reach for the ASH CE program and include representatives from regional Minnesota Area Health Education Centers and industry stakeholders.

Our ASH Program Advisory Board convened on December 1, 2006 and was instrumental in providing input for our 2006-2007 training content. Their combined input regarding assessed needs of rural occupational health professionals in various capacities of population group health promotion led directly to the creation of the courses that occurred in this year. Regional partners selected content areas pertinent to their rural populations; presentations of the courses were done by faculty from other colleges and departments at the University of Minnesota and by partners from the Minnesota Departments of Agriculture and Health, Children's Hospital and Clinics of Minnesota and by local agency and industry representatives. Our regional partners conducted local and regional marketing and provided local facilities for the trainings.

Course Offerings

The ASH CE program goal is to offer responsive face-to-face training as seminars or workshops initiated by ASH CE staff or as requested by partner organizations. Program objectives include enhancing the capacity of occupational health professionals in practice to: 1) recognize agricultural safety and health hazards; and 2) describe appropriate control strategies to minimize morbidity of patients/clients and population groups.

Planned activities are designed to build upon the successful initiatives of the last five years. These include the Rural Jeopardy short-courses, the food system protection courses co-sponsored with the University of Minnesota Center for Public Health Preparedness, the numerous lectures and workshops conducted by Dr. Shutske and staff of the University of Minnesota Extension Service's Agricultural Safety and Health Program and the Center's CE Program, and the web-based CEU module dealing with the North American Guidelines for Children's Agricultural Tasks (NAGCAT). Additional new courses will be designed and conducted in accordance with needs identified by audience representatives, advisory board input and regional environmental changes. These new courses will enhance the capacity of occupational health professionals in health care and public health roles to recognize agricultural safety and health hazards and respond with appropriate control strategies to minimize morbidity of patients/clients and population groups.

The Public Health Institute at the University of Minnesota has been an innovative venue for health care and safety professionals to access such ASH courses as "Worker Health in Food Production and Processing" and "Overview of Workplace Safety and Health in Food Production and Processing," in 2002, and "Designing for Safety," in 2003. Participants choose to take these courses for CE or academic credit. These courses are designed to help students recognize that workers are key in any efforts to prevent an intentional or unintentional breach in security and food safety and that, efforts to incorporate worker safety and health into food safety and food system protection are complementary to one another.

Courses offered in the five-year grant period have reflected student needs and audience requests as evidenced by course evaluation data. Emergency response in the area of agricultural worker safety turned to preparedness as we watched the nation respond to the terrorist event of September 11, 2001. Courses have considered both individual worker safety and the safety and health of populations of agricultural workers in food system industries. Courses in agricultural and food system safety and health in the context of both routine and emergency situations were successfully conducted in 2006 and the all hazards approach will also be important in course development in the future.

Bridging food system preparedness and agricultural safety and health led to three successful courses in Spring 2006 held in partnership with the University of Minnesota Center for Public Health Preparedness: "Retail Food System Worker Issues" (March 2006); "Food Production and Processing Worker Issues" (April 2006); and "Food Distribution Worker Issues" (April 2006); these were attended by over 68 participants. This ASH/UMNCPHP partnership will continue to support agricultural health and safety issues. Courses that assess worker health and safety risks throughout the food system will be offered to local public health practitioners, educators, food industry workers and administrators. Trainings will include content requested by students and advisory board members such as avian influenza, bioterrorism, domestic terrorism, and emergency preparedness, continuity of business operations, pesticide use, disability

management and rural environmental health. Continuing our training activities of 2004-2005 and 2005-2006 to bridge a gap between food system preparedness and agricultural safety and health led to two more successful ASH CE courses in Spring 2007 held in partnership with the University of Minnesota Center for Public Health Preparedness: "Business Preparedness Planning for the Fruit and Vegetable Industry" with ASH content on "Planning for Product and Worker Safety" was held on March 20, 2007 for 20 trainees in Owatonna, Minnesota in the South Central rural region of the state; and on March 29, 2007 for 17 trainees in Staples, Minnesota in the North Central rural region of the state. Participants were given opportunities to identify control strategies for food system hazards and vulnerabilities at production, processing and distribution sites and to describe elements of food system worker issues and employee protection strategies. Agricultural safety and health professionals who attended these trainings now have tools to use in training others to: 1) recognize agricultural safety and health hazards particularly in the fresh produce industry; and to 2) describe appropriate control strategies to minimize morbidity of patients/clients and population groups involved in the fruit and vegetable industry as workers and occupational health professionals.

A topics menu was made available to a new partner, Worthington Regional Hospital, which is associated with the Sioux Valley Hospitals and Health System (now Sanford Health) and is located in the far South West corner of Rural, greater Minnesota. Worthington Regional Hospital was our onsite host partner and the location for two educational programs for rural health care professionals working with farm families presented on January 29, 2007 for 22 trainees and March 26, 2007 for 9 trainees. Topics covered at the two trainings included: current research resources, and positions on infectious diseases related to animal production; animal antimicrobial resistance and its relationship to human health, effects of aging and primary disabilities on workers in production agriculture; early recognition and treatment of asthma in children living in rural agricultural areas; farm family issues for family physicians; and the nurses' roles in protecting our agricultural communities from terrorism. These sessions succeeded in meeting our objectives to enhance the capacity of these occupational health professionals in practice to: 1) recognize agricultural safety and health hazards; and 2) describe appropriate control strategies to minimize morbidity of patients/clients and population groups in rural, Southwest Minnesota. Participants' evaluation summaries indicated that practice changes would include more individual patient instruction on personal and family safety on the farm and smaller group instruction on farm safety using the knowledge gained from these trainings.

The Interface of Rural Family Practice and Farm Families course, especially designed for physician providers, was held September 8, 2006, for 22 physicians, and February 2, 2007 for 20 physicians. This course is a 1.5 hour ongoing workshop for family practice residents participating in their Community Health rotation. This workshop is a synopsis of key agricultural safety and health issues that affect agricultural workers and their families. The focus is on awareness building and presenting five specific recommendations for a health professional's involvement in recognizing, treating, and community-based interventions. One very significant impact of these seminars is that these physicians are trained to do more comprehensive patient histories to include questions on occupational and environmental health issues related to agricultural safety and health of farmers and their families. These physicians involved in the Rural Physician program at the University of Minnesota often continue their practice in those rural areas of the state.

The ASH CE program in an effort to reach the rural audience launched a web-based course in 2003 that has met with success. This course is based on the North American Guidelines for Children's Agricultural Tasks (NAGCAT). In a recent peer reviewed publication, the Journal of Agricultural Safety and Health, the NAGCAT was shown to have a positive effect in decreasing the number of childhood injuries. We would like to continue to disseminate the web-based course "A Nurses Guide to Children's Agricultural Safety". In the evaluation study of this particular course, conducted with grant funds from the Marshfield Medical Research Foundation in 2004, 88% of participants indicated that knowledge gained from the course would be useful in their practice.

Evaluation summaries from the trainings indicated increased awareness of agricultural safety and health hazards and control strategies and willingness to use knowledge gained to influence family members, co-workers and public health professionals in agricultural safety and health interventions to reduce morbidity and mortality in rural farm worker and family populations. All courses offered through the program are evaluated through pre- and post-tests to evaluate knowledge acquisition. Target audience reach is determined by participant data collected at each course. Written course evaluations are conducted to reflect the degree to which participants feel the learning objectives were met, perceived course impact on practice, and extent to which participants believe the course built on prior knowledge. Faculty and content evaluation processes offer students the opportunity to suggest course improvements and future topics. Informal discussion with course participants both during and after courses is also a source of training evaluation data. We continue to access ERC needs assessments and survey results for appropriate ASH CE program input.

D. Conclusions

The continuing education program in Agricultural Safety and Health (ASH) has been an integral part of the University of Minnesota's Education and Research Center for the past 14 years. A significant number of community and campus collaborations were initiated and/or enhanced during this reporting period. These include but are not limited to: Center for Animal Health and Food Safety, College of Veterinary Medicine; College of Agriculture, Food and Environmental Sciences; Department of Food Science and Nutrition, University of Minnesota; Minnesota Area Health Education Centers; Minnesota Department of Agriculture; Minnesota Department of Health; Worthington Regional Hospital; and Minnesota Fruit and Vegetable Growers Association. These partnerships are significant because they represent a broader reach for the ASH CE program and include representatives from regional Minnesota Area Health Education Centers and industry stakeholders. Our ASH Program Advisory Board convened on December 1, 2006 and was instrumental in providing input for our 2006-2007 training content.

The ASH CE program goal is to offer responsive face-to-face training as seminars or workshops, initiated by ASH CE staff, or as requested by partner organizations. Program objectives include enhancing the capacity of occupational health professionals in practice to: 1) recognize agricultural safety and health hazards; and 2) describe appropriate control strategies to minimize morbidity of patients/clients and population groups. Program objectives were reached by offerings such as short-courses like Rural Jeopardy; co-sponsored programs with the University of Minnesota Center for Public Health Preparedness; lectures to family physicians during their rotations; and through the web-based module related to the North American Guidelines for Children's agricultural Tasks (NAGCAT). The ASH CE program is well established and continues to grow, especially in its partnering with other agencies to provide faculty that bring expertise and valuable experiences to ASH CE trainings.

5. L. NORA Program
Ian A. Greaves, B Med Sci, MB BS and Lisa Brosseau, ScD

NORA Program

Directors: Ian A. Greaves, B Med Sci, MB BS and Lisa Brosseau, ScD

A. Background

The primary goals of the NORA Research Program are: 1) to recruit and support graduate research training by offering tuition, stipends and limited travel funds to supplement support of doctoral students in the approved academic programs; and 2) to support interdisciplinary research projects that include faculty and students from two or more Core or Allied Programs and that demonstrate a high chance of leading to an R01 application.

Program success is gauged by the number of students supported and their progress toward degree completion. Success is also determined by the numbers of publications and external grant applications and awards resulting from the small research grants.

Program Leadership and Faculty

Ian A. Greaves, B Med Sci, MB BS (Associate Professor, Environmental Health Sciences) has served as Director for the Midwest Center for Occupational Health and Safety (MCOHS). His internationally recognized research efforts have addressed disorders caused by airborne exposures in the workplace and the general environment, agricultural health and safety issues, health and safety problems of small businesses, and international environmental and occupational health issues. He provides expertise for the NORA program relevant to these areas.

Lisa M. Brosseau, ScD (Associate Professor, Environmental Health Sciences) is Deputy Director for the MCOHS. Dr. Brosseau has expertise and interests in: performance of respiratory protection devices, aerosol measurement, filtration, and health and safety interventions in small businesses.

Susan Goodwin Gerberich PhD (Professor, Environmental Health Sciences) served as Associate Director for Research for the Midwest Center for Occupational Health and Safety and Co-Director of the Occupational Injury Prevention Research Training Program (OIPRTP). Dr. Gerberich has a national and international reputation in the area of injury epidemiology and control, and has consulted for agencies, including the Centers for Disease Control (CDC) and NIOSH. She has been involved in a broad range of research investigations through the Regional Injury Prevention Research Center and Center for Violence Prevention and Control. Her research efforts, funded through several RO1 grants, include a major regional effort to identify etiology and consequences of injuries among children and adults in the agricultural community as well as population-based efforts that address work-related violence; these have provided many opportunities for interdisciplinary research for addressing NORA priorities. She was also involved with Drs. Alexander and Gurney and Mr. Ryan in the development and implementation of the new course, PubH 6193, "Applied Analyses of Occupational and Environmental Health Data," which is integral to research training across all disciplines in the MCOHS; she has continued to teach in this course.

Bruce H. Alexander, PhD (Associate Professor, Environmental Health Sciences), is Co-Director of the Occupational Injury Prevention Research Training Program (OIPRTP). He has expertise in: occupational injury and disease epidemiology; occupational determinants of reproductive health; cancer; traumatic injury; and the use of biological markers in epidemiological research. Dr. Alexander has published numerous peer-reviewed articles in both the national and international literature and has been successful in generating federal agency and other research funding that address many of the NORA priorities; he also collaborates with Dr. Gerberich on two major occupational injury studies, as well as with Drs. Church, Maldonado, and Ramachandran (Industrial Hygiene), among others. His involvement in research efforts, with faculty and students, lends important strength to the NORA program. Recently he led the development and implementation of the new data applications course, PubH 6193, to facilitate the objectives of this program, including enhancement of the students' research capabilities.

Timothy R. Church, PhD (Professor, Environmental Health Sciences) has unique expertise in biostatistics and application of special techniques to ascertain the potential degree of bias in research studies. Such application has been extremely rare in this field and, thus, has provided an important opportunity to greatly enhance the quality of research-training efforts. The realm of his expertise includes: design, management and analysis of clinical trials and environmental and occupational epidemiological studies. He utilizes methods to incorporate model uncertainty into epidemiologic studies, mathematical representations of causal models, adjusting treatment effects for compliance in clinical trials, predictive probabilities for sudden cardiac death, and bias in observational studies of screening. Dr. Church has extensive experience as a Principal Investigator in major population-based epidemiological studies and has collaborated on three occupational injury studies with Dr. Gerberich, and with faculty in the other disciplines. He has been involved in numerous advising activities and co-teaches the Doctoral Research Seminar (PubH 8150) each semester with Dr. Maldonado.

George Maldonado, PhD (Associate Professor, Environmental Health Sciences), brings a creative viewpoint to the investigation of illnesses, injuries and hazardous events among working populations and has a national reputation for his methodologic approaches to the design and study of occupational problems. His involvement has been integral to the research efforts and the students' development of their theses endeavors.

Debra K. Olson, MPH (Associate Dean for Public Health Practice Education; Faculty, Environmental Health Sciences) who has expertise in injury prevention and control as well as the general realm of occupational health and safety, has been involved in teaching activities in the core courses and in the overall ongoing program development and recruitment efforts. In particular, her interests include innovative teaching methods that employ new technologies and involve distance learning. She has been a major asset to the NORA program through her efforts with the community and in continuing education and outreach activities.

Andrew Ryan, MS (Research Fellow, Environmental Health Sciences) has expertise as a statistical analyst/applications programmer, and instructs and assists trainees with data management, programming, and analyses relevant to the large, complex data sets used for their research training. He was also involved with Drs. Alexander, Gurney, and Gerberich in the development and implementation of the new data applications course, PubH 6193, and will continue to teach in this course. In addition, he is involved in numerous research efforts with Drs. Gerberich, Alexander, and Church and others that involve interdisciplinary training for students.

Other *Supporting Faculty* associated with the program:

Patricia McGovern, PhD (Professor, Environmental Health Sciences) is the Director of the Occupational and Environmental Health Nursing (OHN) Program and the Co-Director of the Occupational Health Services Research and Policy Program (OHSRP) with Dr. Bryan Dowd. Her research interests address occupational health policy and program evaluation, including women's use of family medical leave policies associated with their postpartum health, workers' compliance with universal precautions, and work-related violence; based on her efforts, she has developed an international reputation. She collaborates on several research projects involving other NORA program faculty (e.g., Drs. Gerberich, Church, Alexander) and relevant doctoral students.

Bryan Dowd, PhD (Professor, Health Policy and Management) is Co-Director of the Occupational Health Services Research and Policy Program (OHSRP). He specializes in economic and statistical modeling and data analysis. His research focuses on the financing and delivery of health insurance and health care services, for which he is recognized internationally. He teaches health services research methods in the M.S. and Ph.D. programs. In particular, Dr. Dowd has been active in the NORA Program in spearheading implementation of a concentrated course in the utilization of SAS for relevant students that strengthens their capabilities for conducting research efforts.

Nancy M. Nachreiner, PhD (Assistant Professor, Division of Environmental Health Sciences) Dr. Nachreiner has experience in both intentional and unintentional injury epidemiology and conduct of large studies. She is integral to doctoral training and currently serves as Project Director of a major population-based study of occupational violence, with responsibility for supervising doctoral students on this project in concert with Drs. Gerberich, Alexander, and Church and Mr. Ryan. She also teaches the core courses, PubH 6150 and PubH 6170.

Gurumurthy Ramachandran, PhD (Professor, Division of Environmental Health Sciences). Dr. Ramachandran is Director of the Industrial Hygiene program. Dr. Ramachandran's research interests and expertise include occupational and ambient exposure assessment, Bayesian methods in retrospective exposure assessment, inhalation dosimetry for mixed exposures, aerosol measurements, theoretical and experimental studies on design of aerosol samplers, and inversion methodology.

Peter Raynor, PhD. (Assistant Professor, Environmental Health Sciences) coordinates relevant doctoral training within the Industrial Hygiene program with Dr. Ramachandran. Dr. Raynor's research focuses on air filtration, air pollution control, measurement of volatile aerosols, metalworking fluids, aerosol physics, biological aerosols, and exposure assessment.

B. Goals and Objectives

As identified by the National Institute for Occupational Safety and Health (NIOSH), the Education and Research Centers (ERCs) are centers of excellence in preventive occupational safety and health research and professional training and represent a variety of strengths and approaches that are required in order to promote high quality research. They are a major vehicle for the development of future leaders in occupational safety and health research and are structured to foster development of interdisciplinary research skills that are needed to address the NORA priority areas effectively. Furthermore, they are a critical link to occupational safety and health professionals and others who translate research findings into interventions that can ultimately prevent illness and injury in the work environment.

The purpose of the NORA Research Support Program has been to address the primary objective and relevant goals identified below. This effort builds on those programs and curricula established by the four pertinent doctoral programs (Occupational and Environmental Health Nursing [OEHN], Occupational Health Services Research and Policy [OHSRP], Occupational Injury Prevention Research Training Program [OIPRTP], and Industrial Hygiene [IH]) in the MCOHS, to work toward accomplishment of the goals. Interdisciplinary interactions occur throughout the program efforts. Through the NORA Research Support Program, the MCOHS programs in doctoral training have developed a comprehensive collaborative approach toward accomplishment of the following:

Primary Goal: to address NORA priority areas that will ideally result in the reduction of injury and illness in the work environment

Objectives:

- 1. Assess regional research needs*
- 2. Provide administrative and technical support necessary to conduct relevant research*
- 3. Coordinate interdisciplinary research*
- 4. Train graduate students whose research addresses NORA priority areas*
- 5. Administer continuing education and outreach activities to disseminate NORA-related research findings to those who can affect changes that will ultimately reduce worker illness and injury*

C. Results/Discussion:

1. Assess regional research needs

Dr. Lisa Brosseau, in collaboration with Ms. Olson, has taken a lead role in facilitating periodic assessments, and has collaborated with other NORA faculty to identify regional research needs, using various approaches.

Prior assessments of regional research needs have identified agricultural safety, injury prevention, occupational health services research, exposure assessment methods, and non-invasive markers of exposure and health effects as important research areas. Recently, the MCOHS Deputy Director (Dr Brosseau), collaborating with ERC Directors from the University of Michigan and University of Illinois Chicago, assisted NIOSH personnel with delivery of a NIOSH Town Hall meeting in Chicago, December 2005, to gather input for updating the National Occupational Research Agenda (NORA). MCOHS personnel, Drs. Brosseau and McGovern (OEHN/OHSRP Director), and Minnesota health and safety professionals from 3M and St Paul Travelers' Insurance companies presented testimony on research needs in work organization, small businesses, occupational exposure measurement, and impulse noise in construction.

The Midwest Center also evaluated regional needs among alumni and employers for research-related skills. These included surveys of OEHN employers, focus groups with IH employers, and written surveys with OEM employers and Center alumni from each of the programs.

2. Provide administrative and technical support necessary to conduct relevant research

The administrative personnel and highly qualified faculty assembled for this unique program have enabled facilitation of doctoral research training pertinent to NORA priorities. Ann Fredrickson, Coordinator, developed and oversaw employer surveys, alumni surveys from the core programs, and implementation of focus groups with IH employers. Andy Ryan (Research Fellow) consults with MCOHS doctoral students on data quality assurance, interpretation of causal models, and analyses. He also assists in teaching Dr. Alexander's data applications course, preparing datasets, and resolving SAS coding problems. Rick Hoffbeck (Information Technologist) has also been involved in consulting with MCOHS doctoral students on data management and analysis and SAS coding, and has developed databases to be used in PubH 8100, Doctoral Seminar. He also provides technical support for a wide variety of computer hardware and software applications. Jim Fisher (Fiscal Coordinator) is responsible for the financial management of research projects, as well as trainee and research assistant appointments. Dr. Brosseau has been in charge of application, review, and award processes for small interdisciplinary research training projects.

3. Coordinate interdisciplinary research

The NORA faculty regularly met to discuss NORA training opportunities and the potential for interdisciplinary research efforts. In the past years, NORA trainees and faculty have been engaged in various interdisciplinary research efforts that have involved OHSRP, OEHN, IH, and OIPRTP doctoral programs, as well as the OEM residency program.

Most recently, a call for applications was distributed in September 2005; two applications were received. Peer reviewers from external institutions were requested to review these applications. Some revisions were made to each application as the result of reviewers' comments, and the amended applications were approved for funding, pending human subjects approval where required. Appropriate human subjects' approval was obtained from the Institutional Review Board. The two projects supported were:

Influence of Nanoparticle Exposures on Development of Chronic Obstructive Pulmonary Disease, Peter Raynor, PhD, PI (Programs involved: HSAT, IH, OEM)

This project related to the emerging concerns about nanoparticles and their potential health risks. It focused on developing the best procedures to characterize exposures to nanoparticles including an evaluation of the relative value of particle mass, number, and surface area concentrations and the relationships among these metrics. Another important step, was evaluating the efficacy of cytokine expression profiles, using protein array technology on sputum samples as biological markers of early response to nanoparticle exposure. OEM trainees were involved in this phase. Exposures and biological responses were measured for a small group of exposed and unexposed workers in cooking operations. Field data gathering is in progress, and one doctoral student was supported using these funds. Considerable problems were encountered in gaining access to a study population of exposed workers and, in the end, this project related more to exposure assessment than to assessing human health effects. Nonetheless, work sites were identified where significant exposures to nanoparticles occurred, and data from this survey has led to a more detailed R01 application.

Successful Return to Work for Traumatic Work Injury and Cancer Survivors, Nancy M. Nachreiner, PhD, PI (Programs involved: OIPRTP, OHN, OHSRP, OEM)

This project assessed factors that influenced successful return-to-work experiences, following a cancer diagnosis or serious work-related injury, and included an evaluation of compliance with the Americans with Disabilities Act. Dr. Nachreiner led this effort, with cooperation from Dr. McGovern (expertise in focus groups and policy evaluation), Dr. Gerberich (expertise in injury epidemiology), Dr. Alexander (expertise in injury epidemiology and cancer research); and Dr. Baker (expertise in return-to-work issues associated with occupational injuries and illnesses). This study addressed the following NORA priorities: traumatic injuries; special populations at work; and social and economic consequences of workplace illness and injury. Focus groups were utilized to assess: 1) individual factors (age, sex, race, marital status, education, occupation, health insurance coverage, household income, number of financial dependents, employee job satisfaction, years with current employer and ability to perform essential functions of current job, perception of pre-injury/illness health, presence of strong social support, receipt of disability compensation); 2) disease/injury factors (severity, treating physician's recommendation on return to work); and 3) environmental factors (employer size, employer willingness to engage in the ADA accommodation process, supervisor support). Results of the this project were included in an application to an NIH Career Advancement Program for Clinical Research Scholars administered at the University of Minnesota, and recently published in the AAOHN Journal.

4. Train graduate students whose research addresses NORA priority areas

The NORA faculty have been consistently funded for numerous research efforts and projects that provide training opportunities for students; these address a variety of occupational injury and illness problems that are among the NIOSH NORA priorities. Dr. Gerberich and her colleagues developed a five-state (Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska) network through the Regional Injury Prevention Research Center that has enabled several occupational studies that have served as a basis for training; these have included: machinery-related injuries; tractor-related injuries; fall-related injuries; injuries among children and adolescents; general agricultural-related injuries; and injury surveillance efforts. The development of the Center for Violence Prevention and Control has also enabled several endeavors in which students have been involved pertinent to work-related violence research, including those that address violence in health care and school settings. Both of these Centers have a major commitment to interdisciplinary collaboration in graduate education and quality research and have provided a further resource to the NORA training efforts. Data from many of the efforts identified have been presented at major professional meetings and have been used (and will continue to be used) to develop recommendations and specific prevention and control efforts that can impact on worker safety.

Course requirements for the respective doctoral programs provide a foundation for research training. The NORA Research Support Program builds on this foundation to facilitate courses/training that will better prepare students in research principles and applications that will enable them to conduct and evaluate relevant research. A new opportunity, provided to students, is a hands-on programming

course. While some of their required courses have involved SAS and other similar programs, this content/application has been addressed only superficially and has not been adequate for implementation of the thesis efforts. A second course, that was developed and implemented for benefit of the NORA, in 2003, provides training in applied research through the analyses and interpretation of data pertinent to major occupational problems, using large databases and involves team projects that result in publication-quality papers. This course, PubH 6193, "Applied Analyses of Occupational and Environmental Health Data," serves as a basis for strengthening individual research proposals and theses conducted on various NORA priorities. Dr. Bruce Alexander leads this effort, in concert with Drs. Gerberich and the Statistical Applications Specialist, Andrew Ryan; Dr. McGovern has also participated in this course.

Funds recently supported four doctoral students from the OIPRTP, OEHN, and OHSRP programs, conducting research in work organization, environmental risk communication among Native Americans and work-related risk factors among rural youth. Based on completed work from the course, Applied Analyses of Occupational and Environmental Health Data (taught by Drs. Alexander, Gerberich (Co-Directors, OIPRTP) and McGovern (OEHN, OHSRP), aimed at enhancing analytical skills of graduate students from the various MCOHS programs; papers for publication and presentations resulted. These are:

- Grice M (OHSRP) with Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan, McGovern PM: Past violence, future violence: the effect of history of violence on nurses' risk of work-related physical assault, Academy Health Annual Research Meeting, Boston, 2005.
- Grice M (OHSRP) with Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan, McGovern PM: Past violence, future violence: the effect of history of violence on nurses' risk of work-related physical assault, American Public Health Association Meeting, Washington DC, 2005.
- Grice M (OHSRP), Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan AD, and McGovern PM: Past Violence, Future Violence: The Effect of History of Violence on Nurses' Risk of Work-Related Physical Assault. Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.
- Feda D (OIPRTP) and Grice M (OHSRP) with McGovern, B Alexander, and B Dowd, The Impact of Work-Family Conflict on Maternal Health after Childbirth, Women's Health Research Conference, University of Minnesota, 2005.
- Carlson KF, Langner DM, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: [2006] Do parents' agriculture-related injuries influence their children's risk of injury? Analyses from the Regional Rural Injury Study-II. Archives of Pediatrics and Adolescent Medicine (11):1137-1142.
- Ferguson K, Langner D, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: The History Of Parent Agricultural Injury And Risk Of Child Agricultural Injury; Regional Rural Injury Study-II (RRIS-II). 7th World Conference on Injury Prevention and Safety Promotion, Vienna, Austria. Best Poster Award, 7th World Conference on Injury Prevention and Safety Promotion in Vienna Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.
- Ferguson K, Langner D, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: The history of parent agricultural injury and risk of child agricultural injury; Regional Rural Injury Study – II (RRIS-II), 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, Minneapolis: University of Minnesota, May 2004.
- Stedman-Smith M (OEHN), McGovern PM, and Alexander BH: Listening to the Tribe -- Using Focus Groups to Hear the Environmental Health Concerns of the Mdewakanton Dakota Sioux Community Living Near a Nuclear Power Plant, Albuquerque, AAOHN Annual Symposium and Exposition, 2006.
- Dagher R (OHSRP), McGovern PM, Roebert Rice H, and Dowd B: The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis, resulted in a completed research effort that is in preparation for a peer-reviewed publication, "The Psychosocial Work Environment and Maternal Postpartum Depression: A Longitudinal Analysis." This study combined theoretical perspectives from the fields of sociology and occupational health psychology to explain the risk and protective factors of postpartum depression among employed women during the first year after childbirth and has implications for prevention efforts.
- A recent initiative with organized labor involved Professors McGovern, Brosseau, Nathan Barleen (OHSRP student), and Ann Fredrickson (Administrative Core) to conduct a literature review of the cost-effectiveness of worksite interventions for safe patient lifting in the nursing home environment, and diabetes education in the worksite for United Transportation Union and United Food and Commercial Workers, Local 789. In spring semester 2007 Mr. Barleen, Dr. McGovern, and Ann Fredrickson met with the union representatives for Nathan Barleen to present his research, which was very favorably received.

- Bufford Ang (IH) was supported to develop research-to-practice applications in local businesses, resulting directly from graduate student and faculty research projects.

In total, nine graduate students from the IH, OEHN, OHSRP, and OIPRTP programs have received support for interdisciplinary NORA-related research training projects. In addition, through other funding, several others have also focused on NORA-related research.

The publications and presentations of faculty and students are included in the Appendices, listed by Academic Program. .

5. Administer continuing education and outreach activities to disseminate NORA-related research findings to those who can affect changes that will ultimately reduce worker illness and injury

Students and faculty have been actively involved in authorship of peer-reviewed publications (Appendix 1) and presentations of project/research findings at major professional meetings at the local, national and international levels (Appendix 2). Outreach and continuing education activities are extensive and included with the program reports in the Appendices:

- The major two-day 2004 Symposium, "The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century," sponsored by the National Occupational Research Agenda (NORA) and Occupational Safety and Health Research (OSHR) Programs. In concert with the continuing education program staff, Drs. Gerberich and McGovern developed and co-hosted this successful effort, which was advertised locally and nationally; 75 individuals enrolled for the symposium as speakers or participants from five states, Washington, DC, and the Philippines, and represented major health care organizations, industry, professional and labor organizations, and academic settings. Among 25 research presentations, five national speakers, 11 NORA faculty and 3 students participated, in addition to others.
- From the Spring 2005 NORA Seminar Series, organized by Drs. Gerberich, McGovern, and Brosseau, and Dean Olson, in collaboration with the Centers for Public Health Education and Outreach, the programs addressing NORA-related research-to-practice, are now available via streaming video: Dr. Sokas, UI, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations;" Dr. Ashford, MIT, "The Consequences of Thinking About Environmental and Occupational Health as Separate Entities;" and Dr. Wegman, UM, "Health and Safety Issues in the Aging Workforce." To date, over 200 hits have been documented. (<http://www.sph.edu/publichealthplanet/events/NORA.html#022405>).
- The 2007 NORA Conference, "Occupational Health and Safety Research to Practice" organized by Drs. Brosseau, McGovern, Alexander, and others, featured two national guest speakers. Laura Punnett, Sc.D., Professor, Department of Work Environment, University of Massachusetts Lowell; Center for the Promotion of Health in the New England Workplace presented the lecture titled, "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs." The second presentation, "A Model for Implementing, Evaluating and Translating Violence Prevention Intervention Research In The Health Care And Social Service Workplace," was given by Jane Lipscomb, PhD, RN, FAAN, Professor and Director, University of Maryland Baltimore (UMAB) School of Nursing, Work and Health Research Center.
- Dr. Gerberich teaches, with Drs. Alexander and Gurney, among others, including Drs. Church and Maldonado, the PubH 8120 program research seminar which now involves several disciplines and has included institutional and community-based researchers together with the students in critiquing various research and programmatic efforts and applying the research process. Dr. Gerberich has participated in the Environmental Health Sciences Core Course, PubH 6103, Exposure to Environmental Hazards; for this course, she developed/presented a lecture pertinent to identification and measurement of exposures to determine potential risk factors for injury consequences. These courses are all interdisciplinary and involve persons from both within the University, across numerous departments, as well as those from outside the University. In 2007, she redesigned the Occupational Safety Seminar course to include topics across the realm of occupational hazards; this involved invited faculty with expertise in each of the areas.
- Dr. Alexander participated in a large share of the teaching for PubH 5140, Occupational Epidemiology (2 credits) and collaborates with Dr. Gerberich in PubH 8120 and Dr. Church in PubH 8141 each semester. Dr. Alexander, along with Dr. Gerberich, Dr. Gurney, and Andrew Ryan, M.S., developed and piloted, in 2003, a very successful new course: Applied Analyses of Occupational and Environmental Health Data. Dr. Alexander participated in a Public Health Workshop: Epidemiology and Surveillance for Health Promotion, National Center for Disease Control, Tbilisi, Republic of Georgia (Russia). This workshop was sponsored by the American International Health Alliance with a grant from the United States Agency for International Development. The goals of this grant are to improve the public health infrastructure of the Republic of Georgia; aims of the grant and workshop include training public health professionals in the modern sciences of public health.

- Dr. Maldonado offers several courses, critical to projects and research that involve not only students in the program and within the division but, also, numerous students from other programs. These courses include: PubH 8140, Validity Concepts in Epidemiologic Research (2 credits) and PubH 8150, Doctoral Seminar in Observational Inference (2 credits/semester) which he teaches with Dr. Church.
- Interdisciplinary programming among seven local occupational health and safety professional associations and educational providers is a continuous effort for which Dean Olson and program graduates provide major leadership. These organizations include: Minnesota Safety Council; Minnesota Association of Occupational Health Nurses; North Central Occupational Medicine Association; Northern Chapter, American Society of Safety Engineers; Upper Midwest Section, American Industrial Hygiene Association; allied health care providers (Minnesota Association of Rehabilitation Providers; and continuing education providers (Midwest Center for Occupational Health and Safety). All seven local occupational health and safety professional associations and educational providers have sponsored joint meetings held in Minneapolis.
- Dean Olson developed the course and is the primary faculty for, PubH 5201 Issues in Environmental and Occupational Health (2 credits, Summer Session and 2 credits, Fall Semester); offered as an online course offered to an interdisciplinary audience of public health, health care management, nursing and medicine students (50-70 students per semester). This course was developed for persons for whom Environmental and Occupational Health is not a major field. It is the intent of the course to assist the students in becoming aware of the field and with the concepts upon which interventions are based, and to practice identifying specific problems and relevant interventions in their own community or workplace. In addition, Dean Olson was involved in teaching PubH 5770 Principles, Practice, Ethics and Issues of Public Health (2 credits, SSI, one, two-hour session on "Environmental Health Issues and Regulation" for health care administration and ISP students.
- Assistance to schools outside the parent institution include the provision of course syllabi and information relevant to the development of occupational programs to: 1) University of Alabama (Gerberich; Maldonado); 2) The Johns Hopkins University (Gerberich); 3) University of Kentucky (Gerberich); 4) Oregon University (Olson); 5) University of Saskatchewan (Gerberich); 6) University of Iowa (Gerberich); 7) University of California-Sacramento (Gerberich); 8) 35 nursing schools in 26 states (Olson); 9) Concordia College, Minnesota (Olson); 10) University of Idaho (Gerberich); 11) University of North Carolina (Maldonado). Dean Olson was involved in development and teaching: Environmental Health and Nursing: Introduction (online 3 CEU Module) -- offered under the Midwest Center for Life-Long-Learning in Public Health in collaboration with colleagues at Johns Hopkins and University of North Carolina, first of a series of modules offered to nurses and nursing programs. University of North Dakota School of Nursing, University of Wisconsin - Green Bay and Metro State University nursing programs have piloted and adopted content. This effort has been funded by HRSA/ATSDR cooperative agreement but complements those efforts of the MCOHS to introduce the concepts of environmental and occupational health to a broad audience of health professionals.
- Dr. McGovern and Dr. Dowd organized a joint division, student and faculty seminar to create awareness of the field of occupational health services research -- one of the NORA priorities. Professor Allard Dembe, from the OHSR training program at University of Massachusetts Medical School and Harvard School of Public Health, presented a seminar, "National Perspectives on Occupational Health Services Research." Members of the OHSRP advisory board and Minnesota OSHA's research staff were in attendance. Professor Dembe also participated in the program's advisory board meeting and shared his experiences developing the Massachusetts, OHSR training program.
- Dr. McGovern worked with Alden Hoffman, CIH, Director, OSHA Management Team, an occupational and environmental health nursing (OEHN) student and an industrial hygiene doctoral student to analyze three years of OSHA inspection data on health and safety violations in the auto body repair industry. This project addresses the NORA priority of health services research. The objectives for the OHN student intern were to identify the most common violations and create a communication strategy for outreach on prevention and control to shop owners and relevant trade associations.
- Dr. McGovern collaborated with Professor Al Dembe, from the University of Massachusetts Medical School and Harvard School of Public Health, to manage a student and faculty journal club from 2002 to 2006 for the four NIOSH supported OHSR training programs that involve the use of distance learning technologies.
- Professor McGovern (PI), Professor Bryan Dowd and others collaborated on a longitudinal study entitled, "The Impact of Total Workload on Maternal Postpartum Health and Quality of Life," to investigate the changes in women's postpartum health as they return to work following childbirth and the impact of job characteristics, total workload and work-family conflict. Funded by NIOSH, this project addresses two NORA priorities -- special populations -- at-risk (women workers) and work organization

(job design characteristics). Dr. McGovern also advised: a doctoral student from the Division of Health Services Research and Policy in using this data set for dissertation research investigating the effects of job stress on maternal postpartum depression; a doctoral student from EHS using this data set for dissertation research investigating the effects on work-family conflict on maternal postpartum physical and mental health; and several master's-level students.

- Dr. Dowd led the cost analysis on a project with the Minnesota Health Partnership, funded by the Robert Wood Johnson (RWJ) Foundation. This project evaluates the effect of an innovative, cooperative effort of health care systems, clinics and employers to help employees return to work after experiencing adverse health events. The final report is being prepared for this project.
- Dr. McGovern accepted the first ever "experienced researcher award" from the Foundation of the American Association of Occupational Health Nurses for her research addressing work-related violence in the health care industry at the American Occupational Health Conference. She recently stepped down from her appointment on the Minnesota OSHA Advisory Council, which began in 2001, ending a six-year commitment. Among the projects under review by the Council are Minnesota OSHA's response to the issue of ergonomics regulation, fatalities in the construction industry, and an evaluation of Minnesota OSHA's program, activities -- consistent with the NORA priorities of health services research and musculoskeletal disorders.
- Dr. Ramachandran developed and taught the Professional Development Course (PDC) at the American Industrial Hygiene Conference and Exposition (AIHCE) 2003 titled "Mathematical Models for Assessing Exposure to Air Contaminants." He also served as Chair of the Scientific Review Board, University of Minnesota Pilot Projects Research Training Program. In addition, he taught a Certified Industrial Hygiene review course for professionals at the Midwest Center continuing education program in 2003 and lectured on aerosol science and exposure statistics.
- Dr. Brosseau co-taught a Professional Development Course at the American Industrial Hygiene Conference and Exposition (AIHCE) in 2004 titled, "Using a Systematic Approach for Exposure Prevention." She also gave a presentation on "Occupational Exposure Limits for Particulates Not Otherwise Specified (Nuisance Dusts)" to the Pharmaceutical Forum at the 2004 AIHCE; she presented to this same group at the 2003 AIHCE about "Particle Size Selective Sampling." In 2003, she lectured in a Certified Industrial Hygiene Review course for professionals at the Midwest Center continuing education program on basics of air sampling. Dr. Brosseau also gave presentations on occupational exposure limits at ACGIH symposia on enzymes, isocyanates and other topics in 2003 and 2004. In 2003, she made a presentation on TLVs to the Cincinnati chapter of the American Industrial Hygiene Association.; during this same year, she gave a NIOSH-wide presentation on small business intervention research (delivered via ITV).
- Dr. Raynor developed three one-credit courses for the University of Minnesota's Public Health Institute in May and June 2005. These courses dealt with (1) personal protective equipment, (2) health and safety protection for building occupants, and (3) workers as partners in emergency response. He also developed a Professional Development Course for the 2005 American Industrial Hygiene Conference and Exposition entitled, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres." Dr. Raynor serves as the Chair of the Scientific Review Board for the University of Minnesota Pilot Projects Research Training Program in 2004. He is also the Program Director for the Hazardous Substances Academic Training Program in the NIOSH-funded Midwest Center for Occupational Health and Safety.

Program Evaluation

Participating faculty and students are involved in the ongoing evaluation of the MCOHS and Programs, including NORA. Program evaluation is managed through a number of activities, including: 1) course/symposium evaluations; 2) informal feedback solicited from students during the advising process and from faculty; 3) exit interviews with students upon graduation; 4) documentation of the positions assumed by graduates and the 5) presentations and publications that disseminate search findings. Advisory boards also participate in relevant evaluation.

D. Conclusions

These faculty members, with teaching and research expertise in the program area, provide a strong and unique combination that provides great breadth and depth to research training that is highly relevant to the NORA agenda. They contribute, significantly to the strength and continued growth of the program.

5. M. Pilot Projects Program
Director: Lisa Brosseau, ScD

Pilot Projects Program
Director: Lisa Brosseau, ScD

A. Background

The Pilot Research Project supplementary program, which began in September 1999, sought worthy small research projects to fund within the Education and Research Center and at other academic institutions in the region. In this regard, more specific funding criteria were developed and the "pilot" concept was reinforced to emphasize funding for projects that would not ordinarily be funded from other sources. The program supported student projects, faculty at outside institutions who would not normally engage in research (this is an important way that such faculty may learn about research methodologies and what is needed to put together a research proposal—in other words research manpower development), and active research faculty who need to explore new areas for which they have no pilot data that would allow them to apply elsewhere for funding. Applications continually improved in quality over the years of the program as a result of the changes made in defining the purposes of the grants. The previous review of the program in February 2006 stated that while the program was well-conceived with clear links to NORA, the number of applications received was not large. The program has since been discontinued. Because funding was received for a portion of this past five-year time period, the program is described below, based on the years for which it was funded.

Program Plan

The purpose of the Pilot Project Research Training Program was to enhance the research training in occupational health and safety provided by the University of Minnesota Education and Research Center--the Midwest Center for Occupational Health and Safety. Under the guidance of the Director of the Pilot Projects Research Training Program (PPRTP), and through the input of a Scientific Review Board, requests for proposals (RFP) were developed and circulated, proposals were reviewed, awards were made, progress of awards was monitored, and outcomes of the program were documented.

Awards were intended to enhance the research, training and outreach missions of the Midwest Center for Occupational Health and Safety (MCOHS) by building research capacity within the Midwest Region (Minnesota, Wisconsin, North Dakota, and South Dakota) in the field of occupational health and safety. Applications were encouraged from researchers (faculty and masters and doctoral students) at the University of Minnesota, as well as from other educational and research institutions throughout the Midwest Region. In accordance with its outreach mission, at least one member of the Scientific Advisory Board was a member from a program external to the University of Minnesota.

B. Goals and Objectives:

The goals of this Program were to:

- Provide funding for pilot and small-scale research projects that would lead to more extensive research efforts.
- Provide funding for beginning faculty, faculty in other disciplines whose research was relevant to occupational health and safety, and students (doctoral and masters) seeking to complete their research projects.
- Provide funding for researchers at institutions throughout the Upper Midwest.
- Enhance grant-writing experience and research expertise of beginning faculty and students.
- Increase collaboration between experienced and inexperienced researchers.
- Encourage occupational health and safety research, particularly in areas relevant to the NIOSH Occupational Research Agenda.

C. Results and Discussion:

Attainment of these goals was accomplished by:

- Broad dissemination of Program information and application deadlines throughout the University and other Upper Midwest educational institutions, using a variety of media (web, written flyers, email).
- Input and advice to applicants by the Program Director (Dr. Brosseau).
- A short, straightforward application process available on the web, with easy-to-download forms.
- Several application deadlines.

- Written feedback to all applicants from the Scientific Review Board.
- Encouragement of unsuccessful applicants to re-apply.
- Publication of research abstracts on the web.
- Poster presentations by researchers at the annual MCOHS Advisory Board meeting.
- Relatively quick response to applications (within 1 month of submission).
- A Scientific Review Board consisting of researchers in a variety of occupational health and safety disciplines from a variety of educational and stakeholder institutions.

Program Announcement and Competition

A mailing list of regional programs and researchers was developed through: 1) recommendations from MCOHS and faculty from the Division of Environmental and Occupational Health (now Division of Environmental Health Sciences); and 2) web searches of all colleges and universities within the immediate region (North Dakota, South Dakota, Minnesota, and Wisconsin). In the latter case, the words "safety" and "environment" were used to identify appropriate programs and researchers. Programs and individuals were located at the University of Minnesota (Minneapolis, St Paul, and Duluth campuses); University of Wisconsin (Stout, Madison, Eau Claire, Whitewater, Stevens Point and Platteville campuses); University of North Dakota; Concordia College (MN); North Dakota State University; South Dakota State University; South Dakota School of Mines and Technology; Marshfield Clinic (WI); and the Minnesota State Colleges and Universities Fire/EMS/Safety Center. In addition, all faculty and students at the University of Minnesota School of Public Health and other relevant departments (e.g., engineering programs, environmental science programs) received announcements. The mailing list was reviewed and updated regularly.

A description of the Pilot Projects Program was included on the Division website (linked directly from the home page). One month prior to the application deadline, an announcement was sent by email to everyone on the mailing list, directing them to the web page for more information on the program, application process, and examples of past awards. Decisions and awards were made no more than a month after the application deadline. The web page had links to the NIOSH NORA web page, Adobe pdf files with sample budget and compliance/signature pages, and descriptions of past, funded projects. Web page visitors could also send an email to the director (Dr. Brosseau), requesting placement on the mailing list. Making awards twice a year allowed accommodation of student schedules and needs.

Scientific Merit Review Process and Criteria

The Scientific Review Board played a key role in the support of this grant program. The Board: 1) reviewed and ranked research proposals and made funding recommendations to the Directors (Brosseau and Greaves); 2) proposed additional programs and individuals for the mailing list; 3) reviewed and recommended changes to the program announcement, application review process and criteria, as necessary; and 4) recommended particular focus areas for funding. The Scientific Review Board members were experts from academia and industry who had research and professional interests in occupational health and safety. They represented a range of professions, including engineering, medicine, epidemiology, industrial hygiene, nursing, and safety/injury prevention. One member of the Board must come from outside Minnesota. Dr. Ruenger, Director of the NIOSH-funded Industrial Hygiene Training Program at the University of Wisconsin-Stout, served in this capacity.

The Scientific Review Board was chaired by Dr. Gurumurthy Ramachandran, Professor, who directs the Industrial Hygiene Program. The process followed by the Board is described below:

1. Applications were received by the Program Director, copied and distributed to the Scientific Review Board members. This occurred no later than two weeks after the application deadline. A conference call was arranged.
2. The Board Chair led a discussion of each application, seeking input and consensus on scores (see below) and funding recommendations. (Members of the Board with conflicts did not participate in the discussion.)
3. The Board chair prepared a summary of comments, scores and funding recommendations for each application. All members of the Board were given an opportunity to review and comment, after which a final report was sent to the Directors (Brosseau and Greaves).

4. Final funding decisions were made by the Directors. Dr. Brosseau sent a letter to each applicant. If appropriate, conditions to satisfy (human subjects, etc.) were noted in this funding letter. Once all conditions were satisfied, funding officially began. In the case of external applicants, a sub-contract was established between the University of Minnesota and the applicant's institution. Unsuccessful awardees received written comments and were encouraged to re-apply.
5. Unsuccessful applicants were also sent a letter, accompanied by the comments of the Scientific Review board. These applicants were strongly encouraged to re-apply.

Review criteria for proposals submitted to the Research Training Program included the following:

Research Score (60%) includes an assessment of:

- Overall scientific merit: The applicant must submit an original and feasible proposal that demonstrates the applicant's understanding of the proposed field of research. Prior research experience is not necessary.
- Purpose: A clear statement and description of the purpose of the research project must be included.
- Specific objectives and goals: Specific goals of the research project must be listed and defined.
- Methods: The methods proposed for carrying out the research must be defined and described clearly.

Programmatic Score (40%) includes an assessment of:

- Meeting NIOSH NORA objectives: The research priorities identified in the NIOSH National Occupational Research Agenda will be used to evaluate the relevance of research proposals to the field of occupational health and safety. In addition, one or more current occupational health and safety issues of particular relevance in the Upper Midwest Region (for example, agricultural health and safety) could be identified in the program announcement to encourage proposals focused in these areas. The MCOSH advisory board members were asked to prioritize the NORA topic areas and to identify specific regional needs within the top five areas. The most important topic areas identified by eighteen respondents included: mixed exposures (e.g., solvents); Indoor environment (e.g., sampling protocols); exposure assessment methods; social and economic consequences of workplace illness and injury (e.g., impacts following injuries); emerging technologies (e.g., resources for control technologies available to small businesses); special populations at risk (e.g., new immigrants — training needs and cultural biases); risk assessment methods.
- Building research capacity among trainees and new investigators: The research funds provided by this proposal were to facilitate trainees undertaking more research opportunities and in greater depth, providing support particularly for those projects that were innovative and likely to lead to further research activities.
- Involving multiple stakeholders: Proposals for pilot funding that sought to involve multiple interested parties – such as employees, organized labor, employers, state officials, academics, etc. – were encouraged. Similarly, proposals that include the participation of Training Program Grantees or investigators at other academic institutions in the region are particularly encouraged.
- Evaluating intervention strategies and their effectiveness: Proposals that address intervention strategies and/or the evaluation of interventions will receive particular recognition under this criterion.

Program Records

The Director of the Pilot Projects Research Training Program maintained written records of all materials relevant to the program, including announcements, correspondence with the Scientific Review Board and applicants, research proposals and their reviews, human subjects and other required approvals, subcontracts to external applicants, budget reports and all correspondence relating to budgets and final reports from grantees.

Faculty Reputation and Strength

The personnel involved with this Program were highly qualified in occupational health and safety research. They included:

- Ian Greaves, MD (ERC Director and Occupational Medicine faculty) is an occupational physician with research interests relating to airborne workplace exposures and resulting health effects, primarily as these effects relate to the lungs, and workplace hazards of small businesses and in agriculture. Dr. Greaves supervises occupational medicine residents in their didactic training and research projects.
- Lisa Brosseau, ScD (Director of the PPRTP, Co-Technical Director of the Hazardous Substance Training Continuing Education Program) is an industrial hygienist with research expertise in respiratory protection, biological aerosols, and the effectiveness of interventions in small businesses. Dr. Brosseau supervises masters' and doctoral students and teaches courses in the Industrial Hygiene and Hazardous Materials curriculum.
- Gurumurthy Ramachandran, PhD (Director Industrial Hygiene Program, Chair Scientific Review Board) is an industrial hygienist with expertise in the areas of occupational exposure assessment, exposure modeling, statistical methods for assessing historical exposures, development of aerosol samplers, indoor air pollution, and urban environmental air pollution. Dr. Ramachandran's

research projects funded by NIOSH and NCI focus on developing methods to estimate historical exposures to silica and nickel using a combination of sparse measurements, physical modeling, and expert inputs within a Bayesian probabilistic framework. He has also led studies funded by Health Effects Institute on exposure assessment of diesel exhaust aerosol in bus drivers, parking lot attendants, and bus garage mechanics, where such exposure levels are close to ambient levels. Other ongoing studies include indoor air quality assessment in elementary schools in the Twin Cities, funded by the USEPA, where a wide range of air quality parameters and levels of volatile organic chemicals and bioaerosols were measured.

Collaboration with Regional Research Training Institutions

Dr. Eugene Ruenger, Director of the University of Wisconsin (Stout) Industrial Hygiene Training Program, is a graduate of the University of Minnesota Midwest Center and served as a member of the Scientific Review Board. Dr Ruenger also serves on the Scientific Advisory Board of the IH program, which provides feedback on PP RTP efforts.

Program Evaluation

Several measures were used to assess the program and its outcomes:

- Progress of pilot projects and the use of funds. The Directors (Brosseau and Greaves) established a program of review and oversight for each awardee aimed at assessing the progress of each pilot research project. The Director could disapprove expenditures that did not meet the guidelines established for these awards, and could suspend or terminate an award if progress was unsatisfactory. Prior to the award, the grantee was required to demonstrate that appropriate institutional review and approval of human subjects, animal subjects, etc. was obtained.
- Final reports. One month after funding ended, each awardee was required to submit a final report describing the key findings of the research, any publications resulting from the project, and subsequent research planned or on-going. The Directors maintained a file of these reports and copies of resulting publications.
- Theses, Publications, Related Grants. All past awardees were surveyed every 4 years about their experience with this program and resulting publications, grants, etc.
- Periodic Review of Projects and Regional Needs by ERC Advisory Board. An annual report on the pilot projects was made to the ERC Advisory Board. This group was asked periodically to identify specific regional needs for more focused requests for proposals.
- Participation at Annual ERC Advisory Board Meeting The ERC Advisory Board and Executive Committee received an annual report of pilot project awards and activities at a meeting held every spring. A poster presentation of pilot projects awarded and completed was also made at this meeting. Awardees were invited to attend this meeting to present their results in more detail as a poster.

Program Support From Other Sources

MCOHS faculty conduct a considerable amount of research, as research is one of the primary missions of the University of Minnesota. They have a proven track record in receiving federal and state grants and private contracts for their research — and many students benefit directly from these. On the other hand, there are no other intramural funding programs available for students in the Midwest Center or the Division of Environmental and Occupational Health. At the University of Minnesota, masters' students are required to pursue a research project; many of these are funded through extramural research funding received by a faculty investigator. If students wish to pursue a particular project, they have few avenues for funding support. Doctoral students also generally rely on extramural research funding (grants and contracts) for support of their research. Again, if they wish to pursue projects of their own interest, there are few funding sources available to them (other than NIOSH small grants, which can take more than a year to receive). Other institutions in the Upper Midwest have even fewer resources for student research funding available to them. This program represents a much-needed resource for students and early investigators who need small amounts of funding with a relatively quick and simple review process.

Pilot Project Research Training Record

July 2002-June 2003:

In the July 2002 to June 2003 period, four applications were approved for funding.

1. QSAR Models of in vitro Steroid Hormone Receptor Activity for Alkylphenol and Bisphenol A Analogs; Kelly P Coleman (doctoral student) and William Toscano, PhD, Professor (advisor), University of Minnesota, Division of Environmental and Occupational Health

2. Effects of Quality Management on Construction Worker Safety; Todd Loushine (masters student) and Michael Smith, PhD, Professor (advisor), University of Wisconsin-Madison, Department of Industrial Engineering

3. Developing a Better Vapor/Aerosol Sampler; Seung Won Kim (doctoral student) and Peter Raynor, PhD, Assistant Professor (advisor), University of Minnesota, Division of Environmental and Occupational Health

4. Study of the Effect of Ethanol Interference in Toluene Sampling; Sreeram Kailasanathan (masters student) and Claudiu Lungu, PhD, Assistant Professor (advisor), University of Minnesota, Division of Environmental and Occupational Health

July 2003-June 2004:

During this budget year, the Pilot Project research training program provided funding for four proposals.

1. Characterization of new Composite Microporous Fibers (CMF) as gases and vapor adsorbents. Ji Young Park, PhD student, Division of Environmental Health Sciences, University of Minnesota.

2. Job Stress and the Postpartum Mental Health of Employed Women. Rada Dagher, Ph.D student, Division of Environmental Health Sciences, University of Minnesota.

3. The role of Mycotoxin-associated Fungal Particulates in Human Health. Dawn C. Errede, Ph.D student, Division of Environmental Health Sciences, University of Minnesota.

4. Bioactivity of TSCA Inventory Bisphenols and Alkylphenols. Kelly Coleman, Ph.D student, Division of Environmental Health Sciences, University of Minnesota.

July 2004-June 2005:

During this budget year, the Pilot Project research training program provided funding for four proposals.

1. Work System Characteristics of a Case Center for the Developmentally Disabled, and their Relationship to the Safety of Caregivers. Todd Loushine, Risk Management Specialist and Doctoral student, Wisconsin Department of Health and Family Services.

2. Effect of Voltage on Weld Fume Generation and Characteristics. Catherine Hovde, MS student, Division of Environmental Health Sciences, University of Minnesota.

3. The Etiology and Consequences of Injuries to Veterinary Technicians, Leslie Nordgren, Doctoral Student, Division of Environmental Health Sciences, University of Minnesota.

4. Factors affecting virus nebulization and filter efficiency for viruses, Seung Won Kim, Doctoral Student, Division of Environmental Health Sciences, University of Minnesota.

July 2005-June 2006:

This Program was not funded in 2005-2006.

July 2006-June 2007:

This program was not funded in 2006-2007.

D. Conclusions

The Pilot Projects program assisted in funding 12 projects during the 2002-2005 project years, on a variety of topics ranging from injuries to Veterinary Technicians to the characterization of new composite microporous fibers. This funding was instrumental in assisting Masters and Doctoral students in completing their degrees.

FINAL PERFORMANCE REPORT

for the

Midwest Center for Occupational Health and Safety (MCOHS)
A National Institute for Occupational Safety and Health funded
Education and Research Center
Grant Number T42 OH008434

APPENDICES

July 1, 2002 – June 30, 2007

APPENDIX 1: PUBLICATIONS

Appendix 1. A. Industrial Hygiene Program
Director: Gurumurthy Ramachandran, PhD

Industrial Hygiene Program

[Note: faculty and staff names are in bold font and student names are underscored]

Journal Articles

- Kim SW, Ramakrishnan MA, Raynor PC, Goyal SM: [in press] Effects of Humidity and Other Factors on the Generation and Sampling of a Coronavirus Aerosol. *Aerobiologia* {Product of a doctoral student's research}
- Hovde CA, Raynor PC: [in press] Effects of Voltage and Wire Feed Speed on Weld Fume Characteristics. *Journal of Occupational and Environmental Hygiene* {Product of a trainee's research}
- Saravia SA, Raynor PC, Streifel AJ: [2007] A Performance Assessment of Airborne Infection Isolation Rooms. *American Journal of Infection Control* 35:324-331 {Product of a trainee's research}
- Farnsworth JE, Goyal SM, Kim SW, Kuehn TH, Raynor PC, Ramakrishnan MA, Anantharaman S, and Tang W: [2006] Development of a Method for Bacteria and Virus Recovery from Heating, Ventilation, and Air Conditioning (HVAC) Filters. *Journal of Environmental Monitoring* 8:1006-1013 {Product of a doctoral student's research}
- Raynor PC, Kim SW, Bhattacharya M: [2005] Mist Generation from Metalworking Fluids Formulated Using Vegetable Oils. *The Annals of Occupational Hygiene* 49:283-293 {Product of a doctoral student's research}
- Brosseau LM, Raynor PC, Lungu C [2005] Employers' Expectations of Knowledge and Skills of Master's-Trained Industrial Hygienists. *Journal of Occupational and Environmental Hygiene* 2:1-7. {ERC-supported evaluation of training programs}
- Olson DK, Lohman WH, Brosseau LM, Fredrickson AL, McGovern PM, Gerberich SG, Nachreiner N: [2005] Crosscutting Competencies for Occupational Health and Safety Professionals. *Journal of Public Health Management and Practice* 11:235-243 {ERC-supported evaluation of training programs}
- Raynor PC, Chae SJ: [2004] The Long-Term Performance of Electrically Charged Filters in a Ventilation System. *Journal of Occupational and Environmental Hygiene* 1:463-471 {Product of a trainee's research}
- John J, Bhattacharya M, Raynor PC: [2004] Emulsions Containing Vegetable Oils for Cutting Fluid Application. *Colloids and Surfaces A: Physicochem. Eng. Aspects* 237:141-150
- Letts GM, Raynor PC, Schumann RL: [2003] Selecting Fiber Materials to Improve Mist Filters. *Journal of Aerosol Science* 34:1481-1492 {Product of a trainee's research}
- Raynor PC, Chae SJ: [2003] Dust Loading on Electrostatically Charged Filters in a Standard Test and a Real HVAC System. *Filtration and Separation* 40:35-39 {Product of an ERC-faculty's research}
- Raynor PC: [2002] Flow Field and Drag for Elliptical Filter Fibers. *Aerosol Science and Technology* 36:1118-1127 {Product of a ERC-faculty's research}
- Lazovich D, Parker DL, Brosseau LM, Milton FT, Dugan SK, Pan W, Hock L: [2002] Effectiveness of a Worksite Intervention to Reduce an Occupational Exposure: The Minnesota Wood Dust Study. *American Public Health Association Journal*, 92:1498-1505 {Product of a trainee's research}
- Raynor PC, Kim BG, Ramachandran G, Strommen MR, Horns JH, and Streifel AJ. Collection of Biological and Non-Biological Particles by New and Used Filters Made From Glass and Electrostatically-Charged Synthetic Fibers, submitted to *Indoor Air*, 2007. {Product of a trainee's research}
- Kandlikar M, Ramachandran G, Maynard AD, Murdock B, Toscano WA: [2007] Health risk assessment for nanoparticles: A case for using expert judgment. *Journal of Nanoparticle Research*. 9:137-156, 2007. DOI 10.1007/s11051-006-9154-x. {Product of an ERC-faculty's research}
- Adgate JL, Mongin SJ, Pratt GC, Zhang J, Field MP, Ramachandran G, Sexton K: [2007] Relationships between personal, indoor, and outdoor exposures to trace elements in PM_{2.5}. *Sci Tot. Environ* [Online August 10, 2007, doi: 10.1016/j.scitotenv.2007.07.007] {Product of an ERC-faculty's research}

- Sexton K, Mongin SJ, Adgate JL, Pratt GC, Ramachandran G, Stock TH, Morandi MT: [2007] Estimating Volatile Organic Compound Concentrations in Selected Microenvironments Using Time–Activity and Personal Exposure Data. *Journal of Toxicology and Environmental Health, Part A*, 70: 465–476 {Product of an ERC-faculty's research}
- Adgate JL, Ramachandran G, Cho S-J, Ryan AD, Grengs J: [2007] Allergen levels in inner city homes: Baseline concentrations and evaluation of intervention effectiveness. Submitted to *Journal of Exposure Analysis and Environmental Epidemiology*. {Product of an ERC-faculty's research}
- Zhang Y, Banerjee S, Ramachandran G, Yang R: Bayesian modelling of airpattern for two-zone fields. Submitted to *Biometrics*, 2006. {Product of a trainee's research}
- Hewett P, Logan P, Mulhausen J, Ramachandran G, Banerjee S: [2006] Rating exposure control using Bayesian decision analysis. *Journal of Occupational and Environmental Hygiene. Journal of Occupational and Environmental Hygiene*, 3: 568–581, 2006. {Product of an ERC-faculty's research}
- Krishnamoorthy K, Mathew T, Ramachandran G: [2006] Generalized p-values and confidence intervals: A novel approach for analyzing lognormally distributed exposure data. *Journal of Occupational and Environmental Hygiene*. 3(11): 642-650.{Product of an ERC-faculty's research}
- Krishnamoorthy K, Mathew T, Ramachandran G. Upper Limits for Exceedance Probabilities Under the One-Way Random Effects Model. *Annals of Occupational Hygiene*, Accepted for publication, 2007. {Product of an ERC-faculty's research}
- Greaves IA, Sexton K, Blumenthal MN, Church TR, Adgate JL, Ramachandran G, Fredrickson AL, Ryan AD, Geisser, M.S: [2007] Asthma, atopy, and lung function among racially diverse, poor inner-urban Minneapolis schoolchildren. *Environmental Research*, 103:257-266. {Product of an ERC-faculty's research}
- Monkkonen P, Pai P, Maynard A, Lehtinen KE, Hameri K, Rechkemmer P, Ramachandran G, Prasad B, Kulmala M: [2005] Fine particle number and mass concentration measurements in urban Indian households. *Science of the Total Environment*. 347(1-3):131-47. {Product of an ERC-faculty's research}
- Rechkemmer P, Ramachandran, G, Pai P, Maynard A: [2005] Women's personal and indoor exposures to PM2.5 in Mysore, India: Impact of domestic fuel usage, *Atmospheric Environment*, 39:5500-5508. {Product of an ERC-faculty's research}
- Ramachandran G, Adgate JL, Banerjee S, Church TR, Jones D, Sexton K: [2005] Indoor Air Quality in Two Urban Elementary Schools—Measurements of Airborne Fungi, Carpet Allergens, CO2, Temperature, and Relative Humidity. *Journal of Occupational and Environmental Hygiene*. 2: 553–566. {Product of an ERC-faculty's research}
- Ramachandran G, Watts WF, Kittelson D: [2005] Mass, surface area, and number metric in diesel occupational exposure assessment. *Journal of Environmental Monitoring*. 7(7), 728 – 735. {Product of an ERC-faculty's research}
- Adgate JL, Church TR, Ryan AD, Ramachandran G, Fredrickson AL, Stock TH, Morandi MT, and Sexton K: [2004] Outdoor, Indoor, and Personal Exposure to VOCs in Children. *Environmental Health Perspectives*, 2004, 112:1386-1392. {Product of an ERC-faculty's research}
- Pratt GC, Wu CY, Bock D, Adgate JL, Ramachandran G, Stock TH, Morandi M, Sexton K: [2004] Comparing air dispersion model predictions with measured concentrations of VOCs in urban communities. *Environmental Science and Technology*, 38:1949-1959. {Product of an ERC-faculty's research}
- Sexton K, Adgate JL, Mongin SJ, Pratt GC, Ramachandran G, Stock TH, Morandi MT: [2004] Evaluating differences between measured personal exposures to volatile organic compounds and concentrations in outdoor and indoor air. *Environ. Sci. Technol.* 38(9):2593-602, 2004. {Product of an ERC-faculty's research}
- Sexton K, Adgate JL, Church TR, Hecht SS, Ramachandran G, Greaves IA, Fredrickson AL, Ryan AD, Carmella SG, and Geisser MS: [2004] Children's Exposure to Environmental Tobacco Smoke: Using Diverse Exposure Metrics to Document Ethnic/Racial Differences. *Environmental Health Perspectives*; 12(3):392-7. {Product of an ERC-faculty's research}
- Sexton, Adgate JL, Ramachandran G, Pratt GC, Mongin SJ, Stock TH, Morandi MT: [2003] Comparison of personal, indoor, and outdoor exposures to hazardous air pollutants in three urban communities. *Environmental Science and Technology*, 38:423-430. {Product of an ERC-faculty's research}

- Ramachandran G, Banerjee S, and Vincent JH: [2003] Expert judgment and occupational hygiene: Application to aerosol speciation in the nickel primary production industry. *Annals of Occupational Hygiene*, 47:461-475, 2003. {Product of an ERC-faculty's research}
- Ramachandran G, Adgate JL, Pratt GC, and Sexton K: [2003] Characterizing indoor and outdoor 15-minute average PM_{2.5} concentrations in urban neighborhoods, *Aerosol Science and Technology*. 37:33-45. {Product of an ERC-faculty's research}
- Ramachandran G, and Watts WF: [2003] Statistical comparison of diesel particulate matter measurement methods, *American Industrial Hygiene Association Journal*, 64:329-337. {Product of an ERC-faculty's research}
- Adgate JL, Ramachandran G, Pratt G C, Waller L A, and Sexton K: [2003] Longitudinal variability in outdoor, indoor, and personal PM_{2.5} exposure in healthy non-smoking adults. *Atmospheric Environment* 37:993-1002. {Product of an ERC-faculty's research}
- Sexton K, Adgate JL, Church TR, Greaves IA, Ramachandran G, Fredrickson AL, Geisser MS, and Ryan AD: [2003] Recruitment, retention, and compliance results from a probability study of children's environmental health in economically disadvantaged neighborhoods. *Environmental Health Perspectives*. 111:731-736. {Product of an ERC-faculty's research}
- Adgate JL, Ramachandran G, Pratt GC, Waller LA, and Sexton K: [2002] Spatial and temporal variability in outdoor, indoor, and personal PM_{2.5} exposure. *Atmospheric Environment*, 36: 3255-3265. {Product of an ERC-faculty's research}
- Sreenath A, Ramachandran G, and Vincent JH: [2002] Aspiration characteristics of idealized blunt aerosol samplers at large angles to the wind. *Journal of Aerosol Science*, 33:81-881. {Product of a doctoral student's research}
- Kittelson D, Watts WF, Ramachandran G, Paulsen D, and Kreager, C: [2002] Measurement of diesel aerosol exposure: A feasibility study. *Special Report: Research Directions to Improve Estimates of Human Exposure and Risk from Diesel Exhaust*, Health Effects Institute, 2002. {Product of an ERC-faculty's research}

Book

Gurumurthy Ramachandran, *Occupational Exposure Assessment for Air Contaminants*. CRC-Lewis Publishers. 2005.

Book Chapters and Other Publications

- Adgate JL and Ramachandran G: [2007] Probabilistic Models for characterizing aggregate and cumulative risk. Chapter 6 in *Environmental Health Risk Assessment*. Eds. Robson, M.G., Toscano, W.A., Association of Schools of Public Health.
- Logan PW and Ramachandran G: [2007] Bayesian Decision Analysis for Industrial Hygiene. A Strategy for Assessing and Managing Occupational Exposures. 3rd Edition. American Industrial Hygiene Association.
- Ramachandran G: [2004] The burden of occupational COPD. *Advance for Managers of Respiratory Care*, pp 44-46, January.
- Ramachandran G, Adgate JL, Church TR, Jones D, Fischer G, Fredrickson AL, and Sexton K: [2002] Indoor air quality in two urban elementary schools: Comfort parameters and microbial concentrations in air and carpets", *Proceedings of the 9th International Conference on Indoor Air Quality and Climate*, pp 461-466.
- Haran M, Carlin BP, Adgate JL, Ramachandran G, Waller LA, and Gelfand AE: [2002] Hierarchical Bayes models for relating particular matter exposure measures. *Case Studies in Bayesian Statistics*, Volume VI, pp 239-254, eds.C. Gatsonis, et al., New York: Springer-Verlag.
- Ramachandran G: [2002] A critique of Bayesian methods for retrospective exposure assessment, Letter to the Editor - Reply, *Annals of Occupational Hygiene*, 46:431-432.
- Brosseau LM: [in press] Respiratory Protection. In: *Modern Industrial Hygiene*, Vol 2, (ed. JL Perkins), American Conference of Governmental Industrial Hygienists.
- Brosseau LM, Lungu C: [2005] The Nature and Properties of Workplace Airborne Contaminants. In: *Occupational Hygiene*, Third Edition, (eds. K Gardiner, JM Harrington), Blackwell Scientific.

Appendix 1. B. Occupational and Environmental Health Nursing Program
Director: Patricia M. McGovern, PhD

Occupational and Environmental Health Nursing Program

[Note: faculty and staff names are in bold font and student names are underscored]

Selected Publications, Forthcoming Papers and Dissertations/Thesis

McGovern, PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad, LK, McCaffrey, D., Lundberg, U: [2007] Mothers' Health and Work-Related Factors at Eleven Weeks Postpartum. *Annals of Family Medicine*, in press.
[NIOSH funded research involving a student who was a non-trainee, but took many ERC courses]

Nachreiner NM, Dagher R, McGovern PM, Baker B, Alexander B, Gerberich S. Successful return to work for cancer survivors. *AAOHN Journal*, in press.
[NIOSH funded research]

Nachreiner NM, Gerberich SG, Ryan AR, McGovern PM. Minnesota Nurses' Study: Perceptions of Violence and the Work Environment. *Industrial Health*, in press
[NIOSH funded research]

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AJ, McGovern PM, Church TR and Watt GD. [2007] Difference in Work-Related Violence Related to Nurse License Type. *Journal of Professional Nursing*, in press
[NIOSH funded research]

Grice MM, Feda DM, McGovern PM, Alexander BH, McCaffrey D, Ukestad LK: [2007] Giving birth & returning to work: The Impact of work-family conflict on women's health after Childbirth. *Annals of Epidemiology* 17: 791-798. [NIOSH funded research and a product of a ERC course for doctoral students]

Hart PA, Olson DK, Fredrickson AL, McGovern PM: [2006] Competencies most valued by employers: Implications for master's prepared OHNs. *AAOHN Journal* 54:327-335.
[Trainee's plan B paper]

McGovern, PM, Dowd BE, Gjerdingen DG, Gross CR, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U: [2006] The Postpartum Health of Employed Mothers. *Annals of Family Medicine* 4: 159-167.
[NIOSH funded research that provided a data set for two trainee dissertations]

Schult TM, McGovern PM, Dowd BE, Pronk N. [2006] The Future of health promotion/disease prevention programs: the challenges and opportunities faced by stakeholders. *Journal of Occupational and Environmental Medicine* 48: 541-548.
[Product of a trainee's research and a NORA 2004 Seminar sponsored by the MCOHS]

Findorff MJ, McGovern PM, Gerberich SG, Wall MM: [2005] Reporting violence to a health care employer. *AAOHN Journal* 53: 399-406.
[Product of a trainee's dissertation research]

Findorff MJ, McGovern PM, Sinclair S: [2005] Work-related Violence Policy: A Process Evaluation. *AAOHN Journal* 53: 360-369.
[Product of a trainee's dissertation research]

Findorff MJ, Wyman JF, Croghan, CF, Nyman, JA: [2005] Use of Time Studies for Determining Intervention Costs. *Nursing Research* 54: 280-284.
[Product from a former trainee who is now an adjunct faculty member]

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AJ, Mongin SJ, Watt GD: [2005] Risk factors for work-related assaults on nurses. *Epidemiology* 16: 704 -709.
[NIOSH funded research involving a trainee]

McGovern PM, Kenney SJ, Dagher R, Ukestad LK, McCaffrey D: [2005] Six Weeks after Birth: Women's Health & Awareness of Family & Medical Leave Benefits. Proc of 2004 Signature Study and Conference, After Birth: Policies for Healthy Women, Families and Workplaces, Hubert Humphrey Institute (HHI) of Public Affairs University of Minnesota, Minneapolis, Available online: <http://www.hhh.umn.edu/centers/wpp/afterbirth/proceedings.html>; October 1.

[NIOSH funded research that was basis for a key note presentation at the conference that involved four trainees]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AJ: [2005] The Impact of training on work-related assault. Research in Nursing and Health 28: 67-78.

[NIOSH funded research and product of a trainee's dissertation research]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AJ: [2005] Relation between policies and work related assault: Minnesota Nurses' Study. Occupational and Environmental Medicine 62: 675-81.

[NIOSH funded research and product of a trainee's dissertation research]

Olson DK, Lohman WH, Brosseau LM, Frederickson AL, McGovern PM, Gerberich SG, Nachreiner NM: [2005]. Crosscutting Competencies for Occupational Health and Safety Professionals. Journal of Public Health Management and Practice 11: 235-243.

[ERC-supported evaluation of training programs]

Olson DK, Stedman-Smith M, Fredrickson AL: [2005] Environmental health & nursing: Piloting a technology-enhanced distance module. AAOHN 53:353-359.

Findorff MJ, McGovern PM, Wall MM, Gerberich SG, Alexander BH: [2004] Risk factors for work-related violence in a health care organization. Injury Prevention 10: 296-302.

[Product of a trainee's dissertation research]

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AJ, Mongin SJ, Watt GD: [2004] An Epidemiological study of the magnitude and consequences of work-related violence: the Minnesota Nurses Study. Occupational and Environmental Medicine 61: 495-503.

[NIOSH funded research involving a trainee]

McGovern PM, Gross CR, Krueger R., Engelhard DA, Cordes JE, and Church TR: [2004] False Positive Cancer Screens and Health-Related Quality of Life (HRQL). Cancer Nursing 27: 347-352.

[Example of qualitative research used in teaching with doctoral trainees]

Cossi DA, and McGovern PM: [2003] Do employers have to notify employees on Family and Medical Leave? The Case of Ragsdale versus Wolverine Worldwide, Inc and the implications for occupational health nursing practice. AAOHN Journal 5: 482-489.

[Research involving adjunct faculty; content taught as a continuing education program at the AAOHN Annual Symposium and Expo, Orlando, Florida, 4/17/2007]

Kerr MJ, Mucullagh M, Savik K, Dvorak LA: [2003] Perceived and measured hearing ability in construction laborers and farmers. American Journal of Industrial Medicine 44: 431-437.

[NIOSH funded research involving a trainee]

Dissertations/Thesis

Nachreiner NM: [2002] Work-related Assault: Impact of Training and Policy, Ph.D. Thesis, University of Minnesota

Findorf, MJ: [2003] An Evaluation of Work-Related Violence in the Health Care Industry, Ph.D. Thesis, University of Minnesota

Appendix 1. C. Occupational and Environmental Medicine Program
Director: Heidi RoeberRice, MD, MPH

Occupational and Environmental Medicine Program

[Note: faculty and staff names are in bold font and student names are underscored]

Publications

Nabeel I, Baker BA, Zheng CJ, McGrail M, Marshall P, Flottemetsch T. Physical fitness and self-reported injuries in police (Submitted to Minnesota Medicine). [Product of a trainee's research]

Hirschhorn N, Greaves IA. Louisa May Alcott: Her mysterious illness unmasked (Submitted to Perspectives Biol Med) [ERC faculty research]

Greaves IA, Silbergeld EL, Strickland GT, Torres EB, Tapiodor JI, Ramos ER. An outbreak of toxic neuropathy among inmates of a Philippine jail. (Submitted to Environmental Research) [ERC faculty research]

Baker B, RoeberRice H, Bartels M. Phenoxyacetic Acid Herbicides in: Hoffman H and Phillips S (eds). Clinical Practice of Biological Monitoring Submitted for publication, OEM Press. [ERC faculty research]

Baker BA, Dodd K, Greaves I, Zheng CJ, Brosseau, L, Guidotti T: [2007] Occupational medicine physicians in the united states: demographic and core competencies. JOEM 49(4):388-400. [ERC-supported evaluation of training programs and product of a trainee's research]

Alexander BH, Mandel JS, Baker BA, Burns C, Bartles M, Acquavella JF, Gustin C: [2007] Biomonitoring of 2,4-D exposure and dose in farm families. Environmental Health Perspectives115:370-376. [ERC faculty research; external funding]

Baker BA, Katyal S, Greaves IA, He W, Roeber Rice H, Emmett EA, Meyer JD: [2007] Occupational medicine residency graduate survey: assessment of training programs and core competencies In press, JOEM. [ERC-supported evaluation of training programs and product of a trainee's research]

Nachreiner NM, Dagher R, McGovern PM, Baker BA, Alexander BH, and Gerberich SG: [2007] Successful Return to Work in Cancer Survivors. AAOHN 55(7):290-295. [ERC-funded research]

Greaves IA, Sexton K, Adgate JL, Church TR, Blumenthal M, Ramachandran G, Fredrickson AL, Geisser MS, Ryan AD: [2007] Asthma, atopy and lung function among racially diverse, poor inner urban Minneapolis school children. Environmental Research 103(2): 257-266. [ERC faculty research]

Baker BA, McGrail M: [2006] Metals: Arsenic, Lead, Mercury and Metal Fume Fever. In: The Toxicology Handbook for Clinicians. Elsevier. [ERC faculty research]

Zheng CJ, Adams AB, McGrail MP, Marini J, Greaves IA: [2006] A proposed spirometric index for evaluating patients with airflow obstruction. Respiratory Care 51:40-45. [ERC faculty research]

Zheng CJ, Adams AB, McGrail MP, Marini J, Greaves IA: [2006] A proposed curvature index for quantifying the curvilinearity phenomenon present in an obstructive flow-volume curve. Respiratory Care Jan; 51(1): 40-45. [ERC faculty research]

Ide L, Parker, D: [2006] Hazardous Child Labor. Public Health Reports 120 (6); 607-611. [Product of a trainee's research]

Lee DH, Lee IK, Song K, Steffes M, Toscano W, Baker BA, Jacobs DR Jr: [2006] A strong dose-response relation between serum concentration of persistent organic pollutants and diabetes: results from the National Health and Examination Survey 1999-2002. Diabetes Care 29 (7): 1638-1644. [ERC faculty research; external funding]

Hroscikoski MC, Solberg LI, Sperl-Hillen JM, Harper PG, McGrail MP, Crabtree BF: [2006] Challenges of change: a qualitative study of chronic care model implementation. Annals Family Medicine 4(4):317-326. [ERC faculty research; external funding]

Baker BA, Topliff A, Messing RB, Small Johnson J: [2005] Persistent Arsenic Neuropathy after Distant Arsenic Exposure. *Journal of Agromedicine* 10 (4): 43-54 [ERC faculty research]

Baker BA, Alexander BH, Mandel JS, Acquavella JF, Honeycutt R, Chapman P: [2005] Farm Family Exposure Study: methods and recruitment practices for a Biomonitoring Study of Pesticide Exposure. *Journal Exposure Analysis Environmental Epidemiology* 15(6): 491-499. [ERC faculty research; external funding]

Mandel JS, Alexander BH, Baker B, Honeycutt R, Chapman P, Acquavella JF: [2005] Biomonitoring for farm families in the farm family exposure study. *Scandinavian Journal of Work Environmental Health* 31 (suppl 1): 98-104. [ERC faculty research; external funding]

Alexander BA, Burns C, Bartles M, Mandel JS, Baker BA: [2005] Chlorpyrifos Exposure In Farm Families Results from the Farm Family Exposure Study. *Journal Exposure Analysis Environmental Epidemiology* 15: 491-499. [ERC faculty research; external funding]

Abrar F, Baker B, Brodehl M: [2005] *Medicine du travail des Personnels de Sante aux Etats Unis. Bulletin d'Information de Association Nationale de Medicine du Travail et d'Ergonomie du Personnel des Hopitaux* 63; 18-24. [ERC faculty research]

Baker BA, Herbrandson C, Eshenaur T, Messing RB: [2005] Measuring Exposure to an Elemental Mercury Spill- Dakota County, Minnesota, 2004. *MMWR* 54(06): 146-149. [ERC faculty research; external funding]

Zheng CJ, Luebeck EG, Byers B and Moolgavkar SH: [2005] On the number of founding germ cells in humans. *Theoretical Biological Medical Modeling* 2:32-37. [ERC faculty research]

Acquavella JF, Alexander BH, Mandel JS, Gustin C, Baker B, Chapman P, Bleeke M: [2004] Glyphosate Biomonitoring for Farmers and Their Families: Results from the Farm Family Exposure Study. *Environmental Health Perspectives* 112:321-326. [ERC faculty research; external funding]

Zheng CJ: [2004] Re: Parity and the risk of Down's syndrome. (Letter) *American Journal of Epidemiology* 160:608-609. [ERC faculty research]

DeMoss C, McGrail MP, Haus E, Crain L, Asche S: [2004] Workplace injuries and common health and performance factors in health care shift-workers. *JOEM* 46(12): 1278-1281. [Product of a trainee's research]

Sexton K, Adgate JL, Church TR, Hecht SS, Ramachandran G, Greaves IA, Fredrickson AL, Ryan AD, Carmella SG, Geisser MS: [2004] Children's exposure to environmental tobacco smoke: Evidence for ethnic/racial differences in economically disadvantaged neighborhoods. *Environmental Health Perspectives* 112: 392-397. [ERC faculty research; external funding]

Gray T, Baker B, Lintner C, Wells S, Gray K: [2004] Chronic Consumption of Fish associated with Mercury Toxicity. *Clinical Toxicology* 42(5):807-808. [ERC faculty research; external funding]

Baker BA, Alexander BH, Mandel JS, Acquavella JF, Honeycutt R, Chapman P: [2004] Pesticide Exposure in Spouses from the Farm Family Exposure Study. *Clinical Toxicology* 42(5):802. [ERC faculty research; external funding]

Gray JE, Greaves IA, Bustos DM, Krabbenhoft DP: [2003] Environmental mercury and methyl mercury contamination from the Palawan Quicksilver Mine, Philippines. *Med Geol Newsletter* 6:7-10. [ERC faculty research]

Sexton K, Adgate JL, Church TR, Greaves IA, Ramachandran G, Fredrickson AL, Geisser MS, Ryan AD: [2003] Recruitment, retention, and compliance results from a probability study of children's environmental health in economically disadvantaged neighborhoods. *Environ Health Perspectives* 111: 731-736. [ERC faculty research; external funding]

Gray JE, Greaves IA, Bustos DM, Krabbenhoft DP: [2003] Mercury and methylmercury contents in calcine, water, and sediment at the Palawan Quicksilver Mine, Philippines. *Environ Geol* 43: 298-307. [ERC faculty research; external funding]

Torres EB, Greaves IA, Gapas JL, Ong TT: [2002] Occupational Health in the Philippines. In: Occupational Health in Developing Countries, Occupational Medicine: State of the Art Reviews (ed J LaDou) 17: 455-468. [ERC faculty research]

Hirschhorn N, Feldman RG, Greaves IA: [2002] Abraham Lincoln's blue pills: Did our 16th president suffer from mercury poisoning? Perspectives Biol Med 44: 315-332. [ERC faculty research]

McGrail MP, Calasanz M, Christiansen J, Cortez C, Dowd B, Lohman WL, Parker D, Radosevich DM, Westman G: [2002] The Minnesota Health Partnership and Coordinated Health Care and Disability Prevention: the implementation of an integrated benefits and medical care model. Journal of Occupational Rehabilitation 12(1):43-54. [ERC faculty research; external funding]

Appendix 1. D. Occupational Health Services Research and Policy Program
Co-Directors: Bryan Dowd, PhD and Patricia M. McGovern, PhD

Occupational Health Services Research and Policy Program
[Note: faculty and staff names are in bold font and student names are underscored]

Publications

Suying L, Jiannong L, Gilbertson D, McBean MI, Dowd BE, Collins A: [2007] An Instrumental Variable Analysis of the Impact of Practice Guidelines on Improving Quality of Care and Diabetes-Related Outcomes in the Elderly Medicare Population. *American Journal of Managed Care*, in press.

[Research involving OHSRP faculty]

McGovern, PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad, LK, McCaffrey, D., Lundberg, U: [2007] Mothers' Health and Work-Related Factors at Eleven Weeks Postpartum. *Annals of Family Medicine*, in press.

[NIOSH funded research involving a student who was a non-trainee, but took many ERC courses]

Tuttle TM, Habermann EB, Grund EH, Morris TJ, Virnig BA. [2007] Increasing use of contralateral prophylactic mastectomy for breast cancer patients: a trend toward more aggressive surgical treatment. *J Clin Oncol*, in press.

[Research involving a trainee as a research assistant and her OHSRP advisor]

Grice MM, Feda DM, McGovern PM, Alexander BH, McCaffrey D, Ukestad LK: [2007] Giving birth & returning to work: The Impact of work-family conflict on women's health after Childbirth. *Annals of Epidemiology* 17: 791-798.

[NIOSH funded research and a product of a ERC course involving two doctoral students]

Habermann EB, Virnig BA, Riley GF, Baxter NN. [2007] The impact of a change in Medicare reimbursement policy and HEDIS measures on stage at diagnosis among Medicare HMO and fee-for-service female breast cancer patients. *Medical Care* 45:761-766.

[Research involving a trainee as a research assistant and her OHSRP advisor]

Judson PL, Habermann EB, Baxter NN, Durham SB, Virnig BA: [2007] Trends in the Incidence of Invasive and In Situ Vulvar Carcinoma. *Obstetrics & Gynecology* 107:1018-1022.

[Research involving a trainee as a research assistant and her OHSRP advisor]

Kaissi A, Kralewski J, Dowd BE, Heaton AH : [2007] The Effect of Culture-Structure Fit on Prescription Drug Errors in Medical Group Practices. Health Care Management Review 32:12-21.

[Research involving OHSRP faculty]

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AJ, McGovern PM, Church TR and Watt GD: [2007] Difference in Work-Related Violence Related to Nurse License Type. *Journal of Professional Nursing*, in press

[NIOSH funded research involving ERC faculty]

Nyman JA, Barleen NA, Dowd BE, Russell DW, Coons SJ, Sullivan PW: [2007] Quality-of-life weights for the U.S. population: self-reported health status and priority health conditions by demographic characteristics, in press *Medical Care*.

[Research involving OHSRP faculty and trainee's research assistant position]

Tuttle T, Habermann E, Abraham A, Emory T, Virnig B. [2007] Contralateral prophylactic mastectomy for patients with unilateral breast cancer. *Expert Review of Anticancer Therapy* 7:1117-1122.

[Research involving a trainee as a research assistant and her OHSRP advisor]

Nyman JA, Barleen NA: [2006] The Effect of supplemental private health insurance on health care purchases, health and welfare in Brazil" Available at SSRN: <http://ssrn.com/abstract=894443>.

[Related to trainee's research assistant position]

Schult TM, McGovern PM, Dowd BE, Pronk N: [2006] The Future of health promotion/disease prevention programs: the challenges and opportunities faced by stakeholders. *Journal of Occupational and Environmental Medicine* 48: 541-548.

[Product of a trainee's research and a NORA 2004 Seminar sponsored by the MCOHS]

Baxter NN, Habermann EB, Tepper JE, Durham SB, Virnig BA. [2005] Risk of Pelvic Fractures in Older Women Following Pelvic Irradiation. JAMA 294:2587-2593.

[Related to trainee's research assistant position]

Findorff MJ, McGovern PM, Gerberich SG, Wall MM: [2005] Reporting violence to a health care employer. AAOHN Journal 53: 399-406.

[Product of a trainee's dissertation research]

Findorff MJ, McGovern PM, Sinclair S: [2005] Work-related Violence Policy: A Process Evaluation. AAOHN Journal 53: 360-369.

[Product of a trainee's dissertation research]

Findorff MJ, Wyman JF, Croghan, CF, Nyman, JA: [2005] Use of Time Studies for Determining Intervention Costs. Nursing Research 54: 280-284.

[Product from a former trainee who is now an adjunct faculty member]

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AJ, Mongin SJ, Watt GD: [2005] Risk factors for work-related assaults on nurses. Epidemiology 16: 704 -709.

[NIOSH funded research involving ERC faculty and a trainee]

McGovern, PM, Dowd BE, Gjerdingen DG, Gross CR, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U: [2006] The Postpartum Health of Employed Mothers. Annals of Family Medicine 4: 159-167.

[NIOSH funded research that provided a data set for two trainee dissertations]

McGovern PM, Kenney SJ, Dagher R, Ukestad LK, McCaffrey D: [2005] Six Weeks after Birth: Women's Health & Awareness of Family & Medical Leave Benefits. Proc of 2004 Signature Study and Conference, After Birth: Policies for Healthy Women, Families and Workplaces, Hubert Humphrey Institute (HHI) of Public Affairs University of Minnesota, Minneapolis, Available online:

<http://www.hhh.umn.edu/centers/wpp/afterbirth/> proceedings.html.

[NIOSH funded research that was basis for a key note presentation at the conference that involved four trainees]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AJ: [2005] The Impact of training on work-related assault. Research in Nursing and Health 28: 67-78.

[NIOSH funded research and product of a trainee's dissertation research]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AJ: [2005] Relation between policies and work related assault: Minnesota Nurses' Study. Occupational and Environmental Medicine 62: 675-81.

[NIOSH funded research and product of a trainee's dissertation research]

Findorff MJ, McGovern PM, Wall MM, Gerberich SG, Alexander BH: [2004] Risk factors for work-related violence in a health care organization. Injury Prevention 10: 296-302.

[Product of a trainee's dissertation research]

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AJ, Mongin SJ, Watt GD: [2004] An Epidemiological study of the magnitude and consequences of work-related violence: the Minnesota Nurses Study. Occupational and Environmental Medicine 61: 495-503.

McGovern PM, Gross CR, Krueger R., Engelhard DA, Cordes JE, and Church TR: [2004] False Positive Cancer Screens and Health-Related Quality of Life (HRQL). Cancer Nursing 27: 347-352.

[Example of qualitative research used in teaching with doctoral trainees]

Cossi DA, and McGovern PM: [2003] Do employers have to notify employees on Family and Medical Leave? The Case of Ragsdale versus Wolverine Worldwide, Inc and the implications for occupational health nursing practice. AAOHN Journal 5: 482-489.

[Research involving adjunct faculty; content taught as a continuing education program at the AAOHN Annual Symposium and Expo, Orlando, Florida, 4/17/2007]

Howe H, Weinstein R, Schult T, Kohler B, Hotes J: [2003] Registering multiple primary tumors in central cancer registries. *Journal of Registry Management* 30:112-115.

Appendix 1. E. Occupational Injury Epidemiology and Control Program
Co-Directors: Susan Goodwin Gerberich, PhD and George Maldonado, PhD

Occupational Injury Epidemiology and Control Program
[Note: faculty and staff names are in bold font and student names are underscored]

Publications (Partial Listing)

Mongin SJ, Jensen KE, Gerberich SG, Alexander BH, Ryan AD, Masten AS, Carlson KF: [2007] Injuries among agricultural operation household members: Regional Rural Injury Study – II (RRIS-II) – 1999. *Journal of Agricultural Safety and Health*, in press. [NIOSH-funded research involving trainees; SGG, Advisor for KEJ, KFC]

Paulson (Hagen) EK, Gerberich SG, Alexander BH, Ryan AD, Renier CM, Zhang X, French LR, Masten AS, Ferguson Carlson K: [2006] Fall-related injuries among agricultural household members: RRIS-II. *Journal of Occupational and Environmental Medicine* 48(9):959-968. [NIOSH-funded research involving trainees; SGG, Advisor for EKP, KFC; product of master's research]

(Kurszewski LS), Gerberich SG, Serfass RC, Ryan AD, Renier CM, Alexander BH, Carlson KF, Masten AS: [2006] Sports and recreational Injuries: Regional Rural Injury Study-II. Impact on agricultural households and operations. *British Journal of Sports Medicine*, Published Online First: 17 March 2006. *British Journal of Sports Medicine* 40(6):527-535. *Best Paper Award, Student Paper Competition, American Public Health Association, Injury Control and Emergency Health Services, 2004*. [NIOSH-funded research; SGG: Thesis Advisor, LSK and KFC; product of master's research]

Gerberich SG, Gibson RW, French LR, Church TR, Alexander BH, Shutske J, Masten AS, Renier CM, Mongin SJ, Ryan AD, Ferguson KR, (Zhang X), Jensen KE: [December 2002] Etiology and Consequences of Injuries Among Children in Farm Households: A Regional Rural Injury Study – II. RO1/CCR514375, Final Performance Technical Report to the Sponsor: Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. [NIOSH-funded research; basis for student/trainee research – SGG, Advisor for KRF and KEJ and supervisor for XZ]

Appendix 1. F. Occupational Injury Prevention Research Training Program
Co-Directors: Susan Goodwin Gerberich, PhD and Bruce H. Alexander, PhD

Occupational Injury Prevention Research Training Program
[Note: faculty and staff names are in bold font and student names are underscored]

Publications (Partial Listing)

Larson-Bright M, Gerberich SG, Alexander BH, Gurney JG, Masten AS, Church TR, Ryan AD, Renier CM: [2007] Work practices, safety beliefs, and childhood agricultural Injury: Regional Rural Injury Study - II (RRIS - II). Injury Prevention, in press. [NIOSH-funded research involving a trainee; SGG, BHA – PhD Advisors – product of dissertation]

Mongin SJ, Jensen KE, Gerberich SG, Alexander BH, Ryan AD, Masten AS, Carlson KF: [2007] Injuries among agricultural operation household members: Regional Rural Injury Study – II (RRIS-II) – 1999. Journal of Agricultural Safety and Health, in press. [NIOSH-funded research involving trainees; SGG, Advisor for KEJ, KFC]

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, McGovern PM, Church TC, and Ryan A: [2007] Work-related violence: Impact of license type. Journal of Professional Nursing, in press. [NIOSH-funded research]

Nachreiner NM, Gerberich SG, Ryan AR, McGovern PM. Minnesota nurses' study: Perceptions of violence and the work environment. Industrial Health, in press. [NIOSH-funded research]

Jurek AM, Maldonado G, Greenland S, Church TR. Uncertainty analysis: an example of its application to estimating a survey proportion. Journal of Epidemiology and Community Health, In press. [Former trainee; data integral to training program]

Grice MM, Alexander BH, Hoffbeck R, Kampa DM. Self-Reported medical conditions in perfluorooctanesulfonyl fluoride manufacturing workers. Journal of Occupational and Environmental Medicine. In Press. [Funded research; BHA and PMcG: PhD Thesis Advisors]

Grice MM, Feda D, McGovern PM, Alexander BH, McCaffery D, Ukestad, L. Giving birth and returning to work: The impact of work-family conflict on women's health after childbirth. Annals of Epidemiology, In Press. [Funded research; BHA and PMcG: PhD Thesis Advisors for Grice; BHA and SGG thesis advisors for Feda]

Carlson KF, Gerberich SG, Alexander BH, Masten AS, Church TR, Ryan AD, Renier CM: [2007] Children's agricultural injury: Potential behavior-related risk factors. American Journal of Epidemiology, 163(11, Suppl 1):536S. [NIOSH-funded research involving a trainee; SGG, PhD Advisor – product of dissertation]

Carlson CE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier C: [2007] Intra-Familial risk of agricultural injury in the Regional Rural Injury Study II: Beyond behavioral and environmental risk factors. American Journal of Epidemiology 165(11): S127-506S. [NIOSH-funded research involving a trainee; SGG, PhD Advisor – product of dissertation]

Carlson CE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier C: [2007] Children's agricultural injury: Associations between behavioral traits and high-risk work exposures. American Journal of Epidemiology 165(11): S127-505S. [NIOSH-funded research involving a trainee; SGG, PhD Advisor – product of dissertation]

Nachreiner NM, Dagher R, McGovern PM, Baker B, Alexander BH, Gerberich SG: [2007] Successful return to work for cancer survivors. AAOHN 55(7):290-295. [ERC NORA-funded research]

Jurek AM, Maldonado G, Church TR, Greenland S: [2006] Exposure-measurement error is frequently ignored when interpreting epidemiologic study results. European Journal of Epidemiology, 21:871-876. [Former trainee; data integral to training program]

Paulson (Hagen) EK, Gerberich SG, Alexander BH, Ryan AD, Renier CM, Zhang X, French LR, Masten AS, Ferguson Carlson K: [2006] Fall-related injuries among agricultural household members: RRIS-II. Journal of Occupational and Environmental Medicine 48(9):959-968. [NIOSH-funded research involving trainees; SGG, Advisor for EKP, KFC]

Larson-Bright M: [2006] Parents Safety Beliefs, Children's Work Practices, and Childhood Agricultural Injury. Minneapolis, Minnesota: University of Minnesota, PhD Dissertation. [NIOSH-funded research involving trainee; SGG, BHA - Advisors]

Carlson KE: [2006] Environmental and Behavioral Determinants of Children's Agricultural Injury. Minneapolis, Minnesota: University of Minnesota, PhD Dissertation. [NIOSH-funded research involving trainee; SGG, Advisor]

Carlson KF, Langner DM, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: [2006] Do parents' agriculture-related injuries influence their children's risk of injury? Analyses from the Regional Rural Injury Study-II. Archives of Pediatrics and Adolescent Medicine (11):1137-1142. *Best Poster Award, 7th World Conference on Injury Prevention and Safety Promotion in Vienna, June 6-9 2004. Selected from over 2,000 posters submitted by all participants.* [NIOSH-funded research involving trainees; SGG, PhD Advisor for DML, KFC – product of KFC dissertation research]

(Kurszewski LS), Gerberich SG, Serfass RC, Ryan AD, Renier CM, Alexander BH, Carlson KF, Masten AS: [2006] Sports and recreational Injuries: Regional Rural Injury Study-II. Impact on agricultural households and operations. British Journal of Sports Medicine, Published Online First: 17 March 2006. British Journal of Sports Medicine 40(6):527-535. *Best Paper Award, Student Paper Competition, American Public Health Association, Injury Control and Emergency Health Services, 2004.* [NIOSH-funded research involving trainee – KFC; SGG: Thesis Advisor, LSK and KFC]

(Luan X), Pan W, Gerberich SG, Carlin BP: [2005] Does it always help to adjust for misclassification of a binary outcome in logistic regression? Statistics in Medicine 24:2221-2234. [NIOSH-funded research - SGG: Supervisor - Luan, Research Assistant]

Carlson KE, Gerberich SG, Church TR, Ryan AD, Alexander BH, Mongin SJ, Renier CM, Zhang X, French LR, Masten A: [2005] Tractor-Related Injuries: A Population-Based Study of a Five-State Region in the Midwest. American Journal of Industrial Medicine 47(3): 254-264. [NIOSH-funded research involving trainee; SGG, PhD Advisor for KFC]

Olson DK, Lohman WH, Brosseau LM, Frederickson A, McGovern PM, Gerberich SG, Nachreiner NM: [2005] Crosscutting competencies for occupational health and safety professionals, Journal of Public Health Management Practice 11(3):235-243. [ERC-supported evaluation of training programs]

Brunner WM, Lindgren PG, Langner DM, Williams AN, Yawn BP: [2005] Asthma among rural Minnesota adolescents. Journal of Asthma 42(9): 787-792. [PhD trainee]

Gerberich SG, Church TR, Alexander BH, Masten AS, Renier CM, Carlson KE, Ryan AD, Mongin SJ: [2005] Surveillance of injury burden and risk factors for agricultural injury among children and youth: Regional Rural Injury Study. American Journal of Epidemiology, 161:164. [NIOSH-funded research involving trainee; SGG, PhD Advisor for KFC]

Findorff MJ, McGovern PM, Wall MM, Gerberich SG: [2005] Reporting violence to a health care employer, AAOHN 53(9): 399-406. [SGG: Co-Advisor, PhD Dissertation – product of dissertation research]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen H, Geisser MS, Ryan AD, Watt GD: [2005] Relation between policies and work-related assault: Minnesota Nurses' Study. Occupational and Environmental Medicine 62: 675-681. *Best Paper Award, Student Paper Competition, American Public Health Association, Injury Control and Emergency Health Services, 2002* [NIOSH-funded research involving trainee; SGG, PhD Advisor for NMN – product of dissertation research]

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen H, Geisser MS, Ryan AD, Watt GD: [2005] Impact of training on work-related assault. Research in Nursing and Health 28:67-78. [NIOSH-funded research involving trainee; SGG, PhD Advisor for NMN – product of dissertation research]

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: [2005] Risk factors for work-related assaults on nurses. Epidemiology 16(5): 704-709. [NIOSH-funded research; NMN, trainee and Project Coordinator – basis for dissertation research; AJ former trainee]

Gerberich SG, Alexander BH, Church TR, Masten AS, Renier CM, Mongin SJ, Ryan AD, Ferguson KR: [December 2004] Regional Rural Injury Study – II, Phase 2: Agricultural Injury Surveillance. RO1/OHO4270, Final Performance Technical Report to the Sponsor: Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. [NIOSH-funded research involving trainee; SGG, PhD Advisor for KFC – basis for dissertation research]

Nordgren LD, Johnson T, Kirschbaum M, Peterson ML: [2004] Medical errors: excess hospital costs and lengths of stay. *Journal for Healthcare Quality* 26(2): 42-8, quiz 48-49. [PhD trainee]

Findorff M, McGovern PM, Wall M, Gerberich SG, and Alexander BH:[2004] Risk Factors for Work-Related Violence in a Health Care Organization. *Injury Prevention* 10(5): 296-302. [SGG: PhD Dissertation Co-Advisor – product of dissertation]

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD: [2004] An epidemiological study of the magnitude and consequences of work-related violence: The Minnesota nurses' study. *Occupational and Environmental Medicine* 61:495-503. [NIOSH-funded research; NMN, trainee and Project Coordinator – basis for dissertation research]

Gerberich SG, Gibson RW, French LR, Church TR, Alexander BH, Shutske J, Masten AS, Renier CM, Mongin SJ, Ryan AD, Ferguson KR, (Zhang X), Jensen KE: [December 2002] Etiology and Consequences of Injuries Among Children in Farm Households: A Regional Rural Injury Study – II. RO1/CCR514375, Final Performance Technical Report to the Sponsor: Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. [NIOSH-funded research; basis for student/trainee research – SGG, Advisor for KRF and KEJ and supervisor for XZ]

Parker DL, Merchant DL, Munshi K: [2002] Adolescent work patterns and work-related injury incidence in rural Minnesota. *American Journal of Industrial Medicine* 42(2): 134-141. [NIOSH-funded research, PhD trainee]

Gabel CL, Gerberich SG: [2002] Case-control study of injuries among Veterinarians. *Epidemiology* 13(1): 80-86. [Funded research - PhD trainee; SGG: Dissertation Advisor]

Munshi K, Parker DL, Bannerman-Thomson H, Merchant DL: [2002] Causes, nature, and outcomes of work-related injuries to adolescents working at farm and non-farm jobs in rural Minnesota. *American Journal of Industrial Medicine* 42(2): 142-9. [NIOSH-funded research, PhD trainee]

Appendix 1. G. Hazardous Substances Academic Training Program
Director: Peter Raynor, PhD

Hazardous Substances Academic Training Program

[Note: faculty and staff names are in bold font and student names are underscored]

Journal Articles

Kim SW, Ramakrishnan MA, Raynor PC, Goyal SM: [in press] Effects of Humidity and Other Factors on the Generation and Sampling of a Coronavirus Aerosol. *Aerobiologia*. {Product of student research funded by ERC-sponsored Pilot Projects Research Training Program, Minnesota Medical Foundation, and 3M Company}

Hovde CA, Raynor PC: [in press] Effects of Voltage and Wire Feed Speed on Weld Fume Characteristics. *Journal of Occupational and Environmental Hygiene* {Product of student research funded by ERC-sponsored Pilot Projects Research Training Program}

Saravia SA, Raynor PC, Streifel AJ: [2007] A Performance Assessment of Airborne Infection Isolation Rooms. *American Journal of Infection Control* 35:324-331. {Product of student research funded by HRSA}

Farnsworth JE, Goyal SM, Kim SW, Kuehn TH, Raynor PC, Ramakrishnan MA, Anantharaman S, and Tang W: [2006] Development of a Method for Bacteria and Virus Recovery from Heating, Ventilation, and Air Conditioning (HVAC) Filters. *Journal of Environmental Monitoring* 8:1006-1013 {U.S. Department of Homeland Security-funded research}

Raynor PC, Kim SW, Bhattacharya M: [2005] Mist Generation from Metalworking Fluids Formulated Using Vegetable Oils. *The Annals of Occupational Hygiene* 49:283-293 {U.S. Department of Agriculture-funded research}

Brosseau LM, Raynor PC, Lungu C [2005] Employers' Expectations of Knowledge and Skills of Master's-Trained Industrial Hygienists. *Journal of Occupational and Environmental Hygiene* 2:1-7 {ERC-supported employer survey}

Olson DK, Lohman WH, Brosseau LM, Fredrickson AL, McGovern PM, Gerberich SG, Nachreiner N: [2005] Crosscutting Competencies for Occupational Health and Safety Professionals. *Journal of Public Health Management and Practice* 11:235-243 {ERC-supported evaluation of training program}

Raynor PC, Chae SJ: [2004] The Long-Term Performance of Electrically Charged Filters in a Ventilation System. *Journal of Occupational and Environmental Hygiene* 1:463-471 {Research sponsored by John Manville Corporation}

John J, Bhattacharya M, Raynor PC: [2004] Emulsions Containing Vegetable Oils for Cutting Fluid Application. *Colloids and Surfaces A: Physicochem. Eng. Aspects* 237:141-150 {U.S. Department of Agriculture-funded research}

Letts GM, Raynor PC, Schumann RL: [2003] Selecting Fiber Materials to Improve Mist Filters. *Journal of Aerosol Science* 34:1481-1492 {Product of student research funded by NIOSH R03 grant}

Raynor PC, Chae SJ: [2003] Dust Loading on Electrostatically Charged Filters in a Standard Test and a Real HVAC System. *Filtration and Separation* 40:35-39 {Research sponsored by John Manville Corporation}

Raynor PC: [2002] Flow Field and Drag for Elliptical Filter Fibers. *Aerosol Science and Technology* 36:1118-1127 {Non-sponsored research}

Lazovich D, Parker DL, Brosseau LM, Milton FT, Dugan SK, Pan W, Hock L: [2002] Effectiveness of a Worksite Intervention to Reduce an Occupational Exposure: The Minnesota Wood Dust Study. *American Public Health Association Journal*, 92:1498-1505 {NIOSH-funded research}

Books

Brosseau LM: [in press] Respiratory Protection. In: *Modern Industrial Hygiene, Vol 2*, (ed. JL Perkins), American Conference of Governmental Industrial Hygienists

Brosseau LM, Lungu C: [2005] The Nature and Properties of Workplace Airborne Contaminants. In: Occupational Hygiene, Third Edition, (eds. K Gardiner, JM Harrington), Blackwell Scientific

Appendix 1. H. Agricultural Safety and Health Program
Director: John Shutske, PhD

Agricultural Safety and Health Program

[Note: faculty and staff names are in bold font and student names are underscored]

Theses:

Bartz P: [2005] Storytelling as a Delivery Method of Farming Safety Education for Hmong Farmers, MPH Plan B Paper, University of Minnesota.

Carmody T: [2006] Determination of an Air Sampling Protocol for Methamphetamine to be Used in Former Clandestine Laboratories, MPH Plan B Paper, University of Minnesota.

Periakaruppan P: [2006] Assessment fo Milk Processing Worker Exposure to Potential Bioterrorism Agents in Milk Supply, MPH Plan B Paper, University of Minnesota.

Jensen K [2005]: Injuries Among Agricultural Operation Household Members: Regional Rural Injury Study II (RRIS-II)-1999. MPH Plan B Paper, University of Minnesota.

Paulson EH [2003]: The Epidemiology of Agricultural Fall Related Injuries: RRIS II. MPH Plan B Paper, University of Minnesota.

Articles:

Mongin SJ, Jensen KE, Gerberich SG, Alexander BH, Ryan AD, Masten AS, Carlson KF: [2007] Injuries among agricultural operation household members: Regional Rural Injury Study – II (RRIS-II) – 1999. Journal of Agricultural Safety and Health, in press. [NIOSH-funded research involving trainees; SGG, Advisor for KEJ, KFC; product of master's research - KEJ]

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church, TR, Shutske, JM, Ryan, AD, Renier, C: [2007] Intra-Familial Risk of Agricultural Injury in the Regional Rural Injury Study II: Beyond Behavioral and Environmental Risk Factors, American Journal of Epidemiology, 165(11): S127-506S. [NIOSH-funded research involving trainees; SGG, Advisor for KFC; product of doctoral research]

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier C: [2007] Children's Agricultural Injury: Associations between Behavioral Traits and High-Risk Work Exposures, American Journal of Epidemiology, 165(11): S127-505S. [NIOSH-funded research involving trainee; SGG, Advisor for KFC; product of doctoral research]

Paulson (Hagen) EK, Gerberich SG, Alexander BH, Ryan AD, Renier CM, Zhang X, French LR, Masten AS, Ferguson Carlson K: [2006] Fall-related injuries among agricultural household members: RRIS-II. Journal of Occupational and Environmental Medicine 48(9):959-968. [NIOSH-funded research involving trainees; SGG, Advisor for EKP, KFC; product of master's research]

Stedman-Smith M--, McGovern PM, Alexander B: [2006]. Listening to the tribe: Using Focus Groups To Hear The Environmental Health Concerns Of The Mdewakanton Dakota Sioux Living By A Nuclear Power Plant. Poster presentation: AAOHN 2006 Symposium & Expo, Albuquerque, New Mexico. [MSS NIOSH Agricultural Safety and Health trainee]

Schermann M, Shutske J, Rasmussen R, Jenkins S, Vang C, Lor M: [2006] Characteristics of Children's Agricultural Tasks for Hmong Farming Communities. Journal of Agromedicine. 11(4):121-132. [NIOSH-funded research involving trainees; JS, Advisor for RR; product of master's research - RR]

Venem, MT, Shutske J, Gilbert W: [2006] Testing and Creation of a Safety System to Disengage the PTO of a Tractor. Applied Engineering in Agriculture. 22(1): 5-12. [NIOSH-funded research through National Farm Medicine Center, future trainee Tricia Carmody was assistant on research protocol].

Olson DK, Stedman-Smith M, Fredrickson AL [2005]. Environmental Health & Nursing: Piloting a Technology-Enhanced Distance Module, AAOHN. 53:353-359. [MSS NIOSH Agricultural Safety and Health trainee]

Olson DK, Stedman-Smith M, Fredrickson AL: [2005] Environmental Health & Nursing: Piloting a Technology-Enhanced Distance Learning Module. Poster presentation: AAOHN 2005 Symposium & Expo, Minneapolis, Minnesota, May 2005. [MSS NIOSH Agricultural Safety and Health trainee]

Shutske, J: [2004] Role of Agricultural Safety and Health Professionals in the Post-9/11 World. *Journal of Agricultural Safety and Health*. 10(4): 218-220. [Discussion pertaining to future educational needs of AH graduates by ASH faculty JS].

Rasmussen RC, Schermann MA, Shutske JM, Olson DK: [2003] Use of the North American Guidelines for Children's Agricultural Tasks with Hmong farm families. *Journal of Agricultural Safety and Health*, 9(4): 265-274. [NIOSH-funded research involving trainees; JS, Advisor for RR; product of master's research - RR]

Shutske JM, Jenkins S: [2002] The Impact of Biotechnology on Agricultural Worker Safety and Health. *Journal of Agricultural Safety and Health* 8(3): 277-287. [Based on NIOSH conference presentation by ASH faculty JS].

Venem MT, Gilbert W, Shutske JM: [2002] Combine Fire Prevention Summit. ASAE Technical Paper No. 028017. St. Joseph, Mich.: ASAE. [Work partially funded by NIOSH, by ASH faculty JS].

Shutske JM: [2002] Enough is Enough: Rural Leaders Must Take a Stand to End Childhood Fatalities on the Farm. *Resource* 9(2):33. [By ASH faculty JS]

Appendix 1. I. Continuing Education and Outreach Program
Director: Kathleen Smith, MSN

Continuing Education and Outreach Program

[Note: faculty and staff names are in bold font and student names are underscored]

Publication:

Schermann M, Shutske J, Rasmussen R, Jenkins S, Vang C, Lor M: [2007] [Characteristics of Children's Agricultural Tasks in Hmong Farming Communities](#), Journal of Agromedicine. 11(3-4), p121-32. [ERC-related research involving CE faculty and staff]

Appendix 1. J. Hazardous Substances Training Continuing Education Program
Director: Kathleen Smith, MSN

There were no publications from the HST-CE program during this reporting period.

Appendix 1. K. Agricultural Safety and Health Continuing Education Program
Director: Kathleen Smith, MSN

Agricultural Safety and Health Continuing Education Program
[Note: faculty and staff names are in bold font and student names are underscored]

Schermann M, Shutske J, Rasmussen R, Jenkins S, Vang C, Lor M: [2007] [Characteristics of Children's Agricultural Tasks in Hmong Farming Communities](#), Journal of Agromedicine. 11(3-4), p121-32. [ERC-related research involving ASH CE faculty and staff]

Appendix 1. L. NORA Program
Directors: Ian A. Greaves, B Sci, MB BS and Lisa Brosseau, ScD

NORA Publications are listed within each academic program.

Appendix 1. M. Pilot Projects Program
Director: Lisa Brosseau, ScD

Pilot Projects publications are listed within each academic program.

APPENDIX 2: PRESENTATIONS

Appendix 2. A. Industrial Hygiene Program
Director: Gurumurthy Ramachandran, PhD

Industrial Hygiene Program
[Note: student names are underscored where applicable]

Presentations and Lectures

Dr. Ramachandran

- Professional Judgment, Models, and Bayesian Methods in Exposure Assessment and Control, University of Utrecht, The Netherlands, April 2007.
- Nanotechnology and occupational health. Presentation to the Twin Cities section of the American Industrial Hygiene Association, February, 2007.
- Professional Judgment in Exposure Assessment and Control, Occupational Hygiene 2007, British Occupational Hygiene Society, April 2007.
- Invited presentation on Nanoparticles and Occupational Health, AIHA – Chicago Local section, March 2006.
- Professional Judgment, Models, and Bayesian Methods in Exposure Assessment and Control, University of Michigan, Ann Arbor, March 2007.
- Professional Judgment, Models, and Bayesian Methods in Exposure Assessment and Control, University of Cincinnati, Cincinnati, October, 2006.
- Particulate Emissions in Urban India: Exposure and Health Consequences, The World Bank, June 2006.
- Improving accuracy of professional judgments in exposure assessment, American Industrial Hygiene Conference and Exposition (AIHCE) in Chicago, IL, June 2006.
- Health relevance of airborne nanoparticle concentration measurements, American Industrial Hygiene Conference and Exposition (AIHCE) in Chicago, IL, June 2006.
- Nanotechnology and occupational health. Presentation to the Wisconsin section of the American Industrial Hygiene Association, Wisconsin Dells, WI, October, 2006.
- Professional judgment and Bayesian methods in exposure assessment and control, Minnesota Indoor Air Association, September, 2006.
- Basic Principles of Occupational Health and Safety – Application to Ultrafine Aerosols, 2nd International Symposium on Nanotechnology and Occupational Health, 2005.
- Bayesian exposure assessment in occupational hygiene. NORA Symposium, Health and Safety Priorities for the 21st Century, May 26-27, 2004, Minneapolis, MN.
- Expert judgment and Bayesian methods in exposure assessment. American Industrial Hygiene Conference, May 10-14, 2004, Atlanta, GA.
- Performance of electrostatic and glass fiber filters in hospital HVAC systems. American Industrial Hygiene Conference, May 10-14, 2004, Atlanta, GA.
- Expert judgment in exposure assessment - Application to nickel speciation. American Industrial Hygiene Conference, May 10-15, 2003, Dallas, TX. (*Best Poster in Session* award).
- Real-time exposure measurements of aerosol number, surface area, and mass (PM_{2.5}) concentration in the southern Indian city of Mysore. American Association for Aerosol Research (AAAR) 2003. Fourth Colloquium on PM and Health, Pittsburgh, PA March 31-April 4, 2003.
- Women's personal and indoor exposures to PM_{2.5} in Mysore, India - Impact of domestic fuel usage. American Association for Aerosol Research (AAAR) 2003. Fourth Colloquium on PM and Health, March 31-April 4, 2003, Pittsburgh, PA.

- Presentation on "New Approaches to Exposure Assessment" at Symposium on New Frontier in Environmental Health and Medicine - Genomes to Practice: Understanding Exposure and Risk. 3M, St. Paul, Minnesota, October 3, 2003.
- New Approaches to Exposure Assessment", Symposium on New Frontier in Environmental Health and Medicine - Genomes to Practice: Understanding Exposure and Risk. 3M, St. Paul, Minnesota, October 3, 2003.

Dr. Brosseau

- L.M. Brosseau, Evaluating the Effectiveness of Health and Safety Interventions in Small Manufacturing Businesses, Institute of Occupational Safety and Health, Taipei, Taiwan, April 2007.
- L.M. Brosseau, Evaluating the Effectiveness of Health and Safety Interventions in Small Manufacturing Businesses, Institute of Occupational Safety and Health, Taipei, Taiwan, April 2007.
- L.M. Brosseau, How to Choose Respiratory Protection in a Pandemic Situation, ORC Worldwide Pandemic Preparedness Conference Call Series, June 2007.
- L.M. Brosseau. Threshold Limit Values for Chemical Substances: Looking Back and Moving Forward, 2007 Conference of Industrial Hygiene and Occupational Medicine, Kaohsiung, Taiwan, April 2007.
- L.M. Brosseau, Health and Safety of Lead Paint Removal, Public Health Moment Podcast, October 2006.
- L.M. Brosseau, Filter Efficiency and Facial Fit of Health Care Masks," Respiratory Protection Against SARS, Avian Influenza and other Infectious Aerosols Roundtable, AIHCE, June 2006.
- L.M. Brosseau, Filter Efficiency and Facial Fit of Surgical Masks, Working Scientific Meeting on Occupational Influenza Prevention and Control in Health Care Settings, Public Health Agency of Canada, Toronto, Ontario Canada, October 2006.
- L.M. Brosseau, Filter Efficiency and Facial Fit of Surgical Masks, AIHA Upper Midwest Section Professional Development Conference on Pandemic: Pandemonium or Preparedness, November 2006.
- L.M. Brosseau, Respiratory Protection for Pulmonary Therapists PALL Corporation, 2006-2007 Influenza Update CD, December 2006.
- L.M. Brosseau, T. Oberg, "Surgical Mask Filter Efficiency and Fit," American Industrial Hygiene Conference and Exposition, Chicago, IL, May 2005.
- L.M. Brosseau, "Update on TLVs for Chemical Substances Committee," American Industrial Hygiene Conference and Exposition, San Diego, CA, May 2004.
- L.M. Brosseau, A. Fredrickson, M. Casey, "Developing a Health and Safety Newsletter for Small Manufacturing Businesses," American Industrial Hygiene Conference and Exposition, San Diego, CA, May 2004.
- L.M. Brosseau, Particle Size Selective Sampling, Pharmaceutical Forum, Dallas, TX, May 2003.
- L.M. Brosseau, C. Lungu, P. Raynor, "Expectations of employers hiring entry-level masters-trained industrial hygienists," presented at the American Industrial Hygiene Conference and Exposition, Dallas, TX, May 2003.
- L.M. Brosseau, "Small business owners' beliefs and attitudes underlying their intentions to improve workplace health and safety," presented at the American Industrial Hygiene Conference and Exposition, Dallas, TX, May 2003.
- L.M. Brosseau, "Beliefs and attitudes associated with small business owners' intentions to improve health and safety," presented at the Australian Institute for Occupational Hygiene Conference, Adelaide, Australia, December 2003.
- L.M. Brosseau, "Motivating Health and Safety Improvements in Small Business," VIOSH Australia, Ballarat Australia, December 2003.
- L.M. Brosseau, "Intervention Research to Reduce Injuries and Illnesses in Small Businesses," University of Illinois at Chicago, School of Public Health, June 2003.
- L.M. Brosseau, "Impact of Lawsuits on the Current and Future TLV Process," American Industrial Hygiene Association, Ohio Valley Section, Cincinnati OH, October 2003.

- L.M. Brosseau, "Motivating Occupational Health and Safety Improvements in Small Business," National Institute for Occupational Safety and Health, Cincinnati OH, October 2003.
- L.M. Brosseau, J. Spomar, R. von Kalben, G. Heilman, Fostering Small Business Success Through Workplace Improvement, Small Business Assistance Program Conference, Chicago, IL, July 2002.
- L.M. Brosseau, "Threshold Limit Values: Scientific Guidelines," Australian Institute of Occupational Hygienists, December 2002.
- L.M. Brosseau, "Do Air Samples Tell the Truth? Particle Size Selective TLVs" IRSST Symposium on Chemical Exposure Values in the Workplace, Montreal, Canada, May 2003.
- L.M. Brosseau, "TLVs: Committee and Process" IRSST Symposium on Chemical Exposure Values in the Workplace, Montreal Canada, May 2003.
- L.M. Brosseau, "Intervention Research to Reduce Injuries and Illnesses in Small Businesses," University of Illinois at Chicago, School of Public Health, June 2003.

Dr. Raynor

- Andrea Barteková, Peter Raynor, and John Adgate, "Comparison of a Novel Liquid Crystal Monitor for Organophosphate Pesticides to a Conventional Sampling Method", *2007 American Industrial Hygiene Conference and Exposition*, Philadelphia, PA, June 2007.
- Peter C. Raynor, "Approaches for Exposure Assessment and Control for Airborne Infectious Agents ", presentation to the Particle Society of Minnesota St. Paul, MN, December 2006 (invited)
- Peter C. Raynor, Jo Anne Brock, and Monika Vadali, "Influences on Collection of Airborne Bacterial Spores by Charged Filter Media", Paper 15E2, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Ji Young Park, Gurumurthy Ramachandran, Peter C. Raynor, and Lynn E. Eberly, "Comparison of Two Methods for Estimating Surface Area Concentration Using Number and Mass Concentrations", Paper 10C4, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Senthilvelan Anantharaman, M.A. Ramakrishnan, Sagar M. Goyal, Seung Won Kim, Peter Raynor, Nicholas J. Stanley, and Thomas H. Kuehn, "Airborne Human Viruses Captured by HVAC Filters", Paper 13D3, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Seung Won Kim and Peter C. Raynor, "Design for a New Vapor Aerosol Dichotomous Sampler", Paper 6H9, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Thomas Kuehn, Nicholas Stanley, Seung Won Kim, M.A. Ramakrishnan, Senthilvelan Anantharaman, Peter Raynor, and Sagar Goyal, "Background Airborne Bacteria and Virus Populations In and Near Buildings Using Ventilation Filters as Long-Term Bioaerosol Collection Devices", Paper 8H25, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- M.A. Ramakrishnan, Sagar M. Goyal, Senthilvelan Anantharaman, Seung Won Kim, Peter Raynor, Nicholas J. Stanley, and Thomas H. Kuehn, "Detection of Airborne Bacteria in HVAC Filters by Polymerase Chain Reaction", Paper 11G32, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Peter C. Raynor, "Use of HVAC Systems to Limit the Spread of Airborne Microorganisms", presentation to the Minnesota Indoor Air Association, St. Paul, MN, June 2006 (invited)
- Seung Won Kim, James Farnsworth, Sagar Goyal, Peter C. Raynor, and Thomas Kuehn, "Bacterial Aerosol Measurements Using Ventilation Filters in Building Air Handling Units", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Tricia Carmody, Peter C. Raynor, and Martin Bevan, "Development of an Air Sampling Protocol for Sampling in Former Methamphetamine Laboratories", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006

- Jo Anne Brock and Peter C. Raynor, "Efficiency of Filter Media with Biological and Non-Biological Agents", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Ji Young Park, Gurumurthy Ramachandran, Peter C. Raynor, Lynn E. Eberly, and Andrew D. Maynard, "Comparison of Two Surface Area Concentration Estimation Methods Using Number and Mass Concentrations", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006 (poster)
- Seung Won Kim and Peter C. Raynor, "Mist Generation from Vegetable-Oil Based Metalworking Fluids by Three Mechanism", presentation to the Upper Midwest Section-American Industrial Hygiene Association, Roseville, MN, October 2005 (invited)
- Peter C. Raynor, "Worker Competencies for Emergency Preparedness", *The 3rd Annual Statewide Partners' Conference on Public Health and Hospital Emergency Preparedness*, Milwaukee, WI, September 2005 (invited)
- Seung Won Kim and Peter C. Raynor, "Mist Generation from Vegetable-Oil Based Metalworking Fluids by Three Mechanisms", *2005 American Industrial Hygiene Conference and Exposition*, Anaheim, CA, May 2005
- Peter C. Raynor, "Preparedness in the Workplace: Training and Research Activities at the University of Minnesota", presentation to the Upper Midwest Section-American Industrial Hygiene Association, Roseville, MN, February 2005 (invited)
- Peter C. Raynor, "Using HVAC Systems to Limit the Spread of Infectious Agents", seminar at the University of Minnesota, Division of Environmental Health Sciences, Minneapolis, MN, January 2005 (invited)
- Peter C. Raynor and Seung Won Kim, "CFD Modeling of Filter Fibers with Non-Circular Cross Sections", Paper 5B1, *Twenty-Third Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 2004
- Peter C. Raynor, "Modeling the Influence of Fiber Shape on Filter Performance", *2004 Symposium – The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century*, Minneapolis, MN, May 2004
- Peter C. Raynor, "Modeling the Influence of Fiber Shape on Filter Performance", *2004 American Industrial Hygiene Conference and Exposition*, Atlanta, GA, May 2004.
- Peter C. Raynor, "Performance Predictions for Air Filters Made from Fibers with Non-Circular Cross Sections", Paper 311-1, *World Filtration Congress 9*, New Orleans, LA, April 2004.
- Peter C. Raynor and Gina Letts, "Influence of Fiber Material on Mist Filter Performance", Paper 2E2, *Twenty-Second Annual Conference of the American Association for Aerosol Research*, Anaheim, CA, October 2003.
- Peter C. Raynor, Gina Letts, and Seung Won Kim, "Factors Affecting the Long-Term Performance of Mist Control Filters", *Sixteenth Annual Technical Conference and Exposition of the American Filtration and Separations Society*, Reno, NV, June 2003
- Peter C. Raynor and Mira Grice, "Experimental Evaluation of Evaporative Losses During Metalworking Fluid Mist Sampling", *2003 American Industrial Hygiene Conference and Exposition*, Dallas, TX, May 2003.
- Seung Won Kim and Peter Raynor, "Developing a Better Vapor/Aerosol Dichotomous Sampler", *2003 American Industrial Hygiene Conference and Exposition*, Dallas, TX, May 2003. (poster)
- Peter C. Raynor and Soo Jae Chae, "Effects of Particle Loading on Electrically Charged Filters in an HVAC System", *American Filtration & Separations Society Indoor Air Quality-Filtration Conference*, Cincinnati, OH, November 2002.
- Peter C. Raynor and Soo Jae Chae, "Influence of Long-Term Particle Loading on Efficiency of Electrically Charged Filters", Paper 2D1, *Twenty-First Annual Conference of the American Association for Aerosol Research*, Charlotte, NC, October 2002.
- Peter C. Raynor and Mira Grice, "Assessment of Evaporative Losses During Sampling of Metalworking Fluid Mist", *Health Effects of Mineral Oil Mist & Metalworking Fluids Symposium*, Cincinnati, OH, October 2002.

Dr. Lungu

- Yang Rui, C. Lungu: *Airflow Patterns around a Mannequin – Determination of Critical Parameters for Indoor Air Modeling* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004. (poster).

- Ji Young Park and Claudiu Lungu: *Granular Activated Carbon Adsorption of Toluene-Ethanol Binary Mixture* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004. (poster).
- Claudiu Lungu and Ji Young Park: *Comparing the Adsorption of Toluene and Ethanol on Granular Activated Carbon* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004.
- Claudiu T. Lungu: *Determination of ¹³⁷Cs Biological Half-Life from Individual Whole Body Counter Measurements, Following the Chernobyl Accident* 11th International Congress of the International Radiation Protection Association, Madrid, Spain, May 2004.
- Yang Rui and Claudiu Lungu: *"Airflow Patterns Around a Mannequin: Determination of Critical Parameters for Indoor Air Modeling"* AIHA-UMS meeting, Minneapolis, MN, October 2004.
- Claudiu T. Lungu: *Adsorption in Industrial Hygiene; Conventional and Less Conventional Applications* Special Seminar of the Department of Environmental Health Sciences (invited). University of Alabama, Birmingham, AL, November 2004.

Appendix 2. B. Occupational and Environmental Health Nursing Program
Program Director: Patricia M. McGovern, PhD

Occupational and Environmental Health Nursing Program
[Note: faculty and staff names are in bold font and student names are underscored]

Selected Presentations

Brosseau L, Frederickson A, Nachreiner N. Alumni Perceptions of the Value and Proficiency of Occupational Health and Safety Competencies. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota, June 2007 (Presenter: Nachreiner)

Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt GD, Feda DM, Pinder E, Sage SK. Violence in the schools: Teachers at risk. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota, June 2007. (Presenter: Nachreiner)

Johansen K, McGovern PM. Adding Interactivity to Breeze: Developing and Testing Three Levels of Interactivity Classrooms of the Future: Teaching, Learning and Technology, Hamline University, St. Paul, Minnesota, May 2007

McGovern PM. Ingenix Health Care Technology Conference, Benefits of a Results Only Work Environment (ROWE): Best Buy, San Francisco, California, May 2007.

McGovern PM. Childbirth and the Family and Medical Leave Act: Issues of Incapacity, Serious Health Conditions & Intermittent Leave, 2007 AAOHN Symposium & Expo, Orlando, Florida, April 2007.

McGovern PM, Olson DK, Nachreiner NM, Fredrickson AL, Weiss R. Kerr M. Occupational and Environmental Health Nursing Alumni Survey: Preliminary Findings on the Value and Proficiency with Core Competencies. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota, June 2007 (Presenters: Nachreiner, McGovern, Olson)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota, June 2007. (Presenter: Nachreiner)

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AD, McGovern PM, Church TR. Minnesota Nurses' Study: Relation Between Nurse License Type and Violence. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota, June 2007. (Presenter: Nachreiner)

Olson DK, Scheller A, Piland N, Beedasy J, Ramloll R, Monahan C. Playing Along: Computer Games and Simulations for Emergency Preparedness Training" Public Health Preparedness Summit. February 2007. Washington DC.

Olson DK. Education Innovations, The 21st Century Technology for the University of Minnesota: A Preview Technology Showcase for the Academic Health Center. Minneapolis, Minnesota. January 2007.

Olson DK. Playing Along: Developing Computer Games to Create Awareness of Public Health Practice, Beyond Boundaries. Grand Forks, North Dakota. September 2007.

McGovern PM, Johansen K. Adding Interactivity to Breeze, Improving MacroMedia Breeze Learning Activities, TEL Seminar Series, University of Minnesota, St. Paul, Minnesota, November 2006. (Panel presentation).

McGovern PM. After Birth: Women, Work and Health. Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis, Minnesota, October, 2006.

McGovern PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad LK, McCaffrey D, Lundberg U. Twelve Weeks After Birth: Women, Work & Health. AcademyHealth Annual Research Meeting, Seattle, Washington, June 2006. (Presenter: McGovern)

McGovern PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad LK, McCaffrey D, Lundberg U. Work Organization & Postpartum Health in Employed Mothers after Childbirth. National Occupational Research Agenda (NORA) Symposium 2006, Washington DC, April 2006. (Presenter: McGovern)

McGovern, PM, Dowd BE, Gjerdingen DG, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U. After Birth: Policies that Promote Healthy Women and Workplaces. Work, Stress & Health, the National Institute for Occupational Safety and Health (NIOSH) & the American Public Health Association (APA), Miami, Florida, March 2006. (Presenter: McGovern)

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AD, McGovern PM, Church TR. Minnesota Nurses' Study: Relation Between Nurse License Type and Violence. Women's Health Research Conference, Minneapolis, Minnesota, September 2006. (Presenter: Nachreiner)

Nachreiner NM, Wyman JF, McCarthy TC, Peters JA, Findorff MJ. Circumstances and Consequences of Falls in the Fall Evaluation and Prevention Program: Preliminary Findings. American Public Health Association Conference. Washington, D.C., November, 2004 (Presenter: Findorff)

Olson DK, Brosseau L, Staubus I, Vegoe S. 3M Technical Forum for the EH Product Stewards. Lifelong Learning with the Midwest Center for Occupational Health and Safety, St. Paul, Minnesota, March 2006,.

Olson DK, Thompson J, Atchison C, Collins D, Moon R, Reid M, Turnock B. NACCHO Public Health Preparedness Summit, Making the Link: Roundtable Discussion on How Academic Centers and Health Department Partnerships are Building Public Health Capacity, Washington DC, February 2006.

Stedman-Smith M, McGovern PM, Alexander B. Listening to the tribe: Using focus groups to hear the environmental health concerns of the Mdewakanton Dakota Sioux living by a nuclear power plant. Poster presentation: AAOHN 2006 Symposium & Expo, Albuquerque, New Mexico, May 2006. (Presenter: Stedman-Smith).

English N, McGovern PM, Hoffman A. Minnesota OSHA Study of auto Body Repair shops, Poster Presentation: MCOHS NORA Program Seminar Poster Session, Minneapolis, Minnesota. (Presenter: English) April 2005.

Findorff MJ, McGovern PM, Gerberich SG, Wall MM. Reporting Violence to a Health Care Employer (poster). AAOHN Annual Expo & Symposium, Minneapolis, Minnesota, May 2005. (Presenter: Findorff)

Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt GD, Feda DM, Pinder E, Sage SK. Violence Against Teachers: Magnitude and Etiology. Society for Epidemiologic Research, Seattle, Washington, June 2006. (Presenter: Church)

Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt GD, Feda DM, Pinder E, Sage SK. Violence against teachers: Magnitude, consequences, and causes. International Society for Research on Aggression Meeting, Minneapolis, Minnesota, July 2006. (Presenter: Gerberich)

Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt GD, Feda DM, Pinder E, Sage SK. Violence in the schools: Teachers at risk. American Public Health Association (APHA) Conference, Boston, Massachusetts, November 2006. (Presenter: Nachreiner)

McGovern, PM, Dowd BE, Gjerdingen DG, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U. The Health of Employed Women Six Weeks After Childbirth. AcademyHealth Annual Research Meeting, Boston, Massachusetts, June 2005. (Poster presentation: McGovern)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. National Occupational Research Agenda Seminar, Minneapolis, Minnesota, April 2005 (Presenter: Nachreiner)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. American Association of Occupational Health Nurses (AAOHN) Conference, Minneapolis, Minnesota, May 2005. (Presenter: Nachreiner)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. Women's Health Research Conference, Minneapolis, Minnesota, September 2005. (Presenter: Nachreiner)

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AD, McGovern PM, Church TR. Minnesota Nurses' Study: Relation Between Nurse License Type and Violence. American Public Health Association (APHA) Conference, Philadelphia, Pennsylvania, December 2005. (Presenter: Nachreiner)

Nachreiner NM, Wyman JF, McCarthy TC, Peters JA, Findorff MJ. Circumstances and Consequences of Falls in the Fall Evaluation and Prevention Program: Preliminary Findings. University of Minnesota School of Nursing 2005 Annual Spring Research Day: Translating Research into Practice, Minneapolis, Minnesota, April 2005. (Presenter: Nachreiner)

Olson DK, Stedman-Smith M, Fredrickson AL. Environmental health & nursing: Piloting a technology-enhanced distance learning module. Poster presentation: AAOHN 2005 Symposium & Expo, Minneapolis, Minnesota, May 2005.

McGovern PM, Dowd BE, Gjerdingen DG, Rockwood T, Gross C, Kenney SJ, Ukestad LK, McCaffrey D, Lundberg U. Findings from the Minnesota Postpartum Health Study: Women's Health Six Weeks after Childbirth, After Birth: Policies for Healthy Women, Families, and Workplaces. A Signature Study of the Humphrey Institute of Public Affairs conducted in collaboration with the School of Public Health and Consortium on Law and Values in Health, Environment, and the Life Sciences Colloquia Program. Humphrey Institute for Public Affairs, University of Minnesota, Minneapolis, October 2004. (Presenter: McGovern)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. National Occupational Research Agenda (NORA) Symposium: Health and Safety Priorities for the 21st Century, Minneapolis, Minnesota, May 2004. (Presenter: Nachreiner)

Wyman JF, DiFabio R, Nachreiner N, Talley K, Gross C. Correlates of Physical Activity in Sedentary Older Women. Gerontological Society of America (GSA) Conference. Washington, D.C., November 2004 (Presenter: Wyman)

Croghan C, Wyman J, Monigold M, Gomez C, Gildea L, Nachreiner N. Self-Initiated Home Environmental Modifications Following a Fall Prevention Program. International Conference on Aging, Disability, and Independence, Arlington, Virginia, December 2003. (Presenter: Croghan)

Findorff MJ, McGovern PM, Gerberich SG, Wall MM. Risk Factors for Work-Related Violence in a Health Care Organization. American Public Health Association Annual Meeting, San Francisco, California, November 2003. (Presenter: Findorff)

Findorff MJ, McGovern PM, Gerberich SG, Wall M. Predictors of Reporting Violence, 7th Annual Minnesota Health Services Research Conference, Minneapolis, Minnesota 2003. (Presenter: Findorff)

Gerberich SG, Church T, McGovern P, Hansen HE, Nachreiner N, Geisser M, Ryan A, Watt G, Mongin S, Jurek A. Occupational Violence: Environmental Risk Factors. National Occupational Injury Research Symposium (NOIRS), Pittsburgh, Pennsylvania, October, 2003. (Presenter: Gerberich)

Lindquist R, Wyman J, Gross C, Nachreiner N, Talley K. Health-Related Quality of Life: Baseline and Norm Comparisons in a Fall Prevention Trial for High Risk Older Women. Gerontological Society of America (GSA) Conference, San Diego, California, November 2003. (Presenter: Wyman)

McGovern PM, Dowd BE, Wickizer TM, Amick BC. Occupational Health Services Research: Evaluating the Outcomes, Cost and Quality of Care Among Working Adults, American Public Health Association, San Francisco, California, November 2003. (Panel presentation)

McGovern PM, Gross CR, Gjerdingen DG, Dowd BE, Rockwood TH, Kenney SJ, Ukestad LK, O'Connor H, Lundberg U. "Changes in Health and Employment after Childbirth. The Seventh International Women's Policy Conference, Women Working to Make a Difference, The Institute for Women's Policy Research, George Washington University Women's Studies Program and the Friedrich Ebert Foundation, Washington DC, June 2003.

McGovern PM. The Occupational Health Nursing Connection to Public Health Nursing. Celebrating Public Health Nursing in Minnesota-Past, Present and Future. School of Nursing, University of Minnesota, Minneapolis, Minnesota, May 2003.

McGovern PM, Gerberich SG, Nachreiner NM, Findorff MJ. Work-Related Violence in the Health Care Industry: Incidence, Outcomes and Risk Factors. Seventh Annual Minnesota Health Services Research Conference, Minneapolis, Minnesota, March 2003. (Panel presentations)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD, Watt GD. Work-Related Assault: Impact of Violence Prevention Policy. Minnesota Health Services Research Conference, Minneapolis, Minnesota, March 2003. (Presenter: Nachreiner)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD, Watt GD. Work-Related Assault: Impact of Violence Prevention Policy. National Occupational Injury Research Symposium (NOIRS), Pittsburgh, Pennsylvania, October, 2003. (Presenter: Nachreiner)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD. Work-Related Assault: Impact of Training. American Public Health Association (APHA) Conference, San Francisco, California, November 2003. (Presenter: Nachreiner)

Newman DM and McGovern PM. Preliminary findings on the relationship between incidence and cost of cumulative trauma disorder of the upper extremity and workplace location. Poster Presentation. Impress the President: Public Engagement and Research Initiatives: A Student Expo, Minneapolis, Minnesota, February 2003. (Presenter: Newman)

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD, Watt GD. Work-Related Assault: Impact of Violence Prevention Policy. American Public Health Association (APHA) Conference, Philadelphia, Pennsylvania November 2002. (Presenter: Nachreiner)

Appendix 2. C. Occupational and Environmental Medicine Program
Director: Heidi RoeberRice, MD, MPH

Occupational and Environmental Medicine Program

[Note: faculty and staff names are in bold font]

Presentations

Greaves IA. Terrorism and Health. A series of seminars and lectures presented to government officials, policy makers and military personnel, Republic of the Philippines, Manila, December 19, 2001 to January 2, 2002.

Greaves IA. Healthy Homes. Live presentation on KSTP 5, Minneapolis, September, 2002. Bioterrorism. Republic of the Philippines, Manila, July 20, 2003

Greaves IA. Evaluating Occupational Safety and Health in the Philippines, Republic of the Philippines, Manila, July 22, 2003

Greaves IA. Silica, Silicosis and Lung Cancer. Monash Dept of Preventive Medicine and Community Health, Melbourne, Australia, December 19, 2003

Greaves IA. Terrorism and Health. A series of seminars and lectures presented to government officials, policy makers and military personnel, Republic of the Philippines, Manila, January 2-6, 2004.

Greaves IA. Health of the Adult Working-Age Population of the Philippines. Republic of the Philippines, Manila, July 30, 2004.

Greaves IA. Policies and Options for Managing Health Issues of the Working-Age Population. Republic of the Philippines, Manila, July 30, 2004.

Greaves IA. The Need for Schools of Public Health in India, National Working Group, Indian Ministry of Health, Delhi, November 25, 2004.

Greaves IA. Curriculum for a School of Public Health in a Developing Country, B.P Koirala Ministry of Health Sciences, Dharan, Nepal, November 25, 2004.

Greaves IA. Creating a School of Public Health in India, Kasturba Medical College, Manipal, India.

Greaves IA. Healthy Cities: The Minnesota Experience, CIIT International Conference on the Indian Healthy Cities Initiatives, Bangalore, India, January 9-11, 2005.

Greaves IA. Health of Working-Age Adults in Developing Countries, Asian Development Bank, Manila, Philippines, January 14, 2005.

Greaves IA. Did Abraham Lincoln Suffer from Mercury Poisoning? Pinkman Distinguished Lecture, Presented to the Lincoln Historical Society, Springfield, IL, August 28, 2005.

Greaves IA. Abraham Lincoln and His Little Blue Pills. Medical Grand Rounds, University of S. Illinois School of Medicine, Springfield, August 29, 2005.

Greaves IA. Silicon Carbide: An "inert" substance with toxic properties. Monash University School of Medicine, Department of Preventive Medicine and Community Health, Melbourne, Australia, July 12, 2006.

Greaves IA. Heavy Metal and Pesticides. Global Health CME Series, Minneapolis, July 20, 2006.

Greaves IA. Air Pollution and Asthma in Developing Countries. Global Health CME Series, Minneapolis, July 20, 2006.

Baker BA. Farm Family Exposure Study. National Institute of Health, Bethesda, Maryland. July 2002.

Baker BA. Toxic Exposures Through Food. In Harms Way Twin City Training, University of Minnesota School of Medicine. Minneapolis, Minnesota. October 2002.

Baker BA. Mold and Mildew: Cause of Indoor Air Concerns. When Mold Takes Hold. Minnesota State Bar Association Continuing Legal Education, Minneapolis, Minnesota. April 2003.

Baker BA. Mold, Mildew, and Pesticides. Sports/Occupational Medicine Course. Department of Family Practice and Community Health. University of Minnesota Medical School. Robbinsdale, Minnesota. August 2003.

Baker BA. Mold and Mildew, Cause of Health Concern. Mold and Mold Remediation Short Course. University of Minnesota, Minneapolis, Minnesota. October 2003.

Baker BA. Metals 101: Arsenic, Mercury, Lead. Toxicology Review for Acute Care & Emergency Department Providers. HealthPartners Institute for Medical Education, Minneapolis, Minnesota. October 2003.

Baker BA. Arsenic, Mercury, Lead. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. January 2004.

Baker BA. Workers Compensation. Sports/Occupational Medicine Course University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2004.

Baker BA. Workers Compensation and Low Back Pain. St. Joseph's Family Practice Program, St. Josephs Hospital, St. Paul, Minnesota. September 2004.

Baker BA. Pesticide Exposure in Spouses from the Farm Family Exposure Study. 2004 North American Congress of Clinical Toxicology, Seattle, Washington. September 2004.

Baker BA. Chronic Consumption of Fish Associated with Mercury Toxicity. 2004 North American Congress of Clinical Toxicology. Seattle, Washington. September 2004.

Baker BA. Workers Compensation. Metals. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Minneapolis, Minnesota. January 2005.

Roeber Rice HK, Baker BA. Prenatal Lead Screening. HealthPartners Ob/Gyn Update. (Presenter Roeber Rice) Minneapolis, Minnesota. April 2005.

Baker BA. Metals: Arsenic, Mercury and Lead, Family Medicine Review: Update 2005, University of Minnesota, Minneapolis, Minnesota. May 2005.

Baker BA. Workers Compensation, Fitness for Duty Exams. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2005.

Baker BA. Trichloroethylene Chronic Case. State of the Arts Conference. American College of Occupational Medicine, Chicago, Illinois. October 2005.

Baker BA. Workers Compensation. Environmental Exposures. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. January 2006.

Baker BA. Mold Health Effects: Fact or Fiction. American College of Medical Toxicology Spring Meeting. Course Co- Director. Phoenix, Arizona. March 2006.

Baker BA. Perils and Pitfalls of Medical Monitoring. American Occupational Health Conference. Los Angeles, California. May 2006.

- Baker BA. Mold Health Effects: Fact or Fiction. American Occupational Health Conference. Los Angeles, California. May 2006.
- Baker BA. Irritant Gases. St. Joseph Family Practice Program, St. Paul, Minnesota. May 2006.
- Baker BA. Workers Compensation. Environmental Exposures. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2006.
- Roeber Rice HK. Blood Lead Screening in Pregnancy: A Pilot Study. HealthPartners Occupational Medicine Community Grand Rounds. May 2006.
- Roeber Rice HK. DOT Updates for the Commercial Driver Medical Examiner. HealthPartners Occupational Medicine Community Grand Rounds. August 2007.
- Roeber Rice HK. Disability and Self-Perception, St. Mary's/Duluth Clinic Conference: Disability Management. Duluth, Minnesota. April 2007.
- Roeber Rice HK. Employment Services Examinations. University of Minnesota School of Medicine Family Medicine Conference: Occupational Medicine. January 2007.
- Roeber Rice HK. Focus on Function: Prevention of Iatrogenic Disability. HealthPartners Occupational Medicine Community Grand Rounds. December 2006.
- Roeber Rice H, Baker B, Madden J, Zabel E, Falken M. Prenatal Lead Screening: A Pilot Study. Poster presentation. University of Minnesota School of Public Health NORA Symposium, Minneapolis, Minnesota. June 2007.
- Roeber Rice HK. Lateral Epicondylitis and Case Application of Return to Work Principles. University of Minnesota School of Medicine Family Medicine Conference: Occupational Medicine. August 2007.
- Roeber Rice HK. Evaluation of Workability and Social Security Disability. University of Minnesota School of Medicine Family Medicine Conference: Occupational Medicine. August 2007.
- Abrar FA. Management of Bloodborne pathogens in health care workers: Employee Health Services, Fairview Systems Minneapolis, Minnesota. March 2005.
- Abrar FA. The Effect of Somali Health Beliefs on the Provider-Patient Relationship: Woodbury Clinic and The Midwest Center for Occupational Health and Safety update. Woodbury, Minnesota. July 26, 2005.
- Abrar FA. Disability Management and Workers Compensation to: University of Minnesota Internal Medicine Residency Program. Minneapolis, Minnesota. 2001-2005.
- Abrar FA. Health, Sickness, and Somali tradition at Macalester College, St Paul, Minnesota. August 2005.
- Abrar FA. Somali TV in Rochester, Twin Cities: topics: seeking preventive care (Health Promotion) Video in Somali with Minnesota Department of Health – Child and Teen checkups. September 2005.
- Abrar FA. The Effect of Somali Health Beliefs on the Provider-Patient Relationship: Grand Rounds to the Psychiatric residents, University of Minnesota and Hennepin County Medical Center. Minneapolis, Minnesota. July 2006.
- Abrar FA. Global Health Pathway: University of Minnesota, School of Public Health: Faculty Member: Environmental Degradation and Health. Minneapolis, Minnesota. July 2006.

Abrar FA. Cross cultural health: Barriers to care: Somali profile. Minneapolis, Minnesota. July 2006.

Abrar FA. Prevention of depression, the benefits of preventative care, and preventing chronic disease like Diabetes and Hypertension. Presented at the Somali Women's Night celebration sponsored by Mayo Clinic. September 2006.

Zheng CJ. A Proposed Spirometric Index for Evaluating Patients with Airflow Obstruction, Annual Meeting of AOHC, Kansas City, Missouri. May 2004.

Zheng CJ. Maternal Age-Dependent Recurrence of Reproductive Failure poster presentation, Annual Meeting of Society for Epidemiologic Research, Salt Lake City, Utah June 2004.

Zheng CJ. On the Number of Founding Germ Cells in Humans, poster presentation, HealthPartners Celebration of Research 2005, St Paul, Minnesota September 2004.

Zheng CJ. Care of Work Comp Patients in USA, China NIOSH, Beijing. June 2006.

Zheng CJ. Modeling Germline Mutation: From Oocyte Dynamics to the Epidemiology of Down Syndrome, China NIOSH, Beijing June 2006.

Zheng CJ. Biologically-Based Modeling of Smoking Effect on Down Syndrome, poster presentation, HealthPartners Celebration of Research 2006, St Paul, Minnesota September 2006.

Appendix 2. D. Occupational Health Services Research and Policy Program
Co-Directors: Bryan Dowd, PhD and Patricia M. McGovern, PhD

Occupational Health Services Research and Policy Program
[Note: faculty and staff names are in bold font and student names are underscored]

Presentations

Al-Refaie WB, Habermann EB, Jensen E, Tuttle TM, Pisters WT, Virnig BA. Outcomes of surgery alone in patients with AJCC T1 extremity soft tissue sarcoma: a population-based analysis. Accepted for podium presentation at the Western Surgical Association's Annual Meeting, November 2007. (Presenter: Al-Refaie)

Dowd BE. Should Healthy Medicare Beneficiaries Buy Part D Drug Coverage? AcademyHealth annual meeting. Orlando, Florida, June 2007.

Dowd BE Endogenous Explanatory Variables. (A six-hour class taught to participants in the AcademyHealth annual meeting). Orlando, Florida, June 2007.

Dowd BE. Should Healthy Medicare Beneficiaries Buy Part D Drug Coverage? Division of Health Policy and Management, School of Public Health, University of Minnesota, Minneapolis, Minnesota, February 2007.

Habermann EB, Virnig BA, Durham SB, Baxter NN. Effects of health care use on the diagnosis, treatment and survival of disabled women with breast cancer. Poster Presentation. AcademyHealth Annual Research Meeting, Orlando Florida, June 2007. (Presenter: Habermann)

Johansen K, McGovern PM. Adding Interactivity to Breeze: Developing and Testing Three Levels of Interactivity Classrooms of the Future: Teaching, Learning and Technology, Hamline University, St. Paul, Minnesota, May 2007 (Presenter: Johansen)

McGovern PM. Ingenix Health Care Technology Conference, Benefits of a Results Only Work Environment (ROWE): Best Buy, San Francisco, California, May 2007.

McGovern PM. Childbirth and the Family and Medical Leave Act: Issues of Incapacity, Serious Health Conditions & Intermittent Leave, 2007 AAOHN Symposium & Expo, Orlando, Florida, April 2007.

Nyman JA, Barleen NA, Dowd BE, Russell D, Coons S, Sullivan P. Nationally Representative Health Related Quality of Life Weights for Self-reported Health Status and Priority Health Conditions. Poster Presentation: Academy Health Research Meeting, Poster session B, Orlando, Florida, June 2007. (Presenter: Barleen)

Barleen N, McGovern P, Brosseau L, Fredrickson A. Conducting a Literature Review and Cost-Benefit Analysis of Worksite Interventions for Diabetes and Back Injuries. Poster Presentation: Midwest Center for Occupational Safety & Health Advisory Board Meeting, NORA Poster Exhibit, Minneapolis, Minnesota, April

Dowd BE. Endogenous Explanatory Variables. (A six-hour class taught to participants in the AcademyHealth annual meeting) Seattle, Washington, June 2006.

Habermann EB, Virnig BA, Riley G, Baxter NN. The Impact of a change in Medicare reimbursement policy and HEDIS measures on stage at diagnosis among Medicare HMO and FFS female breast cancer patients. Poster Presentation. Third Annual Women's Health Research Conference, Powell Center for Women's Health, University of Minnesota, Minneapolis, Minnesota, September 2006. (Presenter: Habermann)

McGovern PM, Johansen K. Adding Interactivity to Breeze, Improving MacroMedia Breeze Learning Activities, TEL Seminar Series, University of Minnesota, St. Paul, Minnesota, November 2006. (Panel presentation).

McGovern PM. After Birth: Women, Work and Health. Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis, Minnesota, October, 2006.

McGovern PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad LK, McCaffrey D, Lundberg U. Twelve Weeks After Birth: Women, Work & Health. AcademyHealth Annual Research Meeting, Seattle, Washington, June 2006. (Presenter: McGovern)

McGovern PM, Dowd BE, Gjerdingen DG, Dagher R, Ukestad LK, McCaffrey D, Lundberg U. Work Organization & Postpartum Health in Employed Mothers after Childbirth. National Occupational Research Agenda (NORA) Symposium 2006, Washington DC, April 2006. (Presenter: McGovern)

McGovern, PM, Dowd BE, Gjerdingen DG, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U. After Birth: Policies that Promote Healthy Women and Workplaces. Work, Stress & Health, the National Institute for Occupational Safety and Health (NIOSH) & the American Public Health Association (APA), Miami, Florida, March 2006. (Presenter: McGovern)

English N, McGovern PM, Hoffman A. Minnesota OSHA Study of auto Body Repair shops, Poster Presentation: MCOHS NORA Program Seminar Poster Session, Minneapolis, Minnesota. (Presenter: English) April 2005.

Findorff MJ, McGovern PM, Gerberich SG, Wall MM. Reporting Violence to a Health Care Employer (poster). AAOHN Annual Expo & Symposium, Minneapolis, Minnesota, May 2005. (Presenter: Findorff)

Grice MM, Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan AD, and McGovern, PM. Past Violence, Future Violence: The Effect of History of Violence on Nurses' Risk of Work-Related Physical Assault. Poster Presentation. Academy Health Meeting, Boston, Massachusetts, June 2005. (Presenter: Grice)

McGovern, PM, Dowd BE, Gjerdingen DG, Kenney SJ, Ukestad, LK, McCaffrey, D., Lundberg, U. The Health of Employed Women Six Weeks After Childbirth. AcademyHealth Annual Research Meeting, Boston, Massachusetts, June 2005. (Poster presentation: McGovern)

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AD, McGovern PM, Church TR. Minnesota Nurses' Study: Relation Between Nurse License Type and Violence. American Public Health Association (APHA) Conference, Philadelphia, Pennsylvania, December 2005. (Presenter: Nachreiner)

Schult TM, Kochevar L, Virnig BA, Nelson D, Bershinsky B. The Impact of VA Priority Score on Use of Fecal Occult Blood Test in VA and Medicare Systems. Poster Presentation. AcademyHealth, Annual Meeting, Boston, Massachusetts, June 2005.

Grice MM, Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan AD, McGovern, PM. Past Violence, Future Violence: The Effect of History of Violence on Nurses' Risk of Work-Related Physical Assault. Poster Presentation. APHA 132nd Annual Meeting & Exposition, Washington, D.C., November 2004. (Presenter: Grice)

McGovern PM, Dowd BE, Gjerdingen DG, Rockwood T, Gross C, Kenney SJ, Ukestad LK, McCaffrey D, Lundberg U. Findings from the Minnesota Postpartum Health Study: Women's Health Six Weeks after Childbirth, After Birth: Policies for Healthy Women, Families, and Workplaces. A Signature Study of the Humphrey Institute of Public Affairs conducted in collaboration with the School of Public Health and Consortium on Law and Values in Health, Environment, and the Life Sciences Colloquia Program. Humphrey Institute for Public Affairs, University of Minnesota, Minneapolis, October 2004. (Presenter: McGovern)

Findorff MJ, McGovern PM, Gerberich SG, Wall MM. Risk Factors for Work-Related Violence in a Health Care Organization. American Public Health Association Annual Meeting, San Francisco, California, November 2003. (Presenter: Findorff)

Findorff MJ, McGovern PM, Gerberich SG, Wall M. Predictors of Reporting Violence, 7th Annual Minnesota Health Services Research Conference, Minneapolis, Minnesota 2003. (Presenter: Findorff)

McGovern PM, Dowd BE, Wickizer TM, Amick BC. Occupational Health Services Research: Evaluating the Outcomes, Cost and Quality of Care Among Working Adults, American Public Health Association, San Francisco, California, November 2003. (Panel presentation)

McGovern PM, Gross CR, Gjerdingen DG, Dowd BE, Rockwood TH, Kenney SJ, Ukestad LK, O'Connor H, Lundberg U. "Changes in Health and Employment after Childbirth. The Seventh International Women's Policy Conference, Women Working to Make a Difference, The Institute for Women's Policy Research, George Washington University Women's Studies Program and the Friedrich Ebert Foundation, Washington DC, June 2003. (Presenter: McGovern)

McGovern PM, Gerberich SG, Nachreiner NM, Findorff MJ. Work-Related Violence in the Health Care Industry: Incidence, Outcomes and Risk Factors. Seventh Annual Minnesota Health Services Research Conference, Minneapolis, Minnesota, March 2003. (Panel presentations)

Newman DM and McGovern PM. Preliminary findings on the relationship between incidence and cost of cumulative trauma disorder of the upper extremity and workplace location. Poster Presentation. Impress the President: Public Engagement and Research Initiatives: A Student Expo, Minneapolis, Minnesota, February 2003. (Presenter: Newman)

Raynor PC, Grice M. Experimental Evaluation of Evaporative Losses During Metalworking Fluid Mist Sampling, Abstract. American Industrial Hygiene Conference and Exposition, Dallas, Texas, May 2003. (Presenter: Raynor)

Raynor PC, Grice M. Assessment of Evaporative Losses during Sampling of Metalworking Fluid Mist. Poster Presentation. Health Effects of Mineral Oil Mist & Metalworking Fluids Symposium, Cincinnati, Ohio, October 2002. (Presenter: Raynor)

Schult TM, McGovern PM, Dowd B, Pronk, NP. The Future of Health Promotion/Disease Prevention Programs: The Incentives and Barriers Faced by Stakeholders. Poster Presentation. Midwest Center for Occupational Safety & Health Advisory Board Meeting, NORA Poster Exhibit, Minneapolis, Minnesota, April 2006.

Appendix 2. E. Occupational Injury Epidemiology and Control Program
Co-Directors: Susan Goodwin Gerberich, PhD and George Maldonado, PhD

Occupational Injury Epidemiology and Control Program
[Note: faculty and staff names are in bold font and student names are underscored]

Presentations

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin K, Ferguson K, Alexander BH, Ryan AD, (Zhang X): Injury Surveillance: Incorporation of a Case-Control Design. Society of Epidemiologic Research, Atlanta, Georgia, June 2003.

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: Minnesota Nurses' Study: Environmental Risk Factors for Occupational Violence, American Occupational Health Conference, Atlanta, Georgia, May 2003. [Presented by Ryan AD]

Gerberich SG, Renier CM, Gibson RW, French LR, Masten AS, Church TR, Alexander BH, Mongin SJ, Ryan AD, Ferguson K, (Zhang X): Regional Rural Injury Study-II: Agricultural Household Injury Experience and Etiology of Agricultural Injuries Among Children, American Occupational Health Conference, Atlanta, Georgia, May 2003. [Presented by Ferguson, K]

Gerberich SG: Injury Research: Intentional and Unintentional, Coalition Against Violence, Minneapolis, Minnesota: University of Minnesota, April 2, 2003.

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: Incidence, Consequences and Risk Factors for Work-Related Violence: Minnesota Nurses' Study, Minnesota Health Services Research Conference, Minneapolis, Minnesota, March 2003.

Gerberich SG: Violence Within the Context of the Total Injury Problem, Elder Learning Institute, Minneapolis, Minnesota: University of Minnesota, February 13, 2003.

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD, Jurek A: Environmental Risk Factors For Work-Related Violence: Minnesota Nurses' Study, Congress of Environmental and Occupational Epidemiology, Barcelona, Spain, September 2002 (Plenary)

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin SJ, Ferguson K, Alexander BH, Ryan AD, Zhang X: Unique Occupational Injury Surveillance: Regional Rural Injury Study – II, Congress of Environmental and Occupational Epidemiology, Barcelona, Spain, September 2002.

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen H, Geisser M, Ryan AD, Watt GD: Work-Related Assault: Impact of Violence Prevention Policy, American Public Health Association, Philadelphia, November 2002 *Award for the Best Paper, Student Paper Competition, Injury Control and Emergency Health Services section of APHA*

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan A, Watt GD: Minnesota Violence Against Nurses Study: A Comparison of Follow-Up Methods. Society for Epidemiologic Research (SER), Palm Desert, California, June 2002. [Presented by Ryan AD]

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Watt GD, Ryan AD: Minnesota Nurses' Study: Risk Factors for Work-Related Violence. 6th World Conference on Injury Prevention and Control, Montreal, Canada, May 2002

Appendix 2. F. Occupational Injury Prevention Research Training Program
Co-Directors: Susan Goodwin Gerberich, PhD and Bruce H. Alexander, PhD

Occupational Injury Prevention Research Training Program
[Note: faculty and staff names are in bold font and student names are underscored]

Presentations

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier CM. Children's Agricultural Injury: Associations between Behavioral Traits and High-Risk Work Exposures, Society for Epidemiologic Research, Boston, Massachusetts, June 2007.

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier CM. Intra-familial Risk of Agricultural Injury in the Regional Rural Injury Study-II: Beyond Behavioral and Environmental Risk Factors, Society for Epidemiologic Research, Boston, Massachusetts, June 2007.

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Ryan AD, Renier CM: [2007] Children's agricultural injury: Potential behavior-related risk factors, Society for Epidemiologic Research, Boston, Massachusetts, June 2007.

Gerberich SG, Research: The Burden of Injury, Alaska Tribal Injury Directors Annual Meeting, Anchorage, Alaska, May 30, 2007.

Gerberich SG, Injury Prevention Research, Universities of Minnesota and Iceland, Scientific Symposium: Discovery to Impact: The Next Generation, University of Minnesota, Minneapolis, Minnesota, April 13, 2007.

Gerberich SG, Minnesota Educators' Study: Overview and Case-Control Study, Minnesota Educators' Study Symposium, University of Minnesota, Minneapolis, Minnesota, April 10, 2007.

Gerberich SG, Violence Prevention Overview, PubH 6123, Violence Prevention and Control: Theory, Research, and Application, University of Minnesota, Minneapolis, Minnesota, January 29, 2007.

Gerberich SG, PubH 3001 (Personal and Community Health), Injuries and Occupational Health and Safety, Minneapolis: University of Minnesota, December 2006.

Larson-Bright M, Gerberich SG, Alexander BH, Gurney JG, Masten AS, Church TR, Ryan AD, Renier CM: Work Practices, Safety Beliefs, and Childhood Agricultural Injury: Regional Rural Injury Study - II (RRIS - II). Approved for oral presentation, Injury Control and Emergency Health Services, American Public Health Association, Boston, November 2006.

Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt, GD, Feda DM, Pinder E, Sage SK. Violence in the schools: Teachers at Risk, American Public Health Association, Boston, Massachusetts, 2006.

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier CM. Work Practices, Safety Beliefs, and Childhood Agricultural Injury, American Public Health Association, Boston, Massachusetts, 2006. *Best Paper - Student Paper Competition, Injury Control and Emergency Health Services section*

Gerberich SG, Nachreiner NM, Ryan AD, Church AD, McGovern PM, Geisser M, Watt GD, Feda DM, Pinder K, Sage S: Violence against teachers: Magnitude, consequences, and causes, International Society for Research on Aggression, Minneapolis, Minnesota, July 2006.

Gerberich SG, Nachreiner NM, Ryan AD, Church AD, McGovern PM, Geisser M, Watt GD, Feda DM, Pinder K, Sage S: Violence Against Teachers: Magnitude and Etiology, Congress of Epidemiology, Seattle, Washington, June 2006. (Church: Presenter)

Carlson KE, Gerberich SG, Alexander BH, Masten A, Church TR, Ryan AD, Renier CM: Children's Agricultural Injury: Potential Behavior-Related Risk Factors, Congress of Epidemiology, Seattle, Washington, June 2006.

Gerberich SG, Church TR, Alexander BH, Masten AS, Renier CM, Carlson KE, Ryan AD, Mongin SJ: Unique Occupational Injury Surveillance: Identification of the Total Injury Burden and Risks on Agricultural Operations, NORA Symposium 2006, Washington, DC, April 2006.

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: Occupational Violence: Incidence, Consequences and Identification of Risk Factors as a Basis for Prevention, NORA Symposium 2006, Washington, DC April 2006.

Ferguson K, Langner D, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: The History Of Parent Agricultural Injury And Risk Of Child Agricultural Injury; Regional Rural Injury Study-II (RRIS-II). 7th World Conference on Injury Prevention and Safety Promotion, Vienna, Austria. *Best Poster Award, 7th World Conference on Injury Prevention and Safety Promotion in Vienna* Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.

Carlson KE, Gerberich SG, Alexander BH, Church TR, Ryan A, Mongin SJ, Renier CM, Zhang X, French LR, Masten AS: A Population-Based Study Of Tractor-Related Injuries: Regional Rural Injury Study - II (RRIS-II). American Public Health Association, San Francisco, California, *Delta Omega Award for Best Student Abstract* Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.

Gerberich SG, Church TR, Alexander BH, Masten A, Renier CM, Ferguson K, Ryan A, Mongin S: Surveillance Of The Burden Of Injury And Relevant Risk Factors Among Agricultural Household Members: Regional Rural Injury Study – II. Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin S, Watt G, Jurek A: Minnesota Nurses' Study: Environmental Risk Factors for Occupational Violence. Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.

Grice M, Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan AD, and McGovern PM: Past Violence, Future Violence: The Effect of History of Violence on Nurses' Risk of Work-Related Physical Assault. Midwest Center for Occupational Safety and Health, Poster Symposium, April 2006.

Fisher L, Ferguson Carlson K, Guard A: Shaping the Millennium. From the History of Child Home Injury in the United States, in public health journals (1900 - 1975), to Applications of Leadership Systems, 2005 National Injury Prevention and Control Conference, Injury and Violence in America: Meeting Challenges, Sharing Solutions, Denver, Colorado, May 2005.

Ferguson Carlson K, Alexander BH, Gerberich SG, Ryan AD, Renier CM, Mongin SJ, Masten A, Church TR: Musculoskeletal Back Injuries Among Agricultural Household Members in the Regional Rural Injury Study – II: Incidence, Characteristics, and Potential Risk Factors, 2005 Program: The National Occupational Research Agenda (NORA): Health and Safety Issues in the Ageing Workforce, Minneapolis: University of Minnesota, April 2005.

Gerberich SG, Church TR, Alexander BH, Masten AS, Renier CM, Ferguson Carlson K, Ryan AD, Mongin SJ: Surveillance of the Burden of Injury and Relevant Risk Factors Among Agricultural Household Members: Regional Rural Injury Study – II, American Public Health Association Meeting, Philadelphia, Pennsylvania, 2005.

Renier CM, Gerberich SG, Church TR, Masten AS, Ferguson Carlson K, Mongin SJ, Ryan AD, Alexander BH: Regional Rural Injury Study-II: Innovative Design and Methods for Surveillance of the Burden of Injury and Relevant Risk Factors among Agricultural Household Members, American Public Health Association Meeting, Philadelphia, Pennsylvania, 2005.

Nachreiner NM, Hansen HE, Okano A, Gerberich SG, Ryan AD, McGovern PM, Church TR: Minnesota Nurses' Study: Relation Between Nurse License Type and Violence, American Public Health Association Meeting, Philadelphia, Pennsylvania, 2005.

Gerberich SG. Minnesota Nurses' Study: Work-Related Violence Research to Identify the Magnitude, Consequences, and Risk Factors, Anoka-Ramsey Nursing Alumni Association, Performing Arts Center, October 2005.

Gerberich SG. Overview of Disease and Injury Through a Public Health Lens: Injury: A Public Health Problem? School of Public Health, Academic Warm Up, Minneapolis: University of Minnesota, August 2005.

Feda D, Grice M, McGovern P, Alexander B, McCaffrey D, Ukestad L: The Impact of Work-Family Conflict on Maternal Health After Childbirth. Women's Health Research Conference, Minneapolis, Minnesota, 2005.

Gerberich SG, Church TR, Alexander BH, Masten AS, Renier CM, Ferguson Carlson K, Ryan AD, Mongin SJ: Surveillance Of Injury Burden and Risk Factors For Agricultural Injury Among Children And Youth: Regional Rural Injury Study – II. Society for Epidemiologic Research, Toronto, Canada, 2005.

Kurszewski LS, Gerberich SG, Serfass RC, Ryan AD, Renier CM, Mongin SJ, Alexander BH, Ferguson KR, Masten A: Sports and Recreational Injuries: Regional Rural Injury Study – II (RRIS-II), Midwest Center for Occupational Health and Safety, NORA Program Seminar Poster Session, Minneapolis, Minnesota, 2005.

Ryan AD, Mongin SJ, Gerberich SG, Renier CM, Alexander BH, Church TR, Masten AS, Ferguson KR: A Comparison of Exposure Measurements for Injury Rates: Regional Rural Injury Study – II (RRIS-II). Midwest Center for Occupational Health and Safety, NORA Program Seminar Poster Session, Minneapolis, Minnesota, 2005.

Gerberich SG, Church TR, Alexander BH, Masten A, French LR, Renier CM, Mongin SJ, Ryan AD, Ferguson KR, Howse G: Surveillance of the Burden of Injury and Relevant Risk Factors Among Agricultural Household Members: Regional Rural Injury Study – II, Midwest Center for Occupational Health and Safety, NORA Program Seminar Poster Session, Minneapolis, Minnesota, 2005.

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen, HE, Geisser MS, Ryan AD: Work-Related Assault: Impact of Training, Women's Health Research Conference, Minneapolis, Minnesota, 2005.

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD: Work-Related Assault: Impact of Training. National Occupational Research Agenda Seminar, Minneapolis, Minnesota, 2005.

Nachreiner NM, Wyman JF, McCarthy TC, Peters JA, Findorff MJ: Circumstances and Consequences of Falls in the Fall Evaluation and Prevention Program: Preliminary Findings. University of Minnesota School of Nursing Annual Research Day: Translating Research into Practice, Minneapolis, Minnesota, 2005.

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen HE, Geisser MS, Ryan AD: Work-Related Assault: Impact of Training. American Association of Occupational Health Nurses (AAOHN) Conference, Minneapolis, Minnesota, 2005.

Findorff M, McGovern PM, Wall MM, and Gerberich SG: Reporting Violence to a Health Care Employer American Occupational Health Nurses' Association. Minneapolis, Minnesota, May 2005.

Ferguson KR, Gerberich SG, Alexander BH, Church TR, Ryan AD, Renier CM, Mongin SJ, Masten A. Regional Rural Injury Study – II (RRIS-II): Incidence, Characteristics, and Risk Factors for Back Injuries Among Agricultural Household Members, Midwest Center for Occupational Health and Safety, NORA Program Seminar Poster Session, Minneapolis, Minnesota, April 2005.

Gerberich SG, Church TR, Alexander BH, Masten A, French LR, Renier CM, Mongin SJ, Ryan AD, Ferguson KR, Howse G. Surveillance of the Burden of Injury and Relevant Risk Factors Among Agricultural Household Members: Regional Rural Injury Study – II, Midwest Center for Occupational Health and Safety, NORA Program Seminar Poster Session, Minneapolis, Minnesota, April 2005.

Gerberich SG. Building Nested Case Control Studies into Surveillance Efforts: Regional Rural Injury Study-II, Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts, November 29, 2004.

Ferguson Carlson KR, Gerberich SG, Alexander BH, Church TR, Ryan AD, Renier CM, Mongin SJ, Masten A: Regional Rural Injury Study – II (RRIS-II): Incidence, Characteristics, and Risk Factors for Back Injuries Among Agricultural Household Members, American Public Health Association Meeting, Washington, DC, November 2004.

Grice MM, Gromala T, Gerberich SG, Alexander BH, Gurney J, Ryan AD, McGovern PM, Past Violence, Future Violence: The Effect Of History of Violence on Nurses' Risk of Work-Related Violence, American Public Health Association Meeting, Washington, DC, November 2004.

Langner DM, Ferguson KR, Gerberich SG, Alexander BH, Gurney J, Ryan A, Renier C, Mongin S.: Household Injury Experience among Midwest Farmers. The 132nd Annual Meeting of the American Public Health Association, November 2004.

(Kurszewski LS), Gerberich SG, Serfass RC, Ryan AD, Renier CM, Mongin SJ, Alexander BH, Ferguson KR, Masten A: Sports and Recreational Injuries: Regional Rural Injury Study – II (RRIS-II) – Impact on Agricultural Operations, American Public Health Association Meeting, Washington, DC, November 2004. *Best Student Paper Award, Injury Control and Emergency Services Section*

Nordgren L: The effects of mass media messages on population health beliefs, behaviors and attitudes. Minnesota Association for Public Opinion Research. Chicago, Illinois, Fall, 2004.

Ryan AD, Mongin SJ, Gerberich SG, Renier CM, Alexander BH, Church TR, Masten AS, Ferguson, K: A comparison of exposure measurements for injury rates: Regional Rural Injury Study – II (RRIS-II). Society of Epidemiologic Research, Salt Lake City, Utah, June 2004.

Gerberich SG, Renier CM, Alexander BH, Mongin SJ, Ryan AD, Ferguson K, French LR, Masten AS, Church TR: Regional Rural Injury Study-II: Epidemiology of injury experience among children and adults residing in agricultural households, 7th World Conference on Injury Prevention and Safety Promotion, Vienna, Austria, June 2004.

Ferguson K, Langner D, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: The history of parent agricultural injury and risk of child agricultural injury; Regional Rural Injury Study – II (RRIS-II), 7th World Conference on Injury Prevention and Safety Promotion, Vienna, Austria, June 2004. *Best Poster Award, 7th World Conference on Injury Prevention and Safety Promotion in Vienna, June 6-9 2004. Selected from over 2,000 abstracts submitted by all participants.*

Langner DM, Gerberich SG, Alexander BH, Williams A, Hickman CD: Sleep habits and risk of injury among high school adolescents in rural Minnesota, USA. Accepted for presentation at the 7th World Conference of Injury Prevention and Safety Promotion, June 2004. (unable to present due to travel restrictions at the State level)

Ferguson K, Langner D, Alexander BH, Gurney J, Gerberich SG, Ryan AD, Renier CM, Mongin SJ: The history of parent agricultural injury and risk of child agricultural injury; Regional Rural Injury Study – II (RRIS-II), 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, Minneapolis: University of Minnesota, May 2004.

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin SJ, Ferguson KR, Alexander BH, Ryan AD, Zhang X. Injury Surveillance: Incorporation of a Case-Control Design, 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, Minneapolis: University of Minnesota, May 2004.

Ryan A, Mongin SJ, Gerberich SG, Renier CM, Alexander BH, Church TR, Masten AS, Ferguson K: A comparison of exposure measurements for injury rates: Regional Rural Injury Study – II (RRIS-II). 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, Minneapolis: University of Minnesota, May 2004.

Gerberich SG, Renier CM, Alexander BH, Mongin SJ, Ryan AD, Ferguson K, French LR, Masten AS, Church TR: Regional Rural Injury Study-II: Epidemiology of injury experience among children and adults residing in agricultural households, 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, Minneapolis: University of Minnesota, May 2004.

Brunner W, Langner DM, Williams AN, Keysser J: Asthma in Rural Minnesota Adolescents. National Asthma Conference, Atlanta, Georgia, April 2004.

Langner DM, Hickman CD, Hill D: Youth at Work: Knowledge and skills for a life at work. Minnesota Safety Council Spring Health and Safety Conference, Minneapolis, Minnesota, April 2003.

Ferguson KR, Gerberich SG, Alexander BH, Church TR, Ryan A, Mongin SJ, Renier CM, (Zhang X), French LR, Masten AS: A population-based study of tractor-related injuries: Regional Rural Injury Study - II (RRIS-II). American Public Health Association, San Francisco, California, November 2003. *Delta Omega Award for Best Student Abstract*

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin SJ, Ryan AD, Ferguson KR, Alexander BH, (Zhang X): Regional Rural Injury Study-II: Incidence, consequences, and etiology of agricultural injuries, American Public Health Association, San Francisco, California, 2003.

Ferguson KR, Gerberich SG, Alexander BH, Church TR, Ryan AD, Mongin SJ, Renier CM, (Zhang X), French LR, Masten AS: The epidemiology of tractor-related injuries among agricultural households with children: Regional Rural Injury Study – II (RRIS-II), Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities, Saskatoon, Canada, October 2003.

Nordgren L: Minnesota Hospital Association, Minnesota Alliance for Patient Safety, and VHA Regional Conference: Fall 2003, Minneapolis, Minnesota.

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Alexander BH, Mongin SJ, Ryan A, Ferguson KR, (Zhang X): Magnitude and etiology of agricultural injuries among households with children: Regional Rural Injury Study-II. NIOSH NOIRS, Pittsburg, Pennsylvania, October 2003.

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan A, Mongin SJ, Watt GD, Jurek A: Occupational Violence: Environmental Risk Factors. NIOSH NOIRS, Pittsburg, Pennsylvania, October 2003.

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Alexander BH, Mongin SJ, Ryan AD, Ferguson KR, (Zhang X): Regional Rural Injury Study-II: etiology and consequences of agricultural injuries among households with children. NIOSH, Morgantown, West Virginia, September 2003.

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin K, Ferguson K, Alexander BH, Ryan AD, (Zhang X): Injury Surveillance: Incorporation of a Case-Control Design. Society of Epidemiologic Research, Atlanta, Georgia, June 2003.

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AD, Mongin, SJ Watt GD, Jurek A: Minnesota Nurses' Study: Environmental Risk Factors for Occupational Violence, American Occupational Health Conference, Atlanta, Georgia, May 2003. [Presented by Ryan AD]

Gerberich SG, Renier CM, Gibson RW, French LR, Masten AS, Church TR, Alexander BH, Mongin SJ, Ryan AD, Ferguson K, (Zhang X): Regional Rural Injury Study-II: Agricultural Household Injury Experience and Etiology of Agricultural Injuries Among Children, American Occupational Health Conference, Atlanta, Georgia, May 2003. [Presented by Ferguson, K]

Gerberich SG: Injury Research: Intentional and Unintentional, Coalition Against Violence, Minneapolis, Minnesota: University of Minnesota, April 2, 2003.

Gerberich SG, Church TR, McGovern PM, Hansen HE, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: Incidence, Consequences and Risk Factors for Work-Related Violence: Minnesota Nurses' Study, Minnesota Health Services Research Conference, Minneapolis, Minnesota, March 2003.

Gerberich SG: Violence Within the Context of the Total Injury Problem, Elder Learning Institute, Minneapolis, Minnesota: University of Minnesota, February 13, 2003.

Gerberich SG, McGovern PM, Church TR, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD: The Magnitude and Consequences of Work-related Violence: The Minnesota Nurses' Study. Academy for Health Services Research and Policy:

Annual Research Meeting, Washington DC, June 2002 Recognition for one of three outstanding abstracts for Workers and Workplaces category; over 700 submissions were received for the conference (McGovern: Presenter)

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan AD, Mongin SJ, Watt GD, Jurek A. Environmental Risk Factors For Work-Related Violence: Minnesota Nurses' Study, Congress of Environmental and Occupational Epidemiology, Barcelona, Spain, September 2002 (Plenary)

Gerberich SG, Church TR, Renier CM, Gibson RW, French LR, Masten AS, Mongin SJ, Ferguson K, Alexander BH, Ryan AD, Zhang X: Unique Occupational Injury Surveillance: Regional Rural Injury Study – II, Congress of Environmental and Occupational Epidemiology, Barcelona, Spain, 2002.

Nachreiner NM, Gerberich SG, McGovern PM, Church TR, Hansen H, Geisser M, Ryan AD, Watt GD: Work-Related Assault: Impact of Violence Prevention Policy, American Public Health Association, Philadelphia, November 2002 *Award for the Best Paper, Student Paper Competition, Injury Control and Emergency Health Services section of APHA*

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Ryan A, Watt GD: Minnesota Violence Against Nurses Study: A Comparison of Follow-Up Methods. Society for Epidemiologic Research (SER), Palm Desert, California, June 2002. [Presented by Ryan AD]

Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser M, Watt GD, Ryan AD: Minnesota Nurses' Study: Risk Factors for Work-Related Violence. 6th World Conference on Injury Prevention and Control, Montreal, Canada, May 2002

Appendix 2. G. Hazardous Substances Academic Training Program
Director: Peter Raynor, PhD

Hazardous Substances Academic Training Program
[Note: student names are underscored where applicable]

Presentations

Dr. Raynor

- Andrea Barteková, Peter Raynor, and John Adgate, "Comparison of a Novel Liquid Crystal Monitor for Organophosphate Pesticides to a Conventional Sampling Method", *2007 American Industrial Hygiene Conference and Exposition*, Philadelphia, PA, June 2007.
- Peter C. Raynor, "Approaches for Exposure Assessment and Control for Airborne Infectious Agents", presentation to the Particle Society of Minnesota St. Paul, MN, December 2006 (invited)
- Peter C. Raynor, Jo Anne Brock, and Monika Vadali, "Influences on Collection of Airborne Bacterial Spores by Charged Filter Media", Paper 15E2, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Ji Young Park, Gurumurthy Ramachandran, Peter C. Raynor, and Lynn E. Eberly, "Comparison of Two Methods for Estimating Surface Area Concentration Using Number and Mass Concentrations", Paper 10C4, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Senthilvelan Anantharaman, M.A. Ramakrishnan, Sagar M. Goyal, Seung Won Kim, Peter Raynor, Nicholas J. Stanley, and Thomas H. Kuehn, "Airborne Human Viruses Captured by HVAC Filters", Paper 13D3, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Seung Won Kim and Peter C. Raynor, "Design for a New Vapor Aerosol Dichotomous Sampler", Paper 6H9, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Thomas Kuehn, Nicholas Stanley, Seung Won Kim, M.A. Ramakrishnan, Senthilvelan Anantharaman, Peter Raynor, and Sagar Goyal, "Background Airborne Bacteria and Virus Populations In and Near Buildings Using Ventilation Filters as Long-Term Bioaerosol Collection Devices", Paper 8H25, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- M.A. Ramakrishnan, Sagar M. Goyal, Senthilvelan Anantharaman, Seung Won Kim, Peter Raynor, Nicholas J. Stanley, and Thomas H. Kuehn, "Detection of Airborne Bacteria in HVAC Filters by Polymerase Chain Reaction", Paper 11G32, *7th International Aerosol Conference*, St. Paul, MN, September 2006
- Peter C. Raynor, "Use of HVAC Systems to Limit the Spread of Airborne Microorganisms", presentation to the Minnesota Indoor Air Association, St. Paul, MN, June 2006 (invited)
- Seung Won Kim, James Farnsworth, Sagar Goyal, Peter C. Raynor, and Thomas Kuehn, "Bacterial Aerosol Measurements Using Ventilation Filters in Building Air Handling Units", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Tricia Carmody, Peter C. Raynor, and Martin Bevan, "Development of an Air Sampling Protocol for Sampling in Former Methamphetamine Laboratories", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Jo Anne Brock and Peter C. Raynor, "Efficiency of Filter Media with Biological and Non-Biological Agents", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Ji Young Park, Gurumurthy Ramachandran, Peter C. Raynor, Lynn E. Eberly, and Andrew D. Maynard, "Comparison of Two Surface Area Concentration Estimation Methods Using Number and Mass Concentrations", *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006 (poster)
- Seung Won Kim and Peter C. Raynor, "Mist Generation from Vegetable-Oil Based Metalworking Fluids by Three Mechanism", presentation to the Upper Midwest Section-American Industrial Hygiene Association, Roseville, MN, October 2005 (invited)
- Peter C. Raynor, "Worker Competencies for Emergency Preparedness", *The 3rd Annual Statewide Partners' Conference on Public Health and Hospital Emergency Preparedness*, Milwaukee, WI, September 2005 (invited)

- Seung Won Kim and Peter C. Raynor, "Mist Generation from Vegetable-Oil Based Metalworking Fluids by Three Mechanisms", *2005 American Industrial Hygiene Conference and Exposition*, Anaheim, CA, May 2005
- Peter C. Raynor, "Preparedness in the Workplace: Training and Research Activities at the University of Minnesota", presentation to the Upper Midwest Section-American Industrial Hygiene Association, Roseville, MN, February 2005 (invited)
- Peter C. Raynor, "Using HVAC Systems to Limit the Spread of Infectious Agents", seminar at the University of Minnesota, Division of Environmental Health Sciences, Minneapolis, MN, January 2005 (invited)
- Peter C. Raynor and Seung Won Kim, "CFD Modeling of Filter Fibers with Non-Circular Cross Sections", Paper 5B1, *Twenty-Third Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 2004
- Peter C. Raynor, "Modeling the Influence of Fiber Shape on Filter Performance", *2004 Symposium – The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century*, Minneapolis, MN, May 2004
- Peter C. Raynor, "Modeling the Influence of Fiber Shape on Filter Performance", *2004 American Industrial Hygiene Conference and Exposition*, Atlanta, GA, May 2004.
- Peter C. Raynor, "Performance Predictions for Air Filters Made from Fibers with Non-Circular Cross Sections", Paper 311-1, *World Filtration Congress 9*, New Orleans, LA, April 2004.
- Peter C. Raynor and Gina Letts, "Influence of Fiber Material on Mist Filter Performance", Paper 2E2, *Twenty-Second Annual Conference of the American Association for Aerosol Research*, Anaheim, CA, October 2003.
- Peter C. Raynor, Gina Letts, and Seung Won Kim, "Factors Affecting the Long-Term Performance of Mist Control Filters", *Sixteenth Annual Technical Conference and Exposition of the American Filtration and Separations Society*, Reno, NV, June 2003
- Peter C. Raynor and Mira Grice, "Experimental Evaluation of Evaporative Losses During Metalworking Fluid Mist Sampling", *2003 American Industrial Hygiene Conference and Exposition*, Dallas, TX, May 2003.
- Seung Won Kim and Peter Raynor, "Developing a Better Vapor/Aerosol Dichotomous Sampler", *2003 American Industrial Hygiene Conference and Exposition*, Dallas, TX, May 2003. (poster)
- Peter C. Raynor and Soo Jae Chae, "Effects of Particle Loading on Electrically Charged Filters in an HVAC System", *American Filtration & Separations Society Indoor Air Quality-Filtration Conference*, Cincinnati, OH, November 2002.
- Peter C. Raynor and Soo Jae Chae, "Influence of Long-Term Particle Loading on Efficiency of Electrically Charged Filters", Paper 2D1, *Twenty-First Annual Conference of the American Association for Aerosol Research*, Charlotte, NC, October 2002.
- Peter C. Raynor and Mira Grice, "Assessment of Evaporative Losses During Sampling of Metalworking Fluid Mist", *Health Effects of Mineral Oil Mist & Metalworking Fluids Symposium*, Cincinnati, OH, October 2002.

Dr. Brosseau

- L.M. Brosseau, Evaluating the Effectiveness of Health and Safety Interventions in Small Manufacturing Businesses, Institute of Occupational Safety and Health, Taipei, Taiwan, April 2007.
- L.M. Brosseau, Evaluating the Effectiveness of Health and Safety Interventions in Small Manufacturing Businesses, Institute of Occupational Safety and Health, Taipei, Taiwan, April 2007.
- L.M. Brosseau, How to Choose Respiratory Protection in a Pandemic Situation, ORC Worldwide Pandemic Preparedness Conference Call Series, June 2007.
- L.M. Brosseau, Health and Safety of Lead Paint Removal, Public Health Moment Podcast, October 2006.
- L.M. Brosseau, Filter Efficiency and Facial Fit of Health Care Masks," Respiratory Protection Against SARS, Avian Influenza and other Infectious Aerosols Roundtable, AIHCE, June 2006.
- L.M. Brosseau, Filter Efficiency and Facial Fit of Surgical Masks, Working Scientific Meeting on Occupational Influenza Prevention and Control in Health Care Settings, Public Health Agency of Canada, Toronto, Ontario Canada, October 2006.

- L.M. Brosseau, Filter Efficiency and Facial Fit of Surgical Masks, AIHA Upper Midwest Section Professional Development Conference on Pandemic: Pandemonium or Preparedness, November 2006.
- L.M. Brosseau, Respiratory Protection for Pulmonary Therapists PALL Corporation, 2006-2007 Influenza Update CD, December 2006.
- L.M. Brosseau. Threshold Limit Values for Chemical Substances: Looking Back and Moving Forward, 2007 Conference of Industrial Hygiene and Occupational Medicine, Kaohsiung, Taiwan, April 2007.
- L.M. Brosseau, T. Oberg, "Surgical Mask Filter Efficiency and Fit," American Industrial Hygiene Conference and Exposition, Chicago, IL, May 2005.
- L.M. Brosseau, "Update on TLVs for Chemical Substances Committee," American Industrial Hygiene Conference and Exposition, San Diego, CA, May 2004.
- L.M. Brosseau, A. Fredrickson, M. Casey, "Developing a Health and Safety Newsletter for Small Manufacturing Businesses," American Industrial Hygiene Conference and Exposition, San Diego, CA, May 2004.
- L.M. Brosseau, Particle Size Selective Sampling, Pharmaceutical Forum, Dallas, TX, May 2003.
- L.M. Brosseau, C. Lungu, P. Raynor, "Expectations of employers hiring entry-level masters-trained industrial hygienists," presented at the American Industrial Hygiene Conference and Exposition, Dallas, TX, May 2003.
- L.M. Brosseau, "Small business owners' beliefs and attitudes underlying their intentions to improve workplace health and safety," presented at the American Industrial Hygiene Conference and Exposition, Dallas, TX, May 2003.
- L.M. Brosseau, "Beliefs and attitudes associated with small business owners' intentions to improve health and safety," presented at the Australian Institute for Occupational Hygiene Conference, Adelaide, Australia, December 2003.
- L.M. Brosseau, "Motivating Health and Safety Improvements in Small Business," VIOSH Australia, Ballarat Australia, December 2003.
- L.M. Brosseau, "Intervention Research to Reduce Injuries and Illnesses in Small Businesses," University of Illinois at Chicago, School of Public Health, June 2003.
- L.M. Brosseau, "Impact of Lawsuits on the Current and Future TLV Process," American Industrial Hygiene Association, Ohio Valley Section, Cincinnati OH, October 2003.
- L.M. Brosseau, "Motivating Occupational Health and Safety Improvements in Small Business," National Institute for Occupational Safety and Health, Cincinnati OH, October 2003.
- L.M. Brosseau, J. Spomar, R. von Kalben, G. Heilman, Fostering Small Business Success Through Workplace Improvement, Small Business Assistance Program Conference, Chicago, IL, July 2002.
- L.M. Brosseau, "Threshold Limit Values: Scientific Guidelines," Australian Institute of Occupational Hygienists, December 2002.
- L.M. Brosseau, "Do Air Samples Tell the Truth? Particle Size Selective TLVs" IRSST Symposium on Chemical Exposure Values in the Workplace, Montreal, Canada, May 2003.
- L.M. Brosseau, "TLVs: Committee and Process" IRSST Symposium on Chemical Exposure Values in the Workplace, Montreal Canada, May 2003.
- L.M. Brosseau, "Intervention Research to Reduce Injuries and Illnesses in Small Businesses," University of Illinois at Chicago, School of Public Health, June 2003.

Dr. Lungu

- Yang Rui, C. Lungu: *Airflow Patterns around a Mannequin – Determination of Critical Parameters for Indoor Air Modeling* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004. (poster).

- Ji Young Park and Claudiu Lungu: *Granular Activated Carbon Adsorption of Toluene-Ethanol Binary Mixture* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004. (poster).
- Claudiu Lungu and Ji Young Park: *Comparing the Adsorption of Toluene and Ethanol on Granular Activated Carbon* American Industrial Hygiene Conference and Exposition, Atlanta, GA, May 2004.
- Claudiu T. Lungu: *Determination of ¹³⁷Cs Biological Half-Life from Individual Whole Body Counter Measurements, Following the Chernobyl Accident* 11th International Congress of the International Radiation Protection Association, Madrid, Spain, May 2004.
- Yang Rui and Claudiu Lungu: *"Airflow Patterns Around a Mannequin: Determination of Critical Parameters for Indoor Air Modeling"* AIHA-UMS meeting, Minneapolis, MN, October 2004.
- Claudiu T. Lungu: *Adsorption in Industrial Hygiene; Conventional and Less Conventional Applications* Special Seminar of the Department of Environmental Health Sciences (invited). University of Alabama, Birmingham, AL, November 2004.

Appendix 2. H. Agricultural Safety and Health Program
Director: John Shutske, PhD

Agricultural Safety and Health Program

[Note: faculty and staff names are in bold font and student names are underscored]

Presentations

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier C. Children's Agricultural Injury: Associations between Behavioral Traits and High-Risk Work Exposures, Society for Epidemiologic Research, Boston, Massachusetts, June 2007.

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR, Shutske JM, Ryan AD, Renier, C. Intra-Familial Risk of Agricultural Injury in the Regional Rural Injury Study II: Beyond Behavioral and Environmental Risk Factors, Society for Epidemiologic Research, Boston, Massachusetts, June 2007.

Carlson KE, Gerberich SG, Alexander BH, Masten AS, Church TR., Shutske JM, Ryan AD, Renier C. Children's Behaviors and High-Risk Agricultural Work Exposures: An Opportunity for Intervention? American Public Health Association, Washington, D.C., November 2007.

Shutske, J., Schermann, M., Wagstrom, L., Bender, J., Kirkhorn, S. and Powell, T. A Conceptual Model of Bundled Risk Communication and Education to Improve Agricultural Worker Health and Safety. Annual Meeting of the American Public Health Association, Boston, MA. November 2006.

Schermann, M., Bartz, P., Moua, M., Shutske, J., Vue, P., and Lee, T.T. Evaluation of Storytelling in Hmong to Deliver Agricultural Safety and Health Information. Annual Meeting of the American Public Health Association, Boston, MA. November 2006.

Shutske, J., Powell, T, Stelzner, J, and Randall, J. Food and Agricultural Supply Chain Interruptions from a Pandemic Event. Extension Disaster Education Network annual conference, Nashville, Tennessee, November 2006.

Shutske, J. and Koch, B. EDEN's Food Security and National Response Plan Courses. Extension Disaster Education Network annual conference, Nashville, Tennessee, November 2006.

Shutske, J. Agroterrorism and Food Systems Defense: Key Issues and Research Needs. Peer reviewed abstract and invited presentation. Academy Health Annual Research Conference, Boston, MA. June 2005.

Shutske, J. Opportunities for Extension in Public Health and Preparedness. Extension Disaster Education Network Annual Conference, Fargo, ND. October, 2005.

Shutske, J. Defending Agriculture and Our Food System. Conference proceedings and presentation materials published by Association of Schools of Public Health. Washington, DC. September 2005.

Shutske, J., Benson, L. Meit, M, and Campbell, P. Rural Preparedness and Agroterrorism: CPHP Resource Assessment and Toolkit. Published and reviewed by CDC and Association of Schools of Public Health. September 2005.

Shutske, J. Protecting Our Food System from Intentional Attack. Presentation, materials, symposium worksheets, and other handouts presented in Marshall, Mankato, St. Cloud, Rochester, and Crookston, MN. April 2004.

Shutske, J. Development of Model Biosecurity Programs. Joint Animal, Dairy, and Poultry Science Association Annual Meeting, St. Louis, MO. July 2004.

Schermann, M.A., Rasmussen, R.C., Madsen Jenkins, S., Vang, C., Lor, M., & Shutske, J. Hmong children as farm workers in Minnesota: Hazards, tasks, and safe work practices. American Public Health Association, San Francisco, CA. November 2003.

Shutske, J. New Tractor Technologies -- Opportunities for Progress. Presented at Tractor Injury Prevention and Control conference by invitation from the National Institute for Occupational Safety and Health, Pittsburgh, PA. February, 2003.

Shutske, J. Midwest Center Research on Tractors and Machinery Injury Control. Tractor Injury Prevention and Control conference by invitation from the National Institute for Occupational Safety and Health, Pittsburgh, PA. February 2003.

Schermann, M., S. Madsen Jenkins, R. Rasmussen, and J. Shutske. Adapting Health and Safety Guidelines to the Hmong Agricultural Community: A Process Methodology. Children, Youth, and Families at Risk Conference. Minneapolis, MN. May, 2003.

Shutske, J. and M. Schermann. Hmong Children as Farm Workers in Minnesota: Hazards, Tasks, and Safe Work Practices. Presented by invitation to National Institute for Occupational Safety and Health and childhood injury prevention project researchers in Morgantown, WV. September 2003.

Shutske, J. and M. Schermann. Hmong Children and Injury Prevention. Presented by invitation to National Institute for Occupational Safety and Health National Occupational Injury Symposium (NOIRS). Pittsburgh, PA. October 2003.

Shutske, J. Disaster Preparedness, Homeland Security, and Workplace Safety: Optimizing Public Mindspace and Resources. Extension Disaster Education Network (EDEN) Annual Conference, Denver, CO. October 2003.

Shutske, J. and R. Schuler. Liability Concerns for the AgrAbility Professional. Presented at the National AgrAbility Conference in Omaha, Nebraska. November, 2003.

Shutske, J. Safety and Health for Crop Protection Professionals. Pesticide Applicator and Co-Op Manager Crop Protection Course And Recertification Program, Minneapolis, MN. December 2003.

Shutske, J. Stress and Workplace Safety. Midwest Rural Energy Council Annual Meeting, St. Paul, MN. March, 2003.

Shutske, J. Danger Will Robinson: The Promises and Perils of Robotics in Agriculture. Classes Without Quizzes Event. April 2003.

Shutske, J. Application of Homeland Security Concepts in Agricultural and Food Systems. AFE Staff Development Conference of the University of Minnesota Extension Service, Arden Hills, MN. April 2003.

Shutske, J. and S. Madsen-Jenkins. Working Safely in the Garden (Hmong and English versions. Hmong Training Session for Farmers/Families, Rosemount, MN. May 2003.

Shutske, J. The Health of Workers in the Agricultural Industry. Healthy Farm Families Conference - Paynesville Clinic and Healthcare System, Paynesville, MN. April 2003.

Shutske, J. Agricultural Injuries and Illness – The Health Professional's Role in Prevention. Medical Resident Community Health Workshops. Robbinsdale, MN. February and September 2003.

Shutske, J. Ready to Respond: Farm Injuries and Rural Emergencies. Emergency Medical Services And Law Enforcement Personnel Workshops. Paynesville and Moorhead, MN. April 2003 and November 2003.

Shutske, J. Safety and Health Concerns for Commercial Animal Waste Technicians. Commercial Manure Applicators Workshop. Hutchinson, MN. April 2003.

Shutske, J. Terrorism in Agriculture and Our Food System. Invited presentation at Purdue University Department of Agricultural and Biological Engineering. December 2003,

Shutske, J. Caring for Farm Families: Workplace Safety & Health. Healthy Farm Families Workshop, Moorhead, MN. November, 2003.

Schermann MS. Madsen Jenkins, R. Rasmussen, and J. Shutske. Adapting Health and Safety Guidelines to the Hmong Agricultural Community: A Process Methodology. Children, Youth, and Families at Risk Conference. Minneapolis, MN. May, 2003.

Appendix 2. I. Continuing Education and Outreach Program
Director: Kathleen Smith, MSN

Continuing Education and Outreach Program

Presentations

Jeanne Ayers' presentations included:

- Presentation on Occupational Health and Safety Resources/Programs, available through the Midwest Center for Occupational Health and Safety to AIHA-local chapter Fall Conference 2002.
- Presentation on Occupational Health and Safety Resources/Programs available through the Midwest Center for Occupational Health and Safety to AIHA-local chapter Fall Conference 2002.

Lois Harrison's presentations included:

- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference, April, 2005, Minnesota Safety Council conference (May 2005) and Minnesota Pollution Control Agency annual conference (Feb 2005)
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2003)
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference (April 2004)
- Provided poster presentation and table of NIEHS training schedule and materials at annual Minnesota Safety Council conference (May 2004).
- Presented overview of NIEHS training curricula for group of School of Public Health students convened by Multicultural Director, School of Public Health (January 2004)
- Provided poster presentation and table of NIEHS training materials and schedule at annual Minnesota Pollution Control Agency annual conference (February 2004)
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2002) and Minnesota Department of Health /Emergency Preparedness staff (February 2003).
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Public Health Association annual conference (May 2003).
- Provided poster presentation and table of NIEHS training schedule and materials at annual Minnesota Safety Council conference (May 2003).
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2002) and Minnesota Department of Health /Emergency Preparedness staff (February 2003).
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Public Health Association annual conference (May 2003).
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference (Apr 2005), Minnesota Safety Council conference (May 2005) and Minnesota Pollution Control Agency annual conference (Feb 2005)
- Presented NIEHS Persistent Biological Toxins course to the National Association of Minority Medical Educators at the University of Minnesota (April 2002).
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2001) and Minnesota Department of Health Environmental Health Division staff (January 2002).
- Poster presentation and table of NIEHS training schedules and materials at the Minnesota Public Health Association annual conference (May 2002).

- Presentation to Women's Cancer Resource Center, Children's Environmental Committee on Persistent Biological Toxins curricula (April 2002).

Ruth Rasmussen's presentations included:

- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Closing the Health Gap Expo at Walker, MN on November 3, 2005
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Minnesota Safety Council annual conference, May 2004.

Iris' Staubus presentations included:

- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at MN Safety Council Spring Conference and the MAOHN Vendor Fair in Oct 2005
- Provided poster presentation and table of NIOSH and other health and safety training schedules and materials at the AIHA-local chapter annual conference, November 2002.
- Presentation and Summary of Labor Forum results to Education Research Center Advisory Board.
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Minnesota Safety Council annual conference, May 2004, May 2005, May 2006
- Provided poster presentation and table of NIOSH and other health and safety training schedules and materials at the NORA program seminars in spring 2005.
- Facilitator for small group discussions at the Public Health and Terrorism Preparedness: Cross Border Issues Roundtable
- Provided poster presentation and table of NIOSH and other health and safety training schedules and materials at the ERC Advisory Board Meeting in 2006

Mary Hoepfner's presentations included:

- Served as Instructor, OSHA 845 "Recording and Reporting Occupational Injuries and Illnesses course, 2002.
- Created and served as host for "Who Wants to Be a Lead Risk Assessor" game used in annual refresher course.
- "The Evaluation Picture": presented a day long workshop for the NIOSH CE Directors Annual Meeting February, 2003, Marco Island, Florida.
- Guest faculty: "Planning for Urgent Threats". Presentation regarding development of competency based needs assessment processes, University of Minnesota School of Public Health 2003 Summer Institute; May, 2003.

Appendix 2. J. Hazardous Substances Training Continuing Education Program
Director: Kathleen Smith, MSN

Hazardous Substances Training Continuing Education Program

Presentations

Lois Harrison's presentations included:

- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference, April, 2005, Minnesota Safety Council conference (May 2005) and Minnesota Pollution Control Agency annual conference (Feb 2005)
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2003)
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference (April 2004)
- Provided poster presentation and table of NIEHS training schedule and materials at annual Minnesota Safety Council conference (May 2004).
- Presented overview of NIEHS training curricula for group of School of Public Health students convened by Multicultural Director, School of Public Health (January 2004)
- Provided poster presentation and table of NIEHS training materials and schedule at annual Minnesota Pollution Control Agency annual conference (February 2004)
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2002) and Minnesota Department of Health /Emergency Preparedness staff (February 2003).
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Public Health Association annual conference (May 2003).
- Provided poster presentation and table of NIEHS training schedule and materials at annual Minnesota Safety Council conference (May 2003).
- Provided poster presentation and table of NIEHS training schedules and materials at the Minnesota Department of Public Safety Emergency Management Conference (Apr 2005), Minnesota Safety Council conference (May 2005) and Minnesota Pollution Control Agency annual conference (Feb 2005)
- Presented NIEHS Persistent Biological Toxins course to the National Association of Minority Medical Educators at the University of Minnesota (April 2002).
- Presented overview of NIEHS curricula and training to University of Minnesota Technical Assistance Program (MN-TAP) staff (October 2001) and Minnesota Department of Health Environmental Health Division staff (January 2002).
- Poster presentation and table of NIEHS training schedules and materials at the Minnesota Public Health Association annual conference (May 2002).
- Presentation to Women's Cancer Resource Center, Children's Environmental Committee on Persistent Biological Toxins curricula (April 2002).

Appendix 2. K. Agricultural Safety and Health Continuing Education Program
Director: Kathleen Smith, MSN

Agricultural Safety and Health Continuing Education Program

Ruth Rasmussen's presentations included:

- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Closing the Health Gap Expo at Walker, MN on November 3, 2005
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Minnesota Safety Council annual conference, May 2004.

Appendix 2. L. NORA Program
Directors: Ian A. Greaves, B Sci, MB BS and Lisa Brosseau, ScD

NORA presentations are listed within each academic program.

Appendix 2. M. Pilot Projects Program
Director: Lisa Brosseau, ScD

Pilot Projects presentations are listed within each academic program.

APPENDIX 3: OUTREACH

Appendix 3. A. Industrial Hygiene Program
Director: Gurumurthy Ramachandran, PhD

Industrial Hygiene Program
Outreach Activities

1. Educational Development

Dr. Ramachandran

- Developed and taught Professional Development Course (PDC) at the American Industrial Hygiene Conference and Exposition (AIHCE) titled "Mathematical Models for Assessing Exposure to Air Contaminants".
- Chair, Education (Tutorials) Committee, American Association for Aerosol Research, 2000-2002.
- External examiner for Ph. D. candidate (Mr. Arto Voutilainen) in the Faculty of Natural and Environmental Science, University of Kuopio, Finland (2001).
- Served as Chair, Scientific Review Board, University of Minnesota Pilot Projects Research Training Program, 2002
- Taught a CIH Review course for professionals at the Midwest Center continuing education program in 2002 and 2003. Lectured on aerosol science and exposure statistics.
- Served as Chair, Scientific Review Board, University of Minnesota Pilot Projects Research Training Program, 2002, 2003
- Taught a CIH Review course for professionals at the Midwest Center continuing education program in 2003 and 2004. Lectured on aerosol science and exposure statistics.
- Taught a CIH Review course for professionals at the Midwest Center continuing education program. Lectured on aerosol science and exposure statistics.
- Developed an *Exposure Science* curriculum in the Division of Environmental Health Sciences, SPH, University of Minnesota
- Published a textbook *Occupational Exposure Assessment for Air Contaminants*. CRC-Lewis Publishers. 2005.
- Instructor for Professional Development Course on Mathematics of Exposure Modeling. American Industrial Hygiene Association Conference and Exposition, June 1999, June 2000.
- Instructor for Professional Development Course on Mathematical Models for Assessing Exposure to Air Contaminants. American Industrial Hygiene Association Conference and Exposition, June 1999, June 2000, June 2001, June 2002, June 2003, May 2004, May 2005.
- Instructor for Professional Development Course on Bayesian Statistics: Overview and applications in industrial hygiene Data interpretation and exposure risk assessment. American Industrial Hygiene Association Conference and Exposition, May 2006; Professional Conference of Industrial Hygienists, September 2006.

Dr. Brosseau

- Technical Advisor, University of Minnesota, Midwest Center Continuing Education: Development of environment, health and safety certificate programs and curriculum
- Executive Planning Committee; World Occupational Exposure Values Symposium, ACGIH, Cincinnati OH
- Midwest Center for Occupational Safety and Health: Identification of Educational Outcomes for all Occupational Health and Safety Academic Programs
- Lecturer, Continuing Education Course, Review of Industrial Hygiene, Midwest Center (2002)
- Co-Facilitator, Mid-Career Teaching Program, University of Minnesota, Center for Teaching and Learning (2002)
- Lecturer, Professional Development Course, Global Occupational Exposure Limits, Australian Institute of Occupational Hygienists Conference (2002)
- Chair, Joint Scientific Research Task Force, American Industrial Hygiene Conference and Exhibition

- Workshop Leader, "Teaching Professional Students," University of Minnesota, Center for Teaching and Learning Services, August 2003.
- Gas and Vapor Sampling, CIH Review Course, Midwest Center for Occupational Health and Safety

Dr. Raynor

- Served as Member, Scientific Review Board, University of Minnesota Pilot Projects Research Training Program, 1999-2004 (Chair, 1999-2001, 2004)
- Co-Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #425, *2007 American Industrial Hygiene Conference and Exposition*, Philadelphia, PA, June 2007
- Co-Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #425, *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Lead Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #427, *2005 American Industrial Hygiene Conference and Exposition*, Anaheim, CA, May 2005.
- Arranger, "Nanoparticle Exposure Assessment", Roundtable arranged for *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Instructor in University of Minnesota Public Health Institute; Developed courses on "Personal Protective Equipment and Respiratory Protection", "Preparedness for Buildings", and "Workers as Partners in Emergency Preparedness and Response" for May-June 2006
- Instructor, Hazard Awareness Training for Solid Waste Workers, Leech Lake Reservation, Cass Lake, MN, August 2006

2. Consultations

Dr. Ramachandran

- Consulted with University of Michigan, on project dealing with design of new generation of aerosol samplers.
- Consulted with the Northeastern Ontario Regional Cancer Centre on project dealing with retrospective exposure assessment that will assist in an epidemiologic study of lung cancer among nickel workers in Ontario.
- Consulted with State of North Dakota on review of a study on childhood asthma resulting from coal power plant emissions.
- Consulted with 3M Corporation on a study on using expert judgment for occupational exposure assessment.
- Consulted with 3M Corporation on a study on using expert judgment for occupational exposure assessment.
- Consulted on NIOSH-funded RO1 grant on "Statistical Methodologies for Exposure Assessment" (PI: Professor Thomas Mathew, Department of Mathematics and Statistics, University of Maryland)
- Consulted with 3M Corporation on a study on using expert judgment for occupational exposure assessment.

Dr. Brosseau

- University of Minnesota, Department of Environmental Health and Safety, Mercury Task Force
- Member, Advisory Board, Regions Hospital, Occupational Medicine Residency Program
- Consultant, National Institutes for Health, EPA Superfund Grant Review Panel, NIEHS Conference Grant Review Panel
- Member, University of Minnesota, Biomedical Research Advisory Committee
- Member, National Institute for Occupational Safety and Health, Safety and Occupational Health Study Section
- Member, Institute of Medicine, Committee for the Assessment of the NIOSH Head-and-Face Anthropometric Survey of U.S. Respirator Users
- Member, Institute of Medicine, Committee on the Development of Reusable Facemasks for Protection During Pandemic Influenza

- Member, Minnesota Department of Health, Work-Related Asthma Advisory Committee
- Consultant, Minnesota Department of Health, Pandemic Influenza Clinical Advisory Group
- Consultant, NIOSH, NORA Town Hall Meeting, Chicago IL
- Co-Chair, Task Force on ERCs in the 21st Century, Association of University Programs in Occupational Health and Safety
- Member, Task Force on ERC Resource Allocation, Association of University Programs in Occupational Health and Safety
- Member, ACGIH, TLVs for Chemical Substances Committee

Dr. Raynor

- Consulted with Mr. Chris Chita, M.E. Mortenson, on concerns with methane contaminating a facility being constructed on an existing oil field
- Consulted with Mr. Daniel Peña, Minnesota Department of Health, regarding emissions from ethanol plant
- Provided equipment to Ms. Susie Johnson, Minnesota Brewing Company, to evaluate emissions from ethanol facility
- Consulted with Mr. Chris Chita, M.E. Mortenson, regarding "mothball" odors noted inside a metal ventilation stack
- Consulted with law firm on metalworking fluid mist exposure assessment and control issues.

Dr. Lungu

- Consulted with Mr. Daniel Peña, Minnesota Department of Health, regarding emissions from ethanol plant
- Consulted with Charlie Kennedy (MPCA), Phyllis Strong (MPCA) and Randy Cook (MinTAP) on methods to estimate the reduction in styrene emission due to technological changes in the reinforced plastic industry
- Provided equipment to Calvin Cole, Environmental Health and Safety, Hazardous Waste Division to measure hazardous waste tank leakage.

3. Other Outreach Activities:

Dr. Ramachandran

- Chair, Admissions Committee, Division of Environmental and Occupational Health
- Member, Exposure Assessment Strategies Committee, American Industrial Hygiene Association, 1998-present.
- Grant Reviewer, NIH Center for Scientific Review Special Emphasis Panel on Bioengineering Applications (ZRG1 SSS-3 02 S), 2001.
- Member, American Industrial Hygiene Association
- Ad-Hoc* Reviewer for articles submitted to *Journal of Aerosol Science*, *Aerosol Science and Technology*, *American Industrial Hygiene Association Journal*, *Review of Scientific Instruments*, *Journal of the Optical Society of America*, *Annals of Occupational Hygiene*.
- Editorial Board Member, *Journal of Occupational and Environmental Hygiene*, 2004 - present.
- Grant Reviewer, NIOSH/CDC Study Section (SOH-1). 2004-present.
- CDC Study Section Member, Special Review Panel on World Trade Center Responder Health Consortium (ZOH1 SPC 04 R), 2004.
- Grant Reviewer, NIH Center for Scientific Review Special Emphasis Panel on Bioengineering Applications (ZRG1 SSS-3 02 S), 2001-2003.
- Member, NIOSH Board of Scientific Counselors, 2007-2010.

- Institute of Medicine, Board on Military and Veterans Health, Committee on Making Best Use of the Agent Orange Exposure Reconstruction Model, 2007.

Dr. Brosseau

- Chair, Threshold Limit Values for Chemical Substances Committee, ACGIH, Cincinnati OH
- Member, Hazardous Substances Worker Training Advisory Board, Midwest Center Continuing Education Program
- Member, Industrial Hygiene Education Advisory Board, Midwest Center Continuing Education Program
- Member, Advisory Board, Regions Hospital, Occupational Health Program
- University of Minnesota, Office for Women, School of Public Health Representative
- School of Public Health, Recognition, Awards and Honors Committee
- Division of Environmental and Occupational Health, Awards Committee (Chair)
- Member, Study Section, Intervention Effectiveness Research Applications, National Institute for Occupational Safety and Health

Dr. Raynor

- Member, American Association for Aerosol Research; Chair of Control Technology Working Group, 2000-2001; Member of Technical Program Committee for 2001 AAAR Conference
- Member, American Filtration and Separations Society
- Member, American Industrial Hygiene Association
- Member, American Conference of Governmental Industrial Hygienists
- Participant in Center for Filtration Research operated by the University of Minnesota Department of Mechanical Engineering
- Division of Environmental and Occupational Health, Admissions Committee
- Member, AAAR Newsletter Committee, 2001-2004 (Chair, 2003-2004)
- Editor, *Particulars* (AAAR Newsletter), 2003-2004
- Member, AAAR Control Technology Working Group, 1998-present
- Member, AIHA Aerosol Technology Committee, 2001-present (Secretary, 2003; Vice-Chair, 2004)
- Editorial Advisory Board, *Aerosol Science and Technology*, 2001-present
- Proposal Reviewer, U.S. Department of Agriculture Small Business Innovation Research Program, 2003-2004
- Ad-hoc manuscript reviewer for *Applied Occupational and Environmental Hygiene*, *Aerosol Science and Technology*, *The Annals of Occupational Hygiene*, *American Industrial Hygiene Association Journal*, *Industrial and Engineering Chemistry Research*, *Journal of Porous Media*, and *Journal of Aerosol Science*.
- Member, Transportation Planning and the Environment Council, University of Minnesota Center for Transportation Studies, 2003-2005

Dr. Lungu

- Member, American Industrial Hygiene Association; Member of the Ionizing radiation committee
- Member, Health Physics Society
- Member, Sigma Xi Society
- Reviewed manuscripts for *American Industrial Hygiene Association Journal* and *Environmental Science & Technology*

- Member, Laboratory Committee, Division of Environmental and Occupational Health
- Division of Environmental and Occupational Health, Admissions Committee
- AIHC&E – Session arranger – Physics Agents.
- AIHC&E - Session moderator - Ionizing & Non-ionizing radiation.
- Low background Screening and Prototyping Facility at the Soudan Underground Mine–Member of the User Group

Adjunct Faculty Outreach

John Mulhausen, Ph.D., CIH

Educational Development

- Member, Midwest Center for Occupational Health and Safety Advisory Board

4. Other

- Fellow of the American Industrial Hygiene Association
- Friends of the Press Award – American Industrial Hygiene Association
- Director, American Industrial Hygiene Association
- Journal article reviewer – *American Industrial Hygiene Journal* and *Annals of Occupational Hygiene*
- Member American Industrial Hygiene Association
- Member American Conference of Governmental Industrial Hygienists
- Member, Delta Omega Honorary Public Health Society

Appendix 3. B. Occupational and Environmental Health Nursing Program
Director: Patricia M. McGovern, PhD

Occupational and Environmental Health Nursing Program Selected Outreach Activities

1. Educational Development

Professor McGovern has collaborated with UMN School of Nursing faculty to implement a dual degree option (MPH-MS). Four OEHN students graduated from this degree program plan during the period of interest, and two additional dual degree students are completing their plan B masters research paper fall, 2007. School of Public Health Dean Finnegan asked Dr. McGovern to formalize this program by developing a Memorandum of Agreement between the schools, which was signed July 2006. This agreement has facilitated collaborative efforts between schools in program development, promotion and administration, and student recruitment.

Dean Olson developed the first public health course offered on the Internet "Issues in Environmental and Occupational Health" (PubH 3102, 3 credits and 6102, 2 credits) for multidisciplinary students; 135 students participated in 2005-2006. The instructional design developed for this effort has been employed by all core public health courses now available online and for online modules in occupational health and safety. She also offered 8 online modules in "Environmental Health and Nursing" (3 CEUs per module) under a Health Resources and Services Administration funded initiative as the primary faculty that included colleagues from Johns Hopkins, UNC, and OHN students. In 2005-2006 there were 409 participants. Nursing faculty at the University of N.D., University of WI, Green Bay, and Metro State University, Minneapolis have adopted course content.

Dean Olson will continue to offer courses with community faculty, Dr Paul Allwood, that introduce participants to the field of occupational health and safety, such as "Issues in Environmental and Occupational Health, PubH 6102 (2 credits), which is offered to students in nursing, public health and health care administration. She also co-teaches "Issues in Environmental and Occupational Health," PubH 3102 (3 credits), an undergraduate option that meets the requirements of the Council on Liberal Education to help inform pre-nursing and liberal arts students of the possible career options in environmental and occupational health. Offered on the Internet, it allows for regional access to potential candidates and attracts over 130 students annually. Thirteen online modules will be completed for the introduction of occupational health concepts from theory and practice to women in the trades. Marketing of these opportunities to labor unions, undergraduate programs and other organizations will promote OSH integration into curricula and workforce training.

Professor McGovern has collaborated with technical consultant, Krista Johansen, to develop online modules for the division-required class, Occupational and Environmental Policy(PubH 6105, 2 credits). In 2006-2007 students had the option to take the course in-person, online or a combination of the two formats. Forty-three students were enrolled and student evaluations of satisfaction were very favorable as was student performance.

Dean Olson and Professor McGovern collaborate with Professor John Shutske (Biosystems/ Agricultural Engineering) to provide a supporting program in Agricultural Safety and Health (ASH) for OEHN and other students. Penny Bartz, an August 2005 MPH graduate, completed the ASH program, and conducted an innovative plan B, "Storytelling as a Delivery Method of Farming Safety Education for Hmong Farmers" (Research Advisor: Dr. Shutske), and an OEHN internship at the National Farm Medicine Center, Marshfield WI. Kaia Sjogren (MPH student) is also completing the ASH program; she completed an internship with Dr. Shutske and Dean Olson developing online modules in disaster preparedness for the agricultural public health community. Maggie Stedman-Smith (Research Advisor, Dr. McGovern) completed a supporting program in ASH as part of her doctoral studies as her dissertation research investigates pesticide exposure pathways in mothers living in the Red River Valley, an agricultural region that includes northwestern Minnesota and northeaster North Dakota.

Dean Olson served as chair, and Dr. McGovern served as educational co-chair, of the Local Coordinating Committee (LCC) for AAOHN's inaugural Symposium and Expo held in Minneapolis, April 28-May 6, 2005. Faculty worked CPHEO, AAOHN and Minnesota Association for Occupational Health Nurses' (MAOHN) volunteers to develop program content and identify speakers. Extremely successful, the program was attended by 1500 OHNs. Several alumni and faculty, including Dr. Nachreiner, presented posters as detailed in the Progress Report to this application. In 2006 Dr. McGovern facilitated a C.E. program, "Fundamentals of NIH Peer Review," featuring Dr. Michael Micklin, Chief, Risk, Prevention, and Health Behavior Integrated Review Group, Center for Scientific Review, National Institutes of Health, for educators/researchers at the Symposium and Expo in Albuquerque.

Dean Olson's educational development activities include serving on the editorial review board for the AAOHN Journal and chair of the Public Health Practice Council at the Association of Schools of Public Health.

Dr. Nachreiner teaches the "Introduction to Occupational Health and Safety" classes (in person and on-line) and the "Interdisciplinary Evaluation of Occupational Health and Safety Field Problems" (in person). During the 2005-2006 academic year, 31 students participated for academic credit.

2. Presentations/Lectures/Awareness Seminars

Over the past several years Professors McGovern, Gerberich, and Brosseau collaborated with Dean Olson and the CPHEO to host innovative seminars and symposium that promote the translation of "Research to Practice" (r2p) on the priorities of the National Occupational Research Agenda (NORA). The CPHEO have provided C.E. or academic credit for these efforts, and adapted the live programs to an online format (<http://cpheo.sph.umn.edu/cpheo/events/NORA.html>) as follows.

- June 13, 2007 the MCOHS hosted two seminars focused on the theme "Occupational Health and Safety Research to Practice." Speakers and topics included: Laura Punnett Sc.D, Professor, Department of Work Environment, University of Massachusetts Lowell and Jane Lipscomb PhD, RN, FAAN, Professor and Director, University of Maryland Baltimore (UMAB) School of Nursing, Work and Health Research Center. Professor Punnett presented: "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs," and Professor Lipscomb presented: "Evaluation of Workplace Violence Prevention Interventions."
- July 18, 2006 Dr. Jim Collins from the NIOSH Division of Safety Research presented his NORA award winning studies "Research on Safe Patient Lifting & Slip, Trip, and Fall Prevention in Health Care Workers," and his colleague, Dr. Harlan Amandus, presented, "Directions for Future Workplace Violence Research"
- February 24, 2005 Dr. Rosie Sokas presented "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations"
- March 30, 2005 Dr. Nick Ashford presented "The Consequences of Thinking about Environmental and Occupational Health as Separate Entities"
- April 21, 2005 Dr. David Wegman presented "Health and Safety Issues: the Aging Workforce"
- May 26 - 27, 2004 the MCOHS launched a full day symposium "NORA Health and Safety Priorities for the 21st Century." It featured nationally known experts to identify research initiatives in OHS research, especially those related to injury prevention/control, health behavior change, health promotion/disease prevention, and occupational health services research.

Over the period of interest alumni, students and faculty have provided introductory lectures in occupational and environmental health nursing to undergraduate nursing students as follows.

- Angela Kopfer, MPH, RN, an OHN alumnus and program consultant, provided introductory lectures in OEHN to area schools including Metropolitan State University, Minneapolis, Minnesota (October 6, 2004); Gustavus Adolphus College, St. Peter, Minnesota (November 3, 2005); Augustana College, Sioux Falls, South Dakota (November 10, 2004); St. Olaf College, Northfield, Minnesota (November 15, 2004); Bethel University, St. Paul Minnesota (November 24, 2004; March 14, 2005), and Anoka Ramsey Community College, Coon Rapids, Minnesota (February 28, 2005).
- Maggie Stedman-Smith, OEHN student, presented a lecture on occupational and environmental health nursing to 30 University of Minnesota baccalaureate nursing students (November 8, 2005; Nurs 4322, Dr. Laila Gulzar).
- Professor McGovern provided an introductory lecture to 40 undergraduate BSN and 12 continuing RN to BSN students at Bethel University, St. Paul, Minnesota, December 6, 2006 and May 10, 2007, respectively.

Faculty from the OEHN Program will continue to engage in opportunities for providing guest introductory lectures at regional undergraduate schools of nursing. Additionally, the faculty will continue to provide outreach to practicing professionals using oral and poster presentations. For example, OEHN faculty and students routinely work with AAOHN to present research and continuing education at annual meetings. For example, Dr. McGovern presented a CEU program with David Cossi, JD, Adjunct Assistant Professor at the AAOHN 2007 Symposium and Expo in Orlando, Florida on "Serious Health Conditions and the Family Medical and Leave Act," which has implications for OEHN practice.

In June and July 2007 Professors McGovern and Alexander and doctoral student, Maggie Stedman-Smith, implemented a research project "Reducing Children's Exposure to Pesticides in the Red River Valley." As part of the project Professor McGovern designed and implemented an educational session to create awareness of pesticide exposure pathways and prevention strategies for mothers and caregivers of young children including residents of the White Earth Reservation, mothers in Hallock, Minnesota who were recipients of the federal Women, Infant and Children (WIC) nutrition program and mothers who were new Americans participating in the Immigrant Development Center in Fargo, North Dakota.

3. Consultations/Other

Dean Olson served as Chair, Centers for Public Health Preparedness, a University-based preparedness education exemplar group involving a national network for 44 colleges and universities granted under CDC to train the public health workforce in preparedness, and as Co-Chair, Academic Centers for Public Health Preparedness, a national network for 21 public health schools (ASPH/CDC agreement) to train the public health workforce in preparedness for terrorism and other threats, 2002-2005. She has also served on the Medical Services Review Board, Minnesota's Department of Labor and Industry, St. Paul, MN (appointment by Commissioner as first RN position created on MSRB), 2002-2006 Dean Olson has served on AAOHN Journal's editorial board since 1994.

Dean Olsons' other key outreach activity included:

- Iceland Research Symposium (C Delaney, J Finnegan, D Olson, D Bliss, J Garrard) hosted two-day research symposium to initiate faculty collaborations for public health research between Iceland and UMN. Minneapolis and Rochester, April 13-14, 2007
- Global health collaboration group (C Delaney, R Lindquist, S Edwardson, D Bliss, D Olson, J Finnegan) charged to develop public health education and research collaborations in Iceland. September 23-27, 2006;
- Minnesota Department of Health, State Community Health Services Advisory Committee member: Public Health Goals Update Review Group charged to develop a framework for the update and reorganization of the 'Healthy Minnesotans: Public Health Improvement Goals', and identify additional issues and/or indicators that should be included in the update of the goals for the state of Minnesota
- Emerging Leaders Network. Strategic Planning Committee in partnership with MDH, MPHA and School of Public Health. St. Paul, MN.

Dr. McGovern worked with the NIOSH for a special emphasis panel to review applications for "Centers for Excellence to Promote a Healthier Workforce," Philadelphia, PA, November 15-16, 2005. She also worked with NIOSH staff to participate in a national focus group to identify a future research agenda for work-related violence in the health care industry held in Washington DC, May 7, 2003. She worked with 3M Corporation Occupational Health Medicine Department and Professor Bryan Dowd, Health Services Research, University of Minnesota to design a disease management program for employees with diabetes, and to design a program evaluation, 2003-2004. She has served on Minnesota's Advisory Council since 2002 (ongoing). She has served as a reviewer for the following journals: Health Services Research, Annals of Family Medicine, International Journal of Behavioral Medicine, Journal of Agromedicine, Journal of Epidemiology and Community Health, American Journal of Public Health, Scandinavian Journal of Psychology, Social Science and Medicine, and Medical Care.

Dr. Nachreiner serves as a reviewer for Research in Nursing and Health, the International Journal of Nursing Studies, and General Hospital Psychiatry and is the Membership Chair for the Injury Control and Emergency Health section of the American Public Health Association. She was also sought as a consultant on training related to work-related violence against nurses for an NIH SBIR grant proposal from the Life Crisis Institute. Dr. Nachreiner is an adjunct faculty in the School of Nursing, where she collaborates on several papers currently in press and in progress, and assists in advising School of Nursing students.

Appendix 3. C. Occupational and Environmental Medicine Program
Director: Heidi RoeberRice, MD, MPH

Occupational and Environmental Medicine Program
Outreach Activities

1. Educational Development

A new Medical Toxicology (MT) fellowship program accepted the first trainee at Regions/HealthPartners in July 2005. This training program is a joint venture between the Emergency Medicine and Occupational and Environmental Medicine Departments at Regions/HealthPartners and the Minnesota Regional Poison Center. Medical Toxicology Fellows complete clinical rotations in the OEM clinic with Dr. Beth Baker and Dr. Michael Mcgrail, developing expertise in complex clinical consultations related to Occupational and Environmental exposure to toxicants. Approximately 150 cases yearly are evaluated in the OEM clinic by OEM residents and MT fellows—cases which require the application of skills and knowledge of medical toxicology as well as principles of industrial hygiene and risk assessment. Additionally as a part of this collaboration, the OEM residency program sponsors an Occupational and Environmental Toxicology Conference each month. Faculty and residents from the OEM and Emergency Departments as well as PharmD trainees and medical students from the University of Minnesota attend these conferences, which highlight toxicology and environmental issues.

A new seminar on system biology and proteomics entitled "New Frontiers in Environmental Health" was jointly sponsored by the OEM program, 3M and the University of Minnesota, School of Public Health and this course was held at 3M Corporate Headquarters in October 2003. Given the community interest in issues of environmental exposure, a jointly sponsored Environmental Exposure grand rounds commenced in 2007 — a joint venture between the HealthPartners OEM program, the SPH at the University of Minnesota and Minnesota Department of Health.

As a fellow of the American College of Medical Toxicology (ACMT), Dr. Baker has been involved in the educational outreach effort in her position as the co-Director of the ACMT spring medical toxicology conferences for 2006 and 2007—a course which provides an opportunity for medical toxicologists such as PharmDs, poison center staff and physicians in multiple specialties from around the country to develop awareness about issues of toxicology related to occupational and environmental exposures

During the last five years the OEM Program has increased its focus on research training as part of the residency experience, with methodical collaboration between academic institutions and various private and government agencies. All residents must complete an independent research project as a requirement for completing the residency. The faculty works with residents in the development and design of research projects which was supported with the addition of CJ Zheng, MD, PhD who joined the residency staff in July 2004. With a doctorate in epidemiology, Dr. Zheng's biostatistics background and past research experience continues to be utilized in development of new research areas. He has begun the process of establishing occupational/environmental health ties internationally, specifically with the People's Republic of China, where he has an existing network in the science community. As advisor to trainee Dr. Eileen Greenwald, her research entitled; "Curvilinearity in an expiratory flow-volume curve and the severity of chronic obstructive pulmonary disease (COPD)" received the ACOEM Residents Research Presentation Award at the American Occupational Health Conference in New Orleans, LA, on May 7, 2007.

2. Presentations/Lectures/Awareness Seminars

Baker BA. Farm Family Exposure Study. National Institute of Health, Bethesda, Maryland. July 2002.

Baker BA. Toxic Exposures Through Food. In Harms Way Twin City Training, University of Minnesota School of Medicine. Minneapolis, Minnesota. October 2002

Baker BA. Mold and Mildew: Cause of Indoor Air Concerns. When Mold Takes Hold. Minnesota State Bar Association Continuing Legal Education, Minneapolis, Minnesota. April 2003

Baker BA. Mold, Mildew, and Pesticides. Sports/Occupational Medicine Course. Department of Family Practice and Community Health. University of Minnesota Medical School. Robbinsdale, Minnesota. August 2003

Baker BA. Mold and Mildew, Cause of Health Concern. Mold and Mold Remediation Short Course. University of Minnesota, Minneapolis, Minnesota. October 2003

Baker BA. Metals 101: Arsenic, Mercury, Lead. Toxicology Review for Acute Care & Emergency Department Providers. HealthPartners Institute for Medical Education, Minneapolis, Minnesota. October 2003

Baker BA. Arsenic, Mercury, Lead. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. January 2004

Baker BA. Workers Compensation. Sports/Occupational Medicine Course University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2004

Baker BA. Workers Compensation and Low Back Pain. St. Joseph's Family Practice Program, St. Josephs Hospital, St. Paul, Minnesota. September 2004

Baker BA. Pesticide Exposure in Spouses from the Farm Family Exposure Study. 2004 North American Congress of Clinical Toxicology, Seattle, Washington. September 2004

Baker BA. Chronic Consumption of Fish Associated with Mercury Toxicity. 2004 North American Congress of Clinical Toxicology. Seattle, Washington. September 2004

Baker BA. Workers Compensation. Metals. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Minneapolis, Minnesota. January 2005

Roeber Rice HK, Baker BA. Prenatal Lead Screening. HealthPartners Ob/Gyn Update. (Presenter Roeber Rice) Minneapolis, Minnesota. April 2005

Baker BA. Metals: Arsenic, Mercury and Lead, Family Medicine Review: Update 2005, University of Minnesota, Minneapolis, Minnesota. May 2005

Baker BA. Workers Compensation, Fitness for Duty Exams. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2005

Baker BA. Trichloroethylene Chronic Case. State of the Arts Conference. American College of Occupational Medicine, Chicago, Illinois. October 2005

Baker BA. Workers Compensation. Environmental Exposures. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. January 2006

Baker BA. Mold Health Effects: Fact or Fiction. American College of Medical Toxicology Spring Meeting. Course Co- Director. Phoenix, Arizona. March 2006

Baker BA. Perils and Pitfalls of Medical Monitoring. American Occupational Health Conference. Los Angeles, California. May 2006

Baker BA. Mold Health Effects: Fact or Fiction. American Occupational Health Conference. Los Angeles, California. May 2006

Baker BA. Irritant Gases. St. Joseph Family Practice Program, St. Paul, Minnesota. May 2006

Baker BA. Workers Compensation. Environmental Exposures. Sports/Occupational Medicine Course. University of Minnesota. Department of Family Practice and Community Health, Maplewood, Minnesota. August 2006

Roeber Rice HK. Blood Lead Screening in Pregnancy: A Pilot Study HealthPartners Occupational Medicine Community Grand Rounds. May 2006

Roeber Rice HK. Disability and Self-Perception, St. Mary's/Duluth Clinic Conference: Disability Management. Duluth, Minnesota. April 2007

Roeber Rice HK. Employment Services Examinations. University of Minnesota School of Medicine Family Medicine Conference: Occupational Medicine. January 2007

Roeber Rice HK. Focus on Function: Prevention of Iatrogenic Disability. HealthPartners Occupational Medicine Community Grand Rounds. December 2006

Greaves IA. Terrorism and Health. A series of seminars and lectures presented to government officials, policy makers and military personnel, Republic of the Philippines, Manila, December 19, 2001 to January 2, 2002.

Greaves IA. Healthy Homes. Live presentation on KSTP 5, Minneapolis, September, 2002.

Greaves IA. Bioterrorism. Republic of the Philippines, Manila, July 20, 2003.

Greaves IA. Evaluating Occupational Safety and Health in the Philippines, Republic of the Philippines, Manila, July 22, 2003.

Greaves IA. Silica, Silicosis and Lung Cancer. Monash Dept of Preventive Medicine and Community Health, Melbourne, Australia, December 19, 2003.

Greaves IA. Terrorism and Health. A series of seminars and lectures presented to government officials, policy makers and military personnel, Republic of the Philippines, Manila, January 2-6, 2004.

Greaves IA. Health of the Adult Working-Age Population of the Philippines. Republic of the Philippines, Manila, July 30, 2004.

Greaves IA. Policies and Options for Managing Health Issues of the Working-Age Population. Republic of the Philippines, Manila, July 30, 2004.

Greaves IA. The Need for Schools of Public Health in India, National Working Group, Indian Ministry of Health, Delhi, November 25, 2004.

Greaves IA. Curriculum for a School of Public Health in a Developing Country, B.P Koirala Ministry of Health Sciences, Dharan, Nepal, November 25, 2004.

Greaves IA. Creating a School of Public Health in India, Kasturba Medical College, Manipal, India.

Greaves IA. Healthy Cities: The Minnesota Experience, CIIT International Conference on the Indian Healthy Cities Initiatives, Bangalore, India, January 9-11, 2005

Greaves IA. Health of Working-Age Adults in Developing Countries, Asian Development Bank, Manila, Philippines, January 14, 2005.

Greaves IA. Did Abraham Lincoln Suffer from Mercury Poisoning? Pinkman Distinguished Lecture, Presented to the Lincoln Historical Society, Springfield, IL, August 28, 2005.

Greaves IA. Abraham Lincoln and His Little Blue Pills. Medical Grand Rounds, University of S. Illinois School of Medicine, Springfield, August 29, 2005

Greaves IA. Silicon Carbide: An "inert" substance with toxic properties. Monash University School of Medicine, Department of Preventive Medicine and Community Health, Melbourne, Australia, July 12, 2006.

Greaves IA. Heavy Metal and Pesticides. Global Health CME Series, Minneapolis, July 20, 2006.

Greaves IA. Air Pollution and Asthma in Developing Countries. Global Health CME Series, Minneapolis, July 20, 2006.

Abrar FA. Management of Bloodborne pathogens in health care workers: Employee Health Services, Fairview Systems Minneapolis, Minnesota. March 2005

Abrar FA. The Effect of Somali Health Beliefs on the Provider-Patient Relationship: Woodbury Clinic and The Midwest Center for Occupational Health and Safety update. Woodbury, Minnesota. July 26, 2005

Abrar FA. Disability Management and Workers Compensation to: University of Minnesota Internal Medicine Residency Program. Minneapolis, Minnesota. 2001-2005

Abrar FA. Health, Sickness, and Somali tradition at Macalester College, St Paul, Minnesota. August 2005

Abrar FA. Somali TV in Rochester, Twin Cities: topics: seeking preventive care (Health Promotion) Video in Somali with Minnesota Department of Health – Child and Teen checkups. September 2005

Abrar FA. The Effect of Somali Health Beliefs on the Provider-Patient Relationship: Grand Rounds to the Psychiatric residents, University of Minnesota and Hennepin County Medical Center. Minneapolis, Minnesota. July 2006

Abrar FA. Global Health Pathway: University of Minnesota, School of Public Health: Faculty Member: Environmental Degradation and Health. Minneapolis, Minnesota. July 2006

Abrar FA. Cross cultural health: Barriers to care: Somali profile. Minneapolis, Minnesota. July 2006

Abrar FA. Prevention of depression, the benefits of preventative care, and preventing chronic disease like Diabetes and Hypertension. Presented at the Somali Women's Night celebration sponsored by Mayo Clinic. September 2006

Zheng CJ. A Proposed Spirometric Index for Evaluating Patients with Airflow Obstruction, Annual Meeting of AOHC, Kansas City, Missouri. May 2004

Zheng CJ. Care of Work Comp Patients in USA, China NIOSH, Beijing. June 2006

Zheng CJ. Modeling Germline Mutation: From Oocyte Dynamics to the Epidemiology of Down Syndrome, China NIOSH, Beijing June 2006

McGrail MP. Reaching for Health. HealthPartners Healthy Workplace Initiative. Minnesota. January-October 2005

McGrail MP. Healthy Living. MN Thunder Soccer team, Apple Valley, Minnesota. April 2005

Poster Presentations:

Zheng CJ. Biologically-Based Modeling of Smoking Effect on Down Syndrome, HealthPartners Celebration of Research 2006, St Paul, Minnesota September 2006

Roeber Rice H, Baker B, Madden J, Zabel E, Falken M. Prenatal Lead Screening: A Pilot Study. University of Minnesota School of Public Health NORA Symposium, Minneapolis, Minnesota. June 2007

Zheng CJ. Maternal Age-Dependent Recurrence of Reproductive Failure Annual Meeting of Society for Epidemiologic Research, Salt Lake City, Utah June 2004

Zheng CJ. On the Number of Founding Germ Cells in Humans, HealthPartners Celebration of Research 2005, St Paul, Minnesota
September 2004

3. Selected Consultations/Other

Greaves IA.

Minnesota Department of Health

Occupational Asthma Advisory Task Force, 2005-2006

Emergency and Disaster Response (2002-2004)

Immigrant Health Task Force (2002-2005)

Medicolegal consulting for various legal firms involving compensation for workers' illnesses resulting from exposures to metalworking fluids, heavy metals, pesticides (1990-present)

NIH/CDC/NIOSH Review Committees

NIOSH Agricultural Safety and Health Centers (2002-2006)

NIEHS Environmental Health Centers (2002-2006)

Minority Health International Research Training Grants (2004)

University of the Philippines-Manila, Philippines Department of Health, Philippines Bureau of Work Safety,

Philippines Employee Compensation Commission

Development of MOU with UP-Manila College of Public Health for student and faculty exchanges (1998-present)

Kasturba Medical College/Manipal Academy of Higher Education, Manipal/Mangalore, India (2004-present)

St John's Medical College, Bangalore, India (2004-present)

BP Koirala Institute of Health Sciences, Dharan, Nepal (2004-present)

Public Health Foundation of India

American Lung Association of Minnesota

American Refugee Committee

Minnesota International Health Volunteers

Local chapters of the AMA, ACOEM, AIHA

Baker BA.

Vice Chair of the Academic Section of the American College of Occupational and Environmental Medicine

Chair of the Medical Services Review Board for the Minnesota Department of Labor and Industry

Board of Trustees of the Minnesota Medical

Appendix 3. D. Occupational Health Services Research and Policy Program
Co-Directors: Bryan Dowd, PhD and Patricia M. McGovern, PhD

Occupational Health Services Research and Policy (OHSRP) Program Appendix
Outreach Activities

1. Educational Development

Dr. McGovern worked with Professor Al Dembe, University of Massachusetts Medical School and Harvard School of Public Health, and Professor Tom Wickizer, University of Washington to develop a journal club for students and faculty affiliated with NIOSH-supported OHSR training programs, Fall 2002 to Spring 2006. Four faculty and approximately 12-15 doctoral and post-doctoral students from the three training programs participated. This journal club originally involved collaborative efforts with faculty and students from the OHSR training programs from Harvard University-University of Massachusetts, and the University of Washington, with a minimum of six sessions per year. While faculty organized the sessions the first year, in subsequent years the students worked with faculty to host the sessions. Approximately six sessions were held the first three years. One session was held in 2005-2006 organized by Dr. McGovern. This session involved OHSRP student, Mira Grice, presenting her dissertation proposal, "The Impact of Work-Family Conflict on Maternal Health One Year after Childbirth: A Longitudinal Analysis," via Breeze technology so that participants at remote sites could see and hear her presentation, and ask questions. Ms. Grice received helpful feedback in preparation for her oral preliminary examination.

Dr. McGovern worked with technical consultants to create one to two online modules per year relevant to occupational health services research and policy, from "Environmental and Occupational Health Policy" (PubH 6150) as a web-based alternative to the in-person class for those students who require distance learning. The two modules created in 2004-2005 included "Overview of Occupational Health and Safety Policy" (Dr. McGovern), and "The Development of Occupational Health and Safety Standards," (Dr. Ramachandram, Director, Industrial Hygiene Training Program, Mr. Alden Hoffman, Minnesota OSHA, and Dr. McGovern). In 2005-2006 a module was developed, "The Americans with Disabilities Act (ADA) and Policy Evaluation," (Dr. McGovern and Mr. David Cossi, J.D, Adjunct Assistant Professor). In 2006-2007 modules were created on "Bioterrorism, Public Health Preparedness and Risk Communications" (Dr. Richard Danila, Adjunct Professor, Section Chief, Acute Disease Investigation and Control, Minnesota Department of Health and Dr. Pat McGovern), and "Institutionalized Violence: When Does Care Giving Become Submission to Violence?" Dr. McGovern and Mr. David Cossi, J.D, Adjunct Assistant Professor).

In May 2004 Professors McGovern and Gerberich, and Dean Olson developed a symposium, "The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century." It featured nationally known experts to identify research initiatives in occupational health and safety research, especially those related to injury prevention and control, health behavior change, health promotion and disease prevention, and occupational health services research as noted below. It was integrated in the School's May 2004 Institute sponsored by the School of Public Health's Centers for Public Health Education and Outreach (CPHEO). The OHSRP advisory board and Midwest Center faculty were asked to give input on the proposed agenda; many attended the meeting. The content is now available online (<http://cpheo1.sph.umn.edu/nora/index.html>), and much of it has been integrated into the Introduction to "Occupational Health and Safety" (PubH 6170, 3 credits) taught by Dr. Nancy Nachreiner (OEHN Program). Major presentations are listed below.

"NORA at Nine: Looking Back and Looking Forward" presented by Marilyn Fingerhut, PhD, NIOSH International Coordinator and NORA Coordinator, National Institute for Occupational Safety and Health.

"Priorities for Occupational Injury Surveillance in the 21st Century: The Need to Improve Information for Non-Fatal Injuries," presented by Gordon S. Smith, MD, MPH, Senior Research Scientist, Center for Safety Research, Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts.

"Economic Incentives for Health Behavior Change" Nico Pronk, PhD, Vice President, Center for Health Promotion, HealthPartners, Minneapolis, Minnesota. Panel discussants included Sheryl Niebuhr, PhD, Manager, 3M Total Health & Productivity Services, Minneapolis, Minnesota, "A Story from 3M," and Professor Bryan Dowd, PhD, Co-Director, OHSRP, "Worksite Health Promotion and Disease Prevention Programs: An Economic Perspective."

"Musculoskeletal Disorders: Interventions, Outcomes and Proposals: Welcome to 'Reality Science,'" Benjamin C. Amick III, PhD, Associate Professor, School of Public Health, University of Texas Health Sciences Center, Houston, Texas. Panel discussants included William Lohman, MD, Medical Consultant, Minnesota Department of Labor and Industry, "Ergonomic Risks and The Risks of Ergonomics," and Mr. Peter Benner, Executive Director, AFSCME Council 6 - AFL-CIO, Minneapolis, Minnesota, "Labor's Perspective."

"The Clinical and Occupational Correlates of Work Productivity Loss Among Employed Patients with Depression," Debra Lerner, PhD, MS, Director, The Health Institute's Program on Health, Work and Disability, Tufts-New England Medical Center, Boston, Massachusetts.

Dr. Dowd presented a lecture on endogenous explanatory variables in a class taught by Dr. Gerberich during spring semester, 2006.

Dr. Dowd was invited by AcademyHealth (the national professional association for health services researchers) to offer a half-day seminar on endogenous explanatory variables at the annual meeting in Seattle (June, 2006). The seminar attracted twenty-six participants from around the country. Dr. Dowd also was asked to chair a panel on the same topic at the Seattle meeting.

Dr. Dowd also was asked to chair the first health services research Methods Council, organized by AcademyHealth. The Council's first meeting was in Washington, D.C. in October, 2006. The Council will assess and provide resources to health services research professionals and training programs that are seeking to improve their analytic skills.

2. Presentations/Lectures/Awareness Seminars (See also Appendix 3.)

Professors McGovern and Dowd have worked with the Centers for Public Health Education and Outreach (CPHEO) to organize an annual seminar that has featured a national expert in OHSRP, and has been jointly sponsored by the Divisions of Environmental Health Sciences and Health Policy and Management. Beginning in 2005 Professor McGovern collaborated with other ERC faculty to open the seminars appropriate to all ERC students.

Laura Punnett Sc.D, Professor, Department of Work Environment, University of Massachusetts Lowell and Jane Lipscomb PhD, RN, FAAN, Professor and Director, University of Maryland Baltimore (UMAB) School of Nursing, Work and Health Research Center. Professor Punnett presented: "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs," and Professor Lipscomb presented: "Evaluation of Workplace Violence Prevention Interventions." June 13, 2007.

Dr. Jim Collins presented his NORA award winning studies "Research on Safe Patient Lifting & Slip, Trip, and Fall Prevention in Health Care Workers," and Dr. Harlan Amandus presented, "Directions for Future Workplace Violence Research" July 18, 2006.

Dr. Glenn Pransky, Director of Liberty Mutual's Center for Disability Research, and Associate Professor, University of Massachusetts Medical School presented "Disability Prevention: Innovative Approaches," May 25, 2005.

Ben Amick, III, PhD, Associate Professor, University of Texas at Houston, School of Public Health, presented, "Interventions, Policies and Practices [office ergonomics]: Welcome to Reality Science," May 27, 2004.

David Weil, PhD, Associate Professor, Boston University and the John F. Kennedy School of Government presented, "The Future of Workplace Safety Regulation and OSHA: a Second Look," January 29, 2003.

Tom Wickizer, PhD, MPH, Professor, University of Washington, School of Public Health, Department of Health Services, presented, "Do Drug-Free Workplaces Prevent Occupational Injuries? Evidence from Washington State," October 20, 2003.

3. Selected Consultations/Other

During the reporting period Professor McGovern worked with the:

National Institute for Occupational Safety and Health (NIOSH) to participate in a national focus group to identify a future research agenda for work-related violence in the health care industry held in Washington DC, May 7, 2003.

Federal Occupational Health and Safety Administration's (OSHA) Violence Prevention Program to serve on the editorial board of their website, (2002-2004)

Minnesota OSHA's advisory board as a member (ongoing).

Wayne State University School of Social Work, to consult with faculty on the design of the study and survey instruments for a project investigating the postpartum health of employed women using a population of low income minority mothers and infants, Detroit, Michigan, 2004-2005.

AAOHN, to plan and facilitate the annual continuing education program for nurse researchers and educators, "Getting Research Funding at NIH: What Can I Do To Improve my Chances?" presented by Michael Micklin, PhD, Chief, Risk, Prevention & Health Behavior Integrated Review Group, Center for Scientific Review, NIH, AAOHN 2006 Symposium & Expo Albuquerque, New Mexico, May 10, 2006.

University of Illinois, Chicago, Illinois, to provide oral and written testimony on research priorities for the second decade of NORA (National Occupational Research Agenda) at a town hall meeting hosted by the University of Illinois, Chicago, Illinois, December 19, 2005.

NIOSH, served on a special emphasis panel to review applications for Centers of Excellence to Promote a Healthier Workforce, Philadelphia, Pennsylvania, December 15-16, 2005.

During the reporting period Professor Dowd provided informal consultation on economic perspectives on the regulation of the nanoparticle industry for Professor Ramachandran's research on the project "Evaluating Oversight Mechanisms for Active Nanostructures and Nanosystems" funding by the National Science Foundation.

Appendix 3. E. Occupational Injury Epidemiology and Control Program
Co-Directors: Susan Goodwin Gerberich, PhD and George Maldonado, PhD

Occupational Injury Epidemiology and Control Program
Selected Outreach Activities (2002-2003, only)

1. Educational Development/Outreach

Injury Prevention... (PubH 6120 - 2 credits, n=10) led by Dr. Gerberich (included Drs. Parker and Olmstead), provided a conceptual basis in injury prevention to a variety of disciplines. Drs. Gerberich, Alexander with Drs. Church, Maldonado, McGovern, Hansen, and Ward worked with students in PubH 8120 OIPRTP research seminar, to critique various research efforts involving many disciplines/other institutions (n=10/semester). Drs. Church and Alexander participated in teaching of PubH 6140, Environmental Occupational Epidemiology (2 credits, n=11), involving multiple disciplines. Dr. Hansen has taught Psy 8554: Career and Occupational Health Psychology Assessment and Psy 8544: Vocational and Occupational Health Psychology Research -- relevant to the role of psychology in occupational health; she supervised instruction of Psy 5501: Vocational and Occupational Health Psychology, involving 50 to 75 students from many disciplines. Dr. Olmstead participated in PubH 6120 with Dr. Gerberich, has presented a 3-credit course "Safety, Health and Environmental Considerations in Manufacturing," at the University of St. Thomas.

Dean Olson taught specially developed courses with Dr. Shutske presented locally and through interactive television to multiple campuses. Ms. Olson and Drs. McGovern and Gerberich have collaborated with Dr. John Shutske (Biosystems/Agricultural Engineering) to provide a supporting program in Agricultural Safety and Health (ASH) for OIECP, OEHN and other students. During this time, students, Kristen Jensen and Erin Hagen (now Paulson), were both trainees in the ASH program.

2. Presentations - Lectures - Awareness Seminars

Faculty and students gave several presentations to national and international audiences. Peer-reviewed publications, as well as presentations involving OIECP students, are identified in the Appendices.

2. Consultations

Faculty were involved in numerous consultation activities, primarily unpaid efforts:

Gerberich NIOSH; Centers for Disease Control and Prevention (CDCP); United States Department of Agriculture; Minnesota Department of Health; Multiple law firms relevant to product/equipment-related injuries, occupational injuries; Minnesota Occupational Safety and Health Administration; Continuing Education; Alexander: Minnesota Department of Health; NIOSH; Princeton Reimbursement Group; Maldonado: CDCP; Shutske: legal cases: machinery fires, caustic cleaner ingestions, and machinery injuries; Ward: Technical advisor, project (IMMORTAL) on driver impairment; Nissan; BBC; Ford, UK; Renault; BAPTIE, UK; Jaguar, UK; Rail Track, UK; University of Leeds; Hansen: Center for Career and Community Research

Dr. McGovern worked with the NIOSH for a special emphasis panel to review applications for "Centers for Excellence to Promote a Healthier Workforce," Philadelphia, PA, November 15-16, 2005. She also worked with NIOSH staff to participate in a national focus group to identify a future research agenda for work-related violence in the health care industry held in Washington DC, May 7, 2003.

Dean Olson served as Chair, Centers for Public Health Preparedness, a University-based preparedness education exemplar group involving a national network for 44 colleges and universities granted under CDC to train the public health workforce in preparedness, and as Co-Chair, Academic Centers for Public Health Preparedness, a national network for 21 public health schools (ASPH/CDC agreement) to train the public health workforce in preparedness for terrorism and other threats, 2002-2005. She has also served on the Medical Services Review Board, Minnesota's Department of Labor and Industry, St. Paul, MN (appointment by Commissioner as first RN position created on MSRB), 2002-2006

Dr. Nachreiner has served as a reviewer for Research in Nursing and Health, and is the Membership Chair for the Injury Control and Emergency Health section of the American Public Health Association. She was also sought as a consultant on training related to work-related violence against nurses for an NIH SBIR grant proposal from the Life Crisis Institute. Dr. Nachreiner is an adjunct faculty in the School of Nursing, where she collaborates on several papers currently in press and in progress, and assists in advising School of Nursing students.

3. Other

Gerberich: Reviewer: Injury Prevention; Journal of Accident Analysis and Prevention (1997-); Epidemiology (1996-); Journal of Agricultural Safety and Health (1991-) American Journal of Industrial Medicine; Annals of Epidemiology; American Journal of

Epidemiology (1990-); American Journal of Public Health (1989-); Journal of the American Medical Association; Journal of Occupational and Environmental Medicine; Preventive Medicine (1985-); Faculty, Interdisciplinary Human Factors/Ergonomics program; University of Minnesota; Director, Center for Violence Prevention and Control (1994-); Developer/Chair, Student Paper Competition, Injury Control and Emergency Health Services Section, American Public Health Association Annual Meeting (1991-); Director, Regional Injury Prevention Research Center (1986-); Alexander: Reviewer: Science of the Total Environment; Journal of Exposure Assessment and Environmental Epidemiology (2000-); Bulletin of Environmental Contamination and Toxicology; Injury Prevention; Archives of Pediatrics and Adolescent Medicine (1999-); Environmental Health Perspectives; Annals of Epidemiology; Journal of Agricultural Safety and Health; Scandinavian Journal of Work, Environment, and Health; Epidemiology; Injury Prevention; Occupational and Environmental Medicine; American Journal of Industrial Medicine; American Journal of Epidemiology (1998-); Church: (2003-) Co-Chair of Publications, Presentations and Associated Studies Committee, Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial Epidemiology Committee, Colorectal Cancer Family Registry; Consultant to Cardiovascular Systems, Inc. Advisory Board, The Virginia Piper Cancer Institute at Abbott-Northwestern Hospital; (2000-) Executive Committee, Minnesota Colorectal Cancer Consortium; Epidemiology Committee; European Randomized Study of Screening for Prostate Cancer; Epidemiology Committee, International Prostate Screening Trial Evaluation Group (1999-) Chair, Risk Factor Questionnaire Committee, Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial; Journal of the National Cancer Institute, Editorial Board; Maldonado: Reviewer: Epidemiology (1997-); American Chemical Society Press; J Suicide and Life-Threatening Behavior (1994-); International Journal of Epidemiology; American Journal of Industrial Medicine; American Journal of Epidemiology (1993-); Journal of Occupational and Environmental Medicine (1986-); Hansen Editor, Journal of Counseling Psychology (2000-); Reviewer: Personnel Psychology (1998-); Psychology of Women Quarterly (1990-); Journal of Applied Psychology (1980-); Member: Board of Scientific Affairs, American Psychological Association (2003-); Occupational Health Psychology Forum (2001-); Science Leadership Council, American Psychological Association (1997-); Director: Vocational Assessment Clinic; Center for Interest Measurement Research (1974-); Editor, Measurement and Evaluation in Counseling Psychology (1993-); Ward N: Editorial Board, Accident Analysis and Prevention; Guest editor, International Journal of Vehicle Design, Special issue on car phones; ORACLE consortium, Human Factors Board on transportation telematics; IMMORTAL consortium on Driver Impairment; CERTIFIED consortium on Driver Impairment; Committee: Department of the Environment, Transport, and the Regions (DETR); Committee: Engineering and Physical Sciences Research Council (EPSRC); Safety and Human Factors Committee (ITSA); Biobehavioral and Behavioral Processes IRG – Study Section 2, National Institutes for Health (2002-); Reviewer: International Journal of Human-Computer Studies; Journal of Engineering Design and Automation; International Journal of Vehicle Design Perception; Journal of Adolescence; (2001-) Ergonomics (2000-); Olson: Medical Services Review Board, Minnesota Department of Labor and Industry, St. Paul, MN (appointment by Commissioner as first RN position created on MSRB) (2002-); AAOHN: Editorial Review Board; Board of Directors (1989-); Olmstead: (2001-) American Industrial Hygiene Foundation – President; Scientific Advisory Committee, Industrial Hygiene and Hazardous Materials, University of Minnesota; Nachreiner Membership Committee Chair, Injury Control and Emergency Health Services Section, American Public Health Association (2003-); Public Health Practice Major, Public Health Certificate in Core Concepts affiliated faculty; Reviewer, Student Paper Competition, American Public Health Association; Admissions Committee for Public Health Certificate Program in Occupational Health and Safety, University of Minnesota (2002-) Member, American Public Health Association (1998-) Member, American Association of Occupational Health Nurses (AAOHN); Shutske: Reviewer: Journal of Agricultural Safety and Health (1994-); Applied Engineering in Agriculture (1993-); ASAE: Program Planning (1993-)

Appendix 3. F. Occupational Injury Prevention Research Training Program
Co-Directors: Susan Goodwin Gerberich, PhD and Bruce H. Alexander, PhD

Occupational Injury Prevention Research Training Program
Selected Outreach Activities (2002-2007)

1. Educational Development/Outreach

Dr. Alexander developed the Global Health Seminar (PubH 6100, n=14), Spring 2006, designed to explore issues in global public health with emphasis on current problems, using cross-disciplinary approaches to solve relevant problems. Injury Prevention... (PubH 6120 - 2 credits, n=10) Dr. Gerberich (includes Drs. Parker and Olmstead) provides a conceptual basis in injury prevention to a variety of disciplines. Drs. Gerberich, Alexander with Drs. Church, Maldonado, McGovern, Hansen, and Ward work with students in PubH 8120 OIPRTP research seminar, to critique various research efforts involving many disciplines/other institutions (n=10/semester). Drs. Church and Alexander participated in teaching of PubH 6140, Environmental Occupational Epidemiology (2 credits, n=11), involving multiple disciplines. Dr. Alexander, with Drs. Gerberich and McGovern and Mr. Ryan, have continued to conduct the recently developed course: "Applied Analyses of Occupational and Environmental Health Data," which has resulted in papers for publication and presentations to numerous audiences. Dr. Maldonado offers courses, critical to research, involving many programs: PubH 8140, Validity Concepts in Epidemiologic Research (n=14); and PubH 8142, Epidemiologic Uncertainty Analysis (n=6). Dr. Gerberich also participates in presenting a lecture on occupational injury to students (n = ~200) in an undergraduate public health course (PubH 3001). Dr. Nachreiner is primary instructor for PubH 6150, "Interdisciplinary Evaluation of Occupational Health and Safety Field Problems," for the ERC (~16 students, multiple disciplines) with several MCOHS faculty. Dr. Hansen teaches Psy 8554: Career and Occupational Health Psychology Assessment and Psy 8544: Vocational and Occupational Health Psychology Research -- relevant to the role of psychology in occupational health; she supervises instruction of Psy 5501: Vocational and Occupational Health Psychology, involving 50 to 75 students from many disciplines. Dr. Olmstead collaborates with Dean Olson and Dr. Nachreiner in the course, PubH 6170 (n=12), Theory and Practice of Occupational Health and Safety, participates in PubH 6120 with Dr. Gerberich, and presents a 3-credit course "Safety, Health and Environmental Considerations in Manufacturing," at the University of St. Thomas.

Dean Olson developed the first public health course offered on the Internet, "Issues in Environmental and Occupational Health" (PubH 3102, 3 credits and 6102, 2 credits) for multidisciplinary students; 135 students participated in 2005-2006. The instructional design developed for this effort has been employed by all core public health courses now available online and for online modules in occupational health and safety. She also offered eight online modules in "Environmental Health and Nursing" (3 CEUs per module) under a Health Resources and Services Administration funded initiative as the primary faculty that included colleagues from Johns Hopkins, UNC, and OHN students. In 2005-2006 there were 409 participants. Nursing faculty at the University of N.D., University of WI, Green Bay, and Metro State University, Minneapolis have adopted course content.

Dean Olson teaches specially developed courses with Dr. Shutske presented locally and through interactive television to multiple campuses. Dean Olson and Dr. McGovern have collaborated with Dr. John Shutske (Biosystems/ Agricultural Engineering) to provide a supporting program in Agricultural Safety and Health (ASH) for OEHN and other students. Penny Bartz, MPH graduate, completed the ASH program, and conducted an innovative plan B, "Storytelling as a Delivery Method of Farming Safety Education for Hmong Farmers" (Research Advisor: Dr. Shutske), and an OEHN internship at the National Farm Medicine Center, Marshfield WI. Kaia Sjogren (MPH student) is also completing the ASH program; she completed an internship with Dr. Shutske and Dean Olson developing online modules in disaster preparedness for the agricultural public health community.

2. Presentations - Lectures - Awareness Seminars

Faculty and students gave numerous presentations (n = 75) to national and international audiences. Peer-reviewed publications, involving students (n=34) are identified in the OIPRTP table of publications (Appendix).

In 2004, Drs. Gerberich and McGovern developed and co-hosted a major two-day 2004 Symposium, "The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century," Sponsored by the National Occupational Research Agenda (NORA) and Occupational Safety and Health Research (OSHR) Programs (refer to program at end of document). In concert with the continuing education program staff, this successful effort, advertised locally and nationally, attracted 75 individuals enrolled for the symposium as speakers or participants from five states, Washington, DC, and the Philippines; participants represented major health care organizations, industry, professional and labor organizations, and academic settings. Among 25 research presentations, five national speakers, 11 NORA faculty and 3 students participated with oral presentations, in addition to others. Numerous posters, based on the students' research, were also displayed during this symposium.

In Spring 2005, a NORA Seminar Series, organized by Drs. Gerberich, McGovern, and Brosseau, and Dean Olson, in collaboration with the Centers for Public Health Education and Outreach, the programs addressing NORA-related research-to-practice, are now available via streaming video: (<http://www.sph.edu/publichealthplanet/events/NORA.html#022405>). These seminars involved the following national/international leaders in the field and their respective presentations: Rosemary Sokas, MD, "Reaching the Hard to Reach: Outreach Programs for Vulnerable Working Populations;" Nicholas Ashford, JD, PhD, "Consequences of Thinking About Environmental and Occupational Health as Separate Entities;" and David Wegman, MD, MSC, "Health and safety Issues in the Aging Workforce."

In 2007, faculty, students, and staff, participated in a one-day NORA Symposium, "Translation of Research to Practice." This involved two key national speakers, Dr. Jane Lipscomb, "A Model For Implementing, Evaluating And Translating Violence Prevention Intervention Research In The Health Care And Social Service Workplace" and Dr. Laura Punnett, "Socioeconomic Disparities in Health and in Occupational Exposures: Relevance for Workplace Health Promotion and Protection Programs." A research poster session of student and faculty research, was also included.

3. Consultations (Identified for faculty, 2002-2007)

Faculty are involved in numerous consultation activities, primarily unpaid efforts:

Gerberich NIOSH; Centers for Disease Control and Prevention (CDCP); United States Department of Agriculture; Minnesota Department of Health; Multiple law firms relevant to product/equipment-related injuries, occupational injuries; Minnesota Occupational Safety and Health Administration; Continuing Education; Alexander: Minnesota Department of Health; NIOSH; Princeton Reimbursement Group; Church: Chair, Data and Safety Monitoring Board, ev3, Inc. (2005-); State of Pennsylvania, Department of Health Lung Disorders Panel (2005) Maldonado: CDCP; McGovern/Dowd: 3M Corporation Occupational Health Medicine Department; Leech Lake Band of Ojibwe and Minnesota Department of Health, Environmental Health Unit; McGovern: Midwest Center for Occupational Safety and Health, Occupational Medicine Residency Advisory Committee; Federal Occupational Health and Safety Administration's (OSHA) Violence Prevention Program; Minnesota State OSHA's advisory board; Shutske: legal cases: machinery fires, caustic cleaner ingestions, and machinery injuries; Ward: Technical advisor, project (IMMORTAL) on driver impairment; Nissan; BBC; Ford, UK; Renault; BAPTIE, UK; Jaguar, UK; Rail Track, UK; University of Leeds; Hansen: Center for Career and Community Research

Dr. McGovern worked with the NIOSH for a special emphasis panel to review applications for "Centers for Excellence to Promote a Healthier Workforce," Philadelphia, PA, November 15-16, 2005. She also worked with NIOSH staff to participate in a national focus group to identify a future research agenda for work-related violence in the health care industry held in Washington DC, May 7, 2003.

Dean Olson served as Chair, Centers for Public Health Preparedness, a University-based preparedness education exemplar group involving a national network for 44 colleges and universities granted under CDC to train the public health workforce in preparedness, and as Co-Chair, Academic Centers for Public Health Preparedness, a national network for 21 public health schools (ASPH/CDC agreement) to train the public health workforce in preparedness for terrorism and other threats, 2002-2005. She has also served on the Medical Services Review Board, Minnesota's Department of Labor and Industry, St. Paul, MN (appointment by Commissioner as first RN position created on MSRB), 2002-2006

Dr. Nachreiner serves as a reviewer for Research in Nursing and Health, and is the Membership Chair for the Injury Control and Emergency Health section of the American Public Health Association. She was also sought as a consultant on training related to work-related violence against nurses for an NIH SBIR grant proposal from the Life Crisis Institute. Dr. Nachreiner is an adjunct faculty in the School of Nursing, where she collaborates on several papers currently in press and in progress, and assists in advising School of Nursing students.

4. Other

Gerberich: Reviewer: Editorial Board, Journal of Agromedicine (2004-); Injury Prevention; Journal of Accident Analysis and Prevention (1997-); Epidemiology (1996-); Journal of Agricultural Safety and Health (1991-) American Journal of Industrial Medicine; Annals of Epidemiology; American Journal of Epidemiology (1990-); American Journal of Public Health (1989-); Journal of the American Medical Association; Journal of Occupational and Environmental Medicine; Preventive Medicine (1985-); Faculty, Interdisciplinary Human Factors/Ergonomics program; University of Minnesota; Director, Center for Violence Prevention and Control (1994-); Developer/Chair, Student Paper Competition, Injury Control and Emergency Health Services Section, American Public Health Association Annual Meeting (1991-); Director, Regional Injury Prevention Research Center (1986-) Alexander: Reviewer: Science of

the Total Environment; Journal of Agricultural Medicine (2005-); Journal of Exposure Assessment and Environmental Epidemiology (2000-); Bulletin of Environmental Contamination and Toxicology; Injury Prevention; Archives of Pediatrics and Adolescent Medicine (1999-); Environmental Health Perspectives; Annals of Epidemiology; Journal of Agricultural Safety and Health; Scandinavian Journal of Work, Environment, and Health; Epidemiology; Injury Prevention; Occupational and Environmental Medicine; American Journal of Industrial Medicine; American Journal of Epidemiology (1998-); Church: (2004-) Advisory Board, H.H. Humphrey Cancer Center at North Memorial Medical Center (2003-) Co-Chair of Publications, Presentations and Associated Studies Committee, Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial Epidemiology Committee, Colorectal Cancer Family Registry; Consultant to Cardiovascular Systems, Inc. Advisory Board, The Virginia Piper Cancer Institute at Abbott-Northwestern Hospital; (2000-) Executive Committee, Minnesota Colorectal Cancer Consortium; Epidemiology Committee; European Randomized Study of Screening for Prostate Cancer; Epidemiology Committee, International Prostate Screening Trial Evaluation Group (1999-) Chair, Risk Factor Questionnaire Committee, Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial; Journal of the National Cancer Institute, Editorial Board; Maldonado: Reviewer: Epidemiology (1997-); American Chemical Society Press; J Suicide and Life-Threatening Behavior (1994-); International Journal of Epidemiology; American Journal of Industrial Medicine; American Journal of Epidemiology (1993-); Journal of Occupational and Environmental Medicine (1986-); Hansen Editor, Journal of Counseling Psychology (2000-); Reviewer: Journal of Personality and Social Psychology (2005-); Personnel Psychology (1998-); Psychology of Women Quarterly (1990-); Journal of Applied Psychology (1980-); Member: Board of Scientific Affairs, American Psychological Association (2003-); Occupational Health Psychology Forum (2001-); Science Leadership Council, American Psychological Association (1997-); Director: Vocational Assessment Clinic; Center for Interest Measurement Research (1974-); Editor, Measurement and Evaluation in Counseling Psychology (1993-); Ward N: Editorial Board, Accident Analysis and Prevention; Guest editor, International Journal of Vehicle Design, Special issue on car phones; ORACLE consortium, Human Factors Board on transportation telematics; IMMORTAL consortium on Driver Impairment; CERTIFIED consortium on Driver Impairment; Committee: Department of the Environment, Transport, and the Regions (DETR); Committee: Engineering and Physical Sciences Research Council (EPSRC); Safety and Human Factors Committee (ITSA); Biobehavioral and Behavioral Processes IRG – Study Section 2, National Institutes for Health (2002-); Reviewer: International Journal of Human-Computer Studies; Journal of Engineering Design and Automation; International Journal of Vehicle Design; Perception; Journal of Adolescence; (2001-) Ergonomics (2000-); Olson: Medical Services Review Board, Minnesota Department of Labor and Industry. St. Paul, MN (appointment by Commissioner as first RN position created on MSRB) (2002-); AAOHN: Editorial Review Board; Board of Directors (1989-); Olmstead: (2001-) American Industrial Hygiene Foundation – President; Scientific Advisory Committee, Industrial Hygiene and Hazardous Materials, University of Minnesota; Nachreiner (2005-) Environmental Health Sciences Awards Committee, U of M (2004-) Membership Committee Chair, Injury Control and Emergency Health Services Section, American Public Health Association (2003-); Public Health Practice Major, Public Health Certificate in Core Concepts affiliated faculty; Reviewer, Student Paper Competition, American Public Health Association; Admissions Committee for Public Health Certificate Program in Occupational Health and Safety, University of Minnesota (2002-) Member, American Public Health Association (1998-) Member, American Association of Occupational Health Nurses (AAOHN); Shutske: Reviewer: Journal of Agricultural Safety and Health (1994-); Applied Engineering in Agriculture (1993-); ASAE: Program Planning (1993-)

2004 SYMPOSIUM

The National Occupational Research Agenda (NORA):
Health and Safety Priorities for the 21st Century

Sponsored by the Midwest Center for Occupational Health and Safety
National Occupational Research Agenda (NORA) and
Occupational Safety and Health Research (OSHR) Programs
University of Minnesota

May 26-27, 2004
Minneapolis, Minnesota

Purpose: To promote dissemination of research on the National Institute for Occupational Safety and Health (NIOSH) National Occupational Research Agenda (NORA) priorities, including: traumatic injury (unintentional and intentional); occupational health services research; exposure assessment; musculoskeletal disease syndromes; organization of work.

AGENDA

Wednesday, May 26, 2004

5:00 pm Registration and Welcome Reception - Humphey Ballroom

6:30 pm Dinner
Welcome and Introductions

Patricia McGovern, PhD, Associate Professor and Co-director, Occupational Health Services Research and Policy Program, Environmental Health Sciences, School of Public Health, University of Minnesota

William Toscano, PhD, Professor and Head, Environmental Health Sciences, School of Public Health, University of Minnesota

7:30 pm Introduction

Susan Goodwin Gerberich, PhD, Professor and Director, Regional Injury Prevention Research Center, Center for Violence Prevention and Control, and Occupational Injury Prevention Research Training Program, Environmental Health Sciences, School of Public Health, University of Minnesota

NORA at Nine: Looking Back and Looking Forward

Marilyn Fingerhut, PhD, NIOSH International Coordinator and NORACoordinator, National Institute for Occupational Safety and Health, Washington, DC

Thursday, May 27, 2004

8:00 am Registration and Continental Breakfast – Ballroom Foyer
Ballrooms B-C-D

9:00 am Welcome, Announcements and Introductions

Susan Goodwin Gerberich, PhD, Professor and Director, Regional Injury Prevention Research Center, Center for Violence Prevention and Control, and Occupational Injury Prevention Research Training Program, Environmental Health Sciences, School of Public Health, University of Minnesota

Ian A. Greaves, B Med Sci, MB BS, FRACP, FAAAS, Associate Professor and Director, Midwest Center for Occupational Health and Safety, Division of Environmental Health Sciences, School of Public Health, University of Minnesota, Minneapolis, Minnesota

Priorities for Occupational Injury Surveillance in the 21st Century: The Need to Improve Information for Non-Fatal Injuries
Gordon S. Smith, MD, MPH, Senior Research Scientist, Center for Safety Research, Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts

10:00 am Refreshment Break – Ballroom Foyer

10:15 am Economic Incentives for Health Behavior Change

Nicolass Pronk, PhD, Vice President, Center for Health Promotion, HealthPartners, and Research Investigator and Co-Director, Population Health Unit, HealthPartners Foundation, Minneapolis, Minnesota

Discussant: Bryan Dowd, PhD, Professor, Health Services Research and Policy, and Co-Director, Occupational Health Services Research and Policy Program, University of Minnesota School of Public Health, Minneapolis, Minnesota

Sheryl Niebuhr, PhD, Manager, 3M Total Health & Productivity Services, 3M, St. Paul, Minnesota; Adjunct Clinical Assistant Professor, Counseling Psychology, University of Minnesota, Minneapolis, Minnesota

11:30 am Lunch – Humphrey Ballroom

12:30 pm Announcements and Introductions - Ballrooms B-C-D

Patricia McGovern, PhD, Associate Professor, Environmental Health Sciences, University of Minnesota School of Public Health, Minneapolis, Minnesota

Musculoskeletal Disorders: Interventions, Outcomes and Proposals:
Welcome to 'Reality Science'

Benjamin C. Amick III, PhD Associate Professor, School of Public Health, University of Texas Health Sciences Center, Houston, Texas; Co-Chair, Health Services Research Team, NORA, NIOSH, Atlanta, Georgia

Discussants:

William H. Lohman, MD, Adjunct Assistant Professor, Environmental Health Sciences, University of Minnesota School of Public Health; Medical Consultant - Minnesota Department of Labor and Industry

Peter Benner, Executive Director, AFSCME Council 6 - AFL-CIO, Minneapolis, Minnesota

2:00 pm The Clinical and Occupational Correlates of Work Productivity Loss Among Employed Patients with Depression

Debra Lerner, PhD, MS, Director, The Health Institute's Program on Health, Work and Disability, Tufts-New England Medical Center; Associate Professor of Medicine, Sackler School of Biomedical Sciences, Tufts University School of Medicine, Boston, Massachusetts

3:00 pm Refreshment Break – Ballroom Foyer

3:15 pm Breakout Sessions for Faculty and Student Research Presentations

Biological Clocks and Shiftwork: Effects on Health and Performance

Michael McGrail, MD, MPH, Director, Occupational Medicine Residency Program; Department Head, Occupational and Environmental Medicine, HealthPartners Regions Hospital; Adjunct Assistant Professor, Division of Environmental Health Sciences, University of Minnesota School of Public Health

Earhard Haus, MD, PhD, Professor, Laboratory Medicine and Pathology, University of Minnesota Medical School; Department of Anatomic and Clinical Pathology HealthPartners Regions Hospital, St. Paul, Minnesota

Occupational Health and Safety Colloquium – Chair, Bruce H. Alexander, PhD

The Health of Employed Women at Six Weeks After Childbirth
Patricia M. McGovern, PhD

Predictors of Postpartum Depression Among Employed Women
Rada K. Dagher, MPH

The Incidence of Computer-Related MSD-UE from the West Virginia's Workers' Compensation Database (1996-2000)
Nancy A. Baker, ScD, OTR/L

Patient Satisfaction, Treatment Experience and Disability Outcomes Along a Population-Based Cohort of Injured Workers: Implications for Quality Improvement
Thomas Wickizer, PhD, MPH

Hmong Children as Farm Workers in Minnesota: Hazards, Tasks and Safe Work Practices
Michele A. Schermann, MS, RN

4:45 pm Poster Presentations and Reception - Ballroom Foyer

Chlorpyrifos and 2,4-D Biomonitoring in Farmers and Farm Families
Bruce H. Alexander, PhD, Jack S. Mandel, PhD, Beth A. Baker, MD, MPH, John Acquavella, PhD

Developing a Health and Safety Newsletter for Small Manufacturing Businesses
Lisa M. Brosseau, ScD, Ann L. Fredrickson, M.A. Casey

The History of Parent Agricultural Injury and Risk of Child Agricultural Injury: Regional Rural Injury Study - II
Kathleen R. Ferguson, MS, Deborah Langner, MS, Bruce H. Alexander, PhD, James Gurney, PhD, Susan Goodwin Gerberich, PhD, Andrew D. Ryan, MS, Colleen M. Renier, BS, Steven J. Mongin, MS

Injury Surveillance: Incorporation of a Case-Control Design

Susan Goodwin Gerberich, PhD, Timothy R. Church, PhD, Colleen M. Renier, BS, Robert W. Gibson, PhD, L. Ronald French, PhD, Ann S. Masten, PhD, Steven J. Mongin, MS, Kathleen R. Ferguson, MS, Bruce H. Alexander, PhD, Andrew D. Ryan, MS, Xueying Zhang, MS

Regional Rural Injury Study II (RRIS-II): Epidemiology of Injury Experience Among Children and Adults Residing in Agricultural Operation Households

Susan Goodwin Gerberich, PhD, Colleen M. Renier, BS, Bruce H. Alexander, PhD, Steven J. Mongin, MS, Andrew D. Ryan, MS, Kathleen Ferguson, MS, L. Ronald French, PhD, Ann S. Masten, PhD, Timothy R. Church, PhD

Work-Related Assault: Impact of Training

Nancy M. Nachreiner, PhD, Susan Goodwin Gerberich, PhD, Patricia M. McGovern, PhD

Modeling the Influence of Fiber Shape on Filter Performance

Peter C. Raynor, PhD

A Comparison of Exposure Measurements in the Denominator of Injury Rates: Regional Rural Injury Study – II

Andrew D. Ryan, MS, Steven J. Mongin, MS, Susan Goodwin Gerberich, PhD, Colleen M. Renier, BS, Bruce H. Alexander, PhD, Timothy R. Church, PhD, Ann S. Masten, PhD, Kathleen Ferguson, MS

5:45 p.m. Adjourn

Appendix 3. G. Hazardous Substances Academic Training Program
Director: Peter Raynor, PhD

Hazardous Substances Academic Training Program
Outreach Activities

1. Educational Development

Dr. Raynor

- Served as Member, Scientific Review Board, University of Minnesota Pilot Projects Research Training Program, 1999-2004 (Chair, 1999-2001, 2004)
- Co-Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #425, *2007 American Industrial Hygiene Conference and Exposition*, Philadelphia, PA, June 2007
- Co-Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #425, *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Lead Instructor, "The FUN of Aerosols: Fine, Ultrafine, and Nano Particles in Workplace Atmospheres", Professional Development Course #427, *2005 American Industrial Hygiene Conference and Exposition*, Anaheim, CA, May 2005
- Arranger, "Nanoparticle Exposure Assessment", Roundtable arranged for *2006 American Industrial Hygiene Conference and Exposition*, Chicago, IL, May 2006
- Instructor in University of Minnesota Public Health Institute; Developed courses on "Personal Protective Equipment and Respiratory Protection", "Preparedness for Buildings", and "Workers as Partners in Emergency Preparedness and Response" for May-June 2006
- Instructor, Hazard Awareness Training for Solid Waste Workers, Leech Lake Reservation, Cass Lake, MN, August 2006

Dr. Brosseau

- Technical Advisor, University of Minnesota, Midwest Center Continuing Education: Development of environment, health and safety certificate programs and curriculum
- Executive Planning Committee; World Occupational Exposure Values Symposium, ACGIH, Cincinnati OH
- Midwest Center for Occupational Safety and Health: Identification of Educational Outcomes for all Occupational Health and Safety Academic Programs
- Lecturer, Continuing Education Course, Review of Industrial Hygiene, Midwest Center (2002)
- Co-Facilitator, Mid-Career Teaching Program, University of Minnesota, Center for Teaching and Learning (2002)
- Lecturer, Professional Development Course, Global Occupational Exposure Limits, Australian Institute of Occupational Hygienists Conference (2002)
- Chair, Joint Scientific Research Task Force, American Industrial Hygiene Conference and Exhibition
- Workshop Leader, "Teaching Professional Students," University of Minnesota, Center for Teaching and Learning Services, August 2003.
- Gas and Vapor Sampling, CIH Review Course, Midwest Center for Occupational Health and Safety

2. Consultations

Dr. Raynor

- Consulted with Mr. Chris Chita, M.E. Mortenson, on concerns with methane contaminating a facility being constructed on an existing oil field
- Consulted with Mr. Daniel Peña, Minnesota Department of Health, regarding emissions from ethanol plant
- Provided equipment to Ms. Susie Johnson, Minnesota Brewing Company, to evaluate emissions from ethanol facility
- Consulted with Mr. Chris Chita, M.E. Mortenson, regarding "mothball" odors noted inside a metal ventilation stack
- Consulted with law firm on metalworking fluid mist exposure assessment and control issues.

Dr. Brosseau

- University of Minnesota, Department of Environmental Health and Safety, Mercury Task Force
- Consultant, National Institutes for Health, EPA Superfund Grant Review Panel, NIEHS Conference Grant Review Panel
- Consultant, Minnesota Department of Health, Pandemic Influenza Clinical Advisory Group
- Consultant, NIOSH, NORA Town Hall Meeting, Chicago IL

Dr. Lungu

- Consulted with Mr. Daniel Peña, Minnesota Department of Health, regarding emissions from ethanol plant
- Consulted with Charlie Kennedy (MPCA), Phyllis Strong (MPCA) and Randy Cook (MinTAP) on methods to estimate the reduction in styrene emission due to technological changes in the reinforced plastic industry
- Provided equipment to Calvin Cole, Environmental Health and Safety, Hazardous Waste Division to measure hazardous waste tank leakage.

3. Other

Dr. Raynor

- Member, American Association for Aerosol Research (AAAR), 1994-present
- Member, American Industrial Hygiene Association (AIHA), 1998-present
- Member American Filtration and Separations Society (AFS), 1999-2005
- Member American Conference of Governmental Industrial Hygienists (ACGIH), 1998-2003
- Member, AIHA Aerosol Technology Committee, 2001-present
- Chair, AIHA Aerosol Technology Committee, 2005
- Vice-Chair, AIHA Aerosol Technology Committee, 2004
- Secretary, AIHA Aerosol Technology Committee, 2003
- Member, AIHA Nanotechnology Working Group, 2006-present
- Member, AIHA Methamphetamine Working Group, 2006-present
- Member, AAAR Newsletter Committee, 2001-2004
- Chair, AAAR Newsletter Committee, 2003-2004
- Editor, *Particulars* (AAAR Newsletter), 2003-2004
- Member, AAAR Control Technology Working Group, 1998-present
- Member, AAAR Indoor Air Working Group, 2006-present
- Editorial Advisory Board, *Aerosol Science and Technology*, 2001-present
- Proposal Reviewer, U.S. Department of Agriculture Small Business Innovation Research Program, 2003-2006
- Participant in Center for Filtration Research operated by the University of Minnesota Department of Mechanical Engineering
- Ad-hoc manuscript reviewer for *Applied Occupational and Environmental Hygiene*, *Aerosol Science and Technology*, *The Annals of Occupational Hygiene*, *American Industrial Hygiene Association Journal*, *Industrial and Engineering Chemistry Research*, *Journal of Porous Media*, and *Journal of Aerosol Science*.
- Member, Transportation Planning and the Environment Council, University of Minnesota Center for Transportation Studies, 2003-2005

Dr. Brosseau

- Chair, Threshold Limit Values for Chemical Substances Committee, ACGIH, Cincinnati OH
- Member, Hazardous Substances Worker Training Advisory Board, Midwest Center Continuing Education Program
- Member, Industrial Hygiene Education Advisory Board, Midwest Center Continuing Education Program
- Member, Advisory Board, Regions Hospital, Occupational Medicine Residency Program
- University of Minnesota, Office for Women, School of Public Health Representative
- Member, Study Section, Intervention Effectiveness Research Applications, National Institute for Occupational Safety and Health
- Peer Reviewer for *American Industrial Hygiene Association Journal*, *Applied Occupational and Environmental Hygiene*, *Journal of Aerosol Science*, *Aerosol Science and Technology*, *ASHRAE Transactions*, and *Annals of Occupational Hygiene*
- Member, University of Minnesota, Biomedical Research Advisory Committee
- Member, National Institute for Occupational Safety and Health, Safety and Occupational Health Study Section
- Member, Institute of Medicine, Committee for the Assessment of the NIOSH Head-and-Face Anthropometric Survey of U.S. Respirator Users
- Member, Institute of Medicine, Committee on the Development of Reusable Facemasks for Protection During Pandemic Influenza

- Member, Minnesota Department of Health, Work-Related Asthma Advisory Committee
- Co-Chair, Task Force on ERCs in the 21st Century, Association of University Programs in Occupational Health and Safety
- Member, Task Force on ERC Resource Allocation, Association of University Programs in Occupational Health and Safety

Dr. Lungu

- Member, American Industrial Hygiene Association; Member of the Ionizing radiation committee
- Member, Health Physics Society
- Member, Sigma Xi Society
- Reviewed manuscripts for *American Industrial Hygiene Association Journal* and *Environmental Science & Technology*
- Member, Laboratory Committee, Division of Environmental and Occupational Health
- Division of Environmental and Occupational Health, Admissions Committee
- AIHce – Session arranger – Physics Agents.
- AIHce - Session moderator - Ionizing & Non-ionizing radiation.
- Low background Screening and Prototyping Facility at the Soudan Underground Mine–Member of the User Group

Appendix 3. H. Agricultural Safety and Health Program
Director: John Shutske, PhD

Agricultural Safety and Health Program Outreach Activities

1. Educational Initiatives to Unique Audiences

The Agricultural Safety and Health Academic Program leadership has been provided by Dr. John Shutske who has an Extension-Service faculty appointment, which is largely focused on out reach education with significant components of community-based participatory, applied research. Thus, many outreach activities have been conducted under the ASH umbrella and will be summarized here with a few specific highlights and citations.

- a. Throughout the project period, the ASH program director also served as the PI of the USDA-funded Minnesota AgrAbility project. This outreach and education project assists farmers and family members with disabilities, and had approximately 130 clientele during the project cycle.
- b. During portions of the project cycle, ASH program faculty Shutske and Schermann (and graduate students) led projects related to projects to adapt, field test and deliver the NAGCAT child safety guidelines for Hmong parents and other ethnic groups. Project includes extensive outreach component. Projects provided some form of outreach to approximately 65 Hmong families with children.
- c. From 2002-2007, project faculty and staff Shutske and Schermann provided outreach educational sessions on agricultural injury control, health promotion, and related rural public health issues to approximately 200 groups (averaging 40-50 presentations per year in community-based settings with farmers, agricultural service providers, health professionals, and various community leader/multiplier audiences.
- d. Web-based information is provided to rural communities and agricultural audiences through the agricultural safety and health information clearinghouse. Information includes injury and fatality data, and intervention related information focused around people, agent, and environmental issue. The website is also used to disseminate PDF copies of select educational presentations. These are made available to Extension educators (nationwide) upon request. The website draws 30,000 hits per year and can be accessed through: <http://safety.cfans.umn.edu>

2. Presentations and Educational Meetings

Specific highlights of outreach presentations are also included in the publications section, but are repeated below:

Shutske, J., Schermann, M., Wagstrom, L., Bender, J., Kirkhorn, S. and Powell, T. 2006. A Conceptual Model of Bundled Risk Communication and Education to Improve Agricultural Worker Health and Safety. Reviewed abstract presented at 2006 Annual Meeting of the American Public Health Association, Boston, MA. Available at: apha.confex.com/apha/134am/techprogram/paper_140861.htm

Schermann, M., Bartz, P., Moua, M., Shutske, J., Vue, P., and Lee, T.T. 2006. Evaluation of Storytelling in Hmong to Deliver Agricultural Safety and Health Information. Reviewed abstract presented at 2006 Annual Meeting of the American Public Health Association, Boston, MA. Available at: apha.confex.com/apha/134am/techprogram/paper_130609.htm

Shutske, J., Powell, T, Stelzner, J, and Randall, J. Food and Agricultural Supply Chain Interruptions from a Pandemic Event. Presented at 2006 Extension Disaster Education Network annual conference, Nashville, Tennessee, November 2006.

Shutske, J. and Koch, B. EDEN's Food Security and National Response Plan Courses. Presented at 2006 Extension Disaster Education Network annual conference, Nashville, Tennessee, November 2006.

Shutske, J. 2005. Agroterrorism and Food Systems Defense: Key Issues and Research Needs. Peer reviewed abstract and invited presentation. Academy Health Annual Research Conference, Boston, MA. June 26, 2005. (see: <http://www.academyhealth.org/2005/pdf/shutske.pdf>)

- Shutske, J. 2005. Opportunities for Extension in Public Health and Preparedness. Presentation and proceedings of 2005 Extension Disaster Education Network Annual Conference, Fargo, ND. October, 2005.
- Shutske, J. 2005. Defending Agriculture and Our Food System. Conference proceedings and presentation materials published by Association of Schools of Public Health. Washington, DC. See: <http://www.sph.umn.edu/img/assets/8805/DefendingAgriculture.pdf>
- Shutske, J., Benson, L. Meit, M, and Campbell, P. 2005. Rural Preparedness and Agroterrorism: CPHP Resource Assessment and Toolkit. Published and reviewed by CDC and Association of Schools of Public Health.
- Shutske, J. 2004. Protecting Our Food System from Intentional Attack. Presentation, materials, symposium worksheets, and other handouts presented in Marshall, Mankato, St. Cloud, Rochester, and Crookston, MN. <http://safety.coafes.umn.edu/AgPHP/index.html>.
- Shutske, J. 2004. Development of Model Biosecurity Programs. Presented at the Animal, Dairy, and Poultry Science Workshop - Joint Animal, Dairy, and Poultry Science Association Annual Meeting, July 26, 2004, St. Louis, MO.
- Schermann, M.A., Rasmussen, R.C., Madsen Jenkins, S., Vang, C., Lor, M., & Shutske, J. 2003. Hmong children as farm workers in Minnesota: Hazards, tasks, and safe work practices. Peer reviewed abstract. American Public Health Association, San Francisco, CA.
- Shutske, J. New Tractor Technologies -- Opportunities for Progress. February, 2003. Presented at Tractor Injury Prevention and Control conference by invitation from the National Institute for Occupational Safety and Health, Pittsburgh, PA. <http://safety.coafes.umn.edu/presentations/tractors.pdf>
- Shutske, J. Midwest Center Research on Tractors and Machinery Injury Control. February 2003. Presented at Tractor Injury Prevention and Control conference by invitation from the National Institute for Occupational Safety and Health, Pittsburgh, PA.
- Schermann, M., S. Madsen Jenkins, R. Rasmussen, and J. Shutske. Adapting Health and Safety Guidelines to the Hmong Agricultural Community: A Process Methodology. May, 2003. Children, Youth, and Families at Risk Conference. Minneapolis, MN. <http://safety.coafes.umn.edu/hmong/PM/index.html>
- Shutske, J. and M. Schermann. Hmong Children as Farm Workers in Minnesota: Hazards, Tasks, and Safe Work Practices. September 2003. Presented by invitation to National Institute for Occupational Safety and Health and childhood injury prevention project researchers in Morgantown, WV. <http://safety.coafes.umn.edu/presentations/morgantown.pdf>
- Shutske, J. and M. Schermann. Hmong Children and Injury Prevention. October 2003. Presented by invitation to National Institute for Occupational Safety and Health National Occupational Injury Symposium (NOIRS). Pittsburgh, PA. <http://www2a.cdc.gov/noirs/pdfs/NOIRS2003FinalAbstracts.pdf> (see page 29)
- Shutske, J. Disaster Preparedness, Homeland Security, and Workplace Safety: Optimizing Public Mindspace and Resources. October 2003. Presented to Extension Disaster Education Network (EDEN) annual conference and training session, Denver, CO. <http://safety.coafes.umn.edu/presentations/edendenver.pdf>
- Shutske, J. and R. Schuler. Liability Concerns for the AgrAbility Professional. November, 2003. Presented at the National AgrAbility Conference in Omaha, Nebraska. <http://safety.coafes.umn.edu/presentations/liability.pdf>
- Shutske, J. Safety and Health for Crop Protection Professionals. December 2003. Presented to pesticide applicators and co-op managers/agronomists as part of crop protection course and recertification program, Minneapolis, MN. <http://safety.coafes.umn.edu/presentations/pesticides03.pdf>
- Shutske, J. Stress and Workplace Safety. March, 2003. Presentation for the Midwest Rural Energy Council's annual meeting in St. Paul, MN. <http://safety.coafes.umn.edu/presentations/stress.pdf>

Shutske, J. Danger Will Robinson: The Promises and Perils of Robotics in Agriculture April 2003. Presented at the Classes Without Quizzes event for COAFES alumni and college stakeholders. <http://safety.coafes.umn.edu/presentations/robots.pdf>

Shutske, J. Application of Homeland Security Concepts in Agricultural and Food Systems. April 2003. Presented at AFE staff development conference of the University of Minnesota Extension Service in Arden Hills, MN. <http://safety.coafes.umn.edu/presentations/afe2003.pdf>

Shutske, J. and S. Madsen-Jenkins. Working Safely in the Garden (Hmong and English versions). May 2003. Presented to Hmong farmers/families in Rosemount, MN. <http://safety.coafes.umn.edu/presentations/gardens.pdf>

Shutske, J. Automation in Agriculture: Consider a Career in BAE. Spring 2003. Presented to Agricultural and Food Sciences Academy Students. St. Paul, MN. <http://safety.coafes.umn.edu/presentations/automation.pdf>

Shutske, J. The Health of Workers in the Agricultural Industry. April 2003. Presented as part of Health Farm Families Conference at Paynesville Clinic and Healthcare System, Paynesville, MN. <http://safety.coafes.umn.edu/presentations/healthy.pdf>

Shutske, J. Agricultural Injuries and Illness – The Health Professional's Role in Prevention. February and September 2003. Presented as part of Medical Resident Community Health Workshops in Maplewood and Robbinsdale, MN. <http://safety.coafes.umn.edu/presentations/residents2003.pdf>

Shutske, J. Ready to Respond: Farm Injuries and Rural Emergencies. April 2003 and November 2003. Presented as part of emergency medical services and law enforcement personnel workshops in Paynesville and Moorhead, MN. <http://safety.coafes.umn.edu/presentations/ready.pdf>

Shutske, J. Safety and Health Concerns for Commercial Animal Waste Technicians. Presentation for commercial manure applicators, multiple locations 2002 and 2003 as part of certification workshops. <http://safety.coafes.umn.edu/presentations/manure.pdf>

Shutske, J. Terrorism in Agriculture and Our Food System. December 2003, Invited presentation at Purdue University Department of Agricultural and Biological Engineering. <http://safety.coafes.umn.edu/presentations/agroterrorism.pdf>

Shutske, J. Safety in Design. Fall 2003. Presented over two-week period as part of BAE 2113 -- Introduction to Design. <http://safety.coafes.umn.edu/presentations/introtodesign.pdf>

Shutske, J. Caring for Farm Families: Workplace Safety & Health. November, 2003. Presented at Health Farm Families Workshop, Moorhead, MN. <http://safety.coafes.umn.edu/presentations/caring.pdf>

Schermann, M., S. Madsen Jenkins, R. Rasmussen, and J. Shutske. Adapting Health and Safety Guidelines to the Hmong Agricultural Community: A Process Methodology. May, 2003. Children, Youth, and Families at Risk Conference. Minneapolis, MN. <http://safety.coafes.umn.edu/hmong/PM/index.html>

Schermann, M., S. Madsen Jenkins, R. Rasmussen, and J. Shutske. Adapting Health and Safety Guidelines to the Hmong Agricultural Community: A Process Methodology. May, 2003. Children, Youth, and Families at Risk Conference. Minneapolis, MN.

3. Consultations

Program staff/faculty respond to approximately 20-25 telephone calls and emailed technical questions each week directly from Extension educators (who are responding to a client's agricultural safety or health question); farmers; community leaders; regulators; agricultural businesses; etc. A typical question would be: "I am working with a farmer and his/her physician in Wright County Minnesota. After entering a silo last week with severely molded forage, he/she is now dealing with a severe case of hypersensitivity pneumonitis. Can you please point us to: information on controlling the hazard through production practices; sources and recommendations for appropriate PPE, and; guidelines for safe usage of respiratory PPE?"

In addition, we have provided consultation to numerous groups including the National Farm Medicine Center; the National Pork Board; numerous Minnesota-based agricultural commodity groups (in both the livestock and crop areas); multiple state agencies (agriculture, health, board of animal health, and public safety).

4. Other

ASH Program staff provide statewide and regional leadership for extension agricultural and food system safety, health, and food safety/protection through educational programs and research activities. This includes efforts to produce, evaluate, and disseminate instructional materials, audiovisual aids, and other educational products for use in workshops, seminars, and training activities.

Interact with media to educate industry about agricultural workplace and food system hazards and disseminate research-based knowledge. This results in 50-100 news articles in daily/weekly newspaper articles in the region and approximately 30-45 radio interviews.

Advise graduate students in Biosystems and Agricultural Engineering and Veterinary Medicine on issues of agricultural and occupational safety and health..

Member of and provide committee-based consultation and input through participation in: American Society of Safety Engineers (ASSE); Society for Engineering in Agricultural, Food and Biological Systems (ASAE); American Public Health Association (APHA)

Service on review Boards for Journal of Agromedicine; Journal of Agricultural Safety and Health; and Applied Engineering in Agriculture.

Appendix 3. I. Continuing Education and Outreach Program
Director: Kathleen Smith, MSN

Continuing Education and Outreach Program
Outreach Activities

1. Educational Development

Jeanne Ayers:

- Worked with Three Affiliated Tribes, Fort Berthold Reservation, New Town North Dakota to develop a proposal for a pilot project to develop a train the trainer program to facilitate the development and implementation of a reservation-wide emergency response plan. Proposal funded (NIEHS) through August, 2003.
- Participated with the Council on Linkages Between Academia and Public Health Practice to review a list of core competencies that apply to all public health professionals.
- Member, Midwest Consortium for Hazardous Waste Worker Training Steering Committee. Attended meetings through January 2002.
- Served as Program Director for Minnesota, on the Midwest Consortium of Hazardous Waste Worker Training. The Consortium is a working group of 15 organizations in 9 states. These organizations include, one technical college, one historically black college, 2 community groups, 2 OSHA groups, 1 Tribal Nation and 8 Universities.
- Member of the Ramsey County Workplace Action Team working on the prevention of Workplace Violence.
- Worked with Marshfield Medical Research Foundation, the Marshfield National Farm Medicine Center, and the University of Illinois on a proposal for developing distance learning initiatives in agricultural health and safety as part of a larger competitive application for a NIOSH- sponsored Agricultural Center for Research, Education and Disease and Injury Prevention.
- Served as Executive Director of the Center for Public Health Education and Outreach, School of Public Health.
- Staffed the External Advisory Committee of the Center for Public Health Education and Outreach, School of Public Health.
- Established a formal affiliation agreement between Eastern Michigan University and the University of Minnesota to develop and deliver OSHA course curriculum through a web-based format.
- Served on the planning committee for numerous SPH courses including: Meeting the Challenge of Obesity, 2002.
- Served on the planning committee for the Summer Institute on International Health Issues which included one week on International Infection Control topics and one week on International Public Health topics.
- Developed a proposal to the Minnesota Department of Health to create a collaborative Public Health Workforce Assessment Center, 2002. (Approved).
- Coordinated and staffed the Midwest Center for Lifelong Learning in Public Health Advisory Cooperative with representatives from the State Health Departments of Minnesota, Wisconsin, and North Dakota.
- Served on MPHA Annual Conference Planning Committee focused on identifying and building the public health workforce, held May 2002.
- Developed collaborative proposal for OSHA Training Center competitive renewal with the University of Cincinnati, Eastern Michigan University, and United Auto Workers.
- Established training collaborative with Lakeshore Technical College in Cleveland, WI, and South Central College in Mankato, MN, as host sites for occupational health and safety training.
- Worked with Suzanne Perry and American Refugee Committee on treatment of TB in refugee settings, Minneapolis, MN, June, 2002.
- Worked with Kathleen Schuler and Institute for Agriculture and Trade Policy to plan an offering of "In Harm's Way," a national conference on children's environmental health, Minneapolis, MN, October, 2002.
- Attended national APHA and ASPH meetings in Philadelphia, 2002.
- Attended MPHA meeting in Minnetonka, MN, May 2003

- Served as Program Director of the NIOSH Hazardous Substance Training grant and participated in the Annual NIOSH HST/HSAT Meeting in San Diego, CA, February 2002 and in February, 2003 at Marco Island, Florida.
- Served as Program Director, MCOHS, CE Program. Attended the Annual Meeting of NIOSH, ERC, CE Directors in Marco Island, Florida, in February, 2003.
 - Represented the University of Minnesota, MCOHS, and Great Lakes OSHA Training Consortium at the Annual Meeting of OSHA Training Center's in Seattle, WA, June, 2002.
 - Assisted development of a proposal to establish a Center for Public Health Preparedness at the University of Minnesota in cooperation with the Minnesota Department of Health (approved).
 - Worked with Debra Olson, faculty from SPH, and a 4 state advisory group to develop a proposal to establish a Public Health Training Center, (HRSA). (funded) Served as Administrative Director and Coordinator.
 - Served on the planning committee for the University of Minnesota Public Health Institute, 2002 to 2003.
 - Developed a proposal to the Minnesota Department of Health to create a collaborative Public Health Workforce Assessment Center, 2002. (Approved).
 - Coordinated and staffed the Midwest Center for Lifelong Learning in Public Health Advisory Cooperative with representatives from the State Health Departments of Minnesota, Wisconsin, and North Dakota.

Mary Hoepfner:

- Served as Program Coordinator for all Great Lakes OSHA Regional Training Consortium activities, 2002.
- Developed and served as Program Coordinator for "What's it all About: The New OSHA Recordkeeping Standard" course, 2002.
- Served as Course Coordinator for "OSHA 226 course - Permit Required Confined Spaces" course, 2002.
- Served as Course Coordinator for "OSHA 225 course – Principles of Ergonomics Applied to Musculoskeletal Problems" course, 2002.
- Served on work group to develop a proposal to establish the Academic Center for Public Health Preparedness at the University of Minnesota. Center was funded through ASPH/CDC in 2002.
- Served as planning committee member for the "Occupational Nursing Symposium" 2002
- Attended national APHA, HRSA, and ASPH/CDC meetings in Philadelphia, 2002.
- Served on work group to develop a proposal to establish the Academic Center for Public Health Preparedness at the University of Minnesota. Center was funded through ASPH/CDC in 2002.
- Worked with Minnesota Department of Health Emergency Preparedness staff to create a Center for Assessment and Evaluation. Responsible for implementation of activities conducted as part of this initiative, 2002.
- Serve as member of the ASHP Academic Centers for Public Health Preparedness Evaluator's group, with responsibilities for development of competency-based evaluation tools.
- Coordinated a series of courses on legal issues in Occupational Health and Safety, 2002. including "Occupational Health and Employee Law", "Exploring Reasonable Accommodation in the Workplace", "Understanding the Family Medical Leave Act"; and "Understanding Medical Leaves and Absences Under the FMLA and ADA".
- Member of the American Association of Occupational Health Nurses and Minnesota Association of Occupational Health Nurses (MAOHN) 2001- 2003 Member: Governmental Affairs Committee, 2002 - 2003.
- Course Director, OSHA 845 "Recording and Reporting Occupational Injuries and Illnesses course, 2002.
- Served as Course Coordinator for the "Comprehensive Industrial Hygiene Review," 2002. Revised and updated course to integrate multiple study adjuncts for students.
- Consulted with Community-based Institute for Agriculture and Trade Policy to support development of "In Harm's Way: Toxic Threats to Child Development" program, 2002.

- Served as Course Coordinator, OSHA 501 "Trainer Course in Occupational Safety and Health Standards for General Industry" which was presented in Shanghai, Beijing, and Guangzhou China, 2002.
- Served as Course Coordinator, "Lead Risk Assessor Refresher Course," 2002.
- Drafted and coordinated development of the collaborative proposal for OSHA Training Center competitive renewal with the University of Cincinnati, Eastern Michigan University, and United Auto Workers.
- Served as planning committee member for "Ergonomics in Long Term Care" course.
- Attended the ASPH Council for Professional Education (CPE), and the Council for Distance Education, 2002 meetings, Philadelphia.

Susan Larson:

- Coordinated the NIOSH Hazardous Substance Training grant, planned 2004 annual meeting location logistics and participated annually in the Annual NIOSH HST and CE Directors' Meeting.
- Featured under Alumni Profiles on University of Minnesota, Occupational Health Nursing web site.
- Participated as an exhibitor at the Minnesota Association of Occupational Health Nurses Vendor Night.
- Attended and participated as an exhibitor at the North Dakota Rural and Public Health Conference.
- Attended and participated as an exhibitor in the Minnesota Community Health Services Conference, September 2002 and 2003.
- Attended and participated as an exhibitor at the Governor's Emergency Management Conference in 2003 and 2004.
- Participated as an exhibitor at the Minnesota Safety Council Conference- May 2004
- Served as Coordinator for the University of Minnesota Center for Public Health Preparedness beginning in 2003. Worked with community experts to develop courses related to emergency preparedness including Incident Management System-The Public Health Role-online module, Information Technology Tools for Preparedness, Media Relations Practicum; Psychosocial Approaches to Disaster Preparedness, Response and Recovery; Planning for Urgent Threats.
- Member of the American Association of Occupational Health Nurses (AAOHN) and Minnesota Association of Occupational Health Nurses (MAOHN).
- Coordinated the Occupational Health Nursing Symposium, a Midwest Center educational opportunity that included a variety of course options (2002)
- Represented the Midwest Center on the Interdisciplinary Planning Committee for the Team Approach Meeting sponsored by the Midwest Center, Minnesota Association of Occupational Health Nurses (MAOHN), North Central Occupational and Environmental Medical Association (NCOEMA), Northwest Chapter, American Society of Safety Engineers (ASSE), Upper Midwest Section, American Industrial Hygiene Association (AIHA), and the Minnesota Safety Council. The 2002 program addressed "The Next Generation of Preparedness" and featured speakers from the state of Minnesota, Department of Public Safety, Division of Emergency Management. The 2003 program addressed "Sleep Deprivation Issues in the Workplace",
- Participated as an exhibitor at the MPCA Air, Water and Waste Conference.
- Chaired the NIOSH ERC Director's Group Resource Committee.
- Practicum faculty member for the Occupational Hearing Conservation Training Course.
- Co-directed the Management Seminars for Occupational Health Nurses course in the Occupational Health Nursing Symposium. .
- Coordinated contract arrangements with the state of Minnesota that acknowledged the MWC as a state approved provider of continuing education and allows for direct contractual arrangements to be made between state agencies and the Center.
- Attended quarterly NIEHS steering meeting in Cincinnati, OH.
- Attended the NIEHS sponsored Train the Trainer course in Cincinnati, OH
- Participated as an exhibitor at the American Occupational Health Conference in Chicago

- Presented information regarding MCOHS programs and hazardous substance training initiatives to staff of Minnesota Technical Assistance Program.
- Practicum faculty member for the Occupational Hearing Conservation Training Course.
- Coordinated the inaugural University of Minnesota Public Health Institute in May 2002.
- Represented MCOHS at a planning meeting at the National Farm Medicine Center in Marshfield, Wisconsin, March 2002.

Lois Harrison:

- Coordinated NIEHS Hazardous Waste Worker Training Grant which sponsors courses available for scholarship under HST NIOSH initiative
- Secured new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Hazardous Materials courses. (June 2005-January 2006)
- Targeted new marketing to increase enrollment in NIEHS courses by 20% in 2004-05 from 2004-03.
- Coordinated joint Hazardous Substance Training (HST)/NIEHS advisory group meeting (January 2006)
- Developed hazardous materials contract courses for city fire department, environmental consulting, General Mills Corp. and American Indian tribal community in Northern Minnesota (Sep 2005-Jan 2006)
- Coordinated the NIOSH Hazardous Substance Training grant and participated in the Annual NIOSH HST and CE Directors' Meeting in February 2006.
- Worked with community experts to develop new courses related to emergency preparedness.
- Coordinated two new Hazardous Substance Trainings for the City of White Bear Lake (Feb 2006) for approximately 70 participants, and completion of 40 hour Emergency Response Training for Leech lake Reservation (11 participants)
- Coordinated contract arrangements with the state of Minnesota that acknowledge the MWC as a state approved provider of continuing education and allows for direct contractual arrangements to be made between state agencies and the Center.
- Served as program coordinator for the NIEHS Hazardous Waste Worker Training Grant.
- Attended quarterly NIEHS steering meetings in Cincinnati, OH.
- Attended the NIEHS sponsored Train the Trainer course in Cincinnati, OH
- Participated as an exhibitor at Minnesota Safety Council annual conference in May, 2006
- Presented information regarding MCOHS programs and hazardous substance training initiatives to staff of Minnesota Technical Assistance Program.
- Targeted new marketing and electronic newsletter efforts to increase enrollment in all NIEHS courses by 25% in 2003-04 from 2002-03.
- Secured Hazardous Materials Manager continuing education credit for four new courses offered through NIEHS hazardous waste worker training, June, 2004.
- Secured new faculty to present/teach new NIEHS curricula in Homeland Security, June, 2004.
- Coordinated joint Hazardous Substance Training (HST) and NIEHS advisory group meeting with Susan Larson, March, 2004.
- Secured Minnesota Department of Health Registered Sanitarian continuing education credit for seven courses offered through NIEHS hazardous waste worker training and contract training in Bloomington, Minnesota, 2003.
- Developed hazardous materials contract course proposals for city fire department, environmental consulting firm, General Mills Corporation and American Indian tribal community in Northern Minnesota, July, 2004.
- Facilitated instruction by Minnesota Department of Health staff at annual Public Health Institute, May, 2004.
- Secured faculty and development of four new courses in multicultural education and program

evaluation for 2004 Public Health Institute.

- Attended NIEHS quarterly meetings in Cincinnati, OH, and presented community outreach activities at annual NIEHS train the trainer meeting, September, 2003, January, 2004, February, 2004, and June, 2004.
- Wrote NIEHS annual re-application grant, June, 2004.
- Served as member of the planning committee for 2004 School of Public Health annual roundtable offerings.
- Secured three new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Evacuation Coordination, Homeland Security, Incident Management System and Hazardous Materials courses, June, 2004.
- Developed contract proposal for Genomics conference in partnership with Minnesota Department of Health, June, 2004.
- Served on planning committee for annual Maternal and Child Health Disparities Conference, School of Public Health, October, 2003.
- Targeted new marketing and electronic newsletter efforts to increase enrollment in NIEHS courses by 20% in 2002-03 from 2001-02.
- Co-facilitated development and secured continuing education credit for one-day Clandestine Drug Lab Response Course, offered in conjunction with Minnesota Department of Health, 2003.
- Secured Peace Office Standard and Training (POST) continuing education credit for four new courses offered through NIEHS hazardous waste worker training, 2002 and 2003.
- Secured Minnesota Department of Health Registered Sanitarian continuing education credit for seven courses offered through NIEHS hazardous waste worker training and contract training in Bloomington, Minnesota, 2003.
- Coordinated NIEHS contract course at Environmental Consulting Firm, July, 2003.
- Served on Minnesota Public Health Association (MPHA) planning committee for statewide annual public health conference, May, 2003.
- Facilitated instruction by Minnesota Department of Health Public Information officer at annual Public Health Institute, May, 2003.
- Secured faculty and development of three new courses in multicultural education and program evaluation for 2004 Public Health Institute.
- Secured University of Minnesota Environmental and Occupational Health faculty chair to teach community PBT course, September, 2002.
- Attended NIEHS quarterly meetings in Cincinnati, OH, and presented community outreach activities at annual NIEHS train the trainer meeting, June 2002, September 2002, January 2003, February 2003, June 2003.
- Wrote portions of NIEHS annual re-application grant, June, 2003.
- Served as member of the planning committee for 2003 School of Public Health annual roundtable.
- Secured two new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Evacuation Coordination, Incident Management System and Hazardous Materials courses.
- Coordinated and implemented 2 new NIEHS courses during 2002: Persistent Biological Toxins (PBT) and Evacuation Coordination Train the Trainer.
- Served on Minnesota Public Health Association (MPHA) planning committee for statewide annual public health conference on workforce development, May, 2002.
- Worked with Three Affiliated Tribes, Fort Berthold Reservation, New Town, North Dakota, to coordinate future implementation of NIEHS incident management system and evacuation coordination course, June, 2002.
- Secured new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Hazardous Materials courses, June, 2005-January 2006.
- Targeted new marketing to increase enrollment in NIEHS courses by 20% in 2004-05 from 2004-03.
- Coordinated joint Hazardous Substance Training (HST)/NIEHS advisory group meeting January, 2006.

- Developed hazardous materials contract courses for city fire department, environmental consulting, General Mills Corp. and American Indian tribal community in Northern Minnesota , Sep 2005-Jan 2006.
 - Coordinated the NIOSH Hazardous Substance Training grant and participated in the Annual NIOSH HST and CE Directors' Meeting in February, 2006.
 - Worked with community experts to develop new courses related to emergency preparedness.
 - Coordinated two new Hazardous Substance Trainings for the City of White Bear Lake, February, 2006 for approximately 70 participants, and completion of 40 hour Emergency Response Training for Leech lake Reservation (11 participants)
 - Coordinated contract arrangements with the state of Minnesota that acknowledge the MWC as a state approved provider of continuing education and allows for direct contractual arrangements to be made between state agencies and the Center.
 - Attended quarterly NIEHS steering meetings in Cincinnati, OH.
 - Attended the NIEHS sponsored Train the Trainer course in Cincinnati, OH
 - Participated as an exhibitor at Minnesota Safety Council annual conference in May, 2006
 - Presented information regarding MCOHS programs and hazardous substance training initiatives to staff of Minnesota Technical Assistance Program.
 - Served as course coordinator for four 'Hazardous Materials Awareness Trainings' courses in White Bear Lake Minnesota, January 23 and 24, 2007, co-coordinated the "Hazardous Material Chemical High Pressure course" in Federal Dam, Minnesota, April 4, 2007, coordinated the Persistent Biological Toxins Course in Minneapolis, August 2006.
 - Coordinated 10 NIEHS courses with 23 HST participants, including 40 hour Emergency Response, Incident Command, Site Worker Refresher and Evacuation Coordination
 - Represented the NIOSH HST program at the annual NIOSH CE Directors meeting in Charleston, South Carolina in February 2007
 - Represented the NIOSH HST program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) Nov, 2006 and February 2007.
 - Directed the NIOSH HST tuition support program and provided tuition support for twenty three applicants during the 2006-2007 year.
 - Provided presentations and tabling of NIOSH and other health and safety training schedules and materials at the following conferences/exhibits:
 - Minnesota Fire Chiefs Conference, October 2006
 - Minnesota Police Conference, April 2007
 - Minnesota Technical Assistance Program January 2007
 - National Graduate Women in Science conference, June 2007
 - Minnesota Pollution Control Conference, February 2007
 - Provided NIOSH HST materials and/or funding support to the following conferences:
 - Minnesota Safety Council annual conference, May 2007
 - Minnesota Community Health Service Conference, September 2006
 - Represented the NIOSH HST program at the Area Health Education Center meeting, September 2006
 - Represented the NIOSH HST Program as member of National Institute of Environmental Health Sciences grantee state for the Midwest Consortium of Hazardous Waste Worker Training
- Ruth Rasmussen:
- Served as course coordinator for 'Rural Jeopardy', October 4, 2005 in St. Paul, MN, and Nov 17, 2005 in Willmar, MN for NIOSH Agricultural Safety and Health CE and for 'Protecting Our Food System From Intentional Attack' at Marshall, West St. Paul, Wausau,

- WI, and Bismarck, ND on June 13, July 12, June 21, and August 18, 2005 as part of a combined initiative with the University of MN Center for Public Health Preparedness.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Alexandria, MN, December 1, 2005 and at APHA Convention, December, 2005.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) May 24 and November, 2005.
 - Served as course coordinator for 'Rural Jeopardy', March 8, 2006 in Willmar, MN for NIOSH Agricultural Safety and Health CE and for 'Retail Food System Worker Issues, March 30, 2006, Food Production and Processing Worker Issues, April 13, 2006, and Food Distribution Worker Issues, April 20, 2006 as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) May 23, 2006.
 - Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Dakota Conference on Rural and Public Health, Fargo, ND, March 22-24, 2006.
 - Served as course coordinator for 'Healthy Farm Families', held in Rochester, MN, March 23, 2004.
 - Served as course coordinator for 'Protecting Our Food System From Intentional Attack' at Marshall, St. Cloud, Mankato, Rochester, and Crookston, MN on March 9, March 10, March 17, March 24, and March 30, 2004 as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
 - Served as work group member for "Preparing for Public Health Emergencies: Meeting the Challenges in Rural America" conference as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
 - Attended the ASPH Environmental Health Conference with Agriculture Focus, July 11-13, 2004, Minneapolis, MN, on 'Environmental Health Risk: Assessment, Management and Communication.'
 - Served on work group to develop a proposal to establish a Regional Academic Environmental Public Health Center, a collaborative partnership with the University of Wisconsin, Eau Claire and University of Northern Iowa, Cedar Falls.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Hibbing, MN, April 12, 2004.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program at "Creating Outreach Models: Exploring Partnerships site visit with USDA representative Mary Gray on July 15, 2004, Minneapolis, MN.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program at the research agenda setting meeting "Bridging the Health Divide: The Rural Public Health Research Agenda", Pittsburgh, PA, September 22-23, 2003.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) August 28, 2003, February 10, 2004, and August 12, 2004.
 - Represented the NIOSH Agricultural Safety and Health Outreach Program at the Rural Student Interest Group meeting of the University of Minnesota Academic Health Center promoting the academic and continuing education opportunities for health care professional graduate students.
 - Attended APHA November, 2003.
 - Represented the NIOSH Continuing Education Program at "Igniting the Spark: Public Health Nursing" ACHNE conference on June 3-4, 2004, Bloomington, MN.
 - Represented the NIOSH Continuing Education Program at the Minnesota Pollution Control Agency Air, Water and Waste Conference, February 25, 2004, Bloomington, MN.
 - Served as course coordinator for 'Current Issues in Agricultural Safety and Health, Part 1, January 29, 2007 and Part 2, March 26, 2007 in Worthington, MN, for NIOSH Agricultural Safety and Health CE and for 'Business Preparedness Planning for the Fruit and

Vegetable Industry' at Owatonna, MN on March 20 and Staples, MN on March 29, 2007 as part of a combined initiative with the NIOSH Agricultural Safety and Health CE program and the University of MN Center for Public Health Preparedness.

- Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) Nov, 2006 and February 2007.
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Dakota Conference on Rural and Public Health, Fargo, ND, March 20-21, 2007.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Thief River Falls, MN, September 15, 2006.
- Represented the NIOSH Agricultural Safety and Health Outreach Program as member of the Rural Public Health Interest Group series of conference calls co-sponsored by the Public Health Training Center Program of the Health Resources and Services Administration on August 18 and November 30, 2006

Iris Staubus:

- Served as Program Director - Great Lakes OTI Regional Education Center Oct 2004 through June, 2006.
- Developed and implemented a strategy for collaborating with OSHA course host sites, Lakeshore Technical College in Cleveland, WI and South Central College in Mankato MN to deliver OSHA numbered courses. The strategy includes roles and responsibilities, identification of course director criteria, course director selection and reporting.
- Provided oversight for collaboration with OSHA course host site, South Central College in Mankato MN.
- Collaborated with other Region Five OSHA Education Centers to cross-market courses, offering clients the opportunity to participate in courses in a six-state area, while registering at their local University.
- Developed program plan for fall 2003, 2004 and 2005 Occupational Health Symposiums to include up to 19 courses, four to seven courses were new each year.
- Initiated annual collaboration with MAOHN to include an Occupational Health Vendor Fair, Reception and Program into MCOHS Occupational Health Symposium in 2003 and coordinated through 2005.
- Met with community-based OHN Advisory Board and Planning Committee annually, to determine needs and planning suggestions for the Occupational Health Symposium.
- Represented the University of Minnesota, MCOHS and Great Lakes OSHA Training Consortium at national OSHA meetings in Chicago in January, 2003, Washington DC in June, 2003, Florida in March, 2004, and New Orleans April, 2005.
- Participated as member of Planning Committee and provided support for annual Team Approach Meeting – a collaborative networking and educational meeting including ASSE, MAOHN, AIHA, NCOEMA, MSC and MCOHS in, 2004, 2005, 2006
- Served as Program Coordinator for Great Lakes OSHA Regional Consortium Activities October, 2002 through September, 2004.
- Developed annual program plan for 2003-2004, 2004-2005 and 2005-2006 Occupational Health and Safety course offerings.
- Member of Minnesota Association of Occupational Health Nurses (MAOHN) 2003/04 and 2005/06.
- Member of American Society for Safety Engineers 2003/04.
- Served as Course Coordinator for the following courses presented at the University of Minnesota-Minneapolis: "Mold Identification" in Jan 2003 to; "OSHA 222 Respiratory Protection" in February, 2003; "Family Medical Leave Act" in March, 2003; "Preventing the Big Ouch: Creating and Implementing Successful Ergonomics Programs in Long Term Care Settings" in February and April, 2003.
- "Occupational Hearing Conservation," in May 2003; "Comprehensive Industrial Hygiene Review," in August, 2003; "Occupational Hearing Conservation Training" and "Occupational Hearing Conservation Refresher" in May, 2004; "OSHA 7000 Ergonomic Guidelines for Nursing Homes" in April, 2004; "OSHA 226 Permit Required Confined Space" in April, 2003; "OSHA 225 Principles of Ergonomics – Applied to Musculoskeletal Disorders" in April, 2003; NIOSH Approved Spirometry" in May, 2003; "OSHA 511 Occupational Safety and Health Standards for General Industry" in January, 2004; "OSHA 2225 Respiratory Protection" in February,

- 2004; "OSHA 500 Trainer Course in Occupational Safety and Health Standards for Construction" in March 2004. "FMLA/ADA," in April, 2004; and "NIOSH Approved Spirometry," in May, 2004.
- Coordinated the development of course "Preventing the Big Ouch, Creating and Implementing Successful Ergonomics Programs in Long Term Care Settings."
 - Planned and coordinated the Labor Forum, a meeting of University faculty and labor representatives from diverse organizations, in June, 2003.
 - Served as Course Coordinator for the following courses held at the Occupational Health Nursing Symposium in Bloomington MN in September, 2003: "Occupational Hearing Conservation Training," and "Occupational Hearing Conservation Refresher;" "Health Insurance Portability Act (HIPPA) Privacy Rule and Gathering Medical Information Under the FMLA/ADA;" "The Changing Workforce: Its impact on Occupational Health Nurses;" "The Journal Club: What Does the Research Mean to You?" and "OSHA 7000 Ergonomic Guidelines for Nursing Homes."
 - Served as Course Coordinator for the following courses held at the Occupational Health Symposium in Burnsville MN in 2004: "NIOSH Approved Spirometry Training;" "The Mini-Journal Club:" The Changing Workforce: Its Impact on Occupational Health;" "Recognizing Your Potential as a Consultant;" How to Set Up Your Own Consulting Business;" and "Occupational Hearing Conservation" and "Hearing Conservation Refresher."
 - Served as Course Coordinator for the following new courses at the Occupational Health Symposium in 2005: "Making Health and Safety Training Fun;" and Implementing a Successful Respiratory Program in a Business/Hospital/Medical Facility and Respirator Fit Testing
 - Provided oversight for ongoing courses from July, 2004 to June, 2006
 - Identified, oriented, got approval for new course directors in Spirometry and Hearing Conservation
 - Transitioned the course "Preventing the Big Ouch, Creating and Implementing successful Ergonomics Programs in Long Term Care Settings." to the new OSHA course, OSHA 7000, Ergonomic Guidelines for Nursing Homes.
 - Developed framework and objectives for new course in Case Management. Did research to locate assessments that could be adapted to provide Web-based portion of this course.
 - Collaborated with ERM China to offer "OSHA 511 Occupational Safety and Health Standards for General Industry," which was presented Shanghai China in April, 2004.
 - Organized and facilitated February, 2003 meeting of community-based occupational health nursing professionals, for needs assessment and planning recommendations for the annual Occupational Health Nursing Symposium.
 - Facilitated the development and integration of Web-based component and offering of pre-course study materials, including CD Rom exam preparation materials for "Comprehensive Industrial Hygiene Review Course."
 - Involved in a collaborative effort with other departments at the University (College of Continuing Education, Design Housing and Apparel and Environmental Health and Safety) to plan and market, "Mold and Mold Remediation," to be delivered at the Holiday Inn – Minneapolis in fall 2003.
 - Represented the University of Minnesota and MCOHS at the ERC CE Directors Meetings in 2003 -2006

Sharon Vegoe:

- Participated and staffed exhibit for the Community Health Services Annual Conference, September 10-12, 2003.
- Participated in advisory board activities for University of Minnesota Center for Public Health Preparedness, Midwest Center for Life-Long-Learning, Midwest Center for Occupational Health and Safety
- Served as Course Coordinator for "Healthy Farm Families" and "Responding to Farm Injuries and Rural Emergencies," November 6, 2003, Moorhead, Minnesota.
- Served as CPHEO representative for TEAM Approach Annual Meeting, "Risk Communication," March 18, 2004.
- Course Coordinator, "Occupational Medicine Update," March 19, 2004.

- Served as Course Coordinator, University of Minnesota Public Health Institute - May 27 – June 11, 2004. Coordination included: planning meetings, course development, marketing, budget management, on-site management, and evaluation; delivered 27 courses to 282 participants.
- Course coordinator for the 2004 Symposium: The National Occupational Research Agenda (NORA): Health and Safety Priorities for the 21st Century, May 26-27, 2004.
- Assisted national planning committee with on-site coordination for ASPH Council on Environmental Health National Meeting, July 11-13, 2004.
- Participated in exhibits at the Minnesota Safety Council Meeting (May 5-7,2004), Community Health Conference (September 10-12 2003, and Cross Borders Conference (December 15, 2003)
- Member, Minnesota Public Health Association
- Served as Course Coordinator, Minnesota Department of Health, "Environmental and Occupational Exposure to Asbestos Contaminated Vermiculite: New Findings", March 21, 2003.
- Served as Course Coordinator, "Occupational Medicine Update," March 21, 2003.
- Served as Course Coordinator, "Healthy Farm Families," Paynesville, MN, April 29, 2003.
- Served as Course Coordinator, University of Minnesota Public Health Institute – October, 2002 – June, 2003. Coordination included: planning meetings, course development, marketing, budget management, on-site management, and evaluation.

Chris Western:

- Course coordinator for all OSHA courses offered through our Center and OSHA training courses offered by our host site, South Central College, 2002 - 2006.
- Informal presentation and discussion of course offerings and needs assessment at the following professional conferences: Annual professional development conference sponsored by the Upper Midwest Chapter of the American Industrial Hygiene Association, November, 2005 and 2006., Annual vendor fair sponsored by the Minnesota Association of Occupational Health Nurses, October, 2003 to 2006, Minnesota Safety Council Expo and Conference, 2002 to 2007, Governors Conference on Homeland Security and Emergency Management 2002 to 2007, Minnesota Pollution Control Agency Air, Soil and Water annual conference 2002 to 2007
- Collaborated with staff at Federal OSHA to include information on OSHA training courses available through our Center in their e-newsletter (QuickTakes) also co-wrote an article for the OSHA website.
- Participated in advisory board activities for the Midwest Center for Occupational Health and Safety.
- Researched and implemented new marketing strategies for courses offered through the Great Lakes Regional OSHA Training Center, including working with partners to cross-market selected courses.
- Attended OSHA Region V meeting in July, 2005.
- Consulted with American Crystal Sugar in Moorhead, MN to conduct two onsite OSHA courses in 2005 and 2006.
- Partnered with University Medical Reserves Corps dept. to be ready to offer the OSHA 7600 Disaster Site Worker course as needed to health care professionals responding to the Gulf Coast disasters, October, 2005.
- Consulted with Environmental Resources Management to offer the OSHA 511 course in China, 2002 - 2006.
- Initiated a partnership with the local chapters of the American Industrial Hygiene Association and American Society of Safety Engineers to co-sponsor an annual professional development conference as well as select monthly meetings with speakers.
- Represented the University of Minnesota, MCOHS and Great Lakes OSHA Training Consortium at national OSHA meetings in New Orleans, April, 2005.
- Attended annual Train the Trainer sponsored by NIEHS at the University of Cincinnati, February, 2004, presented "Training Techniques and Examples of Hands-on Activities" for Hazardous Waste Site Worker and Hazardous Materials Emergency Response courses.

- Applied for and received continuing education credit from the Minnesota Department of Health Registered Sanitarian for environmental health specialists and sanitarians; for law enforcement professionals from Peace Office Standard and Training (POST); and from the American Board of Industrial Hygiene for our continuing education courses.
- Facilitated cooperative arrangement with the Environmental Health and Safety Division to hold hazardous substance training and have permanent equipment storage at their waste management building and in turn train their staff in the 40 hour and 8 hour refresher courses at no charge.

2. Consultations

Mary Hoepfner:

- Phone consultation to those trying to determine the appropriate OSHA course to take to meet their needs as trainers of occupational health and safety personnel
- Phone consultations Minnesota licensing renewal requirements for lead abatement professionals
- Consulted with HealthPartners, on a comprehensive learning needs assessment of health care providers.
- Provided consultation to 3M Safety and Health Professional Development Task Force regarding development and implementation of internal learning needs assessment survey.
- Phone consultation to those trying to determine the appropriate OSHA course to take to meet their needs as trainers of occupational health and safety personnel.
- Provided consultation to 3M Safety and Health Professional Development Task Force regarding development and implementation of internal learning needs assessment survey.
- Provided consultation to Kathleen Schuler and the St. Paul, Neighborhood Energy Consortium on training program for physician education in the area of pediatric environmental health.
- Provided consultation to Minnesota Department of Health Turning Point Collaborative regarding potential elements for inclusion in leadership development program.

Susan Larson:

- Consulted with the Minnesota Department of Health regarding the development of training related to methamphetamine drug lab cleanup.
- Participated as member of the Minnesota Department of Health External Education and Training Advisory Group- MDH Office of Emergency Preparedness
- Participated on the MDH Commissioner Terrorism and Health Task Force
- In conjunction with staff from the University of Iowa Center for Public Health Preparedness, coordinated the Public Health and Terrorism Preparedness: Cross Borders Issues Roundtable held December, 2003.
- Consulted with the Minnesota Department of Health related to planning for a course on Clandestine Drug Lab Response.
- Numerous Telephone Consultations on the following subjects:
 - Hazardous substance training requirements under 1910.120
 - Respiratory protection and spirometry training and medical surveillance questions.
 - Other occupational health and safety questions.
- Consulted with the Minnesota Department of Health related to their asbestos- contaminated vermiculite project and conference planning.
- Numerous *Telephone Consultations* on the following subjects:
 - Hazardous substance training requirements under 1910.120

Respiratory protection and spirometry training and medical surveillance questions
New occupational health/medicine clinic start-up
Information on the field of occupational health nursing- continuing education suggestion
Other occupational health and safety questions

Jeanne Ayers:

- Site visited and consulted with the Emergency Management Department of the Three Affiliated Tribes, Fort Berthold, North Dakota, on a variety of topics related to development of a coordinated emergency response plan, identification and creation of systems to support a self-sustaining emergency response system, educational needs of responders, and qualifications of trainers.
- Consultation with the Minnesota Department of Health on strategies to create educational initiatives regarding environmental and occupational exposures from clean-up of illegal drug laboratories.
- Consultation with Kathleen Schuler and the St. Paul, Neighborhood Energy Consortium on development of physician education programs regarding pediatric environmental health.
- Consultation with the Minnesota Department of Agriculture on the workplace hazards and educational needs of food and dairy inspectors.
- Consultation with the Minnesota Department of Health Alert Network staff on strategies for inclusion of occupational health and safety professionals in the development of a health alert network for emerging infectious diseases and bioterrorism.
- Consultation with the Minnesota Department of Health Environmental Risk Management Unit on educational initiatives to reach primary care physicians caring for patients potentially exposed to tremolite and asbestos from a significant community exposure.
- Consult on planning committee for development of Public Health Preparedness and Worker Safety and Preparedness Certificate Program curriculum.

Lois Harrison:

- Provided numerous telephone consultations on the following subjects:
 - Hazardous substance training requirements under 29CFR1910.120; appropriate training for emergency response and industry personnel attending NIEHS hazardous waste and emergency response trainings.
- Provided consultation for Leech Lake Environmental Health Coordinator regarding emergency response training for tribal personnel
- Provided consultation for General Mills Corporation Environmental Service Coordinator regarding emergency response training for first, second, and third shift employees (June 2005)
- Consulted with the Minnesota Department of Health related to their participation in 40 hour emergency response and 8 hour emergency response refresher training
- Numerous Telephone Consultations on the following subjects
 - Hazardous substance training requirements under 1910.120
 - Respiratory protection and medical surveillance questions
- Consultation on appropriate emergency preparedness courses offered for HST eligible participants from state agencies, including the Departments of Health, Natural Resources, Pollution Control and Public Safety, as well as county representatives from Dakota, Ramsey, Stearns and Pine Counties (February-June 2006)
- Provided consultation with St Cloud fire department regarding technician level hazardous material training for new fire personnel.
- Provided consultation for Leech Lake Environmental Health Coordinator regarding emergency response training for tribal personnel
- Provided consultation with Program Director, Fay Thompson Center for Environmental Management, University of Minnesota, regarding incident management system and homeland security training for new employees.
- Provided consultation for environmental health remediation firm (Bloomington) regarding hazardous material refresher training for new employees

- Provided consultation for General Mills Corporation Environmental Service Coordinator regarding emergency response training for first, second, and third shift employees (July 2004)
- Provided numerous Telephone consultations on the following subjects:
 - Hazardous substance training requirements under 29CFR1910.120.
 - Appropriate training for emergency response and industry personnel attending NIEHS hazardous waste and emergency response trainings.
- Provided consultation with International Falls, MN fire department regarding technician level hazardous material training for new fire personnel.
- Provided consultation with Program Director, Fay Thompson Center for Environmental Management, University of Minnesota, regarding incident management system training for new employees.
- Provided consultation with Minnesota Department of Health Environmental Health Section staff regarding hazardous substance training requirements for registered sanitarians Numerous
- Provided numerous *telephone consultations* on the following subjects:
 - Hazardous substance training requirements under 29CFR1910.120.
 - Appropriate training for emergency response and industry personnel attending NIEHS hazardous waste and emergency response trainings.
- Consultation with Dayton, MN, fire department regarding technician level hazardous material training for new fire personnel.
- Provided numerous Telephone consultations on Hazardous substance training requirements under 29CFR1910.120.
- Provided consultation for Leech Lake Environmental Health Coordinator regarding emergency response training for tribal personnel
- Provided consultation for General Mills Corporation Environmental Service Coordinator regarding emergency response training for first, second, and third shift employees (June 2005)
- Consulted with the Minnesota Department of Health related to their participation in 40 hour emergency response and 8 hour emergency response refresher training
- Numerous Telephone Consultations on the following subjects
 - Hazardous substance training requirements under 1910.120
 - Respiratory protection and medical surveillance questions
- Consultation on appropriate emergency preparedness courses offered for HST eligible participants from state agencies, including the Departments of Health, Natural Resources, Pollution Control and Public Safety, as well as county representatives from Dakota, Ramsey, Stearns and Pine Counties (February-June 2006)
- Provided numerous Telephone consultations on the following subjects:
 - Hazardous substance training requirements under 29CFR1910.120.
 - Appropriate training for emergency response and industry personnel attending NIEHS hazardous waste and emergency response trainings.
- Provided consultation with International Falls, MN fire department regarding technician level hazardous material training for new fire personnel.
- Provided consultation with Program Director, Fay Thompson Center for Environmental Management, University of Minnesota, regarding incident management system training for new employees.
- Provided consultation with Minnesota Department of Health Environmental Health Section staff regarding hazardous substance training requirements for registered sanitarians.

Iris Staubus:

- Advised organizations of opportunity for courses designed to specifically meet their needs. Assisted them in identification of appropriate subject matter content and pros/cons of this type of offering to meet their learning needs. Oversight and input for proposal development where requested.
- Responded to in person and phone queries about educational needs, courses available, option of onsite courses and referral to other organizations if MCOHS not able to meet their needs.
- Provided ongoing consultation for Technical College Host Site(s) on OSHA courses, materials, approaches, follow-up reporting and other OTI requirements.
- Provided frequent phone assistance to individuals helping them understand the content of specific courses, prerequisites and assess whether it would address their current learning needs.
- Provided input and feedback for AAOHN National Conference Committee as a member of the Local Coordinating Committee.
- Sharon Vegoe:
 - Provided continuing education program development for Minnesota Department of Health – Asbestos- Contaminated Vermiculite – Northeast Minneapolis Neighborhood Project.
 - Provided phone consultation - Conference Call – to National Farm Medicine Center, Marshfield, WI –November 22, 2002.
 - Participated in Conference Call, with Rural Public Health Interest Group, November 4, 2002.
 - Consultation and planning activities with University and community faculty to develop Institute courses and activities including: the development on three new courses in public health preparedness, response and recovery, establishment of a community advisory group to assist with the development of a new course concentration area in culturally responsive public health practice, meetings with an interdisciplinary faculty group to develop a new course concentration area in infectious disease epidemiology, expert consultation from the practice community to develop two new global food system field trips.

Chris Western:

- Communicated to local and state personnel including the Minnesota Department of Health, Minnesota Department of Labor and Industry (MN OSHA), Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, and EMS and law enforcement personnel the availability of NIOSH funds for HST training, at each hazardous substance training course and on the phone.
- Phone consultation to those trying to determine the appropriate OSHA course to take to meet their needs
- Advised organizations of opportunity for courses designed to specifically meet their needs. Provided or assisted with writing proposals where requested.
- Responded to in-person and telephone queries about continuing education opportunities from the Midwest Center and other occupational health and safety questions.
- Participated as an exhibitor at the Upper Midwest Section of the American Industrial Hygiene Association, November, 2005 and 2006; Minnesota Association of Occupational Health Nurses, October, 2005 and 2006, the Minnesota Safety Council Annual Conference, 2002 to 2007, and the National Association of City and County Health Officials Conference, July, 2006, Governor's Emergency Management Conference, Homeland Security and Emergency Response, 2002 to 2007.

4. Other Outreach Activities

Jeanne Ayers:

- Participated as an exhibitor at the Upper Midwest Section of the American Industrial Hygiene Association, 2002.
- Produced the Midwest Center for Occupational Health and Safety Schedule, distributed to over 20,000 people two times annually and oversee the MCOSH/CE website.
- Produced the NIOSH ERC Catalog of Courses, distributed to approximately 10,000 people.
- Produced a National Needs Assessment for NIOSH ERC's CE Programs and tabulated and distributed results 2002-2003.

- Member Minnesota Association of Occupational Health Nurses and the American Association of Occupational Health Nurses.
- Member American Public Health Association (APHA) and Minnesota Public Health Association, (MPHA) and the Association of Schools of Public Health (ASPH).
- Worked with HTML Programmer and Database programmer to develop a database driven website for the NIOSH ERC CE Program's.
- Member of the Board of Directors of the Northwest Chapter, American Association of Safety Engineers.
- Served on Advisory Panel to Minnesota Department of Health on creation of Emergency Health Powers Act. July 2002.
- Attended annual meeting of Public Health Training Centers sponsored by HRSA in Baltimore, MD, July, 2002.
- Working with CDC on a Memorandum of Agreement between CDC and the University of MN SPH to collaborate in support of federal, state, and local efforts to build national capacity for response to bioterrorism. Established regional office for CDC at University of Minnesota.

Mary's Hoepfner:

- Elected to Sigma Theta Tau, International Honorary for Nursing
- Attended the Minnesota Community Health Service Agency and Local Public Health Associations annual conference in Brainerd, MN, November 2002.

Sharon Vegoe:

- Participated in Anthrax Update, Michael T. Osterholm, October 14, 2002 – Midwest Center/CPHEO representative.
- Represented Midwest Center/CPHEO School of Public Health, Rickey Hall, October 23, 2002, Hmong Health Issues – Cultural Diversity, November 22, 2002.

Lois Harrison:

- Grant reviewer for Minnesota Department of Health, Office of Minority Health, Health Disparities Grants (January 2003).
- Member of Minnesota Public Health Association and American Public Health Association.
- Ongoing consultation with Multicultural Director, School of Public Health, regarding cultural responsiveness activities for School of Public Health and community representatives.
- Member and community advisor for Minnesota Association of Children's Mental Health (MACHMA).
- Member of Minnesota Public Health Association

Susan Larson:

- Elected to Sigma Theta Tau, International Honor Society for Nursing.
- Member of Election Committee, Minnesota Association of Occupational Health Nurses.

Ruth Rasmussen:

- Member of University of Minnesota School of Public Health Midwest Center for Life-Long-Learning in Public Health (MCLPH) Advisory Cooperative
- Member American Public Health Association

Iris' Staubus:

- Member Phi Lambda Theta, International Honor Society and Professional Association in Education.
- Member American Society of Training and Development (ASTD)—national and Twin Cities chapter (2003 – 2006)
- Member: American (and Minnesota) Society of Occupational Health Nurses (AAOHN and MAOHN) 2003/04 and 2005/06)

Kathleen Smith:

- Worked with Iris Staubus to write the CE Program section of the 2007-2008 ERC grant application
- Served as coordinator for the fall 2006 CSOMA conference in Rochester, MN
- Presented at the 2006 annual Industrial Hygiene professional development conference held in St. Paul ,MN
- Served as CE program advisory board organizer
- Served on the planning committee for the TEAM Approach dinner
- Served on the planning committee for the Minnesota Safety Council (MSC) annual spring conference
- Served as panel moderator for the MSC annual spring conference
- Sponsor at the MSC out-state annual safety conferences
- Served on the advisory board for the Health Occupations career program at Roosevelt high school and attended monthly meetings
- Presented and demonstrated at the Roosevelt H.S. career fair in 2007
- Assisted with the delivery of several HST CE programs
- Assisted with the delivery of several ASH CE programs
- Advised organizations of opportunity for courses designed to specifically meet their needs. Assisted them in identification of appropriate subject matter content and pros/cons of this type of offering to meet their learning needs.
- Oversight and input for proposal development where requested.
- Responded to in person and phone queries about educational needs, courses available, option of onsite courses and referral to other organizations if MCOHS not able to meet their needs.
- Provided frequent phone assistance to individuals helping them understand the content of specific courses, prerequisites and assess whether it would address their current learning needs.
- Member of the School of Public Health, Health Disparities Workgroup assisted in the development of a proposal for a Health Disparities academic concentration

Appendix 3. J. Hazardous Substances Training: Continuing Education Program
Director: Kathleen Smith

Hazardous Substances Training: Continuing Education Program
Outreach Activities

Lois Harrison:

- Appropriate training for emergency response and industry personnel attending NIEHS hazardous waste and emergency response trainings.
- Attended NIEHS quarterly meetings in Cincinnati, OH, and presented community outreach activities at annual NIEHS train the trainer meeting, June 2002, September 2002, January 2003, February 2003, June 2003, September, 2003, January, 2004, February, 2004, and June 2004.
- Attended quarterly NIEHS steering meetings in Cincinnati, OH.
- Attended the NIEHS sponsored Train the Trainer course in Cincinnati, OH
- Co-facilitated development and secured continuing education credit for one-day Clandestine Drug Lab Response Course, offered in conjunction with Minnesota Department of Health, 2003.
- Consultation on appropriate emergency preparedness courses offered for HST eligible participants from state agencies, including the Departments of Health, Natural Resources, Pollution Control and Public Safety, as well as county representatives from Dakota, Ramsey, Stearns and Pine Counties (February-June 2006)
- Consultation with Dayton, MN, fire department regarding technician level hazardous material
- Consulted with the Minnesota Department of Health related to their participation in 40 hour emergency response and 8 hour emergency response refresher training
- Coordinated 10 NIEHS courses with 23 HST participants, including 40 hour Emergency Response, Incident Command, Site Worker Refresher and Evacuation Coordination
- Coordinated and implemented 2 new NIEHS courses during 2002: Persistent Biological Toxins
- Coordinated contract arrangements with the state of Minnesota that acknowledge the MWC as a state approved provider of continuing education and allows for direct contractual arrangements to be made between state agencies and the Center.
- Coordinated joint Hazardous Substance Training (HST) and NIEHS advisory group meeting with Susan Larson, March, 2004.
- Coordinated joint Hazardous Substance Training (HST)/NIEHS advisory group meeting January, 2006.
- Coordinated NIEHS contract course at Environmental Consulting Firm, July, 2003.
- Coordinated NIEHS Hazardous Waste Worker Training Grant which sponsors courses available for scholarship under HST NIOSH initiative
- Coordinated the NIOSH Hazardous Substance Training grant and participated in the Annual NIOSH HST and CE Directors' Meeting in February 2006.
- Coordinated two new Hazardous Substance Trainings for the City of White Bear Lake, February, 2006 for approximately 70 participants, and completion of 40 hour Emergency Response Training for Leech Lake Reservation (11 participants)
- Developed contract proposal for Genomics conference in partnership with Minnesota Department of Health, June, 2004.
- Developed hazardous materials contract courses for city fire department, environmental consulting, General Mills Corp. and American Indian tribal community in Northern Minnesota (July, 2004; Sep 2005-Jan 2006)
- Developed hazardous materials contract courses for city fire department, environmental consulting, General Mills Corp. and American Indian tribal community in Northern Minnesota, Sep 2005-Jan 2006.
- Directed the NIOSH HST tuition support program and provided tuition support for twenty three applicants during the 2006-2007 year.
- Facilitated instruction by Minnesota Department of Health Public Information officer at annual Public Health Institute, May, 2003.
- Facilitated instruction by Minnesota Department of Health staff at annual Public Health Institute, May, 2004.

- Grant reviewer for Minnesota Department of Health, Office of Minority Health, Health Disparities Grants (January 2003).
- Hazardous substance training requirements under 1910.120
- Member and community advisor for Minnesota Association of Children's Mental Health (MACHMA).
- Member of Minnesota Public Health Association
- Member of Minnesota Public Health Association and American Public Health Association.
- Ongoing consultation with Multicultural Director, School of Public Health, regarding cultural
- Participated as an exhibitor at Minnesota Safety Council annual conference in May, 2006
- Presented information regarding MCOHS programs and hazardous substance training initiatives to staff of Minnesota Technical Assistance Program.
- Provided consultation for environmental health remediation firm (Bloomington) regarding hazardous material refresher training for new employees
- Provided consultation for General Mills Corporation Environmental Service Coordinator regarding emergency response training for first, second, and third shift employees (July 2004; June 2005)
- Provided consultation for Leech Lake Environmental Health Coordinator regarding emergency
- Provided consultation with International Falls, MN fire department regarding technician level
- Provided consultation with Minnesota Department of Health Environmental Health Section staff
- Provided consultation with Program Director, Fay Thompson Center for Environmental
- Provided consultation with St Cloud fire department regarding technician level hazardous material training for new fire personnel.
- Represented the NIOSH HST program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) Nov, 2006 and February 2007.
- Represented the NIOSH HST Program as member of National Institute of Environmental Health Sciences grantee state for the Midwest Consortium of Hazardous Waste Worker Training
- Represented the NIOSH HST program at the annual NIOSH CE Directors meeting in Charleston, South Carolina in February 2007
- Represented the NIOSH HST program at the Area Health Education Center meeting, September 2006
- Respiratory protection and medical surveillance questions
- Secured faculty and development of four new courses in multicultural education and program
- Secured Hazardous Materials Manager continuing education credit for four new courses offered through NIEHS hazardous waste worker training, June, 2004.
- Secured Minnesota Department of Health Registered Sanitarian continuing education credit for seven courses offered through NIEHS hazardous waste worker training and contract training in Bloomington, Minnesota, 2003.
- Secured new faculty to present/teach new NIEHS curricula in Homeland Security, June, 2004.
- Secured new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Hazardous Materials courses. (June 2005-January 2006)
- Secured Peace Office Standard and Training (POST) continuing education credit for four new courses offered through NIEHS hazardous waste worker training, 2002 and 2003.
- Secured three new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Evacuation Coordination, Homeland Security, Incident Management System and Hazardous Materials courses, June, 2004.
- Secured two new faculty with emergency preparedness, nursing and hazardous materials response backgrounds to teach NIEHS Evacuation Coordination, Incident Management System and Hazardous Materials courses.

- Secured University of Minnesota Environmental and Occupational Health faculty chair to teach
- Served as course coordinator for four "Hazardous Materials Awareness Trainings" courses in White Bear Lake Minnesota, January 23 and 24, 2007, co-coordinated the "Hazardous Material Chemical High Pressure course" in Federal Dam, Minnesota, April 4, 2007, coordinated the Persistent Biological Toxins Course in Minneapolis, August 2006.
- Served as member of the planning committee for 2003 School of Public Health annual roundtable.
- Served as member of the planning committee for 2004 School of Public Health annual roundtable offerings.
- Served as program coordinator for the NIEHS Hazardous Waste Worker Training Grant.
- Served on Minnesota Public Health Association (MPHA) planning committee for statewide annual public health conference, May, 2003.
- Served on Minnesota Public Health Association (MPHA) planning committee for statewide annual public health conference on workforce development, May, 2002.
- Served on planning committee for annual Maternal and Child Health Disparities Conference, School of Public Health, October, 2003.
- Targeted new marketing and electronic newsletter efforts to increase enrollment in all NIEHS courses by 25% in 2003-04 from 2002-03.
- Targeted new marketing and electronic newsletter efforts to increase enrollment in NIEHS courses by 20% in 2002-03 from 2001-02.
- Targeted new marketing to increase enrollment in NIEHS courses by 20% in 2004-05 from 2004-03.
- Worked with community experts to develop new courses related to emergency preparedness.
- Worked with Three Affiliated Tribes, Fort Berthold Reservation, New Town, North Dakota, to coordinate future implementation of NIEHS incident management system and evacuation coordination course, June, 2002.
- Wrote NIEHS annual re-application grant, June, 2004.
- Wrote portions of NIEHS annual re-application grant, June, 2003.
 - Minnesota Community Health Service Conference, September 2006
 - Minnesota Fire Chiefs Conference, October 2006
 - Minnesota Police Conference, April 2007
 - Minnesota Pollution Control Conference, February 2007
 - Minnesota Safety Council annual conference, May 2007
 - Minnesota Technical Assistance Program January 2007
 - National Graduate Women in Science conference, June 2007

Appendix 3. K. Agricultural Safety and Health: Continuing Education Program
Director: Kathleen Smith

Agricultural Safety and Health: Continuing Education Program
Outreach Activities

1. Educational Development

Ruth Rasmussen:

- Served as course coordinator for 'Rural Jeopardy', October 4, 2005 in St. Paul, MN, and Nov 17, 2005 in Willmar, MN for NIOSH Agricultural Safety and Health CE and for 'Protecting Our Food System From Intentional Attack' at Marshall, West St. Paul, Wausau, WI, and Bismarck, ND on June 13, July 12, June 21, and August 18, 2005 as part of a combined initiative with the University of MN Center for Public Health Preparedness.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Alexandria, MN, December 1, 2005 and at APHA Convention, December, 2005.
- Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) May 24 and November, 2005.
- Served as course coordinator for 'Rural Jeopardy', March 8, 2006 in Willmar, MN for NIOSH Agricultural Safety and Health CE and for 'Retail Food System Worker Issues, March 30, 2006, Food Production and Processing Worker Issues, April 13, 2006, and Food Distribution Worker Issues, April 20, 2006 as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
- Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) May 23, 2006.
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Dakota Conference on Rural and Public Health, Fargo, ND, March 22-24, 2006.
- Served as course coordinator for 'Healthy Farm Families', held in Rochester, MN, March 23, 2004.
- Served as course coordinator for 'Protecting Our Food System From Intentional Attack' at Marshall, St. Cloud, Mankato, Rochester, and Crookston, MN on March 9, March 10, March 17, March 24, and March 30, 2004 as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
- Served as work group member for "Preparing for Public Health Emergencies: Meeting the Challenges in Rural America" conference as part of a combined initiative with the University of Minnesota Center for Public Health Preparedness.
- Attended the ASPH Environmental Health Conference with Agriculture Focus, July 11-13, 2004, Minneapolis, MN, on 'Environmental Health Risk: Assessment, Management and Communication.'
- Served on work group to develop a proposal to establish a Regional Academic Environmental Public Health Center, a collaborative partnership with the University of Wisconsin, Eau Claire and University of Northern Iowa, Cedar Falls.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Hibbing, MN, April 12, 2004.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at "Creating Outreach Models: Exploring Partnerships" site visit with USDA representative Mary Gray on July 15, 2004, Minneapolis, MN.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the research agenda setting meeting "Bridging the Health Divide: The Rural Public Health Research Agenda", Pittsburgh, PA, September 22-23, 2003.
- Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) August 28, 2003, February 10, 2004, and August 12, 2004.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Rural Student Interest Group meeting of the University of Minnesota Academic Health Center promoting the academic and continuing education opportunities for health care professional graduate students.
- Attended APHA November, 2003.

- Represented the NIOSH Continuing Education Program at "Igniting the Spark: Public Health Nursing" ACHNE conference on June 3-4, 2004, Bloomington, MN.
- Represented the NIOSH Continuing Education Program at the Minnesota Pollution Control Agency Air, Water and Waste Conference, February 25, 2004, Bloomington, MN.
- Served as course coordinator for 'Current Issues in Agricultural Safety and Health, Part 1, January 29, 2007 and Part 2, March 26, 2007 in Worthington, MN, for NIOSH Agricultural Safety and Health CE and for 'Business Preparedness Planning for the Fruit and Vegetable Industry' at Owatonna, MN on March 20 and Staples, MN on March 29, 2007 as part of a combined initiative with the NIOSH Agricultural Safety and Health CE program and the University of MN Center for Public Health Preparedness.
- Represented the NIOSH Agricultural Safety and Health Outreach Program as Advisory Board Member for the Midwest Center for Life-Long-Learning in Public Health (MCLPH) Nov, 2006 and February 2007.
- Provided informal presentation and table of NIOSH and other health and safety training schedules and materials at the Dakota Conference on Rural and Public Health, Fargo, ND, March 20-21, 2007.
- Represented the NIOSH Agricultural Safety and Health Outreach Program at the Area Health Education Center Community Meeting in Thief River Falls, MN, September 15, 2006.

Ruth Rasmussen:

- Member of University of Minnesota School of Public Health Midwest Center for Life-Long-Learning in Public Health (MCLPH) Advisory Cooperative
- Member American Public Health Association

Appendix 3. L. NORA Program
Directors: Ian A. Greaves, B Sci, MB BS and Lisa Brosseau, ScD

NORA Outreach is listed within each academic program.