Northwest Center for Occupational Health and Safety Education and Research Center

Annual Report
July 1, 2006 – June 30, 2007

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Submitted by:
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NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

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INTRODUCTION AND EXECUTIVE SUMMARY

Center Director: Noah Seixas

A. Major Accomplishments, July 1, 2006 to June 30, 2007

The Northwest Center for Occupational Health and Safety continues its mission of training a professional workforce in the disciplines dedicated to preventing disease and injury among the working public in Washington, Idaho, Oregon and Alaska, through strong research-based graduate education, continuing education for practicing professionals and outreach and services to the region. Over this reporting year, we have grown and consolidated our presence as an interdisciplinary Center through continued funding of graduate students in these disciplines, improving our interdisciplinary interactions, and continuing presentations of well-regarded continuing education classes. Stronger central administration of the Center's budgets and activities has allowed us to ensure that our funds are effectively spent and are addressing the core objectives of the Center.

- Each of our academic programs remains strong, with supported trainees numbering twelve in IH, eight in OHN, five in OEM, two in HSAT, and four in HSRT. During the reporting period we graduated three students with an MS in IH, one with a PhD in IH, three with an MPH in OEM, five with an MN in OHN, one with a PhD in OHN, one with an MS in HSAT, and two with a PhD in HSRT.
- CE and HST programs reached a total of 2,158 trainees, with 39% receiving in-person training and the remainder taking part in online training offerings.
- We have continued our interdisciplinary research seminars, exposing students in multiple disciplines to research methods and perspectives of the other disciplines.
- We funded five small research training projects through our NORA research projects funding mechanism, including one at a regional partner institution. This program has been discontinued, while we have applied to move it under a Pilot/Small Project Research Training Program in the current year.
- Trainees from IH, OHN, OMR have all taken faculty jobs at training institutions, thus helping to continue to supply of graduate-trained specialists in occupational health and safety disciplines.

B. Significant Changes

No significant changes have been made to the ERC's structure or program. The curricula remain essentially unchanged in the reporting period, with only small changes in individual courses designed to improve our training effectiveness.

Several significant changes have been made to the leadership of the ERC over the past year. Steve Hecker became Director of CE and HST, and was also appointed Deputy Director for the Center. Dr. Butch de Castro was recruited to the faculty, and became Director of the OHN Program. Dr. Mary Salazar has retired from the UW (becoming Professor Emeritus), and Pat Butterfield has left the UW to become Dean of Nursing at Washington State University.

Two new members were appointed to our External Advisory Board, strengthening our outreach abilities: Jerry Dzugan, Director of the Alaska Marine Safety Association, a NIOSH TPG, and Guy Silvey, Western Region Safety Director for Turner Construction, and a graduate of our IH program were appointed.

Several additional changes have taken place at the beginning of the current year. Susan Brower, the Center Manager has left for a new job and been replaced by Maggie Connor. Dr. Dennis Shusterman has left the UW, and a search for a new residency director is being formed. In the interim, Dr. Sverre Vedal will lead the OMR program.

In the current academic year, we have also initiated a revised IH curriculum to better address the broad requirements of our graduates, and maintain a cutting edge focus on research and practice in exposure assessment and control of workplace risks. The new curriculum maintains a strong training focus in industrial hygiene concepts and techniques.

In addition, planning is taking place for the eventual phasing out of the MN degree in Occupational Health Nursing, substituting for it a Doctorate in Nursing Practice, as is being mandated by the School of Nursing and the accreditation body for nursing education. We expect that this change will help elevate the research capabilities of advanced nursing practitioners such as occupational health nurses.

C. ERC Website

The website for the Northwest Center for Occupational Health and Safety is still under development. Links to each of the programs can be obtained at the following website:
http://depts.washington.edu/nwcohs/.

CENTER ADMINISTRATION

Program Director: Noah Seixas

Program Highlights: July 1, 2006 to June 30, 2007

- Each of our academic programs remained strong, with supported trainees numbering eight in OHN, twelve in IH, two in HSAT, five in OEM, and four in HSRT.
- Recruitment was highly successful for the 2007-2008 year, with eight students enrolled in IH (seven MS, one PhD), four in OEM, six in OHN (five MD, one PhD), and two in HSAT.
- CE and HST programs reached a total of 2,158 trainees with 39% receiving in-person training, and the remainder taking part in online training offerings.
- Dr. Butch de Castro began his tenure as Director of the OHN Program bringing new perspectives and a focus on health and safety of working immigrant populations. Dr. Patricia Butterfield left the UW to take a job as Dean of Nursing at Washington State University.
- Steve Hecker has begun his tenure as Director of the CE/O Program, and as the Center's Deputy Director. Mr. Hecker brings a new level of sophistication to CE activities, with collaborations among numerous partners in Region X.
- The Industrial Hygiene and Safety Program changed its name to Occupational and Environmental Exposure Sciences to reflect the need for addressing exposure issues in a wider context in our changing economy. Occupational or Industrial Hygiene content remains the core discipline, but curriculum changes reflect the wider range of activities and responsibilities confronting our graduates.
- New initiatives to address training effectiveness and regional impact have remained strong components of our program. Our interdisciplinary research seminar met three times, trainees enrolled in research ethics training programs, and we presented at several regional and national conferences. Our NORA research projects program funded five projects involving student research training. This program has been cut back due to NIOSH requirements, and we have applied to continue similar work under a Pilot/Small Research Training Projects Program for future years.
- Two new members were appointed to our External Advisory Board, representing the regional construction industry and the Alaska Marine Safety Association – an ERC TPG.

Program Description

Goals and Objectives

The Northwest Center for Occupational Health and Safety (NWCOHS) supports interdisciplinary training in occupational health and safety (OH&S), including both professional practice and research-oriented education. In addition, the Center provides continuing education programs for OH&S professionals practicing in Region X (WA, OR, ID, AK), and serves as a regional resource for information and consultation on occupational health and safety problems. The Center is housed within the Department of Environmental and Occupational Health Sciences at the University of Washington and is guided by a ten-member External Advisory Board.

The Center Administration includes the Center Director (N. Seixas) and Deputy Director (S. Hecker), a Center Manager and administrative support personnel. The Program Directors support the Administration through management of their individual programs, and provide guidance to the Director through quarterly Program Directors' Meetings. In addition, an External Advisory Board provides guidance to the Center from the perspective of the outside communities we serve.

Faculty Participation

During the reporting period, the NWCOHS was lead by Dr. Noah Seixas, Director, and Steven Hecker, Deputy Director. The individual Program Directors were Michael Yost (Industrial Hygiene – recently renamed Exposure Sciences), Dr. Dennis Shusterman (Occupational and Environmental Medicine), Dr. Butch De Castro (Occupational Health Nursing), Dr. John Kissel (Hazardous Substance Academic Training), Dr. Tom Wickizer (Health Services Research Training) and Steve Hecker (Continuing Education-Outreach and Hazardous Substance Training).

Curriculum

Considerable strength continued in our Industrial Hygiene, Occupational Health Nursing and Occupational Medicine programs, furthered through programs in Hazardous Substance Academic Training, Health Services Research Training, Continuing Education and Outreach, and Hazardous Substance Training Programs. The NORA Research Training program supplemented and added strength to each of the discipline-specific programs. Some changes were made in the curricula of individual programs to enhance specific areas of instruction, as suggested by our advisory boards, review committees and accreditation boards. These changes are outlined in the individual program narratives.

Our Industrial Hygiene curriculum adopted a new name, Occupational and Environmental Exposure Sciences, and a revised curriculum (not included for this reporting period); to better reflect the range of activities and responsibilities addressed by our graduates, and the introduction of new techniques into assessment of occupational exposures. The new curriculum establishes a core sequence of three classes, allows for students to elect different specialty 'pathways' and allows for a project-based degree without a traditional master's thesis. The projects culminate in the presentation of a portfolio of accomplishments including a major focused project, and examination by a faculty committee. We believe this revised curriculum will substantially increase our recruitment of top tier students, address occupational health and safety issues in the evolving workplace, while maintaining a strong basis in traditional industrial hygiene concepts and techniques.

In response to pressures from the graduate nursing accreditation body, our School of Nursing began the process of phasing out Master's level training and substituting for it, a Doctorate of Nursing Practice (DNP). The focus of this change is increasing the scientific basis of nursing practice, while ensuring well prepared practitioners. Our OHN program will begin phasing in the DNP over the next several years, making the DNP an option for incoming classes in the next academic year. The major impact of this change will be extending training to a three year period, and requiring new sources of funding for OHN trainees.

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included lectures on four mandated topics: publication practices and responsible authorship, human subjects, mentor/trainee relationships, and research conduct. 464 student trainees from across the UW campus participated in the series. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at UW-affiliated libraries throughout the year. These lectures cover additional PHS topics relevant to scientific research ethics such as: collaborative science, data collection; data management and ownership; and conflict of interest. For the current year, we have amended our policy to require BRI training for all PhD trainees. Masters' level trainees will continue to have ethical conduct training in the course of their regular curricula.

Interdisciplinary Research and Training

Several activities of note address our interdisciplinary research training. We have continued our quarterly interdisciplinary research seminar in which advanced graduate students present research methods and findings for an audience that includes trainees from all disciplines and the major faculty from each program. Our first seminar this year presented the results of the previous year's NORA research projects which addressed health and safety for day laborers, the organization of work through telecommuting, organizational issues for assisted living workers, risk factors for pesticide exposure among applicators, and intervention effectiveness on take home pesticide exposures for farm workers. The second seminar, in February, addressed a community based intervention for physicians treating occupational illness and injury, an evaluation of the introduction of safe patient handling equipment in nursing facilities, and dermal exposure assessment for isocyanates in auto body shops. The third seminar addressed study design concepts for health and safety among Filipino worker-immigrants to the US, the effectiveness of nurse practitioners in treating disabled workers, and the association of particulate air pollution on early indicators of cardiovascular disease.

The truly interdisciplinary nature of these topics demonstrates the breadth of subject matter encompassed by our Center.

Several required and elective classes in the various curricula attracted students from each of the programs, allowing for a rich interdisciplinary interaction. Trainees have also participated in a wide range of regional and national interdisciplinary research meetings – notably the Northwest Occupational Health Conference and the joint University of Washington-University of British Columbia (Canada) Semiahmoo research symposium, and professional meetings such as the American Industrial Hygiene Conference and Exposition, the National Hearing Conservation Association, and the American College of Occupational and Environmental Medicine Annual Meeting.

Program Activities and Accomplishments

Discussion of Progress

Significant progress has been made in enhancing the interdisciplinary interaction of our trainees. In particular, our Quarterly Interdisciplinary Research Seminar brought together faculty and advanced trainees from all of the occupational health and safety disciplines to discuss current research methodology and findings. Trainees were also encouraged to attend regional conferences on interdisciplinary occupational health and safety research, including our CE offerings and especially the Occupational Medicine Grand Rounds series. Seminars and courses that stimulate interdisciplinary interactions remain a cornerstone of each of our training programs.

Increasingly close ties to regional training institutions and partners outside Washington State have enhanced our ability to conduct needs assessment, and serve the needs of the region. A coordinated needs assessment process was initiated with Oregon Health and Science University and Portland State University (a regional TPG). Surveys were conducted at the Oregon and Washington Governors' Safety Conferences and the multidisciplinary Northwest Occupational Health Conference, and the results will be shared among the institutions.

A second round of research training projects under our NORA Program were funded, including one at a regional institution. The five projects each provided support for a graduate student in some area of occupational safety and health and expanded our ability to address regional issues. The individual projects funded are discussed in the NORA program narrative.

The Northwest Center has an Advisory Board which meets yearly and confers with the directors occasionally throughout the year to provide oversight and advice on programs and progress. The Board met at the end of April and focused discussion on occupational health policy, and ways in which the Center is effectively training on this aspect of our disciplines. Michael Silverstein, a member of the OMR program lead the discussion based on a paper that he developed on this subject. The board reported that it found this discussion engaging, and allowed a more substantial consideration of the on-going challenges presented by ERCs. The board recommended a similar format for the next year, but with a focus on health and safety in the global economy.

Current membership of the board is as follows:

- Mary Salazar, Emeritus Professor of Occupational Health Nursing at the University of Washington, (newly appointed)
- Chris Barton of the Service Employees International Union, District 1199, representing the health care industry,
- Don Lofgren, Industrial Hygienist with the WA State Department of Labor and Industries,
- Dede Montgomery, Industrial Hygienist and Outreach Coordinator for Oregon Health and Science University, Center for Occupational and Environmental Toxicology.
- Michael Muhm, Occupational Physician and Epidemiologist with the Boeing Company,
- Robin Baker, Occupational Health Educator and Director, Labor Occupational Health Program, UC, Berkley,
- Uwe Reischl, Occupational Medicine faculty at Boise State University,

- Guy Silvey, Regional Director of Safety for the Turner Construction Company, and a graduate of our industrial hygiene program (newly appointed),
- Jerry Dzugan, Director of the Alaska Marine Safety Education Association, which is a NIOSH funded TPG (newly appointed).

This group of dedicated advisors represents an excellent geographical distribution across Region X, the various disciplines involved in occupational health and safety, and several important occupational environments, e.g., construction, health care, fishing, etc.

Trainee Recruitment

Our programs continued to attract excellent students into occupational health and safety disciplines. The recruitment activities specified in each program report, website development, targeted mailings, presentations at conferences and at other schools and colleges and participation in national meetings and other activities, continue to produce an adequate number of applicants. Although we would like to see a higher number of applicants, our current efforts are adequately filling our classes with competent, and in some cases, outstanding students.

Minority recruitment has been emphasized during the past year. DEOHS is targeting sophomore and junior undergraduate science majors by offering ten week funded undergraduate summer research experiences. Providing research experiences for underrepresented students may spark future interest in graduate research and enlarge the number of under-represented students in graduate applicant pools – here at the UW and elsewhere. During the summer of 2006 and 2007, DEOHS partnered with the UW Office of Minority Affairs to recruit students nationally. Funding for 5-7 positions each year was cost shared by our department and a National Heart, Blood and Lung Institute Stipends for Training Aspiring Researchers (STAR) training grant administered by the HS Minority Students Program. In December 2006 DEOHS applied for a $300K NIEHS Short Term Educational Experiences for Research (STEER) training grant that will provide five more years of funding for our summer research program. DEOHS was just notified in October 2007 that the grant has been awarded to us. Dr. David Kalman, Chairman of DEOHS, is the Principal Investigator.

In the past five years we have made greater efforts to reach underrepresented applicants through targeted mailings, a presence at national meetings that attract minority students (e.g., Society for Advancement of Chicanos and Native Americans in Science (SACNAS) and the Annual Biomedical Research Conference for Minority Students (ABRCMS), and working with a campus STEM (Science, Technology, Engineering and Medicine) recruiter who is forging partnerships with a dozen minority-serving institutions across the country. We developed recruitment material on subjects like environmental justice to better communicate our field's importance and relevance to community health.

In 2007 we ran into fierce competition for our top minority applicant choices. We received 8 applications from under-represented minorities, offered admission to six of them, but were only able to recruit one of these students. In some cases applicants were being offered additional financial funding incentives if they accepted admission offers elsewhere. We were able to recruit a Native American (Navajo) woman to our doctoral program in Environmental and Occupational Hygiene. She is very interested in being involved in future summer programs and recruiting, and we believe she will greatly enhance our recruiting in the next few years.

Program Products

Measures of Effectiveness

We have continued to monitor several objective measures of effectiveness as outlined in our competing renewal, and consistent with the ERC Directors' Task Force 3 report on evaluation metrics. Our accomplishments are summarized in the following table below showing the number of various indices achieved during the reporting year.

Achieved/Goals: July 1, 2006-June 30, 2007

	IH	OHN	OMR	HSRT	HSAT
Number of Core Faculty*	8	6	13	4	4*
Information Dissemination by Core Faculty					
# Peer Reviewed Publications	30/15	8/10	36/33	11/15	34/8
# Reports/Chapters/Lay Pubs	2/4	4/3	4/5	0/3	0/1
# Research New Grants/Contracts	13/6	4/4	6/6	4/5	2/2
Knowledge Transfer					
# Consultations with outside Groups	7/4	21/5	31/11	2/3	3/4
# Presentations to Regional Conferences	13/9	11/6	20/8	1/2	1/2
Training					
# Trainees enrolled (total)	23/18	8/12	6/6	3/3	12/8
# Graduates	4/7	8/6	3/3	2/1	1/4
# Minority Trainees enrolled	1/3	1/2	2/1	0/1	2/2
# Research papers by trainees published	2/5	3/2	6/2	1/2	0/3
# Conference presentations by trainees	8/9	3/4	4/4	1/4	4/4

As the table suggests, our programs performed very well, and achieved most of our goals. Our publication record is excellent and the programs are competing successfully for research grants and contracts. We provided extensive consulting and presentations with outside groups – primarily within the region. Our enrollment and graduation rates were solid, and most of our programs achieved excellent diversity in our student body. Students have been highly successful in publishing their work, and presenting their work at conferences. Overall, the programs performed very highly.

In addition to these quantitative measures of effectiveness, several examples of achievement are worth noting. On the basis of a survey among day laborers conducted using NORA funds in the previous reporting year, a pilot program of health and safety training for day laborers was conducted by an MPH student. Through this activity, a program focused on health and safety among precariously employed workers continues to develop, with additional training and injury surveillance activities.

Faculty from the OMR, CE and IH programs have developed an organizational level intervention project to address the occupational health and safety needs of the aging workforce. A 9-module curriculum has been developed and is currently being pilot tested for introduction in the coming year. Several large employers in the region have expressed considerable interest in participating in this project.

Trainees from IH, OHN, OMR have all taken faculty jobs at training institutions, thus helping to continue the supply of graduate-trained specialists in occupational health and safety disciplines.

OHN faculty and students have participated in several venues for the evaluation and dissemination of information for health care workers responding to new regulations requiring safe patient handling procedures in Washington State health care facilities.

On the basis of research conducted by ERC trainees and staff in the IH program, an interactive website was developed to assist construction managers predict the type of respiratory protection that may be needed for conducting various jobs with potential exposure to silica dusts. The model condenses a large amount of research from the past several years into a simply-used guidance tool, and can be found at: http://depts.washington.edu/silica/.

Publications

A listing of all publications by core faculty and trainees during the reporting period is given in Appendix B, pages 64-72. In all there were 124 peer reviewed publications during this period. In addition to the knowledge dissemination represented by these publications, these accomplishments also represent the very rich research environment that our trainees are immersed in during their tenure at the University of Washington.

Future Plans: July 2007 - June 2008

A new Center Manager, Maggie Connor, has been hired to continue managing central activities of the Northwest Center.

Our continuing priority is to provide excellent research-based training in the disciplines most closely directed to solving occupational health and safety problems. A strong class has entered into our programs for the current year, and our continuing students are each engaged in field-, laboratory-, or data-oriented research projects, addressing a wide range of issues confronting workplaces in the Pacific Northwest, and increasingly, around the world. We will continue to evolve our curricula to meet on-going and future challenges.

Our interdisciplinary research seminar will continue presentations from Center faculty and trainees. In addition, we plan to focus our spring seminar on expanding notions of health and safety in the global economy.

We have applied to NIOSH to continue use of funds for occupational safety and health research and prevention pilot/small projects, which will allow us to continue funding faculty and students outside the traditional curriculum areas and outside the UW. If this program is funded, we will work hard to establish a permanent mechanism for disseminating these funds to investigators in the region, and to insure integration of the activities with the overall interdisciplinary nature of the Northwest Center training.

We are conducting a systematic occupational safety and health needs assessment for the four state Region X using a methodology developed by the Council of State and Territorial Epidemiologists. The method assembles 19 indicators of occupational health and safety including injury and illness rates, exposure indicators and professional society activities. The wide range of availability of these indicators makes assembly of the information challenging in some cases. This project will continue through the 2007-2008 year, but should provide quantitative indicators of where the occupational safety and health burdens are, and where there is opportunity for substantial impact. We also hope that our methodology will be useful to other regions and ERCs in conducting their needs assessments.

INDUSTRIAL HYGIENE
Program Director: Michael Yost

Program Highlights: July 1, 2006 to June 30, 2007

- The Industrial Hygiene (IH) program currently includes 23 students including 14 in the MS program.
- Eight new MS and one PhD student were admitted to the 2006-07 year class.
- Three MS students and three PhD students graduated during the 2006-07 academic year.
- Of 20 active grants and contracts, 7 new awards, including one new R21 grant, were made to program faculty.
- Rich Fenske received the 2006 NIOSH Director's Award for Research Excellence. He was notified of the award in June 2007 and formally received the award in September 2007.

Program Description

Goals and Objectives:

The Industrial Hygiene training component of the ERC trains MS-level safety and health professionals for outstanding careers as industrial hygienists; the program also trains doctoral-level industrial hygienists to conduct exceptional occupational health and safety research with the most advanced tools and contemporary research methods available. Overall the training program continues to produce strong graduates and to fill a steady regional demand for occupational health and safety professionals and researchers. Future emphasis in the IH program will need to focus on recruiting strong applicants and refining the curriculum to address these diverse needs, while still maintaining a strong core of IH training.

Faculty Participation

No major changes to the core faculty have been made during the reporting period. The IH faculty consists of four full professors, two assistant professors and two lecturers. Starting in the summer, 2006, we added Steve Hecker to our program faculty as a Senior Lecturer. Although he has major responsibility for CE and HST programs, he will contribute to the IH program by teaching on training effectiveness and program evaluation topics.

Curriculum

No significant changes were made in the IH MS or PhD curricula during the reporting period. The faculty revised the curriculum for the 07-08 academic year to improve the integration of traditional occupational health and safety for workers, and risks to the communities exposed in the general environmental exposures. We expect the new curriculum to aid in effective recruitment, and to keep our training relevant to research being done by graduates of our program. [See Appendix A, pages 43-47 for complete MS and PhD curricula and sample plans of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included lectures on four mandated topics: publication practices and responsible authorship, human subjects, mentor/trainee relationships, and research conduct. 464 student trainees from across the UW campus participated in the series. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at UW-affiliated libraries throughout the year. These lectures cover additional PHS topics relevant to scientific research ethics such as: collaborative science, data collection; data management and ownership; and conflict of interest. For the current year, we have amended our policy to require BRI training for all PhD trainees. Masters level trainees will continue to have ethical conduct training in the course of their regular curricula.

Program Activities and Accomplishments

Discussion of Progress

The IH training program has continued to maintain and develop a national presence: Dr. Michael Yost and Dr. Noah Seixas have taken on major roles in both the teaching and research activities in Industrial Hygiene and in the Department. Dr. Yost serves as the Program Director of the Industrial Hygiene & Safety faculty in the Department; Dr. Seixas is the ERC Director and is the Rohm & Haas Professor of Environmental Health. The industrial hygiene ERC training program has six full-time professorial positions and two lecturers; it carries on a strong research and research training program to complement its commitment to the education of industrial hygienists with career ambitions in industry and government. IH program faculty authored 30 peer-reviewed publications, and provided 13 presentations at scientific meetings. We have started to implement revisions to modernize the curriculum as recommended by our outside advisors, the core faculty and the recent NIOSH site review. ENVH 557 “Exposure Controls” was offered this year in revised form to include content in the use of protective equipment along with rigorous training in ventilation. Content in ENVH 564 “Recognition of Health & Safety Problems” has been strengthened to include more on physical agents.

The IH program has 23 students currently enrolled. During this reporting period, three ERC-supported trainees graduated with MS degrees. A list of graduates from the program is provided on page 11.

We accepted eight new students into the program for the 07-08 year, seven MS students and one doctoral student. We continue to conduct exit interviews with graduates and to assess the regional changes in professional needs through contacts with industry and the local American Industrial Hygiene Association (AIHA) section. Graduates report a high level of satisfaction with the training experience; employers in particular seem interested in graduates having a variety of training experiences, internships, and general knowledge of IH, safety, and environmental issues.

Trainee Recruitment

The program has adopted a strategy based on web site presence, targeted mailings, and a department brochure as the principal recruitment tools. This has led to a reasonably stable number of applicants with appropriate qualifications. We continue to use the ERC display at the AIHA Conference to recruit new applicants. We also hosted an alumni reception at AIHCE to help maintain and build our recruitment network. A series of targeted outreach mailings are conducted each year to increase program visibility. Targeted areas include relevant undergraduate majors (i.e., chemistry, biology, engineering, biochemistry), at the UW and other universities and majors of previous applicants; faculty who have written letters of recommendation for previous applicants; and students registered in the GRE Search Service. We also attend numerous recruitment fairs, conferences, university events and community events each year.

The department’s Graduate Program Office has developed several brochures identifying department, school, and university achievements to serve as an initial contact piece. Web links are maintained on commonly used sites including Petersons.com, Gradschools.com, and Enviroeducation.com. We have developed an IH program brochure identifying health and safety careers and opportunities in the private and public sectors. In addition, we created a series of alumni profiles on our website so that applicants can learn how our graduates are applying their education in their professional realm. In the current year, the Graduate Program Office is organizing a new initiative to bring undergrad students from minority and underserved schools in the region to the department for summer internships. Dr. Yost and Dr. Simpson have offered to participate and host student interns in their laboratories.

Program Products

Publications

Research contributions (listed in Appendix B, pages 64-66) by current or former trainees appeared in seven publications in the reporting period. These papers appeared in recognized international scientific journals and have all been subjected to peer review. The faculty in the IH training program produced a total of 30 peer-

reviewed publications during the reporting period, reflecting the breadth and strength of the research experience offered to the trainees.

Continuing Education

The IH program faculty directed and taught in several continuing education courses. Peter Johnson presented in the Occupational Medicine Ground Rounds series on *Computer related musculoskeletal disorders: the roles of medicine, engineering and biology* October 19, 2007. Noah Seixas and Rick Neitzel codirected *Current Solutions to Workplace Noise Hazards,* May 15, and Rick Gleason directed and instructed in a course on *Third Party Liability in Worksite Safety and Health* February 28, 2007.

Research involving students

The following students in the industrial hygiene and safety program produced theses and graduated during the reporting period.

Student	Thesis or Dissertation Title
Peter Lang, MS	Comparing Predictions of Steady-state Permeation Rate Derived from Mass-loss Data to Measured Permeation Rate in Four Combinations of Two Polymeric Glove Materials and Two Common Solvents
Stephanie Griffin, MS	Indicators of Hearing Protection Use: Self Report and Researcher Observation
Amy Sly, MS	Optimization of polyurethane foam (PUF) as a pre-filter for an aerodynamic lens aerosol concentrator (ALAC) in the collection of bioaerosols
Christopher Jacomme, MS	Evaluation of a Two-zone Model Used to Predict Workplace Air Contaminant Concentrations
Wayne Turnberg, PhD	Respiratory Infection Control Practices Among Healthcare Workers in Primary and Emergency Care Settings

Student Achievements:

- Oleg Antonchuk, ES, MS:
  Scholarship- 3M Occupational Health & Environmental Safety, Industrial Hygiene Scholarship Program, May 2007
- Stephanie Griffin, ES, MS:
  Student travel award from the National Hearing Conservation Association to attend their annual conference in February 2007
- Diana Ceballos, EOHyg, PhD:
  Scholarship - Student scholarship from the Pacific Northwest Section - American Industrial Hygiene Association awarded at the 2006 Northwest Occupational Health Conference, October 25 - 27, 2006, Wenatchee, WA

  Presentation - Interdisciplinary Research Seminar, UW, Monday, Feb. 26th, 2007: Isocyanate Surface Sampling in the Puget Sound Collision Repair Industry

  Poster - AIHA 2007, June 3-6, Philadelphia, PA: Isocyanate Surface Sampling in the Puget Sound Collision Repair Industry
- Loren Kaehn, ES, MS:
  American Industrial Hygiene Foundation Scholarship ($4000 for the 07-08 school year)
  Pacific Northwest Section of the American Industrial Hygiene Association Scholarship ($750, fall 2006)

R2P

Each of our MS students prepared research theses with significant R2P content, whether they were laboratory or field based projects.

Future Plans: July 2007 – June 2008

We have admitted seven new MS students and one PhD student into the program for this coming academic year.

Curriculum revisions are currently being prepared by our department curriculum committee for this coming year. These revisions are designed to meet the employer needs and regional trends in occupational health and safety training, while maintaining a research-based training program on the cutting edge of industrial hygiene.

OCCUPATIONAL HEALTH NURSING
Program Director: Butch de Castro, PhD, MSN/MPH, RN

Program Highlights: July 1, 2006 to June 30, 2007

- Eleven OHN (two PhD and nine masters) students were enrolled in the OHN program during the reporting period. Eight (one PhD student and seven master's students) graduated in June 2007.
- Four OHN students were accepted into the program (one PhD student and three master's students), anticipating a total of six OHN students for the 2007-2008 academic year (one PhD students and five master's students).
- OHN students have presented at various meetings and conferences including at the worksite, local, regional, national, and professional assembly levels, produced three publications to their credit, and received various awards and scholarships during the reporting period.
- **Butch de Castro**, PhD, MSN/MPH, RN was hired as the new OHN program director effective September 16, 2007, relieving **Patricia Butterfield**, PhD, RN, FAAN (former OHN Program Director), who began her tenure as Chair of the Department of Psychosocial and Community Health in September, 2005. **Dr. Butterfield**, PhD, RN, FAAN left the UW School of Nursing to become Dean of the Washington State University School of Nursing effective June 2007.
- OHN Program faculty have produced eight publications and have been featured speakers at various regional and national conferences and meetings.
- **Dr. Butterfield** and **Dr. Mary Salazar** made trips to China and Thailand, respectively, representing the UW School of Nursing and the OHN program.

Program Description

Goals and Objectives

The OHN program focuses on the maintenance of a strong interdisciplinary graduate program that prepares graduates to synthesize and apply occupational and public health sciences to the prevention of work-related injury and illnesses, workplace health promotion, and health maintenance of workers and worker populations. Accordingly, graduates are prepared to:

1) Analyze and respond to dynamic and ever-changing forces that affect worker health and safety;
2) Collaborate with an interdisciplinary team to plan, implement, and evaluate comprehensive programs aimed at prevention, management and control of occupational injuries and illnesses;
3) Critically analyze and respond to legal and regulatory mandates that affect worker health and safety;
4) Advocate for organizational attention to occupational concerns of workers, families and the community.

Faculty Participation

Butch de Castro, PhD, MSN/MPH, RN, was hired as Director of the OHN Program and started on September 16, 2007. With this hire **Patricia Butterfield**, PhD, RN, FAAN, was relieved from duties related to the directorship of the program. Dr. de Castro came most recently from a post-doctoral fellowship at the University of Illinois at Chicago School of Public Health, and, previously held posts at the American Nurses Association and the Office of Occupational Health Nursing at the national office of the federal Occupational Safety and Health Administration (OSHA). He completed his doctoral and master's level training at The Johns Hopkins University School of Public Health where he was a NIOSH-ERC trainee. **Annie Bruck**, MN, RN, COHN-S, Lecturer in the School of Nursing, continued as Assistant Director of the program with primary duties involving advising of students, coordinating clinical practicum sites, assisting with teaching responsibilities, and recruitment of students. **Mary K. Salazar**, EdD, RN, FAAN, Professor and former OHN Program Director; **Jenny Tsai**, PhD, RN, Assistant Professor; and **Randal Beaton**, PhD, EMT, Research Professor continued to have active roles in the program as faculty advisors to students and contributors to OHN courses and curriculum. Other faculty that contributed to the OHN program through their mentorship of students and by teaching required courses included Bobbie Berkowitz, PhD, RN, Professor; Doris Boutain, PhD, RN, Associate Professor; Noel Chrisman, PhD, Professor; Rebecca Kang, PhD, RN, Associate Professor; June Strickland, PhD, RN, Associate Professor, Phyllis Zimmer, MN, RN, Lecturer, and Mary Anne Draye, MPH, RN, Assistant Professor.

Curriculum
There were no changes to the program curriculum since the last application. [See Appendix A, pages 48-52] for complete MN and PhD curricula and sample plans of study.]

Responsible Conduct of Science
All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series during the reporting period included four lectures and associated discussion groups on mandated PHS topics. Both master's and doctoral students are required to complete a scholarly project (includes thesis and dissertation) as a requirement for graduation. All research activities that include contact with human subjects must be approved by the University of Washington's human subjects' committee. All students are lectured on the ethical considerations of research and are mentored by faculty advisors on this issue as they conduct their research.

Program Activities and Accomplishments
Discussion of progress
Progress has included: trainee honors, awards, scholarships; faculty honors, awards, appointments; new faculty positions.

Progress Toward Goals and Objectives (as outlined above)
Goal 1: The OHN program has supported and met the needs of student interest in issues related to health promotion among workforce populations. This reflects growing appreciation for the role of health promotion efforts that contribute to healthier workers as well as for NIOSH's Work Life Initiative. Additionally, faculty have included topics related to the health and safety of immigrant and minority workers into OHN courses, reflecting current attention to this population with respect to larger discussions of health disparities. Goal 2: The OHN program has incorporated the inter-relatedness of occupational and environmental exposures by incorporating environmental health topics in OHN courses. Additionally, discussions have been initiated to evaluate how current OHN courses might be redesigned to be applicable and of interest to students in other OH programs (e.g., industrial hygiene, occupational medicine). Goals 3 and 4: Throughout lectures/sessions in OHN courses, students are asked to consider legal and regulatory implications in relation to topics presented. These include OSHA standards (or need for one), protected health information (i.e., HIPAA), and workers' compensation. Additionally, students were encouraged and participated in the Washington State Nurses Association Legislative Day on February 5, 2007 where Suzette Bramwell (graduated MN student) presented her project of a web-based cyber-active archive resource on occupational/environmental health scientific, peer-reviewed journal articles.

Trainee Honors, Awards, and Scholarships
Allyson Ochsner (graduated MN student) received the Fraser & Fredlund Award from the UW School of Nursing in September 2006 providing additional tuition support. Linda Wheadon (graduated MN student) received a Washington State Nurses Association grant award in November 2006 to conduct focus groups on the use of safe patient handling equipment among frontline nurses. Julie Postma (graduated PhD student) received the Citizen of the World Scholarship from the UW Dean's Club members and Hegyvary Citizens of the World donors in August 2006 to support a two-week service learning experience in Guatemala.

Faculty Honors, Awards, and Appointments
Dr. Butch de Castro was accepted in fall quarter 2006 into the UW K12 Clinical Research Career Development Program which includes a training award funded by the National Institutes of Health Roadmap Initiative. This training program supports intensive mentored research experiences over multiple years and will be initiated in July 2007 and conclude June 2012. **Ms. Annie Bruck**, **Dr. Salazar**, **Dr. Butterfield**, Julie Postma, and Elizabeth Tinker were each named as a "Nurse Luminary" in the Luminary Project, a collaboration of the Nurses Workgroup of Health Care Without Harm and funded by The Beldon Fund, which is used to show how nurses strategically address occupational and environmental health problems. **Dr. Mary Salazar** received

the March of Dimes Nurse of the Year Award (Research/Advancing the Practice) in November 2006 and the UW Distinguished Alumni Award in May 2007. **Dr. Randal Beaton** received the following awards: Principal Investigator/Subcontractor for Disaster Research Training Program Northwest Region Child and Family Disaster Research Training Oklahoma University (contract awarded to UW School of Nursing (9/15/06-9/14/07); Principal Investigator, Health Resources and Services Administration Training Grant for Public Health Nursing Education in Disaster and Environmental Health Nursing, (Funded for 7/1/07-6/30/10).

Trainee Recruitment

The OHN program continued efforts to prioritize recruitment of trainees, particularly from underrepresented groups in line with the University of Washington's School of Nursing's strategic plan priorities. The OHN program currently has one returning student from a racial/ethnic minority group and one returning student with a disability. Additionally, one incoming student is of a racial/ethnic minority group. Faculty actively sought out potential students of all types by providing recruiting material for outreach to a variety of student group meetings as well as identifying current nursing students of all types who are eligible for our program. Faculty also have spoken at information sessions for prospective graduate nursing students. Further, graduates of the OHN program continue to serve as ambassadors of the program referring colleagues and students who have an interest in a graduate education in OHN.

Program Products

Publications

The occupational health nursing faculty continues its strong emphasis on the importance of disseminating scholarly work through faculty and student publications in peer-reviewed journals and conference presentations. During this reporting period, faculty have produced eight publications, while trainees and graduates have produced three. The success of this message is also reflected in the participation of faculty, students, and graduates in international, national, and regional meetings.

Continuing Education

On September 13-14, 2006, the OHN program was central to collaborative efforts to organize the 12th Conference on Occupational Hazards to Health Care Workers titled "Narrowing the Knowledge and Action Gaps." This was co-sponsored by the School of Nursing, the Northwest Center for Occupational Health and Safety, and the University of British Columbia School of Environmental and Occupational Hygiene. The meeting was held in Seattle and attracted attendees from across the U.S. as well as from Canada. Conference presenters included internationally-recognized researchers, professionals, and advocates in occupational health. Faculty and students participated as presenters at continuing education conferences; including the American Association for Occupational Health Nursing Conference (Suzette Bramwell: graduated MN student, on Flu-Vaccine Programs for Healthcare Workers; Linda Wheadon: graduated MN student, on Safe Patient Handling; **Dr. de Castro** on Scientific Foundations and Trends of Occupational and Environmental Health Nursing; **Ms. Bruck** on Pediatric Environmental Health; and **Dr. Salazar** on Occupational Health Nursing in Thailand).

Research Involving Students

Allyson Ochsner and Tamsin Sarich (graduated MN students) participated in the Pacific Northwest Agricultural Safety and Health Center's (PNASH) "Pesticide Effects: Curricula Integration Project grant. They worked directly with faculty: **Ms. Helen Murphy**, PNASH Outreach Director, **Ms. Annie Bruck**, **Dr. Patricia Butterfield**, and **Dr. Mary Salazar** to develop pesticide modules and case studies for insertion into undergraduate and graduate nursing training programs. Suzette Bramwell (graduated MN student) took primary responsibility, working on a project led by **Dr. Butterfield** and **Ms. Bruck**, to develop and launch a web-based cyber-active scientific research archive. This archive is intended to promote access to and understanding of occupational and environmental health issues for professional nurses. Beth Tinker (graduated MN student) was a collaborative member and research assistant to **Dr. Butterfield** for the Environmental Risk Reduction through Nursing Intervention and Education project. She conducted an assessment of the educational needs of practicing public health nurses relative to understanding occupational

and environmental health issues impacting the communities they serve. Julie Postma (graduated PhD student) was a collaborator on the El Proyecto Bienstar project, a community based research project, directed by **Drs. Matt Kiefer**, School of Public Health and Community Medicine, and **Mary Salazar**, that investigated the prevention of occupational exposures among primarily Hispanic agricultural workers in eastern Washington state.

The following students in the OHN program produced theses or dissertations and graduated during the reporting period.

Student	Thesis or Dissertation Title
Julie Postma, PhD	Environmental justice discourses in El Proyecto Bienestar (The Well Being Project)
Beth Tinker, MN	What factors contribute and detract from public health nurses delivering environmental risk reduction in the home setting?
Suzette Bramwell, MN	Pub Hub: Environmental health nursing archive
Linda Wheadon, MN	Integrating safe patient handling equipment into practice: Nursing staff perspectives and recommendations
Allyson Ochsner, MN	Health care provider curriculum development addressing pesticides and environmental health
Tamsin Sarich, MN	Pesticide-related environmental health content integration into graduate advanced practice nursing curricula

R2P Activities

Linda Wheadon (graduated MN student), as her thesis project, conducted focus groups among nurses in Washington state to examine perceptions about facilitators and barriers to the use of safe patient handling equipment. Last year, Washington State passed the first state-law in the U.S. requiring hospitals to implement safe patient handling programs, including the use of mechanized lifting equipment. Findings from this project will assist hospitals to better understand frontline nurse reaction and more effectively purchase and implement patient lifting equipment as they move towards compliance with this state law.

Suzette Bramwell (graduated MN student) and Suzanne Lobaton (continuing MN student) developed and implemented a facility-wide flu vaccine program for Seattle's Children's Hospital. Suzette Bramwell also helped to develop a Pandemic flu website for the UW Office of Emergency Management. These programs included a detailed assessment of past programs, current institutional needs and CDC recommendations, development of staff training programs and procedures, management and oversight of program development, implementation, and evaluation.

Dr. de Castro provided workshops for professional practicing nurses (including frontline staff nurses, nurse administrators/managers, and nurse educators) focused on occupational health and safety of healthcare workers. More specifically, he assisted in organizing and presenting workshops across Washington State (April and May 2007) on the state's newly passed Safe Patient Handling Law with the focus on preventing musculoskeletal injuries among healthcare workers performing patient handling tasks. Workshops were coordinated through the Washington State Nurses Association (WSNA). Additionally, **Dr. de Castro and Ms. Bruck** provided workshops titled, "Ensuring workplace safety for nurses and patients" (May 2007) at the WSNA Annual Convention which included exercises such as Risk and Hazard Mapping.

Ms. Bruck began serving as the facilitator of the UW School of Nursing Committee for Workplace Violence Prevention (WPV). This committee is working in collaboration with a greater UW campus wide Violence Prevention Committee to educate the community about WPV and Domestic Violence.

Dr. Tsai conducted a brown bag session titled, "Chinese Immigrant Restaurant Workers' Occupational Health and Safety: An Exploratory Study," on the UW campus through the Center for the Advancement of Health

Disparities Research in the School of Nursing. Additionally, **Dr. Tsai** has initiated work as a consultant to nurse practitioners in Philadelphia to address occupational health and safety with Chinese immigrants.

Dr. Beaton provided several workshops and seminars focusing on addressing needs and protecting healthcare providers and emergency workers, including: the Joint Public Health Conference, Yakima, WA (October 2006), Building Workforce Resilience: Managing Stress and First Responders, Spokane, WA (September 2006), Community Emergency Response Team (CERT) Trainings, Medina, WA (February 2007), Disaster Behavioral Health Workshop/Training for Public Health Seattle King County Administration & Staff, Seattle, WA (March 2007), and various web-based trainings on Workforce Resilience Training (January-May 2007).

Dr. Salazar is completing her final evaluation of a community-based research project focusing on the health and safety of agricultural workers. She has presented her findings to community representatives and is currently working with the community team to establish a forum for continuing this work within the agricultural community with a primary goal to develop an intervention based on project findings. She also assisted a student from Chiang Mai University in Thailand to develop her proposal focusing on noise-induced hearing loss in Thai factory workers.

Future Plans: July 2007 – June 2008

The OHN program will focus on the following areas:

- OHN course revision and potential redesign to engage students from other ERC-OH programs.
- Continue efforts to market the program to prospective students in Region X.
- Explore opportunities to provide OHN student learning experiences in global contexts and settings.
- Utilize distance learning technology to offer OHN courses through web-based, virtual classrooms.
- Continued development of DNP-degree curriculum for OHN students.

Distance learning technology has become increasingly available to UW School of Nursing faculty, including the use of web-based virtual classrooms. Using this technology to deliver didactic training content will increase the ability to reach students in a wider area throughout Region X, from Alaska to Montana, where OHN courses may not be readily available. OHN faculty will make efforts to offer OHN courses via this distance learning technology for the next reporting year. This may serve as a means to offer continuing education as well as to plug into other regional community health nursing programs at other schools/colleges of nursing that wish to provide OHN content.

A major change at the UW School of Nursing during the reporting period was the approval of a Doctor of Nursing Practice (DNP) program. The first students for this degree program were admitted and started during Winter Quarter (January-March) 2007 for other Nursing specialty areas. Nurse practitioner students (including those with a focus in OHN) will be admitted to the DNP degree program starting Fall Quarter (September-December) 2007 as the MN option for nurse practitioner programs will be phased out. The offering of the DNP credential will also impact the OHN program for the OHN Administrator track in the near future. The OHN program intends to open acceptance for the DNP degree to those prospective students interested in the OHN Administrator track starting with the 2008-2009 academic year. The OHN program at UW will continue to accept prospective incoming MN degree students through the 2009-2010. OHN faculty will monitor these changes and will assure that the integrity and the excellence of the OHN curriculum is preserved.

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE
Program Director: Dennis Shusterman

Program Highlights: July 1, 2006 to June 30, 2007

- 6 students were enrolled in the OEM MPH program; one residency candidate was recruited for deferred admission in academic year 2008-2009.
- Several quantitative performance evaluation tools were either implemented or planned in preparation for an ACGME site visit in fall of 2007.

Program Description

Goals and Objectives

The Occupational and Environmental Medicine program's goal is training of physicians specializing in the diagnosis, treatment, management and prevention of illness and injuries related to workplace and general environmental exposures. An emphasis is placed on training of physicians to serve in leadership roles in the specialty, and to prepare physicians to incorporate research activities into their career and practice.

The major emphases over the reporting period were: 1) curriculum revision and 2) the institution of evaluation tools to ensure that the educational objectives of the program were being met. During this period, the modularization of a required 2-year seminar sequence (ENVH 596, Current Issues in Occupational and Environmental Medicine) continued, a specific course on Clinical Preventive Medicine (ENVH 590) was launched, and planning was carried out for the implementation of additional evaluation tools to address the adequacy with which both core preventive medicine and specialty occupational & environmental medicine competencies were being taught.

Faculty Participation

A strong core faculty in occupational medicine continued to provide leadership to the program. Dr. Dennis Shusterman served as ERC program director as well as director of the Residency. Dr. Matthew Keifer served as Associate Residency Director. The overall OEM program was lead by Dr. Joel Kaufman, and supported by core faculty Drs. Bill Daniell, Sverre Vedal, Michael Silverstein, Jordan Firestone, Gary Franklin, Catherine Karr, David Bonauto and Stephen Hunt, and non-medical core faculty members Harvey Checkoway (epidemiology), and Lianne Sheppard (biostatistics).

Curriculum

Through the curriculum review process, we identified several areas for improvement. Specific changes included the launching of a new (Clinical Preventive Medicine) course, modularization of the content for ENVH 596 (Current Issues in Occupational and Environmental Medicine), and incorporation of journal club and a supplemental speaker series into our regular Thursday afternoon Clinical Case Conference schedule. [See Appendix A, pages 53-55] for the MPH curriculum and sample plan of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. In addition, as part of their thesis preparation, all residents are required to complete University of Washington-specific training in Human Subjects Protection. This includes basic principles of research ethics, elements of informed consent, record-keeping responsibilities, and reporting responsibilities.

Program Activities and Accomplishments

Discussion of Progress

Our Thursday afternoon conference schedule was increased from twice to four times per month, organized by the Occupational Medicine Chief Resident and attended by the clinical faculty from the OEM program. In addition to our traditional two Clinical Case Conferences per month, we are now scheduling a Journal Club and a resource speaker session.

Use of on-line rating systems for global performance evaluation of residents and faculty was expanded. On-line portfolios were continued, whereby residents can track their progress through the program's requirements, as well as spotlight their special projects and accomplishments.

Our six-quarter Current Issues in Occupational and Environmental Medicine course (Environmental Health 596) continued its process of reorganization on a modular basis. The modules are: Respiratory Diseases, Physical and Biological Hazards, Musculoskeletal Medicine and Ergonomics, Case Management, Systems Management, and Surveillance and Cluster Investigation.

A new Clinical Preventive Medicine course was inaugurated in the summer of 2006.

Drs. Stephen Hunt and Jordan Firestone continued their pilot grant to evaluate psychosocial services for the Harborview Occupational and Environmental Medicine Clinic.

Selected Accomplishments by Current and Prior Fellows:

- Victor Van Hee, MD, a 2007 fellowship graduate, has been appointed Acting Instructor in Occupational and Environmental Medicine at UW and will be completing a Cardiovascular Epidemiology fellowship under Dr. David Siscovic during academic year 2007-2008.
- Christopher Carlsten, MD, MPH, a 2006 fellowship graduate, accepted a position as Assistant Professor of Medicine (Respiratory Division) with a secondary appointment in the School of Occupational and Environmental Health at the University of British Columbia in Vancouver, B.C.
- Stephen Hunt, MD, MPH, a 2005 graduate, directs the Deployment Clinic at the Seattle Veterans Administration Medical Center.
- Austin Sumner, MD, MPH, a 2004 fellowship graduate, assumed duties as State Epidemiologist for Environmental Health with the Vermont Department of Health.
- David Bonauto, MD, MPH, former UW OM fellow and Associate Medical Director Washington State Department of Labor and Industries Safety and Health Assessment and Research for Prevention Program, leads Washington State's occupational health and safety surveillance program. He is the Principal Investigator of the NIOSH funded Washington Occupational Surveillance Program. He serves on the NORA-2 Trade and Service Sector Councils.
- Jordan Firestone, MD, PhD, MPH, former UW OEM fellow and Medical Director of the UW / Harborview Medical Center Occupational & Environmental Medicine Clinic serves on the Board of Directors of the Northwest Association of Occupational & Environmental Medicine and the Board of Directors of the Association of Occupational & Environmental Clinics. He completed a second cycle as a member of the Institute of Medicine Committee on the Health Effects of Agent Orange in Vietnam Veterans. He also received a two year Occupational Health Education award from the State Department of Labor & Industries to Improve Workers' Compensation and Prevent Disability, and he has been appointed to the State's Industrial Insurance Medical Advisory Committee.

Trainee Recruitment

During the above period, our program supported five residents. This included two incoming academic-year residents and three practicum-year residents.

Drs. Rachel Roisman and Enass A/Rahman advanced from academic- to practicum-year residents in July, 2007. Dr. Roisman completed her training in Internal Medicine at the University of California, San Francisco, and Dr. A/Rahman completed her training in Family Medicine at St. Joseph's Hospital in New York. Dr. A/Rahman immigrated to this country from the Sudan.

Victor Van Hee, MD, MPH, who received ERC support in his first year (and an OPSF scholarship in his second), graduated from the program at the end of June, 2007. An additional trainee (Spencer Olsen, MD, MPH) graduated in September 2006.

Ingeborg Cox, MD went on leave-of-absence because of family health reasons. She continues to analyze data from her research project and plans to return to complete her course and practicum work as soon as circumstances permit.

Dr. Sukriti Singhal was recruited for deferred admission in July 2008. Dr. Singhal attended medical school in her native India, and completed internal medicine and pulmonary medicine training in New York. She is currently completing a year of critical care training.

Four physicians from Madigan Army Hospital were admitted to the MPH program as part of their preventative medicine residency.

Because of the limited applicant pool, no new residents were accepted for admission in July 2007. A strong group of applicants are currently under consideration for July 2008.

Program Products

Publications

Research contributions by current or former trainees appeared in ten publications (three trainee authors) in the reporting period. Core OEM faculty produced a total of 36 peer-reviewed publications during the reporting period, reflecting the breadth and strength of the research experience offered to the trainees[See Appendix B, pages 67-69].

CE Courses

Dr. Dennis Shusterman co-directed a CME course on Occupational Allergy with Dr. Stephen Tilles of Northwest Asthma and Allergy Center in Seattle. The course was co-sponsored by the American Academy of Allergy Asthma and Immunology.

Dr. Jordan Firestone served as Course Director for the monthly Grand Rounds series presented through the NWCOHS CE program.

Trainee Research

Trainees were involved in several substantial research activities with the faculty, and produced the following theses as part of their training.

Student	Thesis Title
Jason Allen	Oxidative Stress and Antioxidant Status in Controlled Human Diesel Exhaust Exposure: A Randomized, Blinded, Cross-Over Experiment
Douglas Badzik	Hearing Loss in U.S. Army Aviators, Comparing 2005 to 2001
Spencer Olsen	Fine Particulate Air Pollution and All-Cause Mortality in a Sample of Older US Veterans
Christine Lang	Assessment of Enrollment Rates in the Army's Weight Control Program and Attrition Among Overweight Recruits Granted Enlistment Waivers and the Role of Waist Circumference as a Predictor (in progress)
Michael Sigmon	Where There's Smoke, Is There Disease? A Study of Environmental Airborne Exposures in Soldiers Returning from Iraq
Victor Van Hee	Air Pollution Exposure and Left Ventricular Mass and Function: The Multi-Ethnic Study of Atherosclerosis

Future Plans: July 2007 – June 2008

The Occupational and Environmental Medicine program will continue to recruit and train two to three residents each year, with a combination of clinical and research skills. We plan to aggressively recruit from among the top applicants for the field. Trainees will be prepared to assume leadership roles in occupational medicine professional practice, and to advance the field through research and leadership.

HEALTH SERVICES RESEARCH TRAINING

Program Director: Thomas Wickizer

Program Highlights: July 1, 2006 to June 30, 2007

- Three trainees were enrolled in the program, two of whom completed their dissertation. The third trainee has begun active work on her dissertation, which will focus on the topic of workplace violence. She anticipates finishing her dissertation in the summer of 2008.
- Jeanne Sears, a third-year Health Services Research Training (HSRT) student, won the Gilbert Ommen Award for academic excellence among all students (MPH and PHD) graduating from the University of Washington School of Public Health in June 2007.
- One new doctoral-degree trainee was recruited and will begin his studies fall term 2007.

Program Description

Goals and Objectives

The goals of the HSRT program have remained essentially unchanged. The program is administratively located within the Department of Health Services and only supports the training of doctoral students. Trainees complete all of the requirements of the Health Services doctoral program, but specialize in the area of occupational health and safety. The HSRT program seeks to provide trainees with strong methodological training in health services research, coupled with an understanding of the special characteristics of the field of occupational health and safety. HSRT trainees are afforded the opportunity to actively participate in applied research activities.

Faculty Participation

Faculty involved in training or research associated with the HSRT program include the Program Director, Thomas Wickizer, and Drs. Gary Franklin and Diane Martin, respectively, Research Professor in the Department of Environmental and Occupational Health Sciences and Professor in the Department of Health Services. Drs. Kopjar, Zimmerman and Watts from the Department of Health Services and Dr. Kaufman from the Department of Environmental and Occupational Health Sciences also serve as core faculty members for this program.

Curriculum

No changes were made to the curriculum during the reporting period. HSRT trainees meet all of the academic requirements of Health Services PhD students, but take elective courses offered through the Department of Environmental and Occupational Health Sciences.

Responsible Conduct of Science

HSRT trainees participate in university courses and training activities related to the ethical conduct of research. All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. In addition, the Health Services doctoral program has quarterly seminars that discuss ethics in research, and HSRT trainees attend this seminar for the first two years of their program.

Program Activities and Accomplishments

Discussion of Progress

During the report period, the HSRT program supported three trainees in different stages of their doctoral work. Two trainees completed their dissertations in June 2007. One trainee accepted a position as a Research Scientist at the University of Washington and will be working at Harborview Medical Center and at the University of Washington Department of Health Services on a two-year project involving surveys of physicians and injured workers who receive health care through the California workers' compensation system. Her dissertation focused on a policy evaluation of a state law intended to improve access to health care for injured workers treated by Advanced Registered Nurse Practitioners. Her dissertation work led to her receiving the previously mentioned Gilbert Ommen Award for academic excellence. The other trainee focused her

dissertation research on the area of telecommuting, as a form of work organization, in relation to health behavior and health behavior change. She is currently exploring different options in the private sector and in academic settings.

There were no new faculty appointments during the reporting period. Program faculty continued their teaching and research activities. The HSRT program recruited one new student for the upcoming academic year. He has a strong academic background from Claremont College in California, with a focus on economics and philosophy. His work during the past year in Minneapolis included policy analyses of the Minnesota workers' compensation program.

Trainee Recruitment

The HSRT program, like the larger Health Services PhD program, views as a high priority the recruitment of underrepresented students. We market the HSRT program at major conferences, e.g., annual public health and health services research meetings, and seek to attract underrepresented students. Students exploring advanced degrees in health services are given information about the availability of funding and research opportunities for those interested in occupational health related research careers.

Program Products

Program core faculty and trainees published 12 research articles (listed in Appendix B). Jeanne Sears, an HSRT trainee, gave presentations at the 2006 Annual Meeting of the American Public Health Association held in Boston in November 2006. Two trainees, Jeanne Sears and Colleen Daly, completed their dissertations. Ms. Sears' dissertation led to the passage of a Washington State law renewing a program to improve access to medical care for injured workers treated by advanced registered nurse practitioners (ARNPs) through the workers' compensation system.

Future Plans: July 2007 – June 2008

We anticipate continuing the training and research activities of the HSRT program. We plan to support two trainees, one of whom should graduate during the summer of 2008. We will be recruiting a replacement for that trainee to begin the program in the fall of 2008.

NORA PROGRAM

Program Director: Noah Seixas

Program Highlights: July 1, 2006 to June 30, 2007

- Two trainees received NORA traineeships: a doctoral student in Industrial Hygiene, and a doctoral student in Occupational Health Nursing.
- The NORA Special Projects Research program funded five small projects, each of which provided support to graduate students while addressing a NORA research topic.
- A quarterly Interdisciplinary Research Seminar was continued, presenting current research of Center faculty and trainees.
- The NORA program helped support the annual Occupational Health Research Conference at Semiahmoo by providing support to the David Bates Lecturer, who this year was Dr. David Wegman of the University of Massachusetts at Lowell.

Program Description

Goals and Objectives

The NORA program of the Northwest Center for Occupational Health and Safety is designed to further the essential goals of the Center – providing advanced graduate education in disciplines dedicated to the prevention of occupational disease and injury, and to serving Region X professionals with continuing education and other services. The NORA program provides a further focus on the development of research proficiency in the OH&S disciplines, and concentrates on those areas of research identified in the National Occupational Research Agenda.

Faculty Participation

No change in faculty participation occurred during the reporting year. The NORA program continues to draw on the substantial support and involvement of each of the discipline-specific Program Directors, and their core faculties, as described in each program narrative.

Responsible Conduct of Science

As described in each program's narrative, all trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures on four mandated topics: publication practices and responsible authorship, human subjects, mentor/trainee relationships, and research conduct. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at the UW libraries throughout the year. Trainees can also attend lectures from prior years that are offered via videotape sessions. These lectures cover additional PHS topics relevant to scientific research ethics such as: data collection; data management and ownership; mentor-trainee responsibilities; human subjects' research and conflict of interest.

The NORA research projects that were supported by the program during the reporting year (see below) also required that each investigator obtain IRB approval for any project involving human subjects. In fact, all trainees involved in human subjects' research have some training and involvement with the requirements of our IRB, including preparation of IRB applications, providing informed consent, and reporting of research results to participants or other affected groups. Additional training in the responsible conduct of science is contained in numerous courses in the individual programs.

Program Activities and Accomplishments

Needs Assessment

The NW Center launched new marketing and needs assessment efforts this year as well as building on existing practices. We exhibited as usual at the Oregon and Washington Governor's Safety and Health conferences, but we added two of Oregon OSHA's regional conferences and the Voluntary Protection Program Association (VPPPA) regional conference in Portland to our circuit. We also initiated, in collaboration with the

Occupational Health Psychology TPG at Portland State University and the Center for Research on Occupational and Environmental Toxicology, a needs assessment survey that we distributed at the Oregon GOSH conference, regional conferences, and the VPPPA conference. Results from about 300 retuned surveys indicate some demand for OHS degree programs in the Portland area but the strongest demand is for certificate type programs based on a series of related courses. We plan to administer this survey at conferences in all four states in our region, and we will adapt a version of it for the Northwest Occupational Health Conference which has a largely health professional audience.

In addition, we initiated a systematic occupational safety and health needs assessment for the four state Region X using a methodology developed by the Council of State and Territorial Epidemiologists. The method assembles 19 indicators of occupational health and safety including injury and illness rates, exposure indicators and professional society activities. The wide range of availability of these indicators make assembly of the information challenging in some cases. This project will continue through the 2007-2008 year, but should provide quantitative indicators of where the occupational safety and health burdens are and where there is opportunity for substantial impact. We also hope that our methodology will be useful to other Regions and ERCs in conducting their needs assessments.

Interdisciplinary Research and Training

Several activities of note address our interdisciplinary research training. We have continued our quarterly interdisciplinary research seminar in which advanced graduate students present research methods and findings for an audience that includes trainees from all disciplines and the major faculty from each program. These seminars are also open to the broader university community.

Our first seminar this year presented the results of the previous year's NORA research projects which addressed health and safety for day laborers, the organization of work through telecommuting, organizational issues for assisted living workers, risk factors for pesticide exposure among applicators, and intervention effectiveness on take home pesticide exposures for farm workers. The second seminar, in February, addressed a community based intervention for physician's treating occupational illness and injury, an evaluation of the introduction of safe patient handling equipment in nursing facilities, and dermal exposure assessment for isocyanates in auto body shops. The third seminar addressed study design concepts for health and safety among Filipino worker-immigrants to the US, the effectiveness of nurse practitioners in treating disabled workers, and the association of particulate air pollution on early indicators of cardiovascular disease. The truly interdisciplinary nature of these topics demonstrates the breadth of subject matter encompassed by our Center.

Several required and elective classes in the various curricula attract students from each of the programs, allowing for a rich interdisciplinary interaction. Trainees have also participated in a wide range of regional and national interdisciplinary research meetings – notably the Northwest Occupational Health Conference and the joint University of Washington-University of British Columbia (Canada) Semiahmoo research symposium, and professional meetings such as the American Industrial Hygiene Conference and Exposition and the American College of Occupational and Environmental Medicine Annual Meeting.

For the second year, we supported small Special Research Projects with a NORA focus. The program was designed to support research projects with a NORA focus that included research training for a graduate student in an allied discipline and furthered the overall goals of the Northwest Center. Through this mechanism, the Center was able to broaden our support of UW students, help attract students in closely allied fields (such as epidemiology and industrial engineering) into occupational health and safety research careers, and for the first time, support a student in another allied institution, the Portland State University Occupational Health Psychology Program which is a NIOSH funded TPG. A request for proposals was released, submitted proposals were peer reviewed by researchers outside the UW, and the Northwest Center Program Directors reviewed and rank ordered the submitted proposals. Five projects were eventually funded. The funded projects include:

1. Richard Fenske, PI. Validation of an enzyme-linked immunoabsorbent assay for analysis of paraquat in human exposure samples. Student: Phayong Thepaksorn, PhD student in Occupational and Environmental Hygiene.
2. Chris Simpson, PI. Use of 3-nitrotyrosine as a biomarker of oxidative and nitrosative stress in humans exposed to diesel exhaust. Student: Post-doctoral trainee Gretchen Onstad, in Occupational and Environmental Hygiene.
3. Ryan Olson, PI. Oregon Health and Science University, and Portland State University. SHIFT: Safety and Health involvement for truck drivers: Development and pilot testing of a high involvement health and safety promotion program. Student: Sara Schmidt, PhD student at Portland State University.
4. Joel Kaufman, PI. Validation of a self-administered questionnaire for skin problems in the workplace. Student: Alon Peretz, MD. Post-doctoral trainee in Occupational Medicine.
5. Michael Yost. PI. Validation of a surface wipe sampling for aliphatic isocyanates. Student: Diana Ceballos, PhD student in occupational and environmental hygiene.

These projects represent a wide range of NORA topics and allow us to broaden the support that we would be able to provide under individual student activities. The accomplishments of the NORA Special Projects will be reported by the participants in the Interdisciplinary Research Seminar in Autumn, 2007.

Future Plans: July 2006 – June 2007

We will continue to use NORA Training funds to support the overall mission of the Center, including coordination and administration of training programs, interdisciplinary research training, outreach to our regional partners, and needs assessment and planning. Some funds will continue to be used for support of trainee and faculty travel to NORA related research meetings, and to help support the regional research meeting at Semiahmoo.

NORA funds will be used to support at least two graduate student traineeships.

We have re-applied for the funds originally awarded for the current year (2007-2008) for support of the NORA research projects' program. In our competing application, we have renamed the program a Pilot/Small Project Research Training Program (PSPRTP) in accordance with the current RFA. If these funds are released, we plan to support the projects that competed successfully in the current year, and continue this PSPRTP in the coming years.

HAZARDOUS SUBSTANCES TRAINING

Program Director: Steven Hecker

Program Highlights: July 1, 2006 to June 30, 2007

- Fourteen courses serving 298 trainees were delivered in Washington, Oregon, and Alaska. All were classroom courses (all online courses are now reported under Continuing Education).
- A new course was developed and delivered on Composite Hazards: Potential Health Hazards of Carbon Fiber Reinforced Materials for the aerospace manufacturing industry.
- The course sequence A Small Dose of Toxicology and A Larger Dose of Toxicology were successfully offered in Portland for a varied audience, and the Small Dose course was repeated in Anchorage.
- A 24-hour national overview course for Certified Hazardous Materials Managers attracted 18 attendees and will become a regular offering of the HST program
- Steven Hecker assumed full-time directorship of the HST program in September 2006. Mr. Hecker had a long career in occupational health and safety training and research at the University of Oregon and knows the NW Center program well both as an advisory board member and an instructor in CE programs.

Program Description

Goals and Objectives

The overall purpose of the HST program is to provide high quality and innovative courses to satisfy environmental and workplace hazardous materials regulatory requirements, with a specific emphasis on assisting state and local health, environmental and public safety agencies in meeting the needs of their personnel. Specific additional objectives include:

- Continuously improve pedagogy and curriculum of courses,
- Identify and respond to changing needs of front-line responders and the agencies that employ them.

Faculty Participation

Steven Hecker assumed the directorship of the HST program on a full-time basis in September 2006. HST has made considerable use of his DEOHS industrial hygiene expertise. Venetia Runnion and Rick Gleason, both CIH, developed and taught the composite health and safety course. Steve Gilbert, PhD, DEOHS affiliate faculty in toxicology, coordinated and taught much of the Small and Large Dose of Toxicology courses. John Malool, a lecturer affiliated with the NIOSH-funded New York/New Jersey Education and Research Center, again taught a summer and winter series of *8-Hour Hazardous Waste Refreshers*. Chuck Mitchell served as a part-time Training Coordinator for the Hazardous Substance and Emergency Response courses.

Program Activities and Accomplishments

1. Discussion of Progress

Steven Hecker assumed full-time directorship of CE in September 2006. Mr. Hecker has 25 years' experience in worker and professional training and education and has a special interest in worker-centered education and training evaluation.

HST programs were conducted in Washington, Oregon, and Alaska, and we were successful in reaching our target audience of state and local government employees with hazardous materials responsibilities.

New Courses:
Three new courses were offered:

- *Certified Hazardous Materials Management National Overview Course,* 11/11-13, held in collaboration with the Pacific NW chapter of the Academy of Certified Hazardous Materials Managers, attracted 18 students.
- *Composite Hazards: Potential Health Hazards of Carbon Fiber Reinforced Materials* was developed and taught for the Boeing Company. With the large-scale production of the Boeing 787 using composite material, this will be an increasingly important technology in the region and demand for this course is expected to grow.
- The HST program collaborated with the local AIHA section to sponsor the ACGIH webinar *Nanoparticle Update-Measuring, Evaluating and Managing Exposures*.

2. Needs Assessment/Trainee Recruitment
The HST program will benefit from the new marketing and needs assessment efforts that the NW Center launched this year. We have distributed a needs assessment survey at the Oregon GOSH conference, Oregon OSHA regional conferences, and the VPPPA regional conference in Portland. We plan to administer this survey at conferences in all four states in our region, and we will adapt a version of it for the Northwest Occupational Health Conference which has a largely health professional audience.

We are reconstituting the HST advisory committee to improve our connections with potential audiences for our courses. With the expansion of our department's continuing education program as part of the NIEHS Western Region University Consortium (WRUC), we now have multiple overlapping audiences for HST and Hazwoper-related training. Two of the major constituencies in our WRUC program are Native American tribes and port workers. In re-forming the HST advisory committee we are reaching out to these multiple constituencies to get a better understanding of how our courses fit with other offerings in the region. This is especially important as Homeland Security funding has changed the landscape of emergency response training. Among the organizations currently represented on the advisory committee are US Coast Guard, WA Division of Occupational Safety and Health (DOSH), WA Department of Ecology, US EPA, and FEMA. We are reaching out to the Tribal Solid Waste Advisory Network (TSWAN) to better understand needs of the Native communities in the region.

Program Products
R2P Activities
The Composite Hazards course is a model of translating current research on a growing technology into practical application for prevention of worker exposure. The HST program also sponsored the AIHA webinar on nanotechnology in which cutting edge information about measurement of nanoparticle exposures was presented.

Future Plans: July 2007 – June 2008
We will offer eight hazardous waste refresher courses and will again present the CHMM national overview course. A respiratory protection course is scheduled for December, and we anticipate additional contract courses on hazardous substances. The reconstituted HST Advisory Committee will meet in October to plan future hazardous materials incident response courses.

HAZARDOUS SUBSTANCE ACADEMIC TRAINING

Program Director: John Kissel

Program Highlights: July 1, 2006 to June 30, 2007

- One HSAT supported trainee was awarded the MS degree during the reporting period.
- An oral presentation on which an HSAT trainee was first author, and a poster on which he was a co-author, were presented at the annual meeting of the Society for Risk Analysis in Baltimore in December 2006.
- Three posters authored or co-authored by two former HSAT supported trainees were presented at the annual meeting of the International Society of Exposure Analysis in Paris in September 2006.
- HSAT Program Director John Kissel served on the organizing committee of the NIOSH sponsored meeting Occupational and Environmental Exposures of Skin to Chemicals-2007, in Golden, CO in June 2007.
- A poster on which a former HSAT supported trainee was co-author was presented at that meeting and was also accepted for presentation at the annual meeting of the International Society of Exposure Analysis in Research Triangle Park, NC in October 2007.
- A paper on which a former HSAT supported trainee is first author was submitted for publication (and has since been accepted pending revision). A book chapter on which that same trainee is a co-author was submitted (and is now in press).

Program Description

Goals and Objectives

In accordance with statutory mandate, HSAT training is intended to prepare professional personnel to properly supervise and/or participate in hazardous substance response and site remediation activities. The overall goal is protection of the workforce engaged in such tasks. That goal is accomplished through delivery of specialized academic training to safety and health professionals to prepare them for practice.

Faculty Participation

Core faculty, including John Kissel, Richard Fenske, David Kalman, Scott Meschke, Michael Morgan, Gwy-Am Shin, and Michael Yost, instructed in required or elective courses in the MS curriculum. Drs. Kissel, Meschke, Shin and contributing faculty member Dr. Faustman supervised HSAT-funded MS candidates in the conduct of their Master's research project during the reporting period. Dr. Marilyn Roberts was added to the program faculty at the rank of Professor.

Curriculum

One small change was made in the HSAT curriculum. ENVH 543 Microbial Risk Assessment was adopted as an acceptable substitute for ENVH 584 Occupational Health Policy or ENVH 577 Risk Assessment of Environmental Health Hazards due to the relevance of ENVH 543 to hazardous substance training and the fact that ENVH 584 is not offered every year.

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included lectures on four mandated topics: publication practices and responsible authorship, human subjects, mentor/trainee relationships, and research conduct. 464 student trainees from across the UW campus participated in the series. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at UW-affiliated libraries throughout the year. These lectures cover additional PHS topics relevant to scientific research ethics such as: data collection; data management and ownership; and conflict of interest.

Program Activities and Accomplishments

Discussion of Progress

One student previously supported under the HSAT program was awarded the MS degree in the reporting period and has found employment with a consulting firm. Two other students finished MS degrees in the reporting period. One of those is currently serving in a post-graduate fellowship at US EPA. The other is on pregnancy leave. Two first year MS students are receiving ERC support for the 2007-08 academic year. Their graduations are anticipated in June 2009. Two second year MS students who received HSAT support in their first year, and two who did not, are expected to graduate in June 2008. One student who enrolled in fall of 2005 and received HSAT support is expected to graduate in Fall 2007. Enrollment is steady at two ERC funded HSAT students (two first year or one first and one second year student) per year, producing one to three HSAT funded MS graduates per year.

A plan for delivery of HAZWOPER 40 hour training to more students (whether or not ERC funded) was initiated in spring 2006. Past trainees obtained certification via outside commercial programs. Because of the cost, training was limited to formally supported HSAT students. Under the new scheme, eight hours of supplemental training covering respirator fit testing and other hands-on activities are delivered by an experienced trainer to a subset of enrollees in EnvH 446 Hazardous Waste Management. Students satisfactorily completing that activity and receiving B or better grades in EnvH 446, EnvH 453 Industrial Hygiene, and EnvH 405 Toxic Chemicals and Human Health are eligible for HAZWOPER certification. Four students received HAZWOPER certifications in the first year of this program as opposed to the typical two in prior years. Six students, including both HSAT supported trainees, received certification in 2006-2007.

Trainee Recruitment

HSAT trainees are recruited from the larger pool of persons enrolled in eligible MS curricula based on orientation and likelihood of relevant subsequent employment. The eligible pool is always larger than the number of students for whom funds are available. At the UW, students receiving HSAT support typically receive support for three of seven quarters required to complete the MS. HSAT funds are leveraged in that students are supported from other sources during the remaining four quarters.

Program Products

Program faculty authored or co-authored 34 publications, listed elsewhere in this report, during the reporting period. HSAT supported trainees (underlined) authored or co-authored the presentations listed below:

Smith JA, Kissel JC, Shirai JH. Balancing Input and Output of Chlorpyrifos and TCPy in the CTEPP Children. (oral presentation) Annual meeting of the SRA, Baltimore, MD; December 2006.

Shirai JH, Spalt EW, Kissel JC. *In Vitro* Dermal Absorption of DEET from Soil. (poster) Joint annual meeting of ISEA and ISEE, Paris; September 2006.

Smith JA, Kissel JC, Shirai JH. Markov-Chain Monte Carlo Estimation of Permeability Coefficients from *In Vivo* Human Exposure to Aqueous Chloroform. (poster) Joint annual meeting of ISEA and ISEE, Paris; September 2006.

Smith JA, Kissel JC, Shirai JH. Estimation of Children's Exposures via Poorly Characterized Pathways Using CTEPP Data (poster) Joint annual meeting of ISEA and ISEE, Paris; September 2006.

Meschke JS, Kissel JC, Beck NK, Shirai JH, Smith JA. Assessment of norovirus exposure from consumption of Puget Sound shellfish impacted by large vessel wastewater discharges. (poster) Annual meeting of the SRA, Baltimore, MD; December 2006.

Student Research

The following EH MS students produced a thesis and graduated within the reporting period.

Student (preceptor)	Thesis or Dissertation Title
Joseph Smith III* (Kissel)	Reconciliation of Aggregate Probabilistic Exposure Model Predictions with Observed Biomarkers: A Case Study Using Data from the CTEPP Child Cohorts
Yolanda Sanchez (Kieffer)	Temporal Patterns of Asthma Hospitalizations in the Yakima Valley Community of Washington
Lisa Tolbert (Fenske)	Ambient Concentrations of Organophosphorus Pesticides Caused by Volatilization During Seasonal Application

*HSAT supported

Future Plans: July 2007 - June 2008

We have recruited a strong class of four new students (3 MS, 1 PhD) entering Autumn, 2007 into the Environmental Health program. Two of the MS students will be supported by the HSAT program and at least those two will follow the HSAT curriculum. No significant changes in curriculum are planned, and the 8-hour HAZWOPER add-on to ENVH 446 will be offered again Winter, 2008.

Research accomplishments of current and past students will continue to be presented. A poster co-authored by an HSAT supported trainee will be presented at the annual meeting of ISEA in NC in October, 2007. A paper and a book chapter on which an HSAT supported trainee is first author and co-author, respectively, are expected to be published in the next year. Several other manuscripts from past HSAT students are in preparation and should be submitted in the coming year.

CONTINUING EDUCATION AND OUTREACH

Program Director: Steven Hecker

Program Highlights: July 1, 2006 to June 30, 2007

- Sixty-one courses serving 2,158 trainees were delivered. About 61% of the trainees have taken online training.
- The 12th Conference on Hazards to Healthcare Workers drew an international assembly of 35 speakers and 118 attendees. The University of British Columbia again cosponsored the conference, and numerous Canadians attended as presenters and participants.
- Occupational Medicine Grand Rounds brought nationally recognized speakers for a series of six seminars on a variety of current topics in occupational safety and health. Most of the presenters also participated in departmental seminars and other University Medical Grand Rounds programs.
- Several courses and conferences pursued themes of emergency preparedness and response to natural and man-made disasters, including a course on Occupational Health Practitioners and a Global Flu Pandemic.
- Our main ergonomics offering this year addressed the upstream design of facilities to improve human factors and minimize ergonomic risks. The one-day workshop was offered on consecutive days to accommodate the demand.
- CE is collaborating in a major curriculum development effort in the area of Designing the Age-Friendly Workplace.
- Steven Hecker assumed full-time directorship of the CE program in September 2006. Mr. Hecker had a long career in occupational health and safety training and research at the University of Oregon and knows the NW Center program well both as an advisory board member and an instructor in CE programs.
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Program Description

Goals and Objectives

The overall mission of the CE/O program is to provide Region X with innovative, high quality continuing education and training for all disciplines of occupational health and safety practitioners, employers, and employees. Specific objectives of the CE/O program remain unchanged and are to:

- Make topical training available in a variety of formats accessible to multiple audiences,
- Translate current research into usable information for practitioners and workplaces,
- Provide forums for exchange of experience and expertise among practitioners, workers, and employers,
- Satisfy current needs of our constituents while introducing cutting edge issues and seeking to reach underserved populations,
- Continuously improve pedagogy and curriculum of courses.

Faculty Participation

The 2006-2007 program faculty again included leading local, regional, national, and international occupational safety and health experts balanced among academic researchers, clinicians, and OHS practitioners. Notable visiting presenters included: Lee Newman, MD, University of Colorado at Denver (*Lessons in 'Solving' Outbreaks 2/1),* David Prezant, MD, Albert Einstein College of Medicine (*Respiratory and Mental Health Consequences of WTC Exposure, 3/22)*; Reynolds Holding, Executive Editor, *Legal Affairs Magazine*, Pulitzer Prize Finalist for his stories on unsafe medical needles (Health Care Hazards conference, 9/13); Shanna H. Swan, PhD, University of Rochester (*New Environmental Challenges to Reproductive Health, 4/12)*; Gregory Belenky, MD, Washington State University, and Gary Greenberg, MD, U. of North Carolina (*Pandemic Flu, 10/25*) Northwest Center course directors this year were Rick Gleason (IH/safety), Mary Salazar (OHN), Kate Stewart (CE), Noah Seixas (IH), Dennis Shusterman (OEM), Jordan Firestone (OEM), and Janice Camp (IH). Center faculty who participated as instructors included Peter Johnson (IH/ergonomics), William Daniell (OEM), Dennis Shusterman (OEM), Joel Kaufman (OEM), Sverre Vedal (OEM), Stephen Hunt (OEM), and Rick Neitzel (IH). Other University of Washington faculty for CE courses included Randal Beaton, PhD, School of Nursing; Jay Herzmark, CIH, Environmental Health and Safety; and Barbara Silverstein, PhD, Washington Dept. of Labor & Industry (adjunct, DEOHS).

NW Center faculty were very involved in local, state, and regional outreach efforts as detailed below in the Outreach section.

Program Activities and Accomplishments

1. Discussion of Progress

Steven Hecker assumed full-time directorship of CE in September 2006. Mr. Hecker has 25 years' experience in worker and professional training and education and has a special interest in worker-centered education and training evaluation.

CE programs were conducted in Washington, Oregon, and Alaska, and each program discipline was well-represented in CE courses this year.

New Courses:
Three completely new courses were offered:

- *Managing Stress in First Responders,* 9/26, held in conjunction with the Washington State Governor's Industrial Health and Safety Conference, spoke to a large audience whose work involves stressful events and environments on health effects and management strategies.
- *Occupational Health Practitioners and a Global Flu Pandemic* was presented as part of the NW Occupational Health Conference, October 25-27.
- *Ergonomic Quality in Facility Design*, a course developed by the University of British Columbia and offered in collaboration with UBC, 4/10 and 4/11. Taught by ergonomist Judy Village, this hands-on course brought together architects, engineers, facilities planners, healthcare professionals, safety professionals, as well as industrial hygienists and ergonomists.

The NW Center served as cosponsor for a fourth new course organized by CROET in Portland on Protecting Vulnerable Workers: Safety at Work in Informal and Nontraditional Settings. We will offer our own version of this conference for Washington during the coming year.

Other CE courses by discipline were:

Occupational Health Nursing:
OHN took the lead for the 12th iteration of the conference on *Occupational Hazards to Health Care Workers: Narrowing the Knowledge and Action Gaps*, September 13-14, 2006. Cosponsored by the UBC School of Occupational & Environmental Hygiene, we hosted 35 speakers, many from the US and Canada, but also from as far away as Iran, Korea and Vietnam. Highlighted course topics included violence in the health-care workplace, needle sticks, emergencies/disaster response, and ergonomics.

Occupational Medicine:
Occupational Allergy was presented in joint sponsorship with the American Academy of Allergy, Asthma and Immunology (AAAAI). Numerous UW OEM faculty participated as did Susan M. Tarlo, MD of the University of Toronto.

OEM also presented its fifth season of Grand Rounds including the following topics and presenters:

- 10/19, *Computer related musculoskeletal disorders: the roles of medicine, engineering and biology,* Peter W. Johnson, PhD
- 11/9, *Mental Health Considerations in Occupational/Environmental Medicine,* Stephen C. Hunt, MD MPH
- 2/1, *Medical Clues and Serendipity: Lessons in 'Solving' Outbreaks,* Lee S. Newman, MD, FACOEM
- 3/22, *Respiratory and Mental Health Consequences of WTC Exposure,* David J. Prezant, MD, FCCP

- 4/12, *New Environmental Challenges to Reproductive Health,* Shanna H. Swan, PhD
- 5/10, *Implementing Safe Patient Lifting Legislation in Washington Hospitals,* Barbara Silverstein, RN, PhD.

Industrial Hygiene/Safety/Ergonomics:

- *Current Solutions to Workplace Noise Hazards*, 5/15, presented in collaboration with the National Hearing Conservation Association, provided updates on regulations, control solutions, protector performance, and strategies on motivating workers to use hearing protection.
- *Third Party Liability in Worksite Safety and Health* was held in Seattle February 28 with faculty drawn from construction attorneys, construction contractors, safety professionals, owner representatives, and regulatory agencies

The NW Center is encouraging course directors to structure their courses to include more participatory learning methods. This was in evidence in the Ergonomics of Facility Design course this year and is incorporated in planning for the Safety and Health Training, Vulnerable Workers, and Safe Patient Handling courses for 2007-08.

2. Needs Assessment/Trainee Recruitment

The NW Center launched new marketing and needs assessment efforts this year as well as building on existing practices. We exhibited as usual at the Oregon and Washington Governor's Safety and Health conferences, but we added two of Oregon OSHA's regional conferences and the Voluntary Protection Program Association (VPPPA) regional conference in Portland to our circuit. We also initiated, in collaboration with the Occupational Health Psychology TPG at Portland State University and the Center for Research on Occupational and Environmental Toxicology, a needs assessment survey that we distributed at the Oregon GOSH conference, regional conferences, and the VPPPA conference. Results from about 300 retuned surveys indicate some demand for OHS degree programs in the Portland area but the strongest demand for certificate type programs based on a series of related courses. We plan to administer this survey at conferences in all four states in our region, and we will adapt a version of it for the Northwest Occupational Health Conference which has a largely health professional audience.

We have also launched more targeted and comprehensive marketing efforts for Northwest Center courses. Our department operates three continuing education programs including the NW Center, and we have added a staff person with marketing expertise. We did a major revision of our annual catalog for 2006-2007 and have received many compliments on its appearance and readability. This will be augmented with the launch of a completely rebuilt website later in 2007. We are now establishing marketing plans for each NW Center course and staging our efforts beginning four months before the course.

Program Products

An exciting project that has developed during this year is curriculum development for a hands-on workshop on "Designing an Age-Friendly Workplace." The project is led by Dr. Michael Silverstein, Clinical Professor of Occupational Medicine, and involves Steven Hecker and Kate Stewart from CE and several ergonomics and industrial hygiene staff from the Washington Department of Labor & Industries. The project grew out of a 2005 CE course on the impact of aging and obesity on workplace safety and health. We have produced a draft 9-module curriculum to be used in workshops with teams from private and public sector organizations that wish to deal with the changing demographics of their workforces. The modules were developed in consultation with a user group including management, labor, and safety and health representatives from manufacturing, transportation, construction, and government organizations, and we have begun to pilot test modules with different audiences. Pilot testing will continue through the end of calendar year 2007, after which the workshops will be offered through the NW Center. Interest has been very high at safety and health conferences where this topic has been presented. This project has a major R2P component as a central objective of the curriculum and workshop is translating research in a number of disciplines- human resource

management, ergonomics, human performance, industrial psychology, among others- into practical programs for employers, employees, and labor organizations.

Online versions of several Grand Rounds presentations were produced and are available for viewing through the DEOHS website. http://depts.washington.edu/envhlth.

Outreach Activity
Presentations/Lectures/Awareness Seminars

- Six faculty and staff presented at the Northwest Occupational Health Conference in Wenatchee WA in October.
- Ten center faculty from IH, OEM, and Health Services participated in the annual UW/UBC Occupational and Environmental Health conference at Semiahmoo, WA.
- Dr. Butch de Castro, new director of the NW Center Occupational Health Nursing program, presented nine workshops on the new Washington safe patient handling legislation for frontline staff nurses, nurse managers, and nurse educators around the state in collaboration with the Washington State Nurses Association.
- Dr. de Castro and clinical instructor Annie Bruck presented a nurse and patient safety workshop at the WSNA annual convention
- Several nursing faculty and students presented at the American Association for Occupational Health Nursing Conference: Suzette Bramwell on Flu-Vaccine Programs for Healthcare Workers; Linda Wheadon on Safe Patient Handling; Dr. de Castro on Scientific Foundations and Trends of Occupational and Environmental Health Nursing; Ms. Bruck on Pediatric Environmental Health; and Dr. Salazar on Occupational Health Nursing in Thailand.
- CE director Steven Hecker presented a workshop on Participatory Ergonomics at the Oregon Governor's Occupational Health and Safety conference (Portland, 3/07), and participated in a panel at the Puget Sound Human Factors and Ergonomics annual conference (Seattle, 9/07)
- Mr. Hecker served on the planning committee and facilitated workshops at the Vulnerable Workers Safety and Health conference sponsored by the Center for Research on Occupational and Environmental Toxicology (CROET) at Oregon Health and Science University (Portland, 6/07).
- Hecker organized and moderated a panel at the American Public Health Association on The Future of OSHA (11/06). Michael Silverstein of OEM was the primary presenter on this panel.
- Hecker served on the planning committee and helped facilitate the Next Generation Construction Safety conference (NexGen) that took place in Nov. 2006 in Portland, jointly sponsored by the Greater Portland Construction Partnership and Oregon OSHA among others.
- Rick Gleason presented a professional development course on Safety Fundamentals at the American Industrial Hygiene Conference and Exposition in June 2007.
- Mr. Gleason spoke at the School to Work program and presented a session on Accident and Injury Costs for Small Businesses at the Washington Governor's Safety and Health Conference in Spokane, September 2006.
- Mr. Gleason presented talks on safety and injury prevention to the Master Builders of King and Snohomish Counties (June 2007), the Utility Contractors of Washington (March 2007), and the Road and Street Maintenance Hazards Supervisor Conference (October 2006)/
- Industrial hygienists Janice Camp, Venetia Runnion, and Maryellen Flanagan conducted two basic industrial hygiene training workshops for TOC (formerly Timber Operators Council) in Everett and Tacoma.
- Noah Seixas collaborated with faculty from the Great Lakes ERC in organizing and presenting a panel on health and safety of day laborers and other vulnerable populations at AIHCE (6/07)
- Sverre Vedal (OEM) gave presentations on air pollution and health to the Annual Air Quality and Health Conference in Vancouver, BC, to the Center for Environmental Health Studies, University of Montana
- Gary Franklin (OEM) made presentations on:
    - Workers' Compensation Reform, New York State Workers' Compensation Board and Insurance

Department (June 2007)
  - Evidence-Based Decisions in Workers' Compensation Health Care, WorkSafeBC 2007 Health Care Provider Conference, Whistler, BC (May 2007)
- Katherine Karr (OEM) presented on asthma to the Pediatric Environmental Health and Safety tribal summit in Denver
- John Kissel (HSAT) helped organize the NIOSH-sponsored Occupational and Environmental Exposures of Skin to Chemicals-2007 meeting, in Golden, CO in June.

Consultations
- John Kissel advised 1) a Washington Department of Ecology employee on the availability of dioxin from contaminated soil, 2) a Health Canada employee on the potential of "washing in" rather than washing off dermal contaminants, and 3) a US EPA employee on interpretation of published work describing dermal absorption of benzo[a]pyrene and DDT.
- Scott Meschke (HSAT) assisted an Idaho OSHA employee investigating a chlorine gas exposure to a truck driver at a dairy; advised infection control specialists at a hospital on hand sanitation; and worked with dairy farmers to reduce occupational exposures fecal bacteria.
- Steven Hecker served on an NIEHS Scientific Review Committee for the SBIR grant program on Advanced Training Technologies in Occupational Safety and Health.
- Mr. Hecker is a consultant to the University of Oregon project "Diffusing Ergonomic Interventions in Construction"
- Rick Gleason serves on the boards of a number of safety and health organizations, including the Evergreen Safety Council, the Puget Sound Safety Summit, and the Residential Construction Board of the Master Builders Association of King and Snohomish Counties.
- Liane Sheppard (OEM) was a member of the External Scientific Advisory Committee to FACES (Fresno Asthmatic Children's Environment Study), and the Environmental Lung Center External Scientific Advisory Committee at National Jewish Hospital.
- Dr. Sheppard is also a member of the EPA Clean Air Scientific Advisory Committee (CASAC) Ozone Review Panel and NOx and SOx Review

Future Plans: July 2007 – June 2008

Six one-day courses are scheduled along with six grand rounds presentations. Of particular note are a course on Safety and Health Training: What's New, What Works, What's Needed (9/25), a conference on safety and health in precarious employment (March or April), and Safe Patient Handling: Implementing Best Practices under the Washington State Law (April 30) in conjunction with the WA Safe Patient Handling Steering Committee. In addition we anticipate 4-6 Aging Workforce pilot workshops and another 4-6 workshops ranging from 4 hours to 2 days after the curriculum has been revised based on the pilots. A graduate student will conduct a formative and summative evaluation of the Aging Workforce curriculum as a thesis project. Recordings of several of the Grand Rounds presentations from 2006-07 and 2007-08 will be available for delivery via the Web.

NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY
IMPACT LIST: July 1, 2006 to June 30, 2007

Industrial Hygiene:

1) Diana Ceballos continues her research on the Puget Sound collision repair industry, which is a compound of numerous small shops, usually family owned, and with little or lacking environmental, health, and safety practices. Spray painters, in particular, are exposed to numerous hazards such as metals, solvents, and isocyanates. Isocyanates are found in paints and are associated with sensitization or allergy-like responses that usually develops as work-related asthma and can be life threatening. There is growing evidence that dermal exposure can trigger this sensitization response. In our field studies, in collaboration with the SHARP Program, we surveyed surface contamination in several shops and employee's protective gloves. We found that most of the contamination was found in the mixing rooms. Our recommendation was that shops should improve their mixing practices. We also found contamination in outer and inner surfaces of gloves. In some instances we found workers using gloves that were punctured even before use. It was rewarding to supply workers with better gloves and the workers were receptive. We also suggested frequent change of gloves to minimize skin exposures.

2) Last year a local aerospace supplier requested an evaluation of some composite material samples, which were to include a carbon nanotubes in the composite matrix. The material was not in a production process, but it was being used in pre-production settings. The question to be addressed was, "are nanotube particles released from the matrix when the material is sanded?" Dr. Michael Yost was asked to participate in the evaluation and help conduct controlled experiments to address this issue. The tests showed that nanoparticles could be released, and resulted in the company's health and safety office developing additional PPE requirements for people performing material testing.

3) Whole body vibration exposures are known to contribute to low back disorders, the number one workers compensation expenditure for King County Metro. We measured whole body vibration exposures in 15 king country bus drivers and in a subset of drivers driving a car over the same route. Our results demonstrated that whole body vibration exposures in busses are 4-fold the exposure in cars. In addition, with the exception of sharp impulses (rough roads, bumps and potholes) the air ride bus seats did not attenuate exposures but actually amplified the exposures. In addition, King County Metro was interested in evaluating a new silicone foam in their bus seat which has an estimated life of 10 years. The average life of the foam in a bus seat is 6 months before it starts to fail and need to be replaced. We measured whole body vibration exposures in 15 King Country bus drivers using a new bus seat with standard foam and again the same seat with the new, long lasting silicone foam. The results demonstrated that the seat covered with the new silicone foam actually attenuated vibration exposures better than the current foam seats. The end result is King County now has information that the new silicone foam seats will not only reduce costs, but also reduce exposures to whole body vibration.

4) Logitech, a large manufacturer of computer hardware accessories, was interested in evaluating a new ergonomic keyboard designed to improve posture and comfort. Using 18 experienced typists, Dr. Peter Johnson and his students evaluated the new Logitech Wave keyboard against the standard, straight keyboard that is shipped with most computers. The results demonstrated that, relative to the standard keyboard, the new Logitech keyboard design improved posture and comfort. With these findings, Logitech went forward with the production and launched the new ergonomic keyboard in August of 2007.

5) Hewlett-Packard, the world's second largest PC seller, was interested in evaluating a new mouse specifically designed for laptops, called the Card Mouse. Unlike a typical laptop mouse which takes up

space and has to be stored in your briefcase, the cordless card mouse could be stored out of the way in the PC card slot of the laptop. HP wanted to determine if the card mouse could perform as well as a conventional mouse and whether it adversely altered muscle load and/or wrist posture. Dr. Peter Johnson, with help from his staff and students, Used 20 experienced laptop users to evaluate the card mouse against a standard conventional laptop mouse and the touchpad which is standard on most laptops. The results demonstrated that the card mouse had no adverse affect on muscle load and wrist posture, approached the performance of a standard laptop mouse and exceeded the performance of a touchpad. With these findings, Hewlett-Pack went forward with the production and launched the card mouse in September 2006.

6) Microsoft, a large manufacturer of computer hardware accessories, was interested in identifying and evaluating a new concept mouse to improve forearm and wrist posture. Unlike the typical mouse, which lies flat on the work surface, the concept mouse was more rounded and twisted up in order to meet and accommodate the hand. Microsoft had three prototypes and wanted to determine which one was most favorable design. Using 12 experienced mouse users, we evaluated the three prototype mice against a standard conventional mouse. The results clearly identified one prototype that was perceived as most comfortable, improved wrist and forearm posture, and could be operated with the same proficiency as a standard mouse. With these findings, Microsoft went forward with the production and launched the Microsoft Natural Mouse in November 2006.

7) Building on the results of a survey of health and safety needs of day laborers in Seattle, Dr. Noah Seixas and a masters student delivered a series of three training programs for day laborers. The initial survey was conducted with the use of NORA funds from the NWCOHS, and the training pilots were supported through funds from the Harry Bridges Labor Research Center at the University of Washington. Three training sessions were developed after conducting focus groups. The sessions addressed some of the primary hazards faced by day laborers; falls from heights, ergonomic stress (especially lifting), and proper use of PPE. The sessions also addressed the rights of workers to a safe workplace and worker's compensation. We experimented with single language, and multi-lingual formats for the sessions. On the basis of this work, additional funding was secured to continue and expand our work with precarious employment health and safety.

8) As part of a NIOSH funded intervention research grant, Dr. Noah Seixas and his students delivered training on hearing conservation to four construction worksites. Changes in behavior concerning hearing protection use was measured before and after training and preliminary results suggest a small increase in use among the workers receiving training.

9) Ryan Blood has been working to implement a number of things that he learned through coursework in his first year at UW in the IH program.

   In Alaska working in the oil industry, the work environment is already very focused on safety. The group he works with has the following rankings when it comes to project work.

   1. Safety
   2. Quality
   3. Budget
   4. Schedule

   The idea with this ranking is that no one should be pushed to a work pace that compromises worker safety. However, in this dangerous industry much of the focus for safety has been on hazard communication, and relying on the individual to make safe decisions when it comes to protecting themselves from hazards in the work environment. This, combined with the use of personal protective equipment, is the approach that has been used to make the workplace safer. He has been working to

influence managers to look at PPE and behavioral decisions, the last line of defense when it comes to safety. Specifically they have re-examined their benzene exposure program to focus more on proper ventilation (engineering control) and pre-job planning (administrative control), and less on putting their workers in respirators with organic vapor cartridges (personal protective equipment control). Put another way, if there is any way possible to reduce the release of hydrocarbons associated with maintenance operations, they are focusing on keeping the human factor out of the exposure risk. We know that respirators are uncomfortable and it is easy for workers to wear them improperly even with a recent fit test. The technical industrial hygiene, epidemiology, and safety courses at the UW have equipped him with tools to help make the already safety conscious oil industry an even safer place to work.

10) *Workplace Determinants of Take-Home Pesticide Exposure*
PI: Richard Fenske, Students: Chris Bellow, MS 2006 and Jannette Kibogy, MS Student
This series of field-based studies has confirmed that agricultural pesticides are moving from the workplace to workers' homes and that commuter vehicles play a role in this transmission. A major finding of the intervention development and evaluation is that vacuuming personal vehicles significantly reduces pesticide residues found in workers' homes. PNASH is promoting the practice of vehicle vacuuming and is working with Northwest growers, pesticide applicators and safety educators to develop practical and effective workplace interventions to interrupt the take-home pathway**.**

11) *Fluorescent Tracer Component for Hands-on Pesticide Handler Training*
PI: Richard Fenske, Students: Mac Rainey, MPH 2006 and Sinang Lee, MPH 2006
We are improving education for pesticide handlers through a new hands-on training program and manual, *Fluorescent Tracer Manual: An Educational Tool for Pesticide Educators*. Pesticide handlers immediately see potential pesticide contamination by viewing results of proper and improper handling techniques. The training was developed and evaluated in collaboration with pesticide safety educators from the Washington State Department of Agriculture and the WSU Agricultural Extension Service. This project transfers to pesticide educators and employers a proven tool for the self-assessment of pesticide exposure, and integrates the technique into existing hands-on pesticide handler training programs. For a copy of Fluorescent Tracer Manual: An Educational Tool for Pesticide Educators, visit: depts.washington.edu/pnash

Occupational Health Nursing:

1) Dr. de Castro provided workshops for professional practicing nurses (including frontline staff nurses, nurse administrators/managers, and nurse educators) focused on occupational health and safety of healthcare workers. More specifically, he assisted in organizing and presenting nine workshops across Washington state (April and May 2007) on the state's newly passed Safe Patient Handling Law with the focus on preventing musculoskeletal injuries among healthcare workers performing patient handling tasks. Workshops were coordinated through the Washington State Nurses Association (WSNA) and had the goal of educating both frontline and manager-level nurses on implementation of this state law. Additionally, Dr. de Castro and Ms. Bruck provided workshops titled, "Ensuring workplace safety for nurses and patients" (May 2007) at the WSNA Annual Convention which included exercises such as Risk and Hazard Mapping.

2) Linda Wheadon (graduated MN student), as her thesis project, conducted focus groups among nurses in Washington state to examine perceptions about facilitators and barriers to the use of safe patient handling equipment. Last year, Washington state passed the first state-law in the U.S. requiring hospitals to implement safe patient handling programs, including the use of mechanized lifting equipment. Findings from this project will assist hospitals to better understand frontline nurse reaction and more effectively purchase and implement patient lifting equipment as they move towards compliance with this state law.

3) Suzette Bramwell (graduated MN student) and Suzanne Lobaton (continuing MN student) developed and implemented a facility-wide flu vaccine program for Seattle's Children's Hospital. Suzette Bramwell also helped to develop a Pandemic flu website for the UW Office of Emergency Management. These programs included a detailed assessment of past programs, current institutional needs and CDC recommendations, development of staff training programs and procedures, management and oversight of program development, implementation, and evaluation.

4) Ms. Bruck and Dr. Randal Beaton are both actively involved in improving emergency preparedness in work settings. In providing direct clinic services to UW employee health services, Ms. Bruck has focused on infectious disease prevention and updating/modifying procedures aimed at improving preparedness and response in the workplace. Dr. Beaton serves on UW's emergency management planning committee and is principal investigator of a disaster behavioral health training program for Washington state. He has participated in several mock drills intended to evaluate and improve emergency preparedness in the state. Dr. Beaton was also asked to serve as a member of the Antiviral Prioritization Task Force this past year and also serves as the Disaster Mental Health Content expert on the Washington State Public Health Emergency Preparedness Workgroup. Dr. Beaton has recently been selected to serve as an evaluator/controller for the upcoming TopOff 4 Exercise in Portland, Oregon. These combined efforts contribute to ensuring that workplace perspectives and occupational health issues are appropriately considered in the context of emergency preparedness.

5) Allyson Ochsner and Tamsin Sarich (graduated MN students) participated in the Pacific Northwest Agricultural Safety and Health Center's (PNASH) "Pesticide Effects: Curricula Integration Project grant. They worked directly with faculty Ms. Helen Murphy, PNASH Outreach Director, Ms. Annie Bruck, Dr. Patricia Butterfield, and Dr. Mary Salazar to develop pesticide modules and case studies for insertion into undergraduate and graduate nursing training programs. Suzette Bramwell (graduated MN student) took primary responsibility, working on a project led by Dr. Butterfield and Ms. Bruck, to develop and launch a web-based cyber-active scientific research archive. This archive is intended to promote access to and understanding occupational and environmental health issues for professional nurses. Beth Tinker (graduated MN student) was a collaborative member and research assistant to Dr. Butterfield for the Environmental Risk Reduction through Nursing Intervention and Education project. She conducted an assessment of the educational needs of practicing public health nurses relative to understanding occupational and environmental health issues impacting the communities they serve. Julie Postma (graduated PhD student) was a collaborator on the El Proyecto Bienstar project, a community based research project, directed by Drs. Matt Kiefer, School of Public Health and Community Medicine, and Mary Salazar, that investigated the prevention of occupational exposures among primarily Hispanic agricultural workers in eastern Washington state.

Occupational and Environmental Medicine

1) *Communication of Pesticide Health Risks for Children of Agricultural Families*
PI: Catherine Karr, Student, Michelle Sommergren, MPH 2007
Through educational courses and workshops, we are providing health care professionals with current scientific information regarding neurodevelopmental health risks for children with exposure to Organophosphate pesticides. This information is needed to understand the known, and sometimes uncertain, health risks to their pediatric patients. Based on our audience research, PNASH is developing educational formats that meet health care professionals need for current scientific information. PNASH aided in the formation of the Northwest Community Health Worker Network and provided these critical health care providers both pesticide training and tailored educational materials. For nurses, physician assistants and physicians the resulting educational format is the web-based CME course, Organophosphate Pesticides and Child Health: A Primer for Health Care Providers, depts.washington.edu/pehsu/pesticide/.

2) *El Proyecto Bienestar*
PI: Matthew Keifer, Students: Julie Postma, PhD Candidate, Rebecca Alvarado-Martin, MPH 2007, Yolanda Sanchez, MS 2007, Joyce Tseng, MPH 2007, Elizabeth Hom, MPH 2006, Jennifer Crowe MPH 2005, Jon Hofmann MPH 2004
El Proyecto Bienestar (The Well Being Project), is a community-based participatory research project that has successfully built the capacity of the Hispanic community in the Yakima Valley to assess community health concerns, understand the scientific process, and begin a coordinated response to these concerns. The project has an informed community advisory board that includes 13 different constituencies who guide the project, and annual community surveys. Along with the University of Washington (UW), three partners serve as catalysts, educators, and resources for the community: Northwest Communities Education Center/Radio KDNA, Heritage College, and the Yakima Valley Farm workers Clinic/Northwest Community Action Center. El Proyecto Bienestar also joined forces with ConneX, a program for economically or educationally disadvantaged students from the Yakima Valley who are interested in pursuing health careers. Community identified concerns include pesticide-related issues, respiratory-related issues (especially asthma), pollution, and work-related issues such as ergonomics, heat stress, injuries from ladder falls, and machine-related injuries. The UW PNASH Center is working to address research concerns and continues as an active partner, but the leadership of El Proyecto Bienstar is now under the community organization, Northwest Communities Education Center/Radio KDNA

Health Services Research Training:

1) Jeanne Sears, a trainee, completed her dissertation in June 2007. Her dissertation work, in part, led to her being awarded the Gilbert S. Ommen Award for Academic Excellence. This is a prestigious school-wide award. Jeanne was the first ERC trainee in any of the programs to receive the award. Her dissertation research led directly to the passage of a Washington State law renewing a program designed to improve access to care for injured workers by broadening the scope of practice of advanced registered nurse practitioners.

2) Thomas Wickizer has continued his research involving a major demonstration program designed to improve the quality of health care provided through the state workers' compensation program. Known as the Occupational Health Services (OHS) project, this intervention has received wide attention within Washington State, including the Governor's Office, and outside Washington State. Findings of Dr. Wickizer's research indicate that the average patient receiving health care through the intervention had 7 less days of disability (lost work time) compared to patients receiving traditional care through the workers' compensation system. On average, claims of workers treated through the intervention was $400 to $600 less than similar claims of workers treated in the traditional manner.

NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

Table of Contents - Program Curricula

Industrial Hygiene
Master of Science, Industrial Hygiene
Program Curriculum and Course Requirements

MS Industrial Hygiene students are required to complete the MS core courses, the Industrial Hygiene required courses, and 12 credits from the Industrial Hygiene representative electives.

Master of Science Core Courses

Course #	Credits	Quarter	Course Title
ENVH 580	1,1,1	A, W, Sp	Environmental Health Seminar
ENVH 581	1	A	Environmental Health Reading I
ENVH 583	1	Sp	Environmental Health Reading III
ENVH 700	9	A, W, Sp, S	Master's Thesis
BIOST 511 OR BIOST 517 or higher*	4 4	A, S A	Medical Biometry I Biostatistics I
EPI 511*	4	A	Introduction to Epidemiology

*Higher level Biostatistics and Epidemiology courses can be substituted for BIOST 511 or 517, and EPI 511.

Industrial Hygiene Required Courses

Course #	Credits	Quarter	Course Title
ENVH 405	3	Sp	Toxic Chemicals in the Environment
ENVH 553	3	W	Instrumental Methods for IH Measurement (Lecture)
ENVH 555	3	Sp	Instrumental Methods for IH Measurement (Lab)
ENVH 557	4	W	Workplace Exposure Controls
ENVH 560	4	A	Organizing and Administering Industrial Safety & Health Programs
ENVH 564	4	A	Recognition of Health and Safety Problems in Industry
BIOST 512 OR BIOST 518 or higher	4	W	Medical Biometry II Applied Biostatistics II
ENVH 552 OR ENVH 570	3 3	W Sp	Environmental Chemistry of Pollution Occupational and Environmental Epidemiology

Industrial Hygiene Electives

Course #	Credits	Quarter	Course Title
ENVH 417	2	W (odd yrs)	Nonionizing Radiation and Electrical Safety
ENVH 446	3	W	Hazardous Waste Management
ENVH 457	3	Sp	Industrial and Environmental Noise
ENVH 556	3	W	Quantitative Occupational Exposure Analysis
ENVH 559	3	Sp	Applied Industrial Hygiene
ENVH 562	3	W	Technical Aspects of Safety and Health
ENVH 566	3	W	Introduction to Ergonomics
ENVH 584	3	Sp	Occupational Health and Safety: Policy and Politics
ENVH 596	2	W*	Current Issues in Occupational Medicine

*Although ENVH 596 is also offered Autumn and Spring quarters, IH students are directed to take it during winter quarter when IH content is covered.

Doctor of Philosophy, Environmental and Occupational Hygiene

Learning objectives
Upon satisfactory completion of the Doctor of Philosophy program in Environmental and Occupational Hygiene, students should be able to:

* Conceive, develop and conduct original research leading to significant advances in the knowledge of mechanisms of toxic action or in the assessment of risk deriving from exposure to toxicants

* Apply advanced methodology to research projects in environmental health and develop new research methods to address environmental or occupational problems

* Demonstrate written and oral skills by preparing papers and presentations for peer scientists and the community at large.

Program Curriculum and Course Requirements
PhD Environmental and Occupational Hygiene students are required to complete the PhD core courses, the Environmental and Occupational Hygiene Required courses, and twenty elective credits.

Doctor of Philosophy Core Courses

Requirement	Courses	Minimum Credits
Core Sciences[1]	Sequence of 3 in one area	11-12
Biostatistics	BIOST 512 or 518 or higher	3
Epidemiology	EPI 511 or higher	3
Env. Health Seminar	ENVH 580	6
Dissertation	ENVH 600/800	27
Lab Rotations[2]	ENVH 595	6-9

[1] Selection must be approved by preceptor. Environmental and Occupational Hygiene allows selection from one of the following: Chemistry, Engineering, Applied Mathematics, Biostatistics, Physiology, Biochemistry, or Epidemiology.
[2] Two rotations required with previous relevant Masters Degree, three otherwise.

Environmental and Occupational Hygiene Required Courses

Requirement	Courses	Minimum Credits
Industrial Hygiene	ENVH 553 and 555	6
Toxicology	ENVH 405 or more advanced	3
Environmental Chemistry	ENVH 552	3
Occup. Env. Epidemiology	ENVH 570	3
Electives*	Variable	20

* Ten elective credits are unspecified and ten must be in courses taught by Industrial Hygiene or Environmental Health program faculty.

Sample Plan of Study for the Industrial Hygiene Program
Industrial Hygiene Option

YEAR 1		**Credits**
Fall Quarter		
ENVH 564	Recognition of Health and Safety Problems in Industry	4
EPI 511	Intro to Epidemiology[1]	3-4
ENVH 581	Environmental Health Reading I	1
BIOST 517 or	Biostatistics	4
Electives		
Winter Quarter		
BIOST 518 or	Biostatistics II	4
ENVH 553	Instrumental Methods for IH Measurement (Lecture)	3
ENVH 557	Workplace Exposure Assessment	4
ENVH 596	Current Issues in Occupational Medicine	2
Spring Quarter		
ENVH 405	Toxic Chemicals in the Environment	3
ENV H 555	Instrumental Methods for IH Measurement (Lab)	3
ENVH 583	Environmental Health Reading III	1
Electives		
Summer	Internship with industry or a regulatory agency, or ENVH 700 Master's Thesis and Electives	

[1] Take BIOST 517 or 511 only if you are not qualified to take BIOST 518 or 512 (in the Winter). If taken, move EPI 511 to second year.
[2] Registration during the summer while serving as an intern in not required, and ordinarily academic credit is not awarded for the internship. In special cases, however, credit for the internship may be earned through ENVH 599A (Field Studies). Students supported by a research assistantship summer quarter must be registered for at least 2 credit hours. Students supported by stipends must be registered for at least 10 credit hours.

YEAR 2		Credits
Fall Quarter		
ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 560	Organizing and Administering Industrial Safety & Health Programs	4
EPI 511	Intro to Epidemiology[1]	3-4
Electives		
Winter Quarter		
ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 552	Environmental Chemistry of Pollution	3
Electives		
Spring Quarter		
ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 570	Occupational & Environmental Epidemiology	3
Electives		

[1] Take BIOST 517 or 511 only if you are not qualified to take BIOST 518 or 512 (in the Winter). If taken, move EPI 511 to second year.

OCCUPATIONAL HEALTH NURSING

Sample Plan of Study for the Occupational Health Nursing Program Administrator Option

YEAR 1		Cr
Fall (1st quarter)		
EPI 511	Introduction to Epidemiology	4
ENV H 564	Recognition of Health and Safety Problems in Industry	4
NURS 578	Social Determinants of Health	3
NCLIN 599	Independent Study Clinical Practicum	2
Winter (2nd quarter)		
NMETH 520	Scholarly Inquiry for Nursing Practice	4
NCLIN 554	Occupational Health Nursing: Practice Issues	3
ENVH 596/NURS 580	Current Issues in Occupational and Environmental Medicine	2
NCLIN 599	Independent Study Clinical Practicum	3
Spring (3rd quarter)		
ENVH 405	Toxic Chemicals in the Environment	3
NURS 576	Assessment and Collaboration with Communities and Systems	3
NCLIN 599	Independent Study Clinical Practicum	3
YEAR 2		
Fall (4th quarter)		
NCLIN 599	OHN Practicum	4
NMETH 598 or NMETH 700	Special (Scholarly) Project or Master's Thesis	2-3
Elective	Business Management of Cognate	6
Winter (5th quarter)		
NCLIN 558	Occupational Health Nursing: Program Development	3
ENVH 596/NURS 580	Current Issues in Occupational and Environmental Medicine	2
NMETH 598 or NMETH 700	Special (Scholarly) Project or Master's Thesis	2-3
NCLIN 599	OHN Practicum	3
Elective	Business Management of Cognate	3
Spring (6th quarter)		
ENVH 570	Occupational and Environmental Epidemiology	3
NMETH 598 or NMETH 700	Special (Scholarly) Project or Master's Thesis	2-3
NURS 523	Communities, Populations, & Systems: Theoretical Foundations	3
Elective	Business Management or Cognate	3

Sample Plan of Study for the Occupational Health Nursing Program
Nurse Practitioner Option

YEAR 1		**Cr**
Fall Qtr		
NCLIN 500/501	Health Assessment for Advanced Practice	6
NCLIN502	Pediatric Health Assessment and Promotion	2
NURS 551	Advanced Practice Role Development: Issues for Primary Care	2
NURS 552	Health Promotion	3
NCLIN 553	Seminar in Primary Care I: Health Promotion	2
Winter Qtr		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
NURS 518	Pediatric Primary Care Management	3
NMETH 520	Methods of Research in Nursing	4
NCLIN 556	Seminar in Primary Care II: Management of Common Health Concerns	3
NCLIN 558	Occupational Health Nursing: Program Development	3
NURS 580/ENVH 596	Current Issues in Occupational Health and Environmental Medicine	2
Spring Qtr		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
PHARM 514	Primary Care Pharmacotherapeutics (includes Peds.)	4
NCLIN 557	Seminar in Primary Care III: Management of Common Health Concerns	3
ENVH 405	Toxic Chemicals in the Environment	3
YEAR 2		**Cr**
Fall Qtr		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
NCLIN 559	Seminar in Primary Care IV: Management of Common Health Concerns	3 or 5
MEDEX 452	Pathophysiology for Primary Care	6
NURS 531 B	Special Topics: Pathophysiology	1
ENVH 564	Recognition of Health and Safety Problems in Industry	4
NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3
Winter Qtr		
NURS 573	Professional Issues for Nurse Practitioners	2
NCLIN 560	Seminar in Primary Care V: Complex Clinical Decision Making	5
UCONJ 505	Professional Interpersonal Styles of Communication with Families	3
NCLIN 554	Occupational Health Nursing: Practice Issues	3
NURS 580/ENVH 596	Current Issues in Occupational Health and Environmental Medicine	2

NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3

Spring Qtr		**Cr**
NCLIN 560	Seminar in Primary Care V: Complex Clinical Decision Making	6
ENVH 570	Occupational Epidemiology	3
NCLIN 599	OHN Practicum	3
NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3
CONJ 505	Family Course	3

Sample Doctoral Program of Study

FIRST YEAR

Autumn Qtr		**Credits**
NURS 588	Philosophical Basis of Nursing Inquiry	3
NURS 587	Role Transition Seminar	2
ENVH 596	Current Issues in Occupational and Environmental Health	2
EPI 511	Introduction to Epidemiology	4
Winter Qtr		
NURS 589	Theoretical Perspective in Nursing Science	3
NURS 590	Ecology of Human Health	3
ENVH 596	Current Issues in Occupational and Environmental Health	2
NURS 599	Selected Readings in Nursing Science	2
Spring Qtr		
NURS 592	The Science of Nursing Therapeutics	4
NURS 587	Role Transition Seminar	2
ENVH 405	Toxic Chemicals	3
NMETH 580	Methodological Perspectives in Nursing Science	5
Summer Qtr		
ENVH 572	Clinical Occupational Medicine	3
NURS 527	Managing Effective Access and Utilization Within Care Systems	3
NMETH 600	Independent Study	4
NURS 595	Synthesis of Nursing Science	3

SECOND YEAR

Autumn Qtr		
EDPSY 490	Basic Educational Statistics	3
ENVH 564	Recognition of Health and Safety Problems in Industry	4
NMETH 591	Clinical Outcomes Research I	4
Winter Qtr		
EDPSY 581	Seminar in Educational Psychology	1
EDPSY 593	Experimental Design and Analysis	5
NCLIN 558	Occupational Health Nursing: Program Development	3
NURS 512	Critical and Interdisciplinary Approaches to Women's Health	3
Spring Qtr		
HSERV 582	Theoretical Perspectives on Health Behavior Change	3
ENVH 584	Occupational Safety and Health: Policy and Politics	3
EDPSY 594	Advanced Correlation Techniques	5
EDPSY 581	Seminar in Educational Statistics	1

THIRD YEAR AND FOURTH YEARS

Dissertation - minimum 27 credits required

NMETH 800	Doctoral Dissertation	27	

Other courses to be taken

NCLIN 554	Occupational Health Nursing: Practice Issues	3	
NURS 566	Occupational Stress and Stress Management	3	
NMETH 582	Interpretative Methods in Nursing Research I	4	
ENVH 566	Introduction to Ergonomics	3	
NMETH 583	Interpretative Methods in Nursing Research II	4	
NMETH 592	Clinical Outcome Research II	4	
NMETH 586	Instrument Development and Testing	4	
NMETH 587	Methods of Theory Testing: Causal Modeling	4	
NURS 596	Colloquium, Scientific Conduct, and Dissertation Seminar (3 quarters)		2

Occupational & Environmental Medicine Residency/Fellowship

Master of Public Health, Occupational and Environmental Medicine
Program Curriculum and Course Requirements

The Occupational and Environmental Medicine curriculum leads to a MPH degree and serves as a core component of qualifications for Board-certification in Occupational and Environmental Medicine. Students enrolled in the Occupational and Environmental Medicine (OEM) Residency/ Fellowship have additional requirements including practica (consult program offices). An acceptable research thesis is required for completion of the MPH degree. The research topic is of the student's choice in conjunction with his/her thesis advisor. The MPH candidate must also complete a total of 63 credits.

Master of Public Health Required Courses

Course #	***Credits***	***Quarter***	**Course Title**
BIOST 511	4	A,S	Medical Biometry I
OR			
BIOST 517	4	A	Applied Biostatistics
EPI 511	4	A	Introduction to Epidemiology
OR			
EPI 512-513	4,4	A,W	Epidemiologic Methods I, II
HSERV 511	3	A,S	Intro to Health Care & Public Health Service
HSERV 510	3	W	Society & Health
ENVH 516	3	Sp	Env. & Occ. Toxicology III
ENVH 564	4	A	Recognition of Health & Sfty. Prob. In Industry
OR			
ENVH 453	3	A	Exposure Assessment for Occ. & Env. Health
ENVH 580	1,1,1	A, W, Sp	Env. Health Seminar; Must take 3 quarters
ENVH 572	2	S	Clinical Occupational Medicine
ENVH 583	1	Sp	Env. Health Readings
ENVH 590	2	S	Special Topics: Clinical Preventive Medicine
ENVH 596	2-6	A, W, Sp	Current Issues in Occup. & Env. Medicine
HSMGMT 560	3	Sp	Mgtmnt. Prac. in Health Care & Public Hlth. Org.
OR			
HSMGMT512	3	S	Introduction to Mgmt. in Health Services
ENVH 599B	2-6	A, W, Sp, S	Occup. & Environmental Medicine Practicum
ENVH 700	9	A, W, Sp, S	Masters Thesis

OEM Electives

Course #	*Credits*	*Quarter*	Course Title
ENVH 514	3	A	Environmental & Occupational Toxicology I
ENVH 515	3	W	Environmental & Occupational Toxicology II
ENVH 566	3	W	Introduction to Ergonomics
ENVH 567	3	A	Mechanisms of Carcinogenesis
ENVH/EPI 570	3	Sp	Occupational and Environmental Epidemiology
ENVH 577	3/4	A	Risk Assessment for Enviro. Hlth. Hazards
ENVH 584	3	Sp	Occupational Health & Safety: Policy & Politics
BIOST 512	4	W	Medical Biometry II
BIOST 513	4	Sp	Medical Biometry III
BIOST 518	4	W	Applied Biostatistics II
EPI 514	4	Sp	Application of Epidemiologic Methods

Occupational and Environmental Medicine

Sample Plan of Study

YEAR 1

Summer Quarter
HSERV 511C Intro to Health Care & Public Health
HSERV 512C Intro to Mgt in Health Services
ENVH 572 Clinical Occup & Envir Medicine

Autumn Quarter	Winter Quarter	Spring Quarter
ENVH 564 Hlth/Sfty Prob Ind	ENVH 580 Seminar	ENVH 516 Env/Occ Tox III
ENVH 580 Seminar	EPI 513 Epi Methods II	ENVH 580 Seminar
EPI 512 Epid Methods	BIOST 518 Applied Biostat II	ENVH 596 Curr Iss OEM
BIOST 517 Applied Biostat I	ENVH 596 Curr Iss OEM	HSERV 581 Health Prom & Disease Prev
ENVH 596 Curr Iss OEM	ENVH 515 Env/Occ Tox II	HSMGMT 560 Mgt Pract
		ENVH 570 Occ/Env Epi
		ENVH 583 Env Hlth Reading III

YEAR 2

Summer Quarter
ENVH 599B Practicum
ENVH 700 Master's Thesis
HSERV 512C Intro Mgt in Health Services

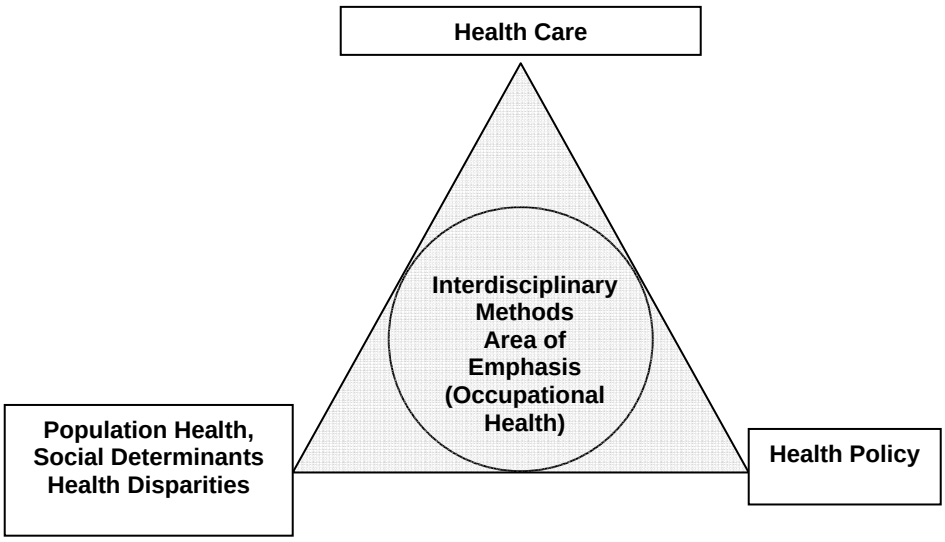
Autumn Quarter	Winter Quarter	Spring Quarter
ENVH 700 Master's Thesis	ENVH 700 Thesis	ENVH 584 Policy and Politics
ENVH 577 Risk Assessment		EPI 514 Applic Epi methods
ENVH 567 Mech Carcinogenesis		ENVH 566 Intro to Ergonomics

Health Services Research Training

This appendix includes sample curricula and selected course syllabi for the HSRT program.

Health Services Research Training Program (HSRT) Curriculum

HSRT students take a series of courses and seminars developed for the Health Services doctoral program. The Health Services doctoral program requires students to complete courses, seminars and dissertation research totaling 101 credits. The Health Services curriculum is based on the triangle shown below, and is anchored by two series of courses: one is content based (U.S. Health and Health Care), the other methods based (Advanced Health Services Research Methods and Analysis). Each Health Services Ph.D. student chooses an area of emphasis. For HSRT trainees, the area of emphasis is occupational health, which is shown in the circle within the triangle in the figure below. HSRT students take courses in three areas: (1) core Health Services courses (35 credits), advanced theory and methods and independent research (50 credits), and elective courses/seminars/research projects in Occupational Health (16 credits). The courses/seminars typically taken (some substitution is allowed depending upon the student's background and prior training) are listed below:



Course # (Credits)	Quarter	Course Title/Instructor

Core Health Services Courses: Required Courses

U.S. Health and Health Care Series:

HSERV 512 (3)	Fall	U.S. Health Care (Wickizer & Dowling)
HSERV 513 (3)	Winter	Population Health, Social Determinants and Health Disparities (Patrick, Grembowski, others)
HSERV 514 (3)	Spring	Health Policy (Martin)
HSMGMT 514 (3)	Winter	Health Economics (Wickizer)
HSERV 522 (4)	Fall	Health Program Evaluation (Grembowski)
EPI 512 (4)	Fall	Epidemiologic Methods I (Koepsell/Weiss)
EPI 513 (4)	Winter	Epidemiologic Methods II (Koepsell/Weiss)
BIOST 517 (4)	Fall	Applied Biostatistics I (Emerson)
BIOST 518 (4)	Winter	Applied Biostatistics II (Emerson)
HSERV 592H (3)	Fall/Winter/Spring	Health Services Research Seminar

Advanced Theory and Methods Courses: Required Courses

HSERV 523 (4)	Fall	Advanced Health Services Research Methods I (Majweiski/Diehr)
HSERV 524 (4)	Winter	Advanced Health Services Research Methods II (Zimmerman)
HSERV 525 (4)	Spring	Advanced Health Services Research Methods III (Sales)

Advanced Theory and Methods Courses: Selected Electives

HSERV 590A (3)	Fall	Preparing and Writing Research Proposals (Reiber)
HSERV 590H (3)	Spring	Survey Research (Martin)
HSERV 584 (4)	Winter (Patrick)	Assessing Outcomes in Health and Medicine
HSERV 583 (4)	Fall	Economic Evaluation in Health and Medicine (Sullivan and Venstra)
HSERV 552 (3)	Fall	Health Policy Development (Watts and Katz)
HSERV 587 (3)	Winter	Health Policy Economics: The Integration of Values in Resource Allocation (Watts)
BIOST 519 (3)	Fall	Topics in Epidemiologic Methods (Davis)
BIOST 536 (4)	Fall (Breslow)	Categorical Data Analysis in Epidemiology
BIOST 537 (4)	Winter	Survival Data Analysis (Breslow)
BIOST 540 (3)	Spring	Correlated Data Regression (Leroux)

Course # (Credits)	Quarter	Course Title/Instructor
EPI 523 (3)	Spring	Injury Epidemiology (Cummings)
EPI 528 (3)	Spring	Exposure Measurement in Epidemiology (White)

Occupational Health and Safety Selected Electives

ENVH 584 (3)	Spring	Occupational Health and Safety: Policy and Politics (Morris and Camp)
ENVH 570 (3)	Spring	Occupational and Environmental Epidemiology (Checkoway and Daniell)
ENVH 577 (3)	Fall	Risk Assessment for Environmental Health Hazards (Faustman)
ENVH 596 (2)	Fall/Winter/Spring	Current Issues in Occupational and Environmental Medicine (Kaufman)
ENVH 511 (3)	Winter	Environmental and Occupational Health (Daniell)
ENVH 556 (3)	Winter	Quantitative Occupational Exposure Analysis (Morgan/Seixas)
ENVH 564 (4)	Fall	Recognition of Health and Safety Problems in Industry (Camp/Seixas)
ENVH 566 (3)	Winter	Introduction to Ergonomics (Johnson/Stewart)

Hazardous Substance Academic Training

(Option in MS Industrial Hygiene & MS Environmental Health)

Core Course Content Outlines and Sample Curricula

Students choosing the HSAT concentration may follow either of two M.S. curricula offered though the Department of Environmental and Occupational Health Sciences, IH or EH.
(The programs are effectively merged at the Ph.D. level and jointly manage the Ph.D. in Environmental and Occupational Hygiene.) There are four categories of M.S. course requirements for HSAT students: 1) departmental core course and thesis requirements applicable to all DEOHS students; 2) IH or EH program required courses; 3) program specific approved electives; and 4) the HSAT core courses. Because IH and EH program core and elective requirements are different, credit hour totals and distributions are typically different for graduates of the respective programs. HSAT core requirements also overlap to different extents with the curricula otherwise normally required for the IH and EH M.S. degrees. This may contribute to further disparities in credit hour totals, (however, students typically accumulate more than the minimum credit hours required in any case). Completion of the 40 hour HAZWOPER course represents an additional effort for HSAT students. HSAT option requirements under either program are tabulated comparatively below. Sample schedules are presented at the end of this Appendix.

HSAT Option Curricula

Master of Science Core Course Requirements – common to all DEOHS students

Course	Cr.	Quarter	CourseTitle
ENVH 580	1,1,1	A, W, Sp	Environmental Health Seminar
ENVH 581	1	A	Environmental Health Reading I
ENVH 583	1	Sp	Environmental Health Reading III
ENVH 700	9	A, W, Sp, S	Master's Thesis
BIOST 511	4	A, S	Medical Biometry I
OR **BIOST 517***	4	A	OR Applied Biostatistics I
EPI 511*	4	A	Introduction to Epidemiology
Total	22		

*Higher level Biostatistics and Epidemiology courses can be substituted for BIOST 511 or 517, and EPI 511.

Required Program Courses - common to both MS IH and MS EH

Course	Cr.	Quarter	CourseTitle
ENV H 405	3	Sp	Toxic Chemicals in the Environment
ENV H 552**	3	W	Environmental Chemistry of Pollution
Total	6		

**General IH students can choose either ENVH 552 or ENVH 570, but an HSAT student would be advised to choose 552.

KEY: Courses in **Bold Face** have syllabi attached.

Remaining Required Program Courses – MS IH

Course	Cr.	Quarter	Course Title
BIOST 512 or **518**[1]	4	W	Med Biometry II OR Applied Biostatistics II
ENVH 553	3	W	Instrumental Methods for IH Measurement
ENVH 555	3	Sp	Instrumental Methods for IH Measurement Laboratory
ENVH 557	4	W	Workplace Exposure Controls
ENVH 560	4	A	Organizing and Administering Industrial Safety and Health Programs
ENVH 564	4	A	Recognition of Health & Safety Hazards in Industry
Total	22		

[1]Higher level Biostatistics courses can be substituted for BIOST 512 or 518.

Remaining Required Program Courses – MS EH

Course	Cr.	Quarter	Course Title
ENVH 453	3	A	Industrial Hygiene
ENVH 541	3	A	Ecology of Environmentally Transmitted Microbial Agents
ENVH 577 OR ENVH 543	3	A (577), Sp (543)	Risk Assessment for Environmental Health Hazards or Microbial Risk Assessment
ENVH 594	1	W	Current Topics in Environmental Health
2 of the following 3 options:			
ENVH 445 or **446**	3	Sp (445), W (446)	Solid Waste Management or Hazardous Waste Management
ENVH 490	3	Sp	Community Air Pollution
ENVH 545	3	A	Water, Wastewater, and Health
Total	16		

Required HSAT Courses - common to both MS IH and MS EH HSAT

Course	Cr.	Quarter	CourseTitle
ENVH 446*	3	W	Hazardous Waste Management
ENVH 541	3	A	Ecology of Environmentally Transmitted Microbial Hazards
ENVH 574	3	Sp	Probabilistic Exposure Analysis
2 of the following 3			
ENVH 543	3	Sp	Microbial Risk Assessment
ENVH 577	3	A	Risk Assessment of Environmental Health Hazards
ENVH 584	3	W	Occupational Health Policy
Total	15		

*includes 8 hr hands-on HAZWOPER training (optional for non HSAT students)

In addition to the 22 departmental core credits, and 28 or 22 program course requirements, the IH and EH programs require 12 and 9 hours of graded electives, respectively. Electives pre-approved by each program are presented in the table below.

Selected Electives Accepted by both MS IH and MS EH

Course	Cr.	Quarter	Course Title
ENVH 457	3	Sp	Industrial and Environmental Noise
ENVH 556	4	W	Occupational Exposure Analysis
ENVH 570	3	Sp	Occupational & Environmental Epidemiology

EH students may also take as electives courses which are required by the IH program. Examples are shown in the following table.

Examples of IH Program Requirements Accepted as electives by EH

Course	Cr.	Quarter	Course Title
BIOST 512 or **518**	4	W	Med Biometry II OR Applied Biost II
ENVH 553	3	W	Instrumental Methods for IH Measurement
ENVH 555	3	Sp	Instrumental Methods for IH Measurement Laboratory

KEY: Courses in **Bold Face** have syllabi attached.

Sample Plans of Study for IH and EH HSAT students

First Year*

IH HSAT Students		
Autumn	**Winter**	**Spring**
ENVH 564 Health/Safety Hazds in Industry	**ENVH 553** IH Methods	**ENVH 555** IH Methods Lab
ENVH 580 EH Seminar	**ENVH 580** EH Seminar	**ENVH 580** EH Seminar
ENVH 581 EH Reading I	**ENVH 596** Current Issues in OccMed	**ENVH 583** EH Reading III
ENVH 577 Risk Assessment for EH Hazards	ENVH 552 Environmental Chemistry	**ENVH 405** Toxic Chemicals
BIOST 511 OR 517	**BIOST 512** OR 518	**ENVH 574** Probabilistic Expo Analysis

EH HSAT Students		
Autumn	**Winter**	**Spring**
ENVH 453 Industrial Hygiene	ENVH 446 Hazardous Waste Management	**ENVH 490** Community Air Pollution
ENVH 580 EH Seminar	**ENVH 580** EH Seminar	**ENVH 580** EH Seminar
ENVH 581 EH Reading I	**ENVH 594** Current Topics in EH	**ENVH 583** EH Reading III
ENVH 577 Risk Assessment for EH Hazards	ENVH 552 Environmental Chemistry	**ENVH 405** Toxic Chemicals
BIOST 511 OR 517	**BIOST 512** OR 518	**ENVH 574** Probabilistic Expo Analysis

*Shaded courses are HSAT core courses.

Summer Quarter*

Both IH and EH HSAT Students
ENV H 700 Master's Thesis and Electives or Internship with industry or a regulatory agency**

** Students supported by a Research Assistantship during the summer quarter must be registered for at least 2 credit hours. Students supported by stipends must be registered for at least 10 credit hours. Registration during the summer while serving as an intern is not required, and ordinarily academic credit is not awarded for the internship. In special cases, however, credit for the internship may be earned through ENVH 599, Field Studies.

Second Year*

IH HSAT Students		
Autumn	**Winter**	**Spring**
ENVH 700 Thesis	ENVH 700 Thesis	ENVH 700 Thesis
ENVH 560 Org/Admin Indus Safety	ENVH 557 Workplace Expo Controls	
EPI 511 Intro to Epidemiology	ENVH 446 Hazardous Waste Management	Electives
ENVH 541 Ecol of Environ Transm Microb Hazards	**ENVH 584** Occ Health Policy	Electives

EH HSAT Students		
Autumn	**Winter**	**Spring**
ENVH 700 Thesis	ENVH 700 Thesis	ENVH 700 Thesis
ENVH 545 Water, Wastewater and Health	Electives	**ENVH 543** Microbial Risk Assessment
EPI 511 Intro to Epidemiology	Electives	Electives
ENVH 541 Ecol Environ Trans Micro Hazards	Electives	Electives

*Shaded courses are HSAT core courses.

FACULTY AND TRAINEE PUBLICATIONS
July 1, 2006 to June 30, 2007

[Trainee names are underlined. Core faculty names are in **boldface**.]
[This list does not include: reports, chapters, or lay publications; articles submitted, in review, accepted, or in press. Only publications available online or in print are included.]

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