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**ROCKY MOUNTAIN CENTER FOR  
OCCUPATIONAL AND ENVIRONMENTAL  
HEALTH**

DEPARTMENTS OF FAMILY AND PREVENTIVE MEDICINE,  
MECHANICAL ENGINEERING, ECONOMICS AND INTERNAL  
MEDICINE

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**Final Performance Report  
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Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., M.D., M.P.H.

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<b>ACRONYM</b>	<b>LONG NAME</b>
AAFP	American Academy of Family Practice
ABET	Accreditation Board for Engineering and Technology
ACGME	American Council on Graduate Medical Education
ACOEM	American College of Occupational & Environmental Medicine
AFL/CIO	American Federation of Labor-Congress of Industrial Organizations
AIHA	American Industrial Hygiene Association
AIHCE	American Industrial Hygiene Conference and Expo
AMA	American Medical Association
AMSEA	Alaska Marine Safety Education Association
ASAC	Applied Science Accreditation Commission
ASP	Associate Safety Professional
ASSE	American Society of Safety Engineers
ATK	Alliant Techsystems
AWMA	Air and Waste Management Association
CAOHC	Council for Accreditation in Occupational Hearing Conservation
CDC	Centers for Disease Control and Prevention
CDME	Commercial Driver Medical Exams
CE	Continuing Education
CEPH	Council on Education for Public Health
CEU's	Continuing Education Units
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CPE	Certification in Professional Ergonomics
CSP	Certified Safety Professionals
DFPM	Department of Family and Preventive Medicine
DOT	Department of Transportation
E&S	Ergonomics and Safety
ERC	Education and Research Center
ESEC	Ergonomics and Safety Engineering Core
ESS	Exercise and Sports Science
FM	Family Medicine
FMR	Family Medicine Residency
FPMD	Family Practice Medicine
GME	Graduate Medical Education
GRE	Graduate Record Examinations
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHS	Health & Human Services
HIPAA	Health Insurance Portability and Accountability Act
HSAT	Hazardous Substances Academic Training
HST	Hazardous Substances Training
IAIABC	International Association of Industrial Accident Boards and Commissions
IH	Industrial Hygiene
IHC	Intermountain Health Care
IHMM	Institute of Hazardous Materials Management
IM	Internal Medicine
KUCC	Kennecott Utah Copper Corporation

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MA	Master of Arts
MBA	Masters of Business Administration
MD	Doctor of Medicine
ME	Mechanical Engineering
MEEN	Mechanical Engineering
MOC	Maintenance of Certification
MPH	Master of Public Health
MS	Master of Science
MSD's	Musculoskeletal Disorders
MSPH	Master of Science in Public Health
NASA	National Aeronautics and Space Administration
NCS	National Children's Study
NIOSH	National Institute for Occupational Safety and Health
NORA	National Occupational Research Agenda
OEH	Occupational & Environmental Health
OHN	Occupational Health Nursing
OIE	Occupational Injury Epidemiology
OIP	Occupational Injury Prevention
OIPRT	Occupation Injury Prevention Research Training
OM (Occ. Med.)	Occupational Medicine
OMR	Occupational Medicine Residency
OSE	Occupational Safety Engineering
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OT	Occupational Therapy
PCBs	Polychlorinated biphenyl
PGY	Post Graduate Year
PhD	Doctor of Philosophy
PI	Principal Investigator
PPE	Personal Protective Equipment
PT	Physical Therapy
RMCOEH	Rocky Mountain Center for Occupational & Environmental Health
RRC	Residency Review Committee
Sc.D	Doctor of Science
SEEU	Statistical and Economic Evaluation Unit
UAOHN	Utah Association of Occupational Health Nurses
UAW	United Auto Workers
UCLA	University of California Los Angeles
UNA	Utah Nursing Association
USEPA	U.S. Environmental Protection Agency
USF	University of South Florida
USRC	Urban Systems Research Center
VA	Veterans Administration
WCF	Workers Compensation Fund

## **Abstract: Overall Report**

The Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) is a growing Occupational Safety and Health (OSH) Education and Research Center (ERC) that has been in existence at the University of Utah since 1977. The center prepares leaders in occupational safety and health research and practice in the following disciplines: Ergonomics and Safety (E&S), Hazardous Substances Academic Training (HSAT), Industrial Hygiene (IH), Occupational Injury Prevention Research Training (OIPRT) and Occupational Medicine Residency (OM). We also have Continuing Education (CE) and Hazardous Substances Training (HST) Programs. The RMCOEH has provided specific curricula by Occupational Health Nurses (OHNs) to emphasize the importance of OHN to our trainees.

We have trained over 393 graduates to date, and are recognized for high quality trainees and strong, interdisciplinary education programs. The Continuing Education program during 2002 - 2007 has presented 518 courses to 11,762 registrants and Hazardous Substances Training has presented 92 courses to 1,251 registrants.

The school and ERC programs maintain accreditation by all respective organizations. The public health programs are accredited by the Council on Education for Public Health. The Occupational Medicine Residency program is ACGME accredited for the maximum of five years. Likewise, the Industrial Hygiene and Ergonomics and Safety programs are accredited through ASAC-ABET.

Faculty members conduct research and have productive publication records that frequently include students as co-authors. The RMCOEH has extensive research programs such as those that seek to prevent common musculoskeletal disorders such as carpal tunnel syndrome, shoulder tendonitis, and low back pain. These disorders cost the U.S. approximately \$200 billion per year. RMCOEH faculty also lead national efforts to develop evidence based guidelines for more effective treatment of these disorders which have been incorporated in statutes and regulations in several states. Faculty are also active in other areas of research such as the National Children's Study, bioterrorism, and other mass casualty events. Regarding service to the community, RMCOEH faculty consult with over 200 Utah businesses annually to provide assistance to reduce or prevent workplace injuries and illnesses. Additionally, ERC faculty hold leadership positions in professional societies and serve on major advisory and professional committees. Their proficiency and recognition as national and international experts comprise a major strength of the center.

RMCOEH has been the only ERC in Region VIII (UT, CO, WY, MT, ND, SD), even though these states are annually in the top rankings for occupational fatalities and thus have an urgent need for more OSH professionals. In the past 5-year grant period, we have made major progress, including the first piece of Legislation supporting (OSH) training in the US in many years [Senate Bill (S.B.) 159, 2005 Utah General Legislative Session], along with growth in extent and quality of all of our programs. The RMCOEH is also the only statutorily established OSH ERC in the US as of 2007 (SB234, 2007 General Session).

The RMCOEH has further built and enjoys collaborative relationships with businesses, trade groups, employee groups, governmental units, healthcare organizations, workers compensation insurers, and community groups, and these interactions foster an atmosphere that facilitates state-of-the art training for OSH professionals for the 21<sup>st</sup> Century. These relationships continue to provide the external 'laboratories' to test critical research theories and develop the innovations to provide safer and healthier workplaces. The RMCOEH has also developed the requisite infrastructure to support the National Occupational Research Agenda (NORA) (I and II), and Research to Practice (r2p) research missions. The Center hosted the largest Townhall meeting in the US to develop NORA II. The RMCOEH's CE and Outreach programs promote and publicize efficacious strategies, helping ensure knowledge is translated into practice.

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## **CENTER ADMINISTRATION**

Kurt T. Hegmann, MD, MPH  
Center Director

## Highlights/Significant Results

In the past five year grant period (July 1, 2002-June 30, 2007) a few of our accomplishments included:

- Develop a new capstone course on Occupational Health Solutions to businesses' OSH problems
- Survey all RMCOEH graduates
- Submitted 6 research grant applications, with major successes and indications of additional successes to come:
  - Distal Upper Extremity Cohort study, and Continuation (2002-2009)
  - Low Back Pain Study, 2006-2012
  - National Children's Study (2006-2016, planned)
  - Firefighters and Peace Officer's Health Study (2006-2008)
- Founded the center's Statistical and Economic Evaluation Unit
- Initiated a transdisciplinary, fully integrated course on solving Occupational Health and Safety problems in the workplace, "OSH Solutions" course
- Developed a new distance based CE course
- Expanded our Outreach efforts
- Intensified our Diversity Recruitment efforts
- Successfully supported passage of SB159 to provide a tax credit for support of the RMCOEH
- Successfully supported the passage of 2SHB009 to study health effects in Firefighters and Police Officers
- Hosted the largest NIOSH NORA II Town Hall meeting, with over 150 in attendance
- Totally revamped and updated the RMCOEH website, located at <http://www.rmcoeh.utah.edu/>
- Became the first statutorily established ERC in the nation through SB234 (2007 Utah General Session)

These accomplishments are significant individually, however in composite, they have raised the RMCOEH to a level that is on par with any other OSH program elsewhere.

As an overview, the RMCOEH has increased the number of faculty and staff. We have received awards for major NIOSH research grants. These research projects have major potential impacts involving widespread OSH issues that include shoulder tendinosis, CTS, low back pain, chemical exposures among pregnant women and silica-related toxicity. We have extensively revised curricula to respond to the changing OSH environment and obtained major new funding sources. There is a marked increase in the numbers of Continuing Education (CE) courses and registrants. We have more than doubled the annual number of publications to over 30 per year. Outreach efforts have expanded markedly, with resultant dramatically expanded support to commercial, government, non-profit, and other organizations that have, in turn, resulted in increased commitment by these groups to Center advocacy. We have moved into more modern, user friendly, facilities and have greatly enhanced our NORA activities

## Outcomes/Relevance/Impact

The Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) is an Education and Research Center that has been in existence at the University of Utah since 1977. It is the only ERC in Region VIII (UT, CO, WY, MT, ND, SD).

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The RMCOEH contains academic programs in Ergonomics and Safety (E&S), Hazardous Substances Academic Training (HSAT), Industrial Hygiene (IH), Occupational Injury Prevention Research Training (OIPRT) and Occupational Medicine Residency (OM). We have Continuing Education (CE) and Hazardous Substances Training (HST) Programs. The RMCOEH provides specific curricula by Occupational Health Nurses (OHNs) to emphasize the importance of OHN to our trainees.

The RMCOEH is primarily housed in the Department of Family & Preventive Medicine (DFPM), University of Utah (U of U) School of Medicine. The RMCOEH's E&S Program and one half of the OIPRT Program (the Occupational Safety Emphasis) are housed in the Department of Mechanical Engineering, College of Engineering. The Center's Economic and Statistical Evaluation Unit is housed in the Dept of Economics (College of Social and Behavioral Science), while including other faculty with biostatistical, epidemiological and business expertise. RMCOEH has collaborative relationships with countless other U of U entities. The RMCOEH also has collaborative ties with the Training Program Grants' programs in Region VIII including those at Montana State and Colorado State, as well as with the next three largest Universities in Utah (Brigham Young University, Utah State University and Weber State University).

The RMCOEH has 4 Program Directors (CE and HST; HSAT and IH; E&S and OIPRT; and OM). Along with the Center Director, Deputy Director and the Statistical and Economic Evaluation Unit Director (Dr. Waitzman), they constitute the Center Executive Committee, which meets monthly and as needed between meetings. The RMCOEH has a large, active and robust Advisory Board that includes representatives from all major stakeholders. The Advisory Board meets at least twice a year. The Director, Deputy Director, or other faculty meet with the RMCOEH Advisory Board Executive Committee periodically as circumstances necessitate.

## Technical Report

The RMCOEH Vision, Mission and Goals statements are critical guiding statements that the RMCOEH faculty and staff review and revise at least annually, at our annual retreats. These statements are also reviewed at the RMCOEH Advisory Board meeting following any changes. Emphases are placed on meeting current and projected OEHS challenges and taking advantage of new educational techniques and other opportunities.

**VISION:** Be recognized internationally as a leading Center in meeting current and future occupational and environmental health and safety challenges

**MISSION:** To protect workers and the environment through interdisciplinary education, research, and service.

**GOALS:**

1. Provide quality academic programs.
2. Accomplish NORA research and translate it into practice.
3. Provide superior continuing education, service, and outreach.
4. Accomplish strong interdisciplinary collaboration.

As has occurred throughout the grant period, each Program Director then revises program-specific goals and objectives to achieve the overall Center goals and guide programmatic efforts. Objectives are structured so that progress in achieving them is evaluated on an ongoing basis. The specific Administration goals and objectives are discussed below.

The RMCOEH has met regional needs by: (1) training students for regional needs (195 of the 363 graduates (54%) of our programs reside in Region VIII states), (2) conducting formal needs assessments, (2) targeting academic and CE/HST programs' contents to regional needs, (3) active involvement of the RMCOEH Advisory Board which raises issues for us to address, (4) answering concerns raised by each program's Advisory Committee, and most recently, (5) tying future research endeavors to the hugely successful NORA II Town Hall meeting held in February 2006 (n>150 participants with extensive regional needs developed and posted on our

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., M.D., M.P.H. web). The fact that so many graduates remain in this region attests to the strong, previously unfilled, need for OHS professionals and the success of the RMCOEH in meeting this need. Our graduate surveys confirm

### **Responsible Conduct of Science Training**

***Current Instruction and Student Participation:*** For over 3 years, all RMCOEH trainees have been required to complete HIPAA and IRB training during orientation. Orientation activities typically take place during the trainee's first week. Trainees do not participate in research activities prior to HIPAA and IRB training. All faculty and staff are required to complete this training. Certificates of completion are documented. Courses, such as Epidemiology, Introduction to Biostatistics, and Social Context of Public Health, also incorporate training in responsible research practices into their curriculum. Ethics are also major topics in Ergonomics, Human Factors Engineering, and Design Implications. The topic of research ethics is also covered extensively in Computer Applications and Research Methods. RMCOEH trainees also attend (beginning 2006) a new mandatory noon lecture series that includes among other topics: conflict of interest, responsible authorship, handling of misconduct, data management, data sharing and animal welfare. Attendance logs are kept to track trainee attendance, and faculty attendance is encouraged. Additional topics include how to write research grant proposals and how to manage research laboratories. Specific reference is made to the University of Utah's Policy and Procedures Manual, with particular emphasis on Part 8, Chapter 10, Sections V and VI, which cover "Student Academic Conduct" and "Student Professional and Ethical Conduct," respectively (<http://www.admin.utah.edu/ppmanual/8/8-10.html>). Faculty participate. Attendance is tracked.

### **Administration Goals and Objectives**

Progress towards achieving each of our goals is below.

#### **Goal 1. Provide proactive administrative support to enable faculty to present quality OEHS academic programs.**

**Objective 1.a.** Assure appropriate utilization of the RMCOEH Advisory Board and provide oversight for other programs to ensure adequacy of functioning Advisory Committees.

**Progress and Plans:** Accomplished. The RMCOEH Advisory Board continued to meet at least twice each year over the past decade. The next meeting is scheduled for October 11, 2007. The RMCOEH Advisory Board formed an RMCOEH Advisory Board Executive Committee (Messrs. Marano, Lloyd, and Drs. Hegmann, and Moser), which has teleconferenced, and met as needed during this past project period. This Board Executive Committee (to be distinguished from the RMCOEH Center Executive Committee consisting of Program Directors) has been instrumental in the great success that the RMCOEH has enjoyed, as this group has been both highly functional and quite nimble. We will be continuing this successful format. Breakout sessions occurring with our RMCOEH Advisory Board meetings, consisting of individual program's Advisory Committee members, have been quite effective. The process allows for program-focused efforts and attention, and is followed by group problem solving immediately afterwards. This biphasic approach has been highly valuable in resolving existing concerns and identifying potential problems so they can be addressed before they become manifest. The development of new OMR comprehensive sites provides an example of the result of these efforts. It is planned to continue this format during the next grant period.

**Objective 1.b.** Complete a survey of graduates of RMCOEH academic programs.

**Progress and Plans:** Accomplished. A survey was e-mailed and mailed to all graduates of RMCOEH academic programs in June 2006, with follow-up reminders to provide up-to-date information for this application's reviewers. Among the most noteworthy findings were that 91% of RMCOEH graduates rated their satisfaction with our training programs at least 7/10 (0-10 scale), with a majority 9/10 or 10/10. Similar results were given to the question regarding whether they would recommend our programs to other potential students.

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Objective 1.c. Provide direction and support for development of innovative educational approaches.

Progress and Plans: Partially Accomplished. This is an ongoing, and somewhat never ending objective. We continue to increase the quantity of digital images in our teaching programs, have involved more distance education formats, and have developed a summative course in OSH problems solving. We have refurbished our classroom/conference room with new tables, chairs, library shelves and a SmartBoard™. We are investigating new degree programs to continue to seek innovative educational formats and solutions.

Objective 1.d. Assist in developing and implementing plans to maintain and expand the number of RMCOEH faculty.

Progress and Plans: Partially Accomplished. This too is naturally a never ending objective. Since June 2002, three IH (Drs. Larson, Pahler and Collingwood) and two OM faculty (Drs. Wood and Edwards) have been added, for a net gain of 3 terminally degreed faculty members. We continue to develop and work towards implementation of plans to additionally augment the RMCOEH faculty, including additions to the E&S and OIPRT programs, followed by restarting the OHN Program.

Objective 1.e. Monitor numbers of minority students with the objective of increasing minority student enrollment in MSPH and MPH programs.

Progress and Plans: Partially Accomplished. We have, and continue to markedly expand our Diversity Recruitment activities.

**Goal 2. Provide administrative support needed to enable faculty to design and accomplish research studies that focus on NIOSH priority areas and translate it into practice.**

Objective 2a. Encourage research directly related to NORA, NORA II, r2p and WorkLife Initiative priority areas.

Progress and Plans: Accomplished. Recent and current RMCOEH efforts and proposals have focused on the following NORA priority areas: Exposure Assessment, Low Back Disorders, Musculoskeletal Disorders of the Upper Extremity, Traumatic Injuries, Risk Assessment Methods, Social and Economic Consequences of Workplace Illnesses and Injuries, Intervention Effectiveness, Special Populations at Risk, and Organization of Work. The Pilot/Small Projects Program discussed below is planned to target these NIOSH research priority areas.

Objective 2b. Obtain funding to support research training and enhancement of research expertise of junior faculty.

Progress and Plans: Accomplished. Faculty have succeeded in obtaining major research awards. These awards have involved large, cross-disciplinary projects that have resulted in practical training in major research projects. Junior faculty also have received training in research from the University of Utah. We are continuing to develop our research training and expertise. It is planned that all senior faculty will continue to work with junior faculty to develop their research expertise and extramural proposals.

Objective 2.c. Continue to explore potentials for joint research programs and efforts with other academic institutions.

Progress and Plans: Accomplished. We have succeeded in initiating and conducting two major joint research programs that have involved large teams of researchers from many institutions. We plan to continue to search for such opportunities and one such project has been submitted to NIOSH (July 2006). Others are pending.

**Goal 3. Assist faculty in providing superior continuing education, service and outreach that protect and enhance the health and safety of workers, their families, and those exposed to environments impacted by work activities.**

Objective 3.a. Provide support to CE and HST efforts to develop Internet-based training programs.

Progress and Plans: Accomplished. The Center's distance based courses continued to prove popular. We have also developed an Occupational and Public Health Journal Club format for

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continuing education students in 2006. We are now offering a distance-based safety training program beginning in 2006, which is patterned after a successful traditional training program. We continue to seek other distance-based educational opportunities.

Objective 3.b. Improve CE and HST facilities.

Progress and Plans: Accomplished. The RMCOEH has moved to newer facilities, which include the conference room with a SmartBoard™ described above. The other DFPM classroom space is now adjacent and also available for CE and HST functions. The University of Utah has markedly improved facilities, including an adjacent Guest House, as a result of the Olympics.

Objective 3.c. Provide administration support to outreach and service support activities.

Progress and Plans: Accomplished. This objective has been met.

**Goal 4. Provide administrative support to programs and activities that will maintain and expand the Center's interdisciplinary foci and collaboration in accomplishing education, research, and service.**

Objective 4.a. Provide administrative support to strengthen the Center's strong interdisciplinary orientation in all areas.

Progress and Plans: Accomplished. The greatest improvement in this area is the development of the new Occupational Safety and Health Solutions Course (scheduled for Spring 2007).

Objective 4.b. Assist Center faculty in expanding local, regional, and national collaborations with government, industries, and professional organizations.

Progress and Plans: Accomplished. Center faculty continue extensive collaborations with other agencies and organizations.

**Trainee and Faculty Honors, Awards, Scholarships, Appointments, New Faculty Positions, New Courses.**

Details are in the program specific progress reports. This is a brief summary. Several trainees have received Paul S. Richards Safe Workplace Scholarships sponsored by the Workers Compensation Fund.

Dr. Wood became the first ACOEM/FMCSA (Federal Motor Carrier Safety Administration) Research Fellow after a competitive national application. Dr. Hegmann has been appointed as Chair of the ACOEM Evidence Based Practice Committee. He also has been recently appointed by Secretary Mineta (Department of Transportation) and now is Chair of the Medical Review Board of the Federal Motor Carrier Safety Administration to establish medical standards for safe commercial vehicle operation.

**Trainee and Diversity Recruitment and Recruitment**

This is discussed in each program. Although states in Region VIII have much lower percentages of minority groups than many other states, Center members recognize that the proportion of minorities is increasing. Further, special effort is needed to overcome the constraints that minorities face. In order to develop a coordinated approach to minority recruitment, the RMCOEH has organized its efforts in this area under the direction of Don Bloswick, Ph.D., E&S program director. Faculty are interacting with numerous University of Utah and community minority groups and schools in an attempt to improve minority recruitment. The efforts have resulted in successes, e.g. those discussed in the OM section of this application. Minority Recruitment remains a priority for the Center and current contacts and efforts set the stage for continued success in this area in the future. We have made contacts with other university's minority and diversity personnel. We have also made contacts with Native American education programs.

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## **ERGONOMIC AND SAFETY (E&S)**

Donald Blowski, PhD, P.E., CPE  
Program Director

## **Abstract: Ergonomics & Safety**

The Ergonomics and Safety (E&S) Program was initiated as one of the core academic programs at the University of Utah Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) in 1982. In 1986, Donald S. Bloswick, Ph.D., P.E., CPE was appointed as full-time Program Director. He received tenure in 1993. Dr. Richard Sesek, Ph.D., M.P.H., CSP was hired as a full-time E&S faculty member in December 1999. Dr. Phillip Drinkaus, Ph.D. was hired as an E&S faculty member for AY 05/06, and continues to teach and collaborate on research. Dr. Stacy Bamberg was hired as an M.E faculty member in 2004 and has become an integral part of the research and teaching efforts of the E&S Program, primarily in the area of occupational biomechanics.

The NIOSH-sponsored E&S Program is located within the Department of Mechanical Engineering and focus is on the Master of Science (M.S.-Thesis, M.S.-Non-thesis) and Doctor of Philosophy (Ph.D.) degrees. Students can also pursue the Master of Science in Public Health (M.S.P.H.), and Master of Public Health (M.P.H.) degrees, but are not eligible for NIOSH funding through the E&S Program. Students entering this program must have a Mechanical Engineering undergraduate degree or meet the requirements for graduation from a University Mechanical Engineering program. In addition to the NIOSH-sponsored students, several mechanical engineering students have completed the entire engineering compliment of E&S courses.

The E&S Program is formally recognized as one of eleven graduate teaching and research emphasis areas in the University of Utah Department of Mechanical Engineering (ME). During the most recent grant period (7/1/02-6/30/07) there were 14 trainee graduates. Additionally, there were also 4 non-NIOSH supported graduates who completed the E&S engineering core courses (ESEC). During the final year of the grant period (7/1/06-6/30/07), there were 5 full-time E&S engineering students (3 Masters, and 2 Ph.D.) and 6 masters-level part-time engineering students in the E&S Program.

The NIOSH funds have been leveraged into a well equipped Ergonomics and Safety Research lab (1,500 square feet) with research equipment including a newly upgraded PEAK motion analysis, EMG system, and two AMTI force plates (approx \$130,000). The E&S Program focuses on the following NIOSH research areas: musculoskeletal disorders of the upper extremities, low back disorders, traumatic injuries, special populations at risk, control technology and personal protective equipment (PPE), exposure assessment methods, and risk assessment methods. Since the beginning of the grant period (July 2002), the E&S Program has received approximately \$502,549 in non-ERC grant/contract support.

The E&S program meets regional needs by: (1) training masters and doctoral level E&S professionals to address the ergonomics and safety issues of Region VIII, (2) targeting our academic and CE programs' contents to meet Region VIII needs, and (3) performing research relevant to the region. Drs. Bloswick and Sesek frequently serve as ergonomics and safety resources within the Region. Graduates are prepared to assume lead roles in ergonomics and safety programs in industry, labor, and government. Students and graduates of the E&S Program are employed as ergonomics and safety specialists by such companies and agencies as 3M, Abbott Labs, Alliant Tech Systems, Argonaut Insurance, Becton Dickinson, Black Diamond Equipment, Conoco-Phillips, Cephalon, ErgoWeb, Ford Motor Company, The Human Solution, Intel, Intermountain Health Care, Medron, Raytheon, Safety Management Services, Sandia National Laboratory, Schlumberger, Thiokol Corp., University of Utah, US Army, US Navy, Utah Medical, Utah OSHA, The Workers Compensation Fund, and others. Graduates of the RMCOEH have become leaders in occupational and environmental health. In our most recent graduates' survey (6/2006), 43% of RMCOEH E&S graduates identified themselves as Senior Professionals or Managers in their work setting. Due to the quality of the RMCOEH programs, RMCOEH trainees are highly sought, and it is not unusual for our students to receive job offers prior to graduation. Overall satisfaction with training is highly rated by RMCOEH E&S students with 77% of graduates rating their training at '8' or higher (0 = "Very Dissatisfied" and 10 = "Very satisfied"). When asked how likely they would be to recommend any of the RMCOEH's programs 68% rated it  $\geq$  '8' (0= Advise Against,

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'10' = 'Enthusiastically Recommend'), (Please see Appendix E&S-1 for full results to date of the 2006 graduate survey).

In addition to the core responsibilities for providing education and training to E&S trainees, the E&S faculty provide E&S-related instruction to students in IH, HSAT, OIP, OMR and Public Health, as well as engineering disciplines other than Mechanical Engineering. We train primary care residents in principles of E&S, as well as teaching other residents [e.g., Physical Medicine and Rehabilitation (PMR)]. The E&S faculty are involved in the RMCOEH's Journal Club, participate in CE, and have extensive Outreach activities.

## Highlights/Significant Results

### **Provide a quality ergonomics and safety academic program.**

The courses required for the E&S masters and Ph.D. programs address all of the topics noted in the NIOSH Guidelines for Graduate Programs in Occupational Safety (by The Occupational Safety Academic Training Program Panel) in Appendix E&S-2. As can be seen from the appendix, all topics (both "highly recommended" and "recommended") are covered in M.S. program courses.

### **Accomplish NORA-related ergonomics and safety research and translate it into practice (r2p).**

In addition to field training and on-site visits that are incorporated into the academic curriculum, students assist in the on-site collection of data for on-going ergonomic epidemiology studies. All current E&S students have participated in the data collection (field work) and/or ergonomic analysis (laboratory work) phases of the Upper Limb Musculoskeletal Disorders: Quantifying Risk and/or the Low Back Pain: Quantifying Risk Factors studies. Ph.D. candidates are strongly encouraged to publish three or more related peer-reviewed journal articles rather than prepare a traditional dissertation (which may or may not result in a publication). All recent graduates, and several active students, of the E&S program have presented their research at the annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, which includes a peer-reviewed proceedings.

### **Provide superior E&S-related continuing education, service and outreach.**

Dr. Blosswick has developed a program for ATK Thiokol through which 38 ME graduate students are pursuing their M.S. degrees off-campus. Nearly all of these students take at least one of the E&S core courses and most take two or three. Twenty-three modules integrating ergonomics and safety material into undergraduate engineering curricula have been developed and are made available via the Internet to engineering faculty throughout the world. E&S faculty offer approximately 40 hours of E&S continuing education, service to the University of Utah, 16 hours/year service/consultation to regional industries, and 16 hours/year outreach/training/assistance to regional industries, schools, colleges, and universities annually

### **Accomplish comprehensive interdisciplinary efforts.**

The E&S program collaborates extensively with other disciplines in teaching courses. All three academic cores (IH, E&S, and OM) have participated on major research projects. For example, in summer 2005 an interdisciplinary project (E&S, OM, IH, approx 100 on-site and analysis hours) was completed at Kennecott Utah Copper Corporation (KUCC). The student chapter of the American Society of Safety Engineers (ASSE) includes diverse membership across the RMCOEH and the College of Engineering. Membership fees to join the national association are funded by E&S and OIPRT development funds. ASSE students have participated on hikes, kayak trips, white water rafting, and "movie nights." Dr. Sesek, as faculty advisor to ASSE, has also participated in many of these activities. Dr. Sesek teaches FPMD 6759 (*Occupational Safety and Health Field Trips*), a required course for all cores. Drs. Blosswick and Sesek also lecture regularly in FPMD courses such as FPMD 6750 (*Occupational Safety and Health*) throughout the academic year. The new course *Occupational Safety and Health Solutions*, required by students in the IH, E&S, and OM cores, is team taught by Drs. Sesek (E&S), Collingwood (IH), and Wood (OM). Dr. Sesek recently advised several students from the IH core on their research. The E&S Program also has ongoing collaborative research projects with the

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University of Wisconsin Milwaukee, the University of Wisconsin Madison, and the University of South Florida USF. Collaborative research efforts are being developed with the Alaska Marine Education Association (AMSEA) and are projected with Auburn University.

## Outcomes/Relevance/Impact

The E&S program meets regional needs by: (1) training masters and doctoral level E&S professionals to address the ergonomics and safety issues of Region VIII, (2) targeting our academic and CE programs' contents to meet Region VIII needs, and (3) performing research relevant to the region. During the most recent grant period (7/1/02-6/30/07), there were 14 trainee graduates. Additionally, there were also 4 non-NIOSH supported graduates who completed the E&S engineering core courses (ESEC). During the final year of the grant period (7/1/06-6/30/07), there were 5 full-time E&S engineering students (3 Masters and 2 Ph.D.) and 6 masters-level part-time engineering students in the E&S Program. Since the beginning of the grant period (July 2002), the E&S Program has received approximately \$502,549 in non-ERC grant/contract support and published 12 journal manuscripts, 2 book chapters, 20 proceedings or other print documents, and 9 presentations in professional/scientific society meetings. In our most recent graduates' survey (6/2006), 43% of RMCOEH E&S graduates identified themselves as Senior Professionals or Managers in their work setting.

## Technical Report

The Ergonomics and Safety (E&S) Program was initiated as one of the core academic programs at the University of Utah Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) in 1982. In 1986, Donald S. Bloswick, Ph.D., P.E., CPE was appointed as full-time Program Director. He received tenure in 1993. Dr. Richard Sesek, Ph.D., M.P.H., CSP was hired as a full-time E&S faculty member in December 1999. Dr. Phillip Drinkaus, Ph.D. was hired as an E&S faculty member for AY 05/06, and continues to teach and collaborate on research. Dr. Stacy Bamberg was hired as an M.E faculty member in 2004 and has become an integral part of the research and teaching efforts of the E&S Program, primarily in the area of occupational biomechanics.

The Program is formally recognized as one of eleven graduate teaching and research emphasis areas in the University of Utah Department of Mechanical Engineering (ME) and focuses is on the Master of Science (M.S.-Thesis, M.S.-Non-thesis) and Doctor of Philosophy (Ph.D.) degrees. Students entering this program must have a Mechanical Engineering undergraduate degree or meet the requirements for graduation from a University Mechanical Engineering program. During the most recent grant period (7/1/02-6/30/07), there were 14 trainee graduates. Additionally, there were also 4 non-NIOSH supported graduates who completed the E&S engineering core courses (ESEC). During the final year of the grant period (7/1/06-6/30/07), there were 5 full-time E&S engineering students (3 Masters and 2 Ph.D.) and 6 masters-level part-time engineering students in the E&S Program. Since the beginning of the grant period (July 2002), the E&S Program has received approximately \$502,549 in non-ERC grant/contract support.

Students and graduates of the E&S Program are employed as ergonomics and safety specialists by such companies and agencies as 3M, Abbott Labs, Alliant Tech Systems, Argonaut Insurance, Becton Dickinson, Black Diamond Equipment, Conoco-Phillips, Cephalon, ErgoWeb, Ford Motor Company, The Human Solution, Intel, Intermountain Health Care, Medron, Raytheon, Safety Management Services, Sandia National Laboratory, Schlumberger, Thiokol Corp., University of Utah, US Army, US Navy, Utah Medical, Utah OSHA, The Workers Compensation Fund, and others. Graduates of the RMCOEH have become leaders in occupational and environmental health. In our most recent graduates' survey (6/2006), 43% of RMCOEH E&S graduates identified themselves as Senior Professionals or Managers in their work setting.

The goals, objectives, and results are noted below.

## Goals and objectives of proposed training.

- GOALS:**
1. Provide a quality E&S academic program.
  - 2. Accomplish NORA-related E&S research and translate it into practice.
  - 3. Provide superior E&S-related continuing education, service and outreach.
  - 4. Accomplish comprehensive interdisciplinary efforts.

### Goal 1. Provide a quality ergonomics and safety academic program.

#### **Objective 1a. Offer a comprehensive program of didactic courses that addresses the NIOSH Guidelines for M.S. Programs on Occupational Health and Safety that will facilitate masters-level research and prepare M.S. graduates to assume journeyman occupational safety and health positions in industry.**

The courses required for the E&S masters program address all of the topics included in the NIOSH Guidelines for Graduate Programs in Occupational Safety (by The Occupational Safety Academic Training Program Panel) (both “highly recommended” and “recommended”). M.S. graduates have been very successful in assuming journeyman occupational safety and health positions in industry. In the most recent survey of RMCOEH graduates (June/July 2006), of the 32 graduates who responded to a question relating to professional time allocation, 82% indicated musculoskeletal disorders, 54% indicated hazardous materials, and 39% indicated occupational health and safety program management. These are all topics covered by multiple courses in the E&S curriculum. Of 49 persons responding to the question “What subjects would you remove” none listed any E&S classes. In response to the question “What subjects would you add” the issues of OSHA safety audit/investigation and Behavior Based Safety were noted. While these areas are included in ME 5110/6110 (Introduction to Industrial Safety), additional emphasis is being placed on these subjects. The need for “collaboration between cores” and “...a field trips class...show how a practical ergonomics assessment is performed...how the company is approached” were also noted. While these issues have been addressed in FPMD 6759 (*Occupational Safety & Health Field Trips*), they are emphasized even more in the new course *Occupational Safety and Health Solutions* that was first offered and team taught by Drs. Sesek (E&S), Collingwood (IH), and Wood (OM) in Spring 2007. This course includes on-site student projects composed of teams with representation from across the RMCOEH (IH, OM, and E&S) who will visit several local manufacturing facilities and work together on real world problems.

#### **Objective 1b. Offer a comprehensive program of didactic courses that addresses the NIOSH Guidelines for Ph.D. Programs on Occupational Health and Safety, that will facilitate Ph.D.-level research and prepare Ph.D. graduates to assume positions as corporate-level ergonomics/safety directors, university faculty, or researchers at nationally recognized labs.**

The courses required for the E&S Ph.D. program address all of the topics included in the NIOSH Guidelines for Graduate Programs in Occupational Safety (by The Occupational Safety Academic Training Program Panel) (both “highly recommended” and “recommended”).

#### **Objective 1c. Offer at least one E&S course/year via distance learning.**

Dr. Blosswick has developed a program for ATK Thiokol through which 38 ME graduate students are pursuing their M.S. degrees off-campus. Nearly all of these students take at least one of the E&S core courses and most take from two to four. During the grant period most graduates of the ATK program completed at least three, and most four, of the five E&S core courses in the ME Department. In addition, Dr. Sesek created safety and ergonomics content for the telecommuter training package. Topics included proper workstation set up, lifting and material handling, computer and electrical safety, as well as checklists to help identify potential safety and ergonomics concerns in the home office. In addition, Dr. Sesek helped review the modules produced by other Center faculty. An innovative effort by the E&S Core is the focus on integrating ergonomics and safety material into the undergraduate engineering curricula (including electrical, mechanical, civil, industrial, etc.). Twenty-three modules have been developed and are made available via the Internet to engineering faculty throughout the world. Each module includes, lecture notes, lecture overheads (or PowerPoint file), student handouts and homework/exam problems and solutions (<http://www.mech.utah.edu/ergo/>, click on “Educational”, then click on “Safety Modules”).

## **Goal 2. Accomplish NORA-related ergonomics and safety research and translate it into practice (r2p).**

### **Objective 2a. Involve all E&S trainees (M.S. and Ph.D.) in field and/or laboratory research relating to NORA priority areas.**

In addition to field training and on-site visits that are incorporated into the academic curriculum, students assist in the on-site collection of data for on-going ergonomic epidemiology studies. All current E&S students have participated in the data collection (field work) and/or ergonomic analysis (laboratory work) phases of the Upper Limb Musculoskeletal Disorders: Quantifying Risk study and/or the Low Back Pain: Quantifying Risk Factors study. Students periodically present their preliminary results to faculty and other E&S students to both educate their fellow students and to gain valuable feedback on their research efforts. Presentations take place in courses such as ME 7960 (*Computer Applications and Research Methods in Health and Safety*) where the semester project involves the creation of the introduction and methods section of each student's thesis or dissertation through an iterative process of classroom presentations and submissions of draft writings. Ultimately, students present their research at the annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, which was held on the University of Utah campus in Spring 2003, 04, 05, 06, and 07. Several current E&S students and all recent graduates have presented their research at this symposium. Students are exposed to laboratory research methods in ME 7105 (*Advanced Ergonomics and Occupational Biomechanics Lab*) where they use EMG, force plates, load cells, and optical motion tracking equipment to perform several "classic" ergonomics experiments that reinforce fundamental ergonomics and safety concepts. NORA related E&S research efforts are often initiated by ERC funded Pilot Projects.

### **Objective 2b. Publish the research of every E&S trainee in at least one referred journal and present NORA-related research in conference settings.**

All E&S students are encouraged to submit their research results to peer-reviewed journals. In fact, thesis and dissertations will not be considered by Drs. Bloswick or Sesek unless they have a publishable endpoint that addresses the NORA priority areas. In addition, Ph.D. candidates are strongly encouraged to publish three or more related peer-reviewed journal articles rather than conduct a traditional dissertation (which may or may not result in a publication).

All recent graduates, and several active students, of the E&S program have presented their research at the annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, which includes a peer-reviewed proceedings. The NORA Symposium provides a forum for students (undergraduate and graduate) and young/new investigators from the region (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming) and other interested parties to present and discuss NORA-related research. At the last five conferences research presentations included 12 IH students, 10 OM residents, 20 E&S students, and 5 OIP students. In addition, presentations were given by students or new faculty from other universities (Alaska Marine Safety Education Association, Auburn University, Black Diamond Equipment, and Boise State University. Colorado State University, Montana State University, Montana Tech of the University of Montana, NIOSH Alaska Field Station, Paramed Systems, Salt Lake Community College, South Dakota School of Mines & Technology, Southeastern Oklahoma State University, University of Alberta, University of Iowa, University of Michigan, University of North Carolina – Chapel Hill, University of Washington, Utah Department of Health, Utah State University, and Weber State University). Additionally, Dr. Sesek hosted the Brouha Work Physiology Symposium on the University of Utah Campus (September 2006). Doctoral candidates from the Mechanical Engineering and Public Health programs presented findings from their research. Invitees include a mix of working professionals in ergonomics and safety, members of academic institutions, and consultants specializing in ergonomics. Students and junior faculty had an opportunity to meet and network with established ergonomists from a variety of work environments ranging from government and academic institutions (including NIOSH) to private industry and medicine. The 2006 Brouha Symposium theme was, "Evidence Based Ergonomics: the Epidemiology of Ergonomics."

**Goal 3. Provide superior E&S-related continuing education, service and outreach.**

**Objective 3a. Offer at least one E&S course/year via distance learning.**

Dr. Blosswick has developed a program for ATK Thiokol through which 38 ME graduate students are pursuing their M.S. degrees off-campus. Nearly all of these students take at least one of the E&S core courses and most take from two to four. During the grant period, most graduates of the ATK program completed at least three, and most four, of the five E&S core courses in the ME Department. In addition, Dr. Sesek created safety and ergonomics content for the telecommuter training package. Topics included proper workstation set up, lifting and material handling, computer and electrical safety, as well as checklists to help identify potential safety and ergonomics concerns in the home office. Dr. Sesek also helped review the modules produced by other Center faculty. An innovative effort by the E&S Core is the focus on integrating ergonomics and safety material into the undergraduate engineering curricula (including electrical, mechanical, civil, industrial, etc.). Twenty-three modules have been developed and are made available via the Internet to engineering faculty throughout the world. Each module includes, lecture notes, lecture overheads (or PowerPoint file), student handouts and homework/exam problems and solutions (<http://www.mech.utah.edu/ergo/>, click on "Educational", then click on "Safety Modules".)

**Objective 3b. Offer 40 hours of E&S continuing education annually.**

Drs. Blosswick and Sesek lecture annually on ergonomics at the RMCOEH's "Fundamentals of Industrial Hygiene" CIH preparatory continuing education course (2 hour lecture), semi-annually at the RMCOEH CIH Preparatory course (2 hour lecture) and the Utah Conference on Safety and Industrial Hygiene (session length ranges from 2-8 hours). For example, Dr. Sesek's presentations at the 2006 Conference include, "Industrial Safety and Human Factors" (1.5 hours) and "Ergonomic Assessment of Large Retailer" (1 hour). In AY 05/06 Dr. Blosswick presented two 2-day on-site ergonomics courses (32 hours). This exceeds the 40-hour objective.

**Objective 3c. Provide service to the University of Utah Department of Mechanical Engineering (ME) and Departments outside of Mechanical Engineering.**

Dr. Blosswick represents ME safety interests at the College of Engineering. As the ME safety representative, and more recently as the College of Engineering (CoE) Safety Officer, Dr. Sesek has improved the safety of the ME department and CoE via frequent laboratory audits. Particular emphasis has been placed on the "Senior Design" fabrication area. Results of audits include: improved chemical containment and handling procedures, facility improvements to improve cylinder storage, improvements to the welding shop (including the loan of an Automated Electronic Defibrillator from the E&S Program), recommendations for, and the purchase of, personal protective equipment (PPE) for laboratories, and the integration of safety into the Senior Design sequence of courses (lectures provided by Dr. Sesek). Drs. Blosswick and Sesek present 6-8 hours per year of ergonomics and safety material in undergraduate mechanical engineering classes. Service outside the ME Department includes annual lectures on ergonomics to Physical Therapy (PT) and Occupational Therapy (OT) students by Dr. Blosswick. These lectures account for 4 student contact hours with 30 PT and 20 OT students annually. Dr. Sesek teaches FPMD 6759 (*Occupational Safety and Health Field Trips*) and Bioengineering 6230 (*Musculoskeletal Functional Anatomy for Engineers*). Both of these classes are also taken by students outside the ME Department and the RMCOEH. Drs. Blosswick and Sesek also lecture regularly in FPMD courses throughout the academic year.

Drs. Blosswick and Sesek serve on numerous graduate committees outside ME and Public Health, including Health Education and Promotion, and Bioengineering. Dr. Blosswick also regularly lectures in both the P.T. and O.T. Programs. Dr. Sesek works with students outside of the E&S Program, using his industry contacts to identify and secure collaborating research partners. Most recently Dr. Sesek located a facility for a noise evaluation and reduction intervention study for a RMCOEH IH student and initiated contact with a call-center facility for an eyestrain study for a Health Education and Promotion student. Dr. Sesek was on-site for at least 20 hours, mostly in the evening, to assist with data collection and noise abatement installations for the IH student. A significant reduction in noise was achieved and both the company and student were very pleased with the final results.

**Objective 3d. Provide 16 hours/year service/consultation to regional industries.**

In AY 2005/06 and 2006/07 Dr. Bloswick presented a 2-day ergonomics course to UAW-Ford (25 attendees), and In AY 2005/06 presented a 2-day course organized by the Singapore Ministry of Manpower and Singapore Society of Safety Engineers (200 attendees). Dr. Sesek provided ergonomics and human factors engineering lectures for local and regional businesses including Martin Door, Williams Pipeline, and Kern River Gas. Dr. Sesek has toured several local businesses to suggest safety and health improvements and has coordinated student projects at these facilities through his classes. All projects include faculty oversight and on-site follow up by faculty to ensure that recommendations are sound. The most recent projects have included a significant noise reduction at Black Diamond Equipment which resulted in an Industrial Hygiene Master's degree and a manuscript submission, and ergonomic improvements at Martin Door which included redesigned equipment carts and assessments of physical risk factors associated with various garage door assembly processes.

**Objective 3e. Provide 16 hours/year outreach/training/assistance to regional industries, schools, colleges, and universities.**

In AY 05/06 Dr. Bloswick presented lectures for students in the sophomore, junior, and senior classes of the Industrial Hygiene Program at Utah State University and for the Industrial Engineering Seminar at Auburn University. Dr. Bloswick also presented lectures at Wier Specialty Pumps Corporate Safety meeting in SLC and the AIHA Nevada section. The annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium epitomizes the cooperative spirit of both the E&S Program and the RMCOEH as a whole. Partnerships and collaborations often result. In addition to young and new investigator presentations, the conference participants include regional safety and health practitioners and educators. Their interaction with presenters often results in new ideas for research and helps ensure that occupational safety and health research continues to meet the needs of the safety and health community. For example, Dr. Sesek and Dr. Gilkey of Colorado State University have a joint research project and manuscript submission that resulted from earlier meetings at the NORA conference and interactions with other conference participants. In addition, through the efforts of Dr. Collingwood (IH) the 2006 Regional NORA Conference was "attended" by six persons via Elluminate, a computer based streaming network, and one presentation was made from Southeastern Oklahoma State University and streamed via Elluminate to the conference on the University of Utah campus through this same process.

In AY 06/07 Ph.D. students Bryan Howard (E&S) and Andrew Merryweather (OIP) collaborated and presented a 4-hour short course on ergonomics to Dupont Holographics in Logan Utah. Laboratory tours are always welcome and have included 2<sup>nd</sup> and 3<sup>rd</sup> grade students from Washington Elementary's Open Classroom and HiGear, featuring a full day open laboratory "experiment day," hosted by E&S trainees Sharon Davis and Bryan Howard, for young high school women interested in pursuing engineering education. Dr. Bloswick has supervised numerous ME Senior Design projects that benefit disabled populations. Most notably a novel wheel chair propulsion system that has been submitted for a patent and an "all terrain walker" to assist a local disabled child with "hiking" and walking on unpaved trails. The presence of RMCOEH in the Region and RMCOEH outreach activities are also publicized in the Center Newsletter.

**Goal 4. Accomplish comprehensive interdisciplinary efforts.**

**Objective 4a. Involve E&S students in academic courses with students from other core programs.**

The E&S program collaborates extensively with other disciplines in teaching. The new course, *Occupational Safety and Health Solutions*, first taught in Spring 2007, is team taught by Drs. Sesek (ES), Collingwood (IH), and Wood. (OM) and is required for students of all three cores. Course faculty (Sesek (E&S), Collingwood (IH), and Wood (OM)) were awarded a University teaching grant for development of the course, which has been integrated into the RMCOEH curriculum as the capstone course for all our graduate students, including E&S students. This course takes real world problems presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to solve those problems. Faculty from the School of Business and Dept. of Economics (Dr. Waitzman) also participate in this course, with a plan for all RMCOEH trainees, including E&S, to become familiar with quantification of costs and benefits from proposed interventions. Some graduate students from the School of Business will likely enroll in the class and provide

additional perspectives on interdisciplinary teams and further those interactions that are so essential to success in today's business environment.

**Objective 4b. Involve E&S students in research with students and faculty from other core programs.**

Dr. Bloswick is assisting Public Health doctoral candidate Matt Thiese in his Ph.D. research, particularly with respect to ergonomics. The Upper Limb Musculoskeletal Disorders: Quantifying Risk and Low Back Pain: Quantifying Risk Factors studies best exemplify the cooperation between the cores. These prospective studies require frequent and continued communication and coordination of data between E&S ergonomic analysis teams, Public Health, and OM health assessment teams. Despite the double-blind, extended nature of this research (3 and 4 year studies with several students graduating and others joining the RMCOEH "mid-stream"), data coordination has been seamless and many interesting inter-core projects are resulting from this work. All three academic cores (IH, E&S, and OM) have participated on these projects. In summer 2005, Bryan Howard (E&S trainee) and John Kannas (IH trainee) completed an interdisciplinary project (approx 100 on-site and analysis hours) at Kennecott Utah Copper Corporation (KUCC) involving the measurement and analysis of vibration exposures for seated equipment and vehicle operators. The project was directed by a combined team of E&S (Bloswick, Sesek), IH (Pahler), and OM (Hegmann) faculty.

**Objective 4c. Involve E&S students in professional and informal activities with students and faculty from other core programs.**

The student chapter of the American Society of Safety Engineers (ASSE) is very active and includes diverse membership across the RMCOEH and the College of Engineering. Membership fees to join the national association are funded by E&S development funds. In addition to all E&S students, members include Public Health students (including RMCOEH OM and IH students as well as general MPH students), Electrical Engineers, Chemical Engineers, and Civil Engineers. The ASSE student chapter has sponsored numerous guest lectures (including a NASA scientist, safety professionals from Schlumberger and Safety Management Services, and a human factors expert from Hewlett Packard). Chapter members have been recognized by regional ASSE chapters with scholarships (including the Idaho and Arizona chapters). ASSE activities include both formal and informal meetings outside the university. Students from all cores participated in a team building "ropes" course (an outdoor cooperative exercise). In addition to these more formal, structured activities, ASSE students have participated on hikes, kayak trips, white water rafting, and "movie nights." Dr. Sesek, as faculty advisor to ASSE, has also participated in many of these activities.

**Objective 4d. Involve Drs. Bloswick and Sesek in academic courses and research with students from other core programs.**

Dr. Sesek teaches FPMD 6759 (*Occupational Safety and Health Field Trips*), a required course for all cores. Drs. Bloswick and Sesek also lecture regularly in FPMD courses such as FPMD 6750 (*Occupational Safety and Health*) throughout the academic year. As noted above, the course, *Occupational Safety and Health Solutions*, first taught in Spring 2007, is team taught by Drs. Sesek (ES), Collingwood (IH), and Wood (OM) and is required for students of all three cores. This course represents the results of long-term efforts by RMCOEH faculty to more formally integrate the cores into a "capstone" course with the opportunity to work as a truly collaborative health and safety team (both at the student and faculty levels).

Dr. Sesek recently advised several students from the IH core on their research. Recent projects involved: noise reduction at a manufacturing facility, investigation of potential health effects associated with "dry machining," and an ergonomic evaluation of wrist movements in sewing operations. The Upper Limb Musculoskeletal Disorders: Quantifying Risk and Low Back Pain: Quantifying Risk Factors studies best exemplify the cooperation between the cores. These prospective studies require frequent and continued communication and coordination of data between E&S ergonomic analysis teams, Public Health, and OM health assessment teams. Despite the double-blind, extended nature of this research (3 and 4 year studies with several students graduating and others joining the RMCOEH "mid-stream"), data coordination has been seamless and many interesting inter-core projects are resulting from this work. All three academic cores (IH, E&S, and OM) have participated on these projects.

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**Objective 4e. Involve Drs. Blosswick and Sesek in research with other universities and Health and Safety entities.**

The E&S Program has ongoing collaborative research projects with the University of Wisconsin Milwaukee, the University of Wisconsin Madison, and the University of South Florida USF. Collaborative research efforts have been initiated with the Alaska Marine Education Association (AMSEA) and are projected with Auburn University.

The E&S Program has strong ties to local industry and has enjoyed collaborations with several manufacturing facilities. Several of these projects have resulted in thesis topics, semester projects, and manuscript submissions. Dr. Sesek's FPMD 6759 (*Occupational Safety and Health Field Trips*) has not only brought RMCOEH student and faculty groups to numerous occupational settings (including food processing, medical pharmaceuticals, an Air Force Base, open-pit mining, a metal foundry, an airbag manufacturer, among others), but contacts made during these trips have resulted in both semester projects for other classes (including ME 6120 (Human Factors), ME 6130 (Design Implications), ME 6110 (Introduction to Industrial Safety), and ME 6960 (Engineering Control and PPE)) and thesis research projects.

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., M.D., M.P.H.

## **HAZARDOUS SUBSTANCE ACADEMIC TRAINING (HSAT)**

Rodney Larson, PhD, CIH  
Program Director

## **Abstract: Hazardous Substance Academic Training**

Using NIOSH support, the Hazardous Substance Academic Training (HSAT) program was created at the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) at the University of Utah in February 1993, making it one of the first nine ERCs to receive this award. The primary program goal is to provide an academic course of study and training in the hazardous substances within the academic curriculum of RMCOEH. Focus of this specialty area is to prepare outstanding professionals ready to practice management of and/or research and/or teaching in the subject of handling, exposure control, and disposal of hazardous substances.

Key program components include training of the student to meet the regional needs for individuals with such education (e.g., hazardous substance training, risk assessment training); and certification as having received the 40-hr Hazardous Waste Operator and Emergency Response (HAZWOPER) Training in accordance with requirements in OSHA 1910.120.

Based on NIOSH's HSAT program goals and objectives and after review and discussion, the Rocky Mountain Center's HSAT program was designed to expand on the existing American Board of Engineering Technologies - Applied Science Accreditation Commission (ABET-ASAC) - accredited Industrial Hygiene (IH) program. The HSAT program uses the existing general public health, occupational health and safety, and IH courses and develops additional didactic, research, and hands-on experience to address some unique environmental and occupational health and safety concerns related to hazardous substances. The HSAT program accepts one-two full-time students each year, plus occasional new part-time students.

Graduates of the HSAT program are industrial hygienists possessing additional insights into the unique roles and responsibilities of the professional charged with anticipation, recognition, evaluation and control of occupational and environmental exposures to hazardous substances. The additional training and education these individuals receive position them to assume responsible professional roles in this uniquely specialized area of health and safety.

During the 5-year funding period, twelve students have been supported with HSAT funds. Ten HSAT supported students have graduated. Students have submitted eight manuscripts, three of which have been presented as posters and one in a podium presentation at a national conference on occupational or environmental health and five at the annual NORA Young Investigators conference (an annual two day conference in Spring of each year at the University of Utah. Students have also made four technical presentations at national conferences.

The Academic curriculum is designed to offer the best Master's level preparation available. It comprises didactic, field and research experiences. The interdisciplinary nature of occupational health and safety is emphasized. The program is regularly evaluated utilizing inputs from students and graduates, RMCOEH and HSAT Advisory Committee members, and other University of Utah faculty and national leaders. A significant program revision with course modifications preceded the University's conversion from quarters to semesters in fall, 2000. Ongoing modifications have continued as areas for improvements have been identified. These ongoing efforts ensure the currency and relevance of the HSAT Master's program

The day to day operation of the HSAT program is accomplished by three full-time faculty members. Complementary full time faculty are in safety and ergonomics (2), occupational/environmental medicine (3), and numerous epidemiologists, biostatisticians, injury control specialists, environmental health experts, and other public health faculty. Besides full-time faculty employed by the University, numerous clinical faculty from various government, industry, and academic organizations, support the program and supplement the knowledge base. Recently, increasing the research activities of the IH/HSAT faculty has been emphasized.

## Highlights/Significant Results

### Provide Quality Academic Programs

The RMCOEH IH Program, which the HSAT Program is linked to, was accredited through the entire prior 5-year grant period. It is currently accredited by Applied Science Accreditation Commission of ABET (ASAC of ABET) to September 30, 2011. Relative to curriculum changes, the HSAT Program utilizes a continuous quality improvement/total quality management model for enhancing the academic curriculum. Some of the changes or additions in courses during the last five years includes the combination of the *Industrial Toxicology* course (FPMD 6752) with the Physiology course, and to expand the course contents to include additional information on a wider variety of potentially hazardous materials; the expansion of the Hazardous Substance course (FPMD 6756) to include the hands-on training to meet requirements to also provide students with certification of having taken the 40-hr HAZWOPER Training when they complete this course, addition of a new, capstone course titled *Occupational Health & Safety Solutions* (MEEN 6960) has been added to the requirements for all RMCOEH students, and purpose of that course is to provide both academic and field training on how to identify potential or real concerns, determine methods for remediation, and implement such methods for protection of workers and the environment; and addition of a requirement for HSAT students to take a course on *Quantitative Risk Assessment* (FPMD 6730), which is taught by Dr. Larson, who is a CIH and experienced in conducting quantitative risk assessments for government and industry,. Appendix HSAT-1 lists students enrolled during the grant period.

### Accomplish NORA-related hazardous substance research and translate it into practice (r2p).

All past HSAT students participated in the data collection (field work) and laboratory analysis. They also conducted statistical analysis of the data they obtained in the study and developed their own conclusions and recommendations when applicable for their study/research project. Three of the research projects involved determination of the bioavailability of specific inorganic agents (e.g., silica, zinc oxide, and beryllium from various ores) in synthetic lung fluids. One research project was to develop a computerized training module for respiratory protection to provide to users needing rapid access to training to respond to emergency situation such as 9-11. Recent graduates of the HSAT Program have presented their research at the annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, which includes a peer-reviewed proceedings.

### Provide Superior Continuing Education, Service, and Outreach

The HSAT program has worked extensively with the Continuing Education program over the past 5-year grant period. It continues to work closely with the continuing education program in developing courses containing information pertinent to IH that can be presented via distant learning technology (e.g., computer linking). Based on input from students that have recently completed CE courses on subjects related to HSAT, the HSAT Program's current/traditional CE courses are continually being enhanced with more current information and new courses are being developed. This effort to maintain high quality courses is met with good demand. Examples of some of the CE courses with HSAT emphasis include:

- ✓ Intermediate Industrial Toxicology;
- ✓ HAZWOPER Training;
- ✓ Review Course for Methamphetamine Lab Remediation;
- ✓ Quantitative Risk Assessment;

NIOSH support of HSAT faculty and the CE Program make these courses possible. RMCOEH students also benefit, as we arrange for students to take courses at cost. IH faculty and students participation is significantly aided by NIOSH grant monies. In addition to the course development activities, the HSAT Program has been increasing its outreach over the past few years. For example, the HSAT program has recently increased its outreach activities by collaboration with: Utah State University, Colorado State University, Montana Technical University, Brigham Young University-Utah, Weber State University, and Salt Lake County Community College, Utah Division of Labor, Utah Division of Environmental Quality, US

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Department of Labor, NIOSH, and the US Environmental Protection Agency. These activities will continue in the future.

### **Accomplish comprehensive interdisciplinary efforts.**

The HSAT program collaborates extensively with other disciplines in both research and teaching courses. All three academic cores (IH, E&S, and OM) have participated with HSAT students on major research projects, and collaboration has also involved other programs at the University of Utah, such as the Dept. of Metallurgy, and the Dept. of Pharmacology and Toxicology. For example, the Dept. of Metallurgy in the School of Engineering provided the ICP equipment for analysis of samples for the bioavailability studies. All HSAT students were also required to take a course titled (*Occupational Safety and Health Field Trips* (FPMD 6759), taught jointly by Dr. Sesek of the Ergonomics and Safety Program and Dr. Pahler of the Industrial Hygiene Program. A new course *Occupational Safety and Health Solutions*, replaced the *Occupational Safety and Health Field Trips* course a year ago, and is now required for all students in the HSAT, IH, E&S, and OM cores, and is team taught by Drs. Sesek (E&S), Collingwood (IH), and Wood (OM).

## **Outcomes/Relevance/Impact**

The HSAT program meets regional needs by training masters professionals in the sciences and practices associated with management of hazardous waste programs for waste generators, shippers and disposal companies. The majority of the graduates stay with companies and other organizations in Region VIII that need to address hazardous substance issues. We also work with the CE programs in preparing and presenting courses, such as HAZWOPER Training, Intermediate Industrial Toxicology, and Decontamination Training (methamphetamines) to meet Region VIII needs. A significant amount of research on hazardous substance exposures and controls relevant to region, such as development of a computerized training module for respiratory protection, and bioavailability studies for silica and beryllium were also conducted during the recent grant period (7/1/02-6/30/07). A total of 10 trainees were graduated with the HSAT emphasis in IH for this period.

## **Technical Report**

Goals and Objectives:

The RMCOEH's HSAT Program has been and is in existence due to the need for hazardous substances professionals and because of historic and current NIOSH grant support. We have and will continue to build upon our existing success by further improvement of course content and expanding the student research into new areas. For example, some of the research related to the HSAT program that is planned to be conducted includes:

- solubility of metals and other inorganics in various body fluids (e.g., lung, gastric, intestinal fluids) to determine the capacity of the inorganic to enter the blood distribution system in the human body;
- evaluate the effectiveness of exposure control equipment and methods for materials that may occur in the nanoparticle size;
- Develop computer training program in area related to use of personal protective equipment in emergency or otherwise hazardous environments; and
- evaluate associations between exposures to airborne contaminants from sources such as hazardous waste sites or other emission sources and adverse health effects such as asthma, coronary artery disease or kidney disease.

We have mapped our relevant background and progress against our HSAT Goals and Objectives.

**The objectives of the HSAT program can be classified within four specific goals within the RMCOEH.**

**These goals are as follows:**

- 1.) Provide Quality Academic Programs.**
- 2.) Accomplish NORA research and translate it into practice.**
- 3.) Provide superior continuing education, Hazardous Substance Training, service, and outreach.**
- 4.) Accomplish Strong Interdisciplinary collaboration.**

### **Goal 1: Provide Quality Academic Programs**

#### **Objective 1.a: Enhance HSAT academic classes.**

Through the entire 5-year grant period, the HSAT Program's faculty and staff utilized a continuous quality improvement/total quality management model for enhancing the academic curriculum. The HSAT curriculum is parallel to the processes for the IH Program. At least twice a year, the curriculum was comprehensively reviewed in different venues noted below, and modifications were drafted. The HSAT faculty discussed proposed changes in the Center Executive Committee meetings to ensure there were not unintended consequences on another program. Key among the steps was review by the IH and HSAT Advisory Committee, particularly for external validity and assurance of the program meeting regional needs. All of the following sources were utilized for improvements: (1) Student course evaluations, (2) Faculty experiences, (3) Graduate surveys (every 2 years), (4) IH and HSAT Advisory Committee meetings, (5) RMCOEH Advisory Board meetings (every 6 months), (6) HSAT Program Director meetings, and (7) the NORA research agenda. Changes to the curriculum were made at least three times over the 5-year period of the grant. Before making these changes, we also carefully evaluate accreditation changes. **Changes made over the past five years to the HSAT curriculum in response to this process that are particularly relevant to the HSAT program include: (i) revisions, improvement and a new course director (Dr. Pahler) for the 3-credit *Hazardous Substances* course ([FPMD 6756](#)), which is the cornerstone of the HSAT program, (ii) addition of a new *Quantitative Risk Assessment* course (FPMD 6730) that has been added to the requirements for the HSAT program and is taught by Dr. Larson, who is experienced in conducting quantitative risk assessments for government and industry, and (iii) we revised the *Industrial Toxicology and Physiology* (FPMD 6752) to improve the content of the course and include more information related to hazardous waste site chemicals, and added interdisciplinary instruction from Dr. Wood, MD.**

#### **Objective 1.b: Annually evaluate, replace, purchase, and calibrate IH equipment and instrumentation.**

NIOSH Funding over the last 5-years has been effectively used to assure our equipment is properly maintained and periodically calibrated by manufacturers at recommended frequencies. NIOSH funds were also used to update the various types of analytical and field monitoring equipment used by professionals working with developing and maintaining programs related to hazardous materials. For example, recently purchased equipment related to HSAT type activities includes a GRIMMS Model 1.109 aerosol spectrometer. This instrument was purchased for the purpose of evaluating particle count, mass and particle size. It will be used to evaluate aerosols in work or hazardous waste environments, or downwind of hazardous waste sites. Additionally, these funds were used to purchase five SKC programmable sampling pumps to permit the collection of additional air quality information.

#### **Objective 1.c: Increase RMCOEH Web site information and resources.**

We significantly improved our website based information available for both internal and external purposes to include information on our HSAT program. Information was added to this website to indicate the training is intended to prepare professional personnel to properly carry out their responsibilities in the hazardous substance response and site remediation activities authorized by SARA. We also revised and updated our RMCOEH website to include a link to the HSAT web site. This serves as an important reference for both our current students, as well as for our alumni and other OSH professionals.

#### **Objective 1.d: Increase recruiting to maximize student quality and diversity, including women and minorities.**

(See also the Diversity Recruitment section discussed later.) We have been increasing our recruitment activities for all students, but are particularly focused on Diversity Recruitments. The IH and HSAT Advisory

Committee meetings continue to include this as one of the main agenda items for discussion and problem solving. Our efforts have previously been focused on a combination of contacts and visits to local university programs and our RMCOEH website. Our plans for the coming year include more active recruitment of under-represented minorities through more visits to appropriate professionals at these schools, involvement in high school programs by the University of Utah, and visits to Tribal Colleges (the closest of which is approximately 500 miles).

**Objective 1.e: Train and graduate a minimum of two HSAT students each year who are qualified to take the ABIH Board Examination**

The HSAT Program graduates two to three trainees per year. They are qualified to sit for the Certified Hazardous Materials Management (CHMM) examination after fulfilling the practice requirement.

**Objective 1.f: Increase the rate at which the HSAT Program graduates obtain CIH certification.**

Similar to the IH Program, we are encouraging our graduates to obtain CIH certification. This is difficult due to the length of practice requirement prior to examination eligibility. However, the examination may well be the best external measure of competence due to the national, standardized nature of the examination and test pool. Accordingly, we are vigorously encouraging our graduates to plan to obtain CIH certification. Although we have not previously tracked these data, the HSAT Program has set this as a new Objective and will be evaluating this over the coming grant period. Later, we plan to quantify our performance expectations and improve upon them as needed, including adding this as one of the main methods to assess our curriculum (see Objective 1a above).

**Objective 1.g: Maintain ABET accreditation.**

The RMCOEH IH Program, including our HSAT Program, was among the first three accredited by ABET in 1989. We are currently accredited through 2011. We were told the primary reason that we had been given less than 5 years of accreditation for this most recent cycle was that we needed to show better funding mechanisms, and the addition of the MPH degree with emphasis in IH was late in the accreditation processes. The addition of the MPH degree to the accreditation process was done in response to the increased credit requirements of the Council on Education for Public Health for their degree programs. These issues of concern have now been corrected: the obtaining of additional funding was accomplished with the signing into law of Senate Bill 159 in 2005, an off-set tax credit for industries that contribute a fraction of their workers compensation insurance tax to the RMCOEH, and the additional documentation requested for the MPH degree program has been submitted to ABET. We submitted a request for extension of our accreditation in December, 2006 which was approved this summer.

**Goal 2: Accomplish NORA research and translate it into practice.**

**Objective 2.a: Conduct NORA related research.**

The RMCOEH HSAT Program has expanded its NORA related research activities markedly in the past 5-year period. In addition to evaluating methods for determining routes and concentrations of exposure, research is being conducted to determine the actual dose received by the exposed individual and the potential routes of movement (e.g., in the attached system) once it enters the body. Additional effort is being placed on quantifying risk and not just performing risk assessment. For example, students and faculty are involved in evaluation of exposures to air contaminants, especially those that may be from hazardous waste sites, and the onset of asthma. Students and faculty have been involved in research to determine the relation between exposures to specific contaminants, such as PCBs and Dioxins, and the potential association with gynecological disorders in women (e.g., endometriosis), or with effects on pregnancies, such as premature deliveries. Involvement in developing the research plan, conducting the research, and analyzing data provides the HSAT student with the necessary knowledge to understand what is necessary for a credible research project. NIOSH training program support allows students to participate in such research. The HSAT Program is also involved in a major epidemiological study, the National Children's Study (NCS). The IH and HSAT Program faculty are leading the efforts nationally in quantification and estimation of exposures for the NCS. Dr. Larson is the Leader for the environmental monitoring program for the University of Utah Vanguard Site of the NCS, and is also a member of the NCS Central Committee Environmental Team. He has input into the decisions on the agents to be monitored, method of monitoring and analysis, and frequency of monitoring.

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Because of the hypotheses of various exposures potentially leading to certain adverse health effects, Hazardous Substances are one of the primary exposures that are of interest in the NCS. Appendix HSAT 15 shows an EnviroMapper image indicating the specific location in Region 8 of facilities regulated by the USEPA that handle materials designated as hazardous waste. Hazardous waste is any by-product of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Thus, we are particularly interested in this study to quantify the potential for adverse health effects to offspring from exposures to women during pre-pregnancy as well as during pregnancy. HSAT students are involved in our research to see if there are effects from exposures to specific contaminants, such as PCBs and Dioxins, and the potential association with gynecological or obstetrical disorders in women. There are also multiple public and industry-funded projects that students can elect to participate in, such as validation of methods used for monitoring exposure of women and/or children to potentially hazardous contaminants from waste handling sites.

**Objective 2.b: Develop additional interdisciplinary research efforts.**

RMCOEH HSAT faculty have increased our interdisciplinary research activities. Recent successful collaborations are reflected in the following examples of studies involving RMCOEH HSAT faculty:

- Occupational and environmental research, including measurements and coordination of the environmental measurement teams for the National Children's Study, with a focus on helping develop methods for monitoring exposures to women that work in jobs outside the home. The University of Utah site for the National Children's Study is composed of faculty and researchers from pediatrics, psychology, obstetrics, nursing, internal medicine, and genetics.
- Environmental and indoor monitoring coordination for the Urban Systems Research Center (USRC) project, where exposure data will be collected on men and women relative to both their residence and their work environments. The USRC project is composed of university faculty from environmental engineering, geology, urban planning, environmental psychology, family medicine, and architecture.

Several other joint or collaborative research projects are also in the discussion or planning phase at this time that will assist in expanding the knowledge of HSAT faculty and students.

**Objective 2.c: Implement a research plan to develop HSAT students' research capabilities.**

All HSAT students in the MSPH program are required to complete a major project with publishable results or a thesis. The HSAT students in the MPH program are required to conduct a mini-research project (e.g., literature search and/or data analysis of already existing data) and put in a format to be submitted for publication. There are many existing projects available from which students may select. However, students are not restricted to work on an existing RMCOEH HSAT project. They may develop a proposal in an area of their particular interest. HSAT students may also be involved in this applications' NORA research project targeting the mining industry. Additionally, they may elect to participate in an industry or preceptorship site research project. Many students perform industry externships in the summer, which also may afford access to data or data collection for a research project in select circumstances. To further assist the students, the IH and HSAT programs have developed a student manual. This manual has been completed and is distributed to all HSAT and IH students at the beginning of each fall semester. The manual is a useful tool for students and will be updated as needed. Part of the plan to develop student research capabilities involves presentations. To gain this experience, students are encouraged to present their research design in seminars with appropriate critiquing of methods or results with presentations in Departmental seminars. All HSAT students are required to present their findings at the annual Regional NORA Young/New Investigators Symposium, which includes the development of a peer reviewed conference proceedings.

**Goal 3: Provide superior continuing education, Hazardous Substance Training, service, and outreach.**

**Objective 3.a: Increase student participation in local and national professional organizations and conferences.**

Students are encouraged to become members of at least one professional organization. Fees for student membership in the Air and Waste Management Association (AWMA), Utah Section are paid by the HSAT program using non-NIOSH funds. Cost for travel for students who have presentations accepted at meetings,

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such as at the AWMA annual meeting, is provided. Many alumni continue to maintain professional organization affiliations and many are involved in administrative and technical committees in these organizations.

**Objective 3.b: Increase the HSAT program's internet available resources to assist students.**

A description of the HSAT program and program curriculum requirements is located on the Rocky Mountain Web Site ([www.rmcoeh.utah.edu](http://www.rmcoeh.utah.edu)). Through this web site, the user can also link to course syllabi and other pertinent information. We are developing additional on-line resources to assist both academic students and external OSH professionals.

**Objective 3.c: Continue to present high quality and timely Hazardous Substance Training courses.**

Based on external input from past courses, the current effort in our Hazardous Substance Training courses is adequate. Examples of continuing education courses that have HSAT emphases presented, in addition to the HST program's courses, include:

- Quantitative Risk Assessment;
- Industrial Toxicology;
- Decontamination Specialist Training; A review course for methamphetamine lab remediation.

NIOSH support of HSAT faculty and students, and the HST Program at the Rocky Mountain Center helps the Center provide a comprehensive occupational health and safety program. HSAT faculty and student participation are significantly aided by NIOSH grant monies.

**Objective 3.d: Develop partnerships with regional universities; local, state, tribal and federal governments; and private organizations.**

The HSAT program engages in strategic linkages with relevant regional and national organizations. This includes involvement in the Region VIII Training Program Grantees. During the just completed budget period, collaboration occurred with: Utah State University, Colorado State University, Weber State University, Utah Division of Labor, Utah Division of Environmental Quality, US Department of Labor, NIOSH, and the US Environmental Protection Agency. We will be increasing our involvement in these outreach activities in the coming grant period. For example, we will be increasing our Outreach efforts to the Tribal Colleges in Region VIII.

**Goal 4: Accomplish Strong Interdisciplinary collaboration.**

**Objective 4.a: Continue to develop interdisciplinary research and teaching activities with other OSH disciplines.**

The HSAT Program is engaged in strong interdisciplinary collaborations involving research as well as teaching activities. These collaborative efforts were augmented in the past grant period, and we have active planning to further increase those efforts in the coming grant period.

We have successfully increased our extramurally funded research efforts. There are two main credits for this success. First, we have hired research oriented faculty members who have become engaged in research projects as well as the pursuit of additional funding. Second, we have relied upon an interdisciplinary approach in many proposals. The utility of an interdisciplinary approach is that by its nature, it strengthens research proposals as well as resulting in more robust results. Five years ago, there was little extramurally funded research in HSAT at the RMCOEH. Now, as discussed previously, there is significant extramurally funded research that is HSAT specific (details above):

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## **INDUSTRIAL HYGIENE (IH)**

Rodney Larson, PhD, CIH  
Program Director

## **Abstract: Industrial Hygiene**

Industrial Hygiene trainees have been (and continue to be) in significant demand because of the value of graduate level trained industrial hygienists as members of team-based occupational health and safety programs. The University of Utah's Industrial Hygiene (IH) program was established in 1978 as part of the original Education and Research Center (ERC) grant of the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH). The IH program has been continuously supported by NIOSH funding since. The vision statement of the IH program is: "To be the World's best graduate level industrial hygiene training program."

Eighteen students were enrolled during the grant period. A total of sixteen students graduated. Graduates of the Master's degree program are well prepared to meet current and projected challenges in occupational health and safety. The quality of the training program continues to be nationally recognized. Graduates have been (and continue to be) very successful in obtaining responsible positions within the region and the nation (100% placement rate in the last five years), have proven to be competent practitioners, and consistently contribute to the development of the profession.

The RMCOEH IH academic curriculum has been (and is) designed to offer the best master's level IH preparation available. It comprises classroom, field, and research experiences. Course work is designed to meet the Applied Sciences Accreditation Commission of ABET (ASAC of ABET) requirements. These requirements include significant theory, laboratory, and field experience. Research has been significantly increased by the new faculty, and student research projects routinely address National Occupational Research Agenda (NORA) priority areas, as well as global issues. The program is regularly critiqued by students and graduates, Industrial Hygiene and Hazardous Substance Advisory Committee members, other University of Utah faculty, and national leaders in IH.

The day to day operation of the IH program has been (and continues to be) accomplished by three new full-time faculty members. Complementary full time faculty are in safety and ergonomics, occupational/environmental medicine, and numerous epidemiologists, biostatisticians, injury control specialists, environmental health experts, and other public health faculty. In addition to full-time faculty employed by the university, numerous adjunct Industrial Hygiene faculty from various government, industry, and academic organizations, support the program and supplement the knowledge base.

## **Highlights/Significant Results**

The following is a summary of progress in accomplishing the overall goals for the Industrial Hygiene program for the 2002 - 2007 grant period.

### **Provide Quality Academic Programs**

The RMCOEH IH Program was accredited through the entire prior 5-year grant period. It is currently accredited by Applied Science Accreditation Commission of ABET (ASAC of ABET) to September 30, 2011. Relative to curriculum changes, the IH Program utilizes a continuous quality improvement/total quality management model for enhancing the academic curriculum. Some of the changes or additions in courses during the last five years includes the combination of the *Industrial Toxicology* course (FPMD 6752) with the Physiology course, and to expand the course contents, and to include additional information on a wider variety of potentially hazardous materials; addition of a new, capstone course titled *Occupational Health & Safety Solutions* (MEEN 6960) has been added to the requirements for all RMCOEH students, and purpose of that course is to provide both academic and field training on how to identify potential or real concerns, determine methods for remediation, and implement such methods for protection of workers and the environment; and addition of a course on *Quantitative Risk Assessment* (FPMD 6730) as an elective for IH students (required for HSAT students) has been added and is taught by Dr. Larson, who is a CIH and experienced in conducting

quantitative risk assessments for government and industry,. Appendix IH-1 lists students enrolled during the grant period.

### **Accomplish NORA Research and Translate it into Practice**

The RMCOEH IH Program markedly expanded its NORA related research activities in the prior 5-year grant period, and continues to do so. In addition, the IH Program is involved in a major epidemiological study. This particular study is a major prospective cohort study, the National Children's Study (NCS). The IH Program faculty are the national leaders in the area of exposure assessment for the NCS. Dr. Larson is the Leader for the environmental monitoring program for the University of Utah Vanguard Site of the NCS, and is also a member of the NCS Central Committee Environmental Team. He has input into the decisions on which agents to be monitored, method of monitoring and analysis, and frequency of monitoring. Because of the hypotheses of various exposures potentially leading to certain adverse health effects, focus is being place on monitoring for various chemical and biological agents in the Mother's workplace pre and post pregnancy for those Mothers that work outside the home. Thus, we are particularly interested in this study for exposures to working women, as we will be performing detailed IH measurements of occupational exposures to be assessed for potential adverse health effects in women prior to, during, and after pregnancy. Students are also involved in research to evaluate monitoring methods, such as direct read aerosol spectrometers for particulates, and determine the relation between exposures to specific contaminants, and routes of contamination as well as total exposure concentrations of specific agents (e.g., solvents, pesticides, etc.). All IH students are required to complete a research project for graduation and In contrast to 5 years ago, IH students now have an array of opportunities to participate in the above research projects currently underway at the RMCOEH.

### **Provide Superior Continuing Education, Service, and Outreach**

The IH program has worked extensively with the Continuing Education program over the past 5-year grant period. It continues to work closely with the continuing education program in developing courses containing information pertinent to IH that can be presented via distant learning technology (e.g., computer linking). Based on input from students that have recently completed CE courses on subjects related to IH, the IH Program's current/traditional CE courses are continually being enhanced with more current information and new courses are being developed. This effort to maintain high quality courses is met with good demand. Examples of some of the CE courses with IH emphasis include:

- ✓ Industrial Toxicology;
- ✓ Comprehensive IH Review (for those wanting to take CIH exam);
- ✓ Review Course for Methamphetamine Lab Remediation;
- ✓ Quantitative Risk Assessment;

NIOSH support of IH faculty and the CE Program make these courses possible. RMCOEH students also benefit, as we arrange for students to take courses at cost. IH faculty and students participation is significantly aided by NIOSH grant monies. In addition to the course development activities, the IH Program has been increasing its outreach over the past few years. For example, the IH program has recently increased its outreach activities by collaboration with: Utah State University, Colorado State University, Montana Technical University, Weber State University, Salt Lake County Community College, Utah Division of Labor, Utah Division of Environmental Quality, US Department of Labor, NIOSH, and the US Environmental Protection Agency. These activities will continue in the future.

### **Accomplish Strong Interdisciplinary Collaboration**

The RMCOEH IH Program has supported strong interdisciplinary activities over the past 5-year grant period. It continues to actively support strong interdisciplinary interaction in all of the aspects of our program. We are a clear example of the success that will come when one embarks on interdisciplinary efforts. For example, five years ago, there was little extramurally funded research in IH at the RMCOEH. Today, that is completely turned around, in no small part to hiring faculty who believed in interdisciplinary efforts. There are multiple

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examples, such as the fact that we also have been involved with the State of Washington Nanotechnology Research Center in evaluating new methods for monitoring nanoparticles in work environments.

Our IH Program's academic aspects, while previously very good, have improved due to engaging in increased interdisciplinary efforts. The IH program collaborates extensively with other disciplines in teaching courses. Currently, several courses are team taught with faculty from different OSH disciplines. For example, FPMD 6752, "Introduction to Industrial Toxicology and Physiology" is co-taught by Drs. Larson (IH) and Wood (OM). Faculty representing the three RMCOEH core programs (Drs. Collingwood (IH/HSAT), Sesek (E&S/OIPRT), and Wood (OM/IH)) were awarded a University teaching grant in 2006 to develop of a new summative course, "Occupational Safety and Health Solutions," MEEN 6960. This course has now been developed and is a capstone course for all RMCOEH graduate students. This course takes real world problems presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to identify methods to solve those problems. Faculty from the School of Business (Dr. Smith-Crowe) and Dept. of Economics (Dr. Waitzman) also participate in this course to familiarize students with methods for quantification of costs and benefits associated with proposed interventions. These interdisciplinary activities will provide both students and faculty with the opportunity to interact with other researchers, as well as representatives of various types of industry, and learn about new health and safety technologies and how to apply them.

## Outcomes/Relevance/Impact

Sixteen IH students graduated during this grant time period. There have been significant, positive, changes to the IH Program. Key of which is the replacement of prior faculty with three new faculty with a variety of expertise. Courses continue to be developed and existing courses were improved. Hands-on and professional experiences are emphasized, both in placement of students for internships (preceptorships), and in conducting their research. Six students have presented at professional meetings and/or made poster presentations at national conferences. With the new faculty, there has been an increased emphasis in a broader range of research, which has increase interest of undergraduate students in other universities to be interested in this program. As a result, students graduating from the IH program available through the RMCOEH the Education and Research Center, they are well prepared for the professional practice of industrial hygiene.

## Technical Report

Program Goals and Objectives:

Much of the success of the RMCOEH's IH Program can be attributed to NIOSH support. Our current plan is to build upon our existing success by further improvement of course contents, expanding student research and increasing our interdisciplinary collaboration on research and teaching.

**The objectives of the IH program can be classified within the RMCOEH's four specific goals. Those goals are as follows:**

- 1.) Provide Quality Academic Programs.**
- 2.) Accomplish NORA Research and Translate it into Practice.**
- 3.) Provide Superior Continuing Education, Service, and Outreach.**
- 4.) Accomplish Strong Interdisciplinary Collaboration.**

### **Goal 1. Provide Quality Academic Programs**

**Objective 1.a:** Maintain ASAC-ABET accreditation.

Result: Accomplished The RMCOEH IH Program, including our HSAT Program, was among the first three accredited by Applied Science Accreditation Commission of ABET (ASAC of ABET) in 1989. We were

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accredited through 2007. After submitting information on the changes request, in August, 2007 this accreditation has been extended to September 30, 2011.

**Objective 1.b:** Enhance IH academic classes.

Result: Accomplished The IH Program utilizes a continuous quality improvement/total quality management model for enhancing the academic curriculum. At least twice a year, the curriculum is comprehensively reviewed in different venues noted below, and modifications are drafted. IH faculty discuss proposed changes in the IH and HSAT Advisory Committee to ensure there are not unintended consequences on another program. Key among the steps is review by the IH and HSAT Advisory Committee, particularly for external validity and assurance of meeting regional needs. All of the following sources are utilized for improvements: (1) Student course evaluations, (2) Faculty experiences, (3) Graduate surveys (every 2 years), (4) IH and HSAT Advisory Committee meetings, (5) RMCOEH Advisory Board meetings (every 6 months), (6) IH Program Director meetings once per year, and (7) the NORA research agenda. Changes to the curriculum are made at least annually, with the goal to be to proactive. We carefully weigh accreditation changes. Changes made to the curriculum in response to this process include expansion of the Industrial Toxicology course from two credits to three to address a broader range of chemical agents, provide more current information on distribution of chemical toxins in the body, and allow more education in physiology. The Advanced Industrial Hygiene course has also been modified to increase coverage of new technology for monitoring (e.g., equipment and methods for monitoring and analyzing nanoparticles). Additionally, a new course on Quantitative Risk Assessment to teach how to use epidemiological and toxicological information to derive exposure limits for various chemical agents has been added to the curriculum.

**Objective 1.c:** Annually evaluate, replace, purchase, and calibrate IH equipment and instrumentation.

Result: Accomplished Successful research grants have added to the instrument and equipment inventories over the past 5-year grant period and are anticipated to continue. NIOSH funds have also been effectively used to update the various types of standard analytical and field monitoring equipment that IHs need to understand how to use. This equipment includes octave band analyzers for noise surveys and programmable noise dosimeters, aerosol spectrometers for particulate monitoring and analysis, and programmable precision sampling pumps and calibration instruments.

**Objective 1.d:** Involve students in the AIHA-Student Section meetings and engage in professional organizational activities.

Result: Accomplished We encourage the IH students to attend at least 3 of the 4 quarterly meetings per year (Student Section of the American Industrial Hygiene Association - Utah Chapter), as well as to become members of at least one professional organization. The IH Program continues to foster this relationship by paying for the student memberships in the AIHA Student Section with non-NIOSH funds. The purpose of this objective is to begin the integration of the students into their future professional organization. Students also volunteer to assist at and attend the Annual Utah Conference on Safety and Industrial Hygiene. Travel costs for students who have presentations accepted at meetings, such as at the AIHCE, are also provided as additional incentive. We have succeeded in having students awarded best poster of the conference awards at AIHCE.

**Objective 1.e:** Increase recruiting to maximize student quality and diversity, including women and minorities.

Result: Accomplished (See also the Diversity Recruitment section later in this narrative.) These activities were initiated in the prior 5-year grant period and this continues to be an area of increasing emphasis not only for the IH program but for all RMCOEH programs. This topic continues to be a focal point for at least one of the semi-annual IH Advisory Committee meeting each year. The committee has provided insight and suggestions for future improvement. We have contacted the undergraduate science programs at the University of Utah, undergraduate IH Program at Utah State University, and the science programs at Weber State University. Plans include contacting of Westminster College. Suggestions from the IH Advisory Committee, which will be

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followed up by Dr. Larson, include identifying additional engineering and life science students and providing students with information about career opportunities in OSH. An e-mail based letter will be mailed to undergraduate career counselors across the nation to make them aware of IH as a career path and provide them an internet address of the RMCOEH for further information.

Numerous inquires about the IH program have resulted from our Internet site. The site will be maintained and improved. Besides the web site, the IH program, in cooperation with the CE program, has staffed a booth at the annual AIHCE to recruit and provide information to potential students. This activity will also be continued.

**Objective 1.f:** Train and graduate a minimum of three IH students each year who are qualified to take the ABIH Board Certified Industrial Hygienist (CIH) Examination

Result: Accomplished The IH Program has graduated an average of more than three graduates per year over the past 5-year grant period. We are continuing and accelerating that pace currently.. They are qualified to sit for the CIH examination after fulfilling the practice requirement.

**Objective 1.g:** Increase the rate at which the IH Program graduates obtain CIH certification.

Result: We believe that this has been accomplished, however as there is no mandate for IHs to obtain Certification in Industrial Hygiene status this remains somewhat unclear and is an area of major focus for the coming 5-year grant period. CIH status is widely considered to be a good marker for quality and implied IH professional abilities. This may be one of the best outcome measures of quality for our IH Program. As well, it may be the best outcome indicator for the quality of an IH Program due to the national nature and standardization of the examination. Accordingly, even though we have not previously tracked these data, the IH Program has set this as a new Objective and will be evaluating this over the coming grant period. Later, we plan to quantify our performance expectations and improve upon them as needed.

## **Goal 2: Accomplish NORA Research and Translate it into Practice.**

**Objective 2.a:** Emphasize NORA related areas.

Result: Accomplished Over the past 5-year grant period the RMCOEH IH Program has emphasized NORA related research. The program also continues to markedly expand its NORA related research activities. The IH Program is involved in a major epidemiological study. This particular study is a major prospective cohort study, the National Children's Study (NCS). The IH Program faculty are the national leaders in the area of exposure assessment for the NCS. Dr. Larson is the Leader for the environmental monitoring program for the University of Utah Vanguard Site of the NCS, and is also a member of the NCS Central Committee Environmental Team. He has input into the decisions on which agents to be monitored, method of monitoring and analysis, and frequency of monitoring. Because of the hypotheses of various exposures potentially leading to certain adverse health effects, focus is being place on monitoring for various chemical and biological agents in the Mother's workplace pre and post pregnancy for those Mothers that work outside the home. Thus, we are particularly interested in this study for exposures to working women, as we will be performing detailed IH measurements of occupational exposures to be assessed for potential adverse health effects in women prior to, during, and after pregnancy. Students are also involved in research to determine the relation between exposures to specific contaminants, and routes of contamination as well as total exposure concentrations of specific agents (e.g., solvents, pesticides, etc.). We also have industry funded studies and students are invited to work on those studies. Other applications are pending.

**Objective 2.b:** Develop and implement multidisciplinary research efforts.

Result: Accomplished Over the past 5-year grant period, the RMCOEH IH Program has developed and implemented major interdisciplinary efforts. Successful research activities increasingly require an interdisciplinary effort as nearly all of our successful applications above demonstrate. For example, the NCS involves faculty from pediatrics, psychology, obstetrics, nursing, and genetics. Another study is the Urban

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Systems Research Center (USRC) project, where exposure data will be collected on men and women relative to both their residence and their work environments as applicable. The USRC project is composed of university faculty from environmental engineering, geology, urban planning, environmental psychology, family medicine, and architecture.

**Objective 2.c:** Implement a research plan to develop IH students' research capabilities.

Result: Accomplished Over the past 5-year grant period, the IH Program has implemented a research plan to develop IH students' research capabilities. All IH students are required to complete a research project for graduation. Students in the MSPH program are required to conduct an in-depth research project and the MPH students are also required to conduct a research project but to a lesser level of intensity (e.g., MSPH research will likely involve laboratories to conduct a study, and MPH research may be based on field observations or statistical analyses of existing data). To further assist the students, IH faculty work closely with the student to help develop the research plan, assist in arranging resources needed to conduct the study (e.g., chemical reagents, monitoring and/or analytical equipment, miscellaneous supplies), provide guidance on interpretation of data (e.g., application of statistics), and assist in preparing the study report.

In contrast to five years ago, IH students now have an array of opportunities to participate in the above research projects currently underway at the RMCOEH. This application's proposed NORA research project targeting the mining industry is also planned to heavily rely on student involvement and become another major source of student projects. Many students perform industry externships in the summer, which frequently afford access to data or data collection for a research project in select circumstances. Many of the other student research projects are directly or indirectly supported with NIOSH funds as they are part of the formal MSPH degree requirements and are an integral part of student training. Students consistently present their research design in RMCOEH seminars with appropriate critiquing of methods or results and also present in Departmental seminars, regional meetings, and national conferences. They are required to present their findings at the annual Regional NORA Young/New Investigators Symposium, which includes the development of a peer reviewed conference proceedings.

### **Goal 3: Provide Superior Continuing Education, Service, and Outreach.**

**Objective 3.a:** Increase the IH program's electronic resources.

Result: Accomplished The IH program has worked closely with the continuing education program over the past 5 years and continues to work closely with the CE Program in developing courses containing information pertinent to IH that can be presented via distant learning technology (e.g., computer linking).

**Objective 3.b:** Continue to present high quality and timely CE courses in IH.

Result: Accomplished Over the past 5-year grant period, the IH Program has presented numerous high quality CE courses. Based on input from students that have recently completed CE courses on subjects related to IH, the IH Program's current/traditional CE courses are continually being enhanced with more current information. This effort to maintain high quality courses is met with good demand. Examples of some of the CE courses with IH emphasis presented in addition to hazardous substances CE course include:

- ✓ Industrial Toxicology;
- ✓ Comprehensive IH Review (for those wanting to take CIH exam);
- ✓ Review Course for Methamphetamine Lab Remediation;
- ✓ Quantitative Risk Assessment;

NIOSH support of IH faculty and the CE Program make these courses possible. RMCOEH students also benefit, as we arrange for students to take courses at cost. IH faculty and students participation is significantly aided by NIOSH grant monies.

**Objective 3.c:** Develop outreach partnerships with: regional universities; local, state, tribal and federal governments; and private organizations.

Result: Accomplished Over the past 5-year grant period, the IH Program has developed increased outreach activities with these entities. This has involved a large array of different types of governmental and private industries. During the just completed budget period, collaboration has occurred with: Utah State University, Colorado State University, Montana Technical University, Weber State University, Salt Lake County Community College, Utah Division of Labor, Utah Division of Environmental Quality, US Department of Labor, NIOSH, and the US Environmental Protection Agency. These activities will continue, and in some areas expand in the future particularly to emphasize diversity recruitments.

#### **Goal 4: Accomplish Strong Interdisciplinary Collaboration.**

**Objective 4.a:** Continue to develop interdisciplinary research and teaching activities with other OSH disciplines.

Result: Accomplished The RMCOEH IH Program has activity developed interdisciplinary research and teaching activities over the past 5-year grant period. The IH Program actively supports strong interdisciplinary interaction in all of the aspects of our program. We are a clear example of the success that will come when one embarks on interdisciplinary efforts. For example, five years ago, there was little extramurally funded research in IH at the RMCOEH. Today, that is completely turned around, in no small part to hiring faculty who believed in interdisciplinary efforts. There are multiple examples, such as the fact that we also have been involved with the State of Washington Nanotechnology Research Center in evaluating new methods for monitoring nanoparticles in work environments.

Our IH Program's academic aspects, while previously very good, have improved due to engaging in increased interdisciplinary efforts. The IH program collaborates extensively with other disciplines in teaching courses (see ADM Interdisciplinary discussion and matrix Appendix IH-2). Several courses are team taught with faculty from different OSH disciplines. For example, FPMD 6752, "Introduction to Industrial Toxicology and Physiology" is co-taught by Drs. Larson (IH) and Wood (OM). Interdisciplinary Field Trips was co-taught by Drs. Sesek (OIPRT and E&S), Pahler (HSAT) and Edwards (OM). This course offers the opportunity for demonstrations of team approaches in OSH activities at in-plant settings, and frequently involves OHNs and now has been improved through the merging of this course with the OSH Solutions course which follows. Faculty representing the three RMCOEH core programs (Drs. Collingwood (IH/HSAT), Sesek (E&S/OIPRT), and Wood (OM/IH)) were recently awarded a University teaching grant for development of a new summative course, "Occupational Safety and Health Solutions," MEEN 6960. This course is planned to become the capstone course for all our graduate students (See Appendix IH-3) for Course Description). This course will take real world problems presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to solve those problems. Faculty from the School of Business (Dr. Smith-Crowe) and Dept. of Economics (Dr. Waitzman) have agreed to participate in this course, with a plan for all RMCOEH trainees, including IHs, to become familiar with quantification of costs and benefits from proposed interventions. Some graduate students from the School of Business will likely enroll in the class and provide additional perspectives on interdisciplinary teams and further those interactions that are so essential to success in today's business environment. These interdisciplinary activities will provide both students and faculty with the opportunity to interact with other researchers and learn about new technologies and how to apply them.

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**NORA RESEARCH**  
Kurt T. Hegmann, MD, MPH  
Program Director

## Abstract: NORA Research

Over the past 5 years, the RMCOEH markedly increased its involvement in many areas of the National Occupational Research Agenda. We have placed significant emphasis on including practical r2p aspects in our research projects. We have developed a Statistical and Economic Evaluation Unit to support RMCOEH faculty and trainee projects, as well as to further OSH research into related fields. We also have worked on communicating those results to the communities for maintaining state-of-the-art OSH programs in Region VIII. RMCOEH involvement in NORA-related research includes both major extramurally funded research proposals, all of which involve trainees, as well as internally funded student projects. A few of these include:

- ✓ A large scale, prospective cohort study on distal upper extremity disorders. This study also involves the University of Wisconsin and Medical College of Wisconsin. The OM, OIPRT and E&S programs are all involved and all trainees in all of those programs participate.
- ✓ A large scale, prospective cohort study on low back pain. This study involves the University of Wisconsin, and Texas A&M University. This study similarly includes all trainees and all faculty in the OM, E&S and OIPRT programs. We have been informed that this is the only such major study in the US on low back pain.
- ✓ A third major prospective cohort study, the National Children's Study (NCS) which has been initiated by the University of Utah and others to study health effects in children and involves the measurement of occupational and environmental factors in expectant mothers. This project relies on the IH core and HSAT programs, with some nominal support from the OM core.
- ✓ Numerous industry-funded projects have been undertaken. These involve work with the mining, minerals processing, and chemotherapeutics industries.
- ✓ Additional research applications are currently pending.

We track two main research measures: 1) Extramural funding and 2) Publications. These measures are showing positive trends.

## Highlights/Significant Results

The highlights of the RMCOEH's NORA Program Products included:

- A large scale, prospective cohort study on distal upper extremity disorders. This study also involves the University of Wisconsin and Medical College of Wisconsin. The OM, OIPRT and E&S programs are all involved and all trainees in all of those programs participate. We applied for a competing renewal. This study is one of the largest, most intensive studies of these problems ever accomplished. It has involved 2 states, 15 employers and 920 workers.
- A large scale, prospective cohort study on low back pain. This study involves the University of Wisconsin, and Texas A&M University. This study similarly includes all trainees and all faculty in the OM, E&S and OIPRT programs. We have been informed that this is the only such major study in the US on low back pain. We applied for a competing renewal and have written this project as a NORA project in our competing renewal. This study is the most comprehensive epidemiological evaluation of LBP problems ever accomplished. It has involved 3 states, 30 employers and 817 workers.
- A third major prospective cohort study, the National Children's Study (NCS) which has been initiated by the University of Utah and others to study health effects in children and involves the measurement of occupational and environmental factors in expectant mothers. This project relies on the IH core and HSAT programs, with some nominal support from the OM core.

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- Numerous industry-funded projects have been undertaken. These involve work with the mining, minerals processing, and chemotherapeutics industries.
- Additional research applications are currently pending.
- Wonderful NORA research-related training experiences for our masters and doctoral trainees.

These studies are resulting in ground-breaking results that are just beginning to be presented and published. The databases and ongoing surveillance will provide fertile ground for students, junior and senior investigators for years to come.

## **Outcomes/Relevance/Impact**

The main outcomes of the RMCOEH's NORA Research program have been to be the only ERC to have succeeded in landing two major prospective cohort studies on MSDs. Additionally, we have succeeded in becoming a leading center for the National Children's Study that involves major involvement of the IH and HSAT programs to quantify whether and at what levels, chemical and other exposures result in adverse fetal and developmental effects.

Prospective cohort studies are the most powerful observational studies possible. Yet, they take years to develop meaningful data. Thus, all of these major studies will take years to develop major outcomes. However, the LBP project is close to final data analyses for the first 3 years of the study. Thus, we are also close to being able to start the process of major publications.

Impacts from all of these research studies are quite likely to be so major that it is not an exaggeration to be able to predict that the results are likely to have lasting impacts that outlast the careers of all those currently involved.

## **Technical Report**

### Assessing Regional Research Needs

The RMCOEH has incorporated regional needs into its research plan. The regional needs have been viewed as critical to developing a research program and plan for the RMCOEH.

The RMCOEH made major efforts for its NORA II Town Hall meeting of February 27, 2006 and by all accounts, it was an unqualified spectacular success. NIOSH personnel commented that it was "by far" the best of these meetings. Over 150 were in attendance, making it by far the largest such meeting in the US. Roundtables were held to solicit as much information as possible. We have carefully evaluated the input, as this is an entirely new source of regional NORA needs. The information is posted on our website.

The Center continues to implement an extensive needs assessment program to research the NORA priority needs of each state within the Center's designated region by needs assessment surveys and questionnaires. Impact evaluations, which also address future needs, are distributed on an every-other-year basis; the most recent survey was sent in 2006. In addition, the Center will continue to use the needs assessment network of the ERC Continuing Education Directors. A regional assessment to occupational physicians was conducted in 2004.

### Providing Administrative and Technical Research Support

Royce Moser, Jr., M.D., MPH, Professor and RMCOEH Deputy Director served as the Director of Research Planning throughout the grant period (2002-07). In this role, he provided leadership for the faculty in planning and accomplishing research that will concentrate on NORA priority areas. Dr. Moser's leadership was exemplified by the outstanding accomplishments over the past grant period in building major research infrastructure in the RMCOEH.

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Dr. Moser specifically directs planning that will focus the Center's research on a limited number of priority areas. This permits development of more extensive expertise than might occur with dilution of efforts by attempting to study all priority areas. He works to ensure that projects complement other RMCOEH research and support NORA objectives. He was assisted in these efforts by Ms. Deanne Clegg, Research Coordinator. Ms. Clegg assumed the duties of maintaining a tracking system that has proven particularly helpful in monitoring grant submissions and results by program and by investigator.

#### Coordinating Interdisciplinary Research

Dr. Moser previously initiated actions to develop a research plan for the Center, and he scheduled six month reviews by RMCOEH faculty to assure the plan remains relevant and pertinent. Through the most recent year, efforts continued to include investigators from other components of the Department of Family and Preventive Medicine (DFPM). This thrust has resulted in interdisciplinary NORA projects and other research projects that have taken advantage of the diverse capabilities, including biostatistical and epidemiologic, of DFPM. One of the outgrowths of these efforts has been the formalization of an Economic and Statistical Evaluation Unit of the RMCOEH that is led by Norm Waitzman, PhD, an internationally known economist who specializes in robust economic analyses of industrial health and safety issues, particularly of the construction industry.

The \$2M NIOSH Distal Upper Extremity musculoskeletal disorders and the \$1.5M Low Back Pain grants are evidence of such interdisciplinary efforts in that Drs. Hegmann (Occupational Medicine) and Bloswick (Ergonomics and Safety) are lead RMCOEH investigators. The primary Biostatistician on the grants is from Pediatrics (Dr. Holubkov), reflecting the efforts to expand interactions with disciplines outside the RMCOEH.

#### Training Graduate Students with NORA Focus

The OIPRT and E&S Programs are developing young PhD trained investigators all of whom target NORA priority areas for research efforts. The masters students in all cores also target NORA priority areas for nearly all the theses and research projects.

Drs. Moser, Bloswick, Hegmann, Holmes, and Larson continue to provide constructive critiques to junior investigators. The senior faculty also serve as mentors for the junior faculty and students. All senior faculty also serve as mentors and provide assistance to junior faculty and students who are accomplishing other research efforts. These efforts will continue during the remainder of the grant period. Faculty regularly assist each other and students in developing papers to be peer-reviewed for consideration for publication in professional journals.

Utilizing NORA Support funds, RMCOEH faculty are again organized the Fourth Annual NORA Young/New Investigators Symposia in Salt Lake City scheduled for April 19-20, 2007. Financial support was provided to young and new investigators, in particular those who have obtained support, to facilitate their attendance at the meeting. This effort is specifically designed to enable junior faculty and students to gain experience in developing a presentation and then presenting it to peers and colleagues. This venue has been particularly successful in accomplishing these goals.

#### Administration of Pilot Project Research Training Program

The RMCOEH reapplied for a Pilot Projects program in the coming competing renewal cycle (2007-2012). The Center voluntarily dropped its prior Pilot Projects program when despite much effort, the previous operational rules were unworkable for Region VIII.

#### Administration of Continuing Education/Outreach Program to apply NORA Research Findings

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Another set of program products from our NORA Research Program involve educational activities (Continuing Education, Outreach and other). Many of our outreach activities also involve findings from this program and examples are listed in the Outreach section.

We utilized our NORA research projects to great effect in educational fora. The RMCOEH delivered an extremely successful 2-day State of the Art Conference on Musculoskeletal Disorders on February 23-24, 2006. This conference was intentionally designed to present up-to-date research findings from our 2 prospective cohort studies, along with the results of other major researchers performing NORA related research. While the final results are not in, from all accounts, this meeting was highly successful in meeting and exceeding expectations of excellence. We plan to hold the Second Annual State of the Art Conference on Musculoskeletal Disorders this coming March 1-2, 2007.

The Regional NORA New/Young Investigators symposium represents another significant effort to promote occupational safety and health throughout the region. Regional investigators are invited to participate in the symposium to exchange research activities. In addition, the Center exhibits at national and regional association meetings as available funds allow. The CE program will also continue its established marketing efforts to disseminate course information, including listings in association journals as well as collaborating with the University Health Sciences Center departments to ensure widespread notification of upcoming programs. Current marketing strategy combines direct mail with electronic notification through targeted lists.

Lastly, the RMCOEH Newsletter, "Gateway to OSH" is an additional platform to promote NORA research findings and is currently in its fourth edition.

### **Responsible Conduct of Science Training**

***Current Instruction and Student Participation:*** For over 3 years, all RMCOEH trainees have been required to complete HIPAA and IRB training during orientation. Orientation activities typically take place during the trainee's first week. Trainees do not participate in research activities prior to HIPAA and IRB training. All faculty and staff are required to complete this training. Certificates of completion are documented. Courses, such as Epidemiology, Introduction to Biostatistics, and Social Context of Public Health, also incorporate training in responsible research practices into their curriculum. Ethics are also major topics in Ergonomics, Human Factors Engineering, and Design Implications. The topic of research ethics is also covered extensively in Computer Applications and Research Methods. RMCOEH trainees also attend (beginning 2006) a new mandatory noon lecture series that includes among other topics: conflict of interest, responsible authorship, handling of misconduct, data management, data sharing and animal welfare. Attendance logs are kept to track trainee attendance, and faculty attendance is encouraged. Additional topics include how to write research grant proposals and how to manage research laboratories. Specific reference is made to the University of Utah's Policy and Procedures Manual, with particular emphasis on Part 8, Chapter 10, Sections V and VI, which cover "Student Academic Conduct" and "Student Professional and Ethical Conduct," respectively (<http://www.admin.utah.edu/ppmanual/8/8-10.html>). Faculty participate. Attendance is tracked.

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# **OCCUPATIONAL INJURY PREVENTION RESEARCH TRAINING (OIPRT)**

Donald Bloswick, PhD, PE, CPE  
Program Director

## **Abstract: Occupational Injury Prevention Research Training**

The OIPRT program was initiated as an allied academic program in the RMCOEH in July 2001 for two years, then unfunded. In response to critiques, we then extensively revised the curriculum, including development of the two interdisciplinary emphases and in July 2005, the revised OIPRT program was again funded by NIOSH as an interdisciplinary effort between the Department of Mechanical Engineering (ME) and the Public Health Program in the Department of Family and Preventive Medicine (DFPM). The RMCOEH OIPRT Program is a unique occupational injury prevention program in that it is a combination of two different, but related and well integrated emphases within one program. In keeping with CDC Program Announcement 01036 (March 13, 2001), one emphasis is "Occupational Safety Engineering" (OSE), resulting in a Ph.D. in Mechanical Engineering, and the other is "Occupational Injury Epidemiology" (OIE), resulting in a Ph.D. in Public Health. The coordination and integration of these programs occurs at the programmatic, teaching and research levels. We believe the value in having such strong interdisciplinary training is the fact that OSH problems are increasingly complex, requiring interdisciplinary approaches to problem solving. The relationship between these two emphases is illustrated in Figure 1.

For planning purposes, most doctoral candidates are expected to complete their doctoral degree over 4 years. The primary use of the NIOSH funds is to support the training of these students. Admission to the OIPRT training program differs between the two emphases. For the OSE emphasis, students must have a bachelors or masters degree in engineering or a related field. For the OIE emphasis, most successful applicants will have completed a MSPH or comparable degree. Bachelor-trained students are potentially successful applicants, however to be successful, some extenuating circumstance must be present such as years of experience or an outstanding undergraduate academic record. Incoming students for the Ph.D. program in Mechanical Engineering are required to have competency in the basic engineering sciences. This competency may be demonstrated through: (1) graduation from an engineering curriculum, (2) completion of the Fundamentals of Engineering exam, (3) record of appropriate course work, or (4) successful completion of appropriate course work while in residence. Trainees are selected on the basis of academic record, GRE scores, industrial experience, and letters of recommendation. Incoming students for the Ph.D. program in Public Health are required to have demonstrated capabilities in science including mathematics. This competency is typically demonstrated through: (1) graduation from an appropriate scientific background, (2) high Quantitative scores on the GRE exam, (3) record of appropriate course work, or (4) successful completion of appropriate course work. Trainees are selected on the basis of academic record, GRE scores, experience, and letters of recommendation.

The OIPRT training program is structured to produce Ph.D.-level OSE and OIE professionals. Graduates will be able to assume lead roles in these occupational injury safety, epidemiology and control programs in industry, labor, and government. In May 2004, one student graduated from the OSE program (Phillip Drinkaus; Faculty Advisor: Dr. Bloswick) and another graduated in December 2004 (Mark Warner; Faculty Advisor: Dr. Bloswick). Dr. Warner is a corporate-level safety professional in industry (Sandia National Laboratory) and Dr. Drinkaus is an academic researcher.

In June 2007 there was one student in the OSE emphasis (Andrew Merryweather, Faculty Advisor: Dr. Bloswick) and one in the OIE emphasis (Matthew Thiese, Faculty Advisor Dr. Hegmann). Another trainee (Steve Oostema, Faculty Advisor Dr. Hegmann) was appointed in August of 2007. The interdisciplinary nature of the OIPRT is producing an excellent training program. These three current OIPRT trainees are truly outstanding, e.g., having already begun to assume major roles in our cohort studies that augur very well for the future.

RMCOEH OIPRT graduates are given extensive, interdisciplinary NORA-related research experiences in this training program. Thus, the proposed training program also facilitates the completion of NORA-related research by program graduates. The OIPRT Program focuses on the following National Occupational Research Agenda (NORA) areas: (1) Musculoskeletal Disorders of the Upper Extremities, (2) Traumatic Injuries, (3) Low Back Disorders, (4) Special Populations at Risk, (5) Control Technology and Personal Protective Equipment, (6) Exposure Assessment Methods, and (7) Risk Assessment Methods. We are particularly addressing issues in the mining, manufacturing, healthcare, and transportation sectors.

The RMCOEH's OIPRT program meets regional needs by: (1) training doctoral level OIPRT professionals to address the well documented, elevated fatality and injury problems of Region VIII, (2) targeting our academic and CE programs' contents to meet Region VIII needs, (3) active involvement of the OIPRT Program Advisory Committee and the RMCOEH Advisory Board which raise Regional issues for us to address, and (4) tying future research endeavors to the very successful NORA II Town Hall meeting held in February 2006 (n>150 participants with extensive regional needs developed and posted on our website). Our graduate surveys confirm our success in training our students to meet challenges and underscore the RMCOEH OIPRT Program's ability to continue to meet regional needs.

In addition to the core responsibilities for providing education and training to OIPRT trainees, the OIPRT faculty provides OIP-related instruction to students in IH, HSAT, E&S, OMR and Public Health, as well as engineering disciplines, other than Mechanical Engineering. We train primary care residents in principles of OIP, as well as teaching other residents [e.g., Physical Medicine and Rehabilitation (PMR)]. We also teach medical students. The OIPRT faculty sponsor the RMCOEH's Journal Club. The OIPRT faculty also regularly participate in CE. We have extensive Outreach activities.

The RMCOEH OIPRT program continues to evolve in response to faculty guidance, ongoing feedback from graduates and students, and in response to professional and community needs. The OIPRT's OIE emphasis also changed modestly in response to our program's responses to new Council on Education for Public Health (CEPH) mandates. These changes are generally resulting in a stronger, more effective training program. The RMCOEH anticipates further growth of the OIPRT program and increased success in its efforts to train highly skilled OIPRT doctorates. Thus, there is strong rationale and need for the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) Occupational Injury Prevention Research Training (OIPRT) Program.

## **Highlights/Significant Results**

### **Provide quality OSE and OIE academic programs.**

The curriculum is in place and additional courses have been designed to improve it further. In addition to the course curriculum, the RMCOEH OIPRT Program provides extensive formal and practical experiences in the development, implementation and execution of research programs. There is presently one student in the OSE emphasis (Andrew Merryweather, Faculty Advisor: Dr. Blowski) and two in the OIE emphasis (Matthew Thiese, Faculty Advisor Dr. Hegmann, and Steve Oostema, Faculty Advisor Dr. Hegmann).

### **Accomplish NORA-related OSE and OIE research and translate it into practice (r2p).**

OIPRT program faculty and students are currently involved in extensive research studies. All current OIPRT students have participated in the data collection (field work) and/or ergonomic analysis (laboratory work) phases of the Upper Limb Musculoskeletal Disorders: Quantifying Risk study and/or the Low Back Pain: Quantifying Risk Factors study. They are strongly encouraged to publish three or more related peer-reviewed journal articles rather than prepare a traditional dissertation (which may or may not result in a publication). All graduates, and two of the active students, of the OIPRT program have presented their research at the annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, which includes a peer-reviewed proceedings. Since the beginning of the grant period (July 2002), the OIPRT Program has published 11 journal manuscripts, 2 book chapters, and 26 proceedings or other print documents. Now that the cohort studies baseline databases are largely complete, we anticipate an acceleration of the rate of publications.

### **Provide Superior Service, Outreach, and Support of Continuing Education**

While the OIPRT Program is relatively young, we have initiated OIPRT-related CE activities. We anticipate increasing this effort in the near term as the program matures. OIPRT faculty have extensive Outreach activities.

### **Accomplish comprehensive interdisciplinary efforts.**

The OIPRT program collaborates extensively with RMCOEH core programs in teaching courses. OIPRT faculty and students have collaborated with the three academic cores (IH, E&S, and OM) on major research projects. The student chapter of the American Society of Safety Engineers (ASSE) includes diverse membership across the RMCOEH and the College of Engineering. Membership fees to join the national association are funded by E&S and OIPRT development funds. ASSE students have participated on hikes, kayak trips, white water rafting, and "movie nights." Dr. Sesek, as faculty advisor to ASSE, has also participated in many of these activities. Dr. Sesek teaches FPMD 6759 (*Occupational Safety and Health Field Trips*), a required course for all RMCOEH core programs and OIPRT trainees. Drs. Blowski and Sesek also lecture regularly in FPMD courses such as FPMD 6750 (*Occupational Safety and Health*) throughout the academic year. The new course *Occupational Safety and Health Solutions*, is required by OIPRT trainees as well as students in the IH, E&S, and OM cores. It is team taught by Drs. Sesek (E&S), Collingwood (IH), and Wood (OM). The OIPRT Program also has ongoing collaborative research projects with the University of Wisconsin Milwaukee, the University of Wisconsin Madison, and the University of South Florida USF. Collaborative research efforts are being developed with the Alaska Marine Education Association (AMSEA) and are projected with Auburn University.

### **Outcomes/Relevance/Impact**

The OIPRT training program is structured to produce Ph.D.-level OSE and OIE professionals. Graduates will be able to assume lead roles in these occupational injury safety, epidemiology and control programs in industry, labor, and government. One of the two graduates from the OIPRT Program (Mark Warner) is a corporate-level safety professional in industry (Sandia National Laboratory) and the other is an academic researcher (Phillip Drinkaus). All current OIPRT trainees have participated in the data collection (field work) and/or ergonomic analysis (laboratory work) phases of the Upper Limb Musculoskeletal Disorders: Quantifying Risk study and/or the Low Back Pain: Quantifying Risk Factors study. OIPRT Program trainees have been included in the authorship of 8 journal manuscripts, 1 book chapter, and 24 proceedings or other print documents.

## Technical Report

The OIPRT program was initiated as an allied academic program in the RMCOEH in July 2001 for two years, then unfunded. In response to critiques, we then extensively revised the curriculum, including development of the two interdisciplinary emphases and in July 2005, the revised OIPRT program was again funded by NIOSH as an interdisciplinary effort between the Department of Mechanical Engineering (ME) and the Public Health Program in the Department of Family and Preventive Medicine (DFPM). The RMCOEH OIPRT Program is a unique occupational injury prevention program in that it is a combination of two different, but related and well integrated emphases within one program. In keeping with CDC Program Announcement 01036 (March 13, 2001), one emphasis is "Occupational Safety Engineering" (OSE), resulting in a Ph.D. in Mechanical Engineering, and the other is "Occupational Injury Epidemiology" (OIE), resulting in a Ph.D. in Public Health.

In May 2004, one student graduated from the OSE program (Phillip Drinkaus; Faculty Advisor: Dr. Bloswick) and another graduated in December 2004 (Mark Warner; Faculty Advisor: Dr. Bloswick). Dr. Warner is a corporate-level safety professional in industry (Sandia National Laboratory) and Dr. Drinkaus is an academic researcher. In June 2007 there was one student in the OSE emphasis (Andrew Merryweather, Faculty Advisor: Dr. Bloswick) and one in the OIE emphasis (Matthew Thiese, Faculty Advisor Dr. Hegmann). Another trainee (Steve Oostema, Faculty Advisor Dr. Hegmann) was appointed in August of 2007.

The goals, objectives, and results are noted below.

Goals and objectives of proposed training.

- GOALS:**
1. Provide quality OSE and OIE academic programs.
  - 2. Accomplish NORA-related OSE and OIE research and translate it into practice (r2p).
  - 3. Provide superior OIPRT-related continuing education, service and outreach
  - 4. Accomplish comprehensive interdisciplinary efforts.

### **Goal 1. Provide quality OSE and OIE academic programs.**

#### **Objective 1a. Offer a quality interactive program of engineering and public health didactic courses that addresses the NIOSH Guidelines for Programs in OIP.**

The OSE and OIE curricula cover all of the topics noted in NIOSH Guidelines for Programs in Occupational Injury Prevention. This interdisciplinary OIPRT program plan is attracting high quality applicants, and their productivity is evidence of a quality program.

#### **Objective 1b. Facilitate PhD-level research to prepare OIPRT trainees to assume positions as corporate safety directors, injury epidemiologists, university faculty, or researchers at nationally recognized labs.**

The RMCOEH OIPRT Program views formal and practical instruction in all phases of research to be of critical importance to the foundation of a successful career. Trainees receive extensive education in research methods that include: hypothesis conceptualization, proposal application writing, proposal submission, hypothesis testing, data quality control, quality assurance, power, sample size, research team building, research team management, etc. This training occurs over a broad, but coordinated range of courses, e.g. ME 7960 (Computer Applications and Research Methods) where the semester project involves the creation of the introduction and methods section of each student's thesis or

dissertation through an iterative process of classroom presentations and submissions of draft writings. Critical teaching also occurs in field experiences, which simply cannot be taught well in classroom settings (e.g., how to manage a research team). Current trainees have already participated in at least one grant submission. One current trainee, Matt Thiese, has already participated in approximately 6 grant applications, having written much of one proposal, with some guidance. One graduate, Phillip Drinkaus, is PI on a contract with UAW-Ford. We maintain highly rigorous, massive databases of over 20M datapoints each, and outfit our laboratory with state of the art equipment. These resources also help to teach research principles and practical aspects of research to our trainees.

## **Goal 2. Accomplish NORA-related OSE and OIE research and translate it into practice (r2p).**

### **Objective 2a. Involve all OSE and OIE trainees in field and/or laboratory NORA research.**

The OIPRT program is currently extensively involved in 2 major prospective cohort studies on MSDs (\$3.5M). Those studies also assess slips, trips, falls and other acute accidental injuries. One has recently been successfully funded for another 3 years. The other on low back pain is written into the ERC grant as a NORA project. We have other grant applications pending on other areas of OIP. Both trainees are currently involved in both studies, thus they are truly carrying out groundbreaking NORA research that has highly practical r2p aspects.

All current OIPRT students participate in the data collection (field work) and/or job analysis (laboratory work) phases of the Upper Limb and/or Low Back Pain cohort studies. Students are involved in data analyses and periodically present preliminary results to both educate their fellow students and faculty to gain valuable feedback on their research efforts, as well as experience. (The interdisciplinary nature of this program fosters positive feedback from such experiences due to the varied backgrounds.) Students are exposed to laboratory research methods in ME 7105 (Advanced Ergonomics and Occupational Biomechanics Lab) where students use EMG, force plates, load cells, and optical motion tracking equipment to perform experiments that reinforce fundamental ergonomics and safety concepts. The research of one OIP trainee (Andrew Merryweather, OSE) involves an investigation into safety issues (slips/falls) and ergonomic issues (ankle/knee stresses) while walking on uneven surfaces.

### **Objective 2b. Present an annual conference through which students and junior faculty can present NORA-related research.**

The RMCOEH OIPRT Program views formal presentations as a critical part of the path from a doctorate to a productive research career. We actively encourage all OIPRT students to formally present multiple times in the course of their PhD training. The NORA Young/New Investigators Symposium provides a forum for students (undergraduate and graduate) and young/new investigators from Region VIII and other interested parties to present and discuss NORA-related research. At the last five conferences research presentations included 12 IH students, 10 OM residents, 20 E&S students, and 5 OIPRT students. The OIPRT trainees bring a different, but highly relevant aspect to this conference, and all are required to present at this conference at least once. In addition, Dr. Sesek hosted the Brouha Work Physiology Symposium on the University of Utah Campus (September 2006) where doctoral candidates were invited to present recent findings from their research. We also encourage national and international conference presentations, with travel financial assistance when possible.

**Objective 2c. Publish the research of every OSE and OIE trainee in at least one refereed journal.**

Since the revision of the OIPRT program in 2005, trainees are now encouraged, and actively mentored, in the production of peer-reviewed manuscripts. To facilitate the transition to peer reviewed publications, the NORA Young/New Investigators Symposium includes the production of a peer-reviewed proceedings and presentation at this conference is required by all OIPRT trainees. Also, thesis and dissertations are not considered by OIPRT faculty to be ready for defense unless they have a publishable endpoint that addresses NORA priority area(s). In addition, Ph.D. candidates are encouraged to publish 3 related peer-reviewed publications rather than conduct a traditional dissertation (which may or may not result in a publication). Since the beginning of the grant period (July 2002), OIPRT Program trainees have been included in the authorship of 8 journal manuscripts, 1 book chapter, and 24 proceedings or other print documents. Since joining the OIPRT Program in 2005, Matt Thiese (current OIPRT-OIE student), has had 8 published abstracts and 4 conference proceedings. He has given professional presentations in Canada (Society for Epidemiologic Research) and Switzerland (PREMUS). Two manuscripts are currently under review. Andrew Merryweather (current OIPRT-OSE student), has co-authored 1 book chapter and 2 peer-reviewed publications (currently under review), and 6 conference proceedings.

**Goal 3. Provide superior OIPRT-related continuing education, service and outreach.**

OIPRT faculty continue to perform consultative services that will continue.

**Objective 3.a Provide outstanding Continuing Education courses. Conduct at least 2 CE programs annually.**

While the OIPRT Program is relatively young, we have significant OIPRT-related CE activities that are being delivered. These course offerings include our immensely successful State of the Art Conference on Musculoskeletal Disorders. This conference targeted one aspect of OIP that was repetitively identified in many of our industry sector-specific roundtables at the SLC NORA II Townhall meeting as a major need. While that course also targeted Health Care Providers and Ergonomists, it contained major course content on injury epidemiology and safety. That course will be repeated this winter. Each of the first five annual Regional (NORA) Young/New Investigators Symposiums have included significant content relating to epidemiology and injury prevention. The NORA II Townhall meeting agenda is being reviewed in more detail to identify additional needs likely to be successful in a CE venue.

**Objective 3.b. Maintain high quality outreach activities.**

OIPRT faculty have increased Outreach efforts over the past grant period and will maintain such activities. We deliver OIPRT-related lectures regionally, e.g. most recently a keynote address at a conference in Grand Junction, CO that targeted the "Western Slope" of Colorado. The presence of RMCOEH in the Region and RMCOEH outreach activities are also publicized in the RMCOEH Newsletter.

**Goal 4. Accomplish comprehensive interdisciplinary efforts.**

**Objective 4.a. Augment current interdisciplinary teaching activities**

The OIPRT program collaborates extensively with other disciplines in teaching courses. It includes students in both the Mechanical Engineering and Public Health Ph.D. programs and is, by its very nature, an interdisciplinary effort. Students in the OSE emphasis (working toward a Ph.D. in Mechanical Engineering) take 5 courses (14 credits) in the Department of Family and Preventive Medicine and students in the OIE emphasis (working toward a Ph.D. in Public Health) take 3 courses

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(6 credits) in the Dept. of Mechanical Engineering (See Figure 1). Currently, several courses are team taught with faculty from different OEH disciplines. For example, the Interdisciplinary Field Trips is co-taught by Drs. Sesek (OIPRT and E&S), Pahler (HSAT) and Edwards (OM). This course offers the opportunity for demonstrations of team approaches in OEH activities at in-plant settings, and frequently involves OHNs. Faculty representing the 3 RMCOEH core programs Drs. Sesek, Collingwood (IH), Sesek (E&S), and Wood (OM) were awarded a University teaching grant for development of a new summative course, "Occupational Safety and Health Solutions," MEEN 6960-3. This course has been established as the capstone course for all our graduate students, including OIPRT students. This course addresses real world problems, presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to solve those problems. Faculty from the School of Business and Dept. of Economics (Dr. Waitzman) also participate in this course, with a plan for all RMCOEH trainees, including OIPRTs, to become familiar with quantification of costs and benefits from proposed interventions. Some graduate students from the School of Business will likely enroll in the class and provide additional perspectives on interdisciplinary teams and further those interactions that are so essential to success in today's business environment.

#### **Objective 4.b. Foster interdisciplinary research efforts**

The OIPRT program collaborates extensively with other disciplines in research activities. Currently, nearly all of the research conducted through the RMCOEH is interdisciplinary with involvement of at least two core disciplines e.g., the 2 MSD cohort studies involve major efforts by all OIPRT, E&S and OM faculty, as well as every student and resident. These NIOSH-funded studies best exemplify the cooperation between the OSE and OIE emphasis areas and the three ERC cores. These prospective studies require frequent and continued communication and coordination of data between Andrew Merryweather, team leader for the Low Back Job Exposure Assessment Team (OSE student; supervision by Dr. Bloswick), and Matthew Thiese, Research Associate of the Statistical Analyses and Data Management Team, (OIE student; supervision by Dr. Hegmann) and the Health Outcomes Assessment Teams (OM Program). Despite the double-blind, multi-year nature of these projects with several students graduating and others joining the RMCOEH "mid-stream", data coordination has been seamless and the OIPRT trainees are learning how to manage and coordinate these numerous research issues under direct faculty supervision. In addition to OIPRT students, other RMCOEH students representing all three academic cores (IH, E&S, OM) are working on these projects. Also, a retrospective cohort study of firefighters and police officers in Utah is commencing. Another large OIPRT project is pending peer review. The master's thesis committees are generally comprised of at least one member outside the primary discipline (e.g., 1 OSE, 1 OIE and 1 biostatistician). Thus, the OIPRT faculty have built a program that fosters and actively demonstrates major, interdisciplinary research. Interdisciplinary research efforts are often initiated by ERC funded Pilot Projects.

#### **Objective 4c. Involve OSE and OIE students in professional and informal activities with students and faculty from other core programs.**

The student chapter of the American Society of Safety Engineers (ASSE) is very active and includes diverse membership across the RMCOEH and the College of Engineering. Members include OIPRT, Public Health, E&S, and all other center cores as well as Electrical Engineers, Chemical Engineers, and Civil Engineers. The ASSE student chapter has sponsored numerous guest lectures and ASSE activities include both formal and informal meetings outside the university. Students from the OIPRT Program and all ERC cores have participated in outdoor team building exercises. In addition to these more formal, structured activities, ASSE students have participated on hikes, kayak trips, white water rafting, and "movie nights" along with faculty.

Figure 1. Illustration of Integration of OSE & OIE

<b><u>Occupational Safety Engineering (OSE)</u></b>		<b><u>BOTH</u></b>		<b><u>Occupational Injury Epidemiology (OIE)</u></b>	
		ME 6960-3	Occupational Safety and Health Solutions		
ME 6040	Quality Assurance	ME 6960-6	Interdisciplinary Seminar in Occupational Injury Prevention (0 credits)	FPMD 6340	Infectious Disease Epidemiology
ME 6130	Design Implications for Human Machine Systems	ME 7960	Computer Applications & Research Methods in Occupational Injury Prevention	FPMD 7100	Biostatistics II
ME 6960-4	Work Physiology and Occupational Heat Stress (2 credits)	FPMD 6101	Introduction to SAS Programming	FPMD 7140	Survival Methods and Logistic Regression
ME 7100	Advanced Ergonomics and Occupational Biomechanics	FPMD 6607	Injury Surveillance (2 credits)	FPMD 7310	Advanced Research Design
ME 7110	System Safety	FPMD 6703	Occupational Injuries and Diseases	FPMD 7530	Design Implementation and Evaluation of Public Health Programs
ESS 6560	Experimental Design and Analysis	FPMD 7300	Epidemiology II	FPMD 7640	Advanced Social Context of Medicine
		FPMD 7720	Occupational Epidemiology		
6 courses 17 credits		8 courses 20 credits		6 courses 18 credits	

Not including ME requirements, Interdisciplinary Seminar, Research Practicum, and Dissertation credit.

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## **OCCUPATIONAL MEDICINE (OM)**

Edward Holmes, MD, MPH  
Program Director

## **Abstract: Occupational Medicine**

The Occupational Medicine Residency (OMR) program at the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) fills a critical need by providing highly skilled OM physicians to a region underserved by OM providers (Region VIII: CO, MT, ND, SD, UT, WY). The OMR trains resident physicians, an average of five at any one time, in their second and third years. In addition to educating residents, the OM faculty also instruct students in a variety of occupational and public health disciplines.

The OM program surpassed all four goals established at the beginning of the grant period. The first goal was to provide quality academic programs. In the past five years, the OM program substantially improved the content of courses and rotations. In 2003, the University of Utah opened a full service OccMed Clinic staffed by OM faculty that serves as a training site for residents. Every resident trained between 2002 and 2006 who took the ABPM (OM) Board Certification examination passed the examination.

The second goal was to accomplish NORA related research. The RMCOEH markedly expanded its research programs to emphasize NORA, r2p and WorkLife Initiative projects. To date, these efforts have resulted in the successful funding of two prospective cohort studies on musculoskeletal disorders (upper extremities and low back pain) through a consortium with the University of Wisconsin, Texas A&M, and the Medical College of Wisconsin. A third major prospective cohort study, the National Children's Study (NCS) has been initiated by the University of Utah and others. In addition, OM faculty have a project underway to study back injuries in commercial truck drivers, and will be studying the potential health consequences experienced by methamphetamine laboratory investigators and firefighters. There are also multiple public and industry-funded projects undertaken by the RMCOEH.

The third goal was to provide superior service, outreach, and support of continuing education. Faculty accomplished extensive service and outreach to industry, government, academic, and professional organizations, as well as to the general public. OM faculty increased continuing education offerings. The OM program was particularly successful with CDME (DOT medical examination) courses, State-of-the-Art Conferences on Musculoskeletal Disorders, and co-sponsorship of OM Grand Rounds.

The fourth goal was to accomplish strong interdisciplinary efforts. Currently, several courses are team taught by faculty from different occupational health disciplines. The new capstone course, Occupational Safety and Health Solutions, addresses real world problems presented by businesses interested in having the problems solved by multidisciplinary teams of students under close faculty supervision. All major research conducted through the RMCOEH involves at least two core disciplines.

The OM program anticipates further growth and increased success in its efforts to train OM physicians. In the next five years, the program will pursue: (1) increasing the numbers of OM residents, (2) additional growth in extramural research programs that emphasize NORA (as well as NORA II, r2p, and WorkLife Initiative), (3) utilizing the proposed NORA projects for additional resident research projects as well as r2p training aspects, (4) further integrating the RMCOEH's Statistical and Economic Evaluation Unit in support of resident research, (5) further enhancing education programs, (6) further increasing OM consultations through the RMCOEH, (7) increasing on-campus clinical activities, (8) recruiting additional OM faculty after national searches, and (9) developing additional distance-based education programs.

## Highlights/Significant Results

The OMR met and surpassed essentially every goal and objective established at the beginning of the grant period. The two largest areas of growth were in clinical and research spheres. The OMR also completely revised the curriculum to markedly improve resident training.

**Clinics.** In 2003, Dr. Holmes worked with the University of Utah Community Clinics to found the OccMed clinic at Redwood Health Center, a full time, full service clinic staffed by OM faculty from the RMCOEH. Residents (OM and primary care) and students in this clinic learn mostly primary OM care by managing OM patients under the direct supervision of OM faculty. They also obtain continuity experiences with patients that teaches critical contingency skills when initial treatment plans fail. Faculty also dramatically increased the number of OM consultations performed through the RMCOEH. Two new faculty, Drs. Wood and Edwards, joined the OM program. This expansion of the faculty has allowed the program to focus on further curriculum review and development.

**Research.** The RMCOEH markedly expanded its research programs to emphasize NORA, r2p and WorkLife Initiative projects. To date, these efforts have resulted in the successful funding of two prospective cohort studies on musculoskeletal disorders (upper extremities and low back pain) through a consortium with the University of Wisconsin, Texas A&M, and the Medical College of Wisconsin. A third major prospective cohort study, the National Children's Study (NCS) has been initiated by the University of Utah and others and primarily utilizes expertise of the Industrial Hygiene (IH) and Hazardous Substances Academic Training (HSAT) programs with some nominal support from the OM core. In addition, OM faculty have a project underway to study back injuries in commercial truck drivers. There are also multiple public and industry-funded projects undertaken by the RMCOEH in which residents can elect to participate. These projects involve work with air pollution, the mining industry, minerals processing, and chemotherapeutics. Additional research applications are pending.

**Education.** The OMR at the RMCOEH has substantially revised the curriculum provided to OM residents during the grant cycle. The OM curriculum has changed primarily in response to the experiences of Drs. Holmes and Hegmann who had extensive clinical experiences elsewhere and felt that, in contrast with nearly all OMRs nationally (discussions with other OM Program Directors and Fortune 500 corporate medical directors), we Must incorporate sufficient training to transition an OMR into those environments. All OM residents are now required to take classes in Ergonomics, Occupational Injury and Disease, and Clinical Prevention in addition to core Industrial Hygiene and Public Health courses. Most of the core OEH courses are taught by OM and other faculty in the RMCOEH. All residents now also train in the RMCOEH's OccMed primary care OM clinic along with a variety of industrial and population-based medical surveillance sites. The success of this revised curriculum is evident in the fact that **all of the residents who graduated between 2002 and 2006 who have taken the ABPM OM board certification examination have passed.**

Additional significant results are briefly described as follows in context with the goals and objectives of the program in 2001.

### **Goal 1. Provide Quality Academic Programs.**

#### **Objective 1.a. Maintain ACGME accreditation of the OM residency**

**Result:** In 2003, the OM residency was awarded the maximum 5 year accreditation by ACGME. There were no citations or adverse comments. This objective is met.

#### **Objective 1.b. Train and graduate a minimum of two OM residents each year who are qualified to sit for the ABPM examination by equipping them with state of the art knowledge.**

**Result:** The OM residency exceeded the goal of graduating at least two residents each year. From 2002 to present, the program graduated 2-4 residents each year. This objective is met.

#### **Objective 1.c. Provide OM residency training at the PGY-3 level (only) for applicants qualified to enter at that level.**

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**Result:** The OM Program has been successful in attracting qualified residents who already have the MPH (or equivalent) degree and require only the practicum year of training. Most years, there is one such resident admitted to the program. Funding typically limits the number of such residents accepted, as there is a substantial pool of applicants in this category who are interested in the RMCOEH OMR Program. This is met.

**Objective 1.d. Train individuals who are sponsored by other agencies and are qualified to enter the programs.**

**Result:** RMCOEH OM residents have been sponsored by the U.S. Air Force and by the Occupational Physicians' Scholarship Fund. Due to increased credit requirements for the MPH degree, it has recently become essentially impossible to accommodate military residents who need to complete the MPH degree in one year, unless they have prior graduate credit or other extenuating circumstances. Faculty are working to facilitate the return of aerospace residents for an alternate degree program (MSOH). This is partially met.

**Objective 1.d. Provide a superior academic curriculum**

**Result:** We have changed curricular elements in response to new training mandates, degree requirements, and feedback from residents, graduates, and the community. Several courses were modified to bolster the content/quality of instruction and new rotations were established. This objective is met.

**Objective 1.e. Respond to the need for residents in other specialties and medical students to acquire OEM-related expertise pertinent to their chosen field(s) of practice.**

**Result:** We continue to make major progress in this important area. OM faculty have provided didactic instruction to Family Medicine (FM), Internal Medicine (IM), and Physical Medicine and Rehabilitation (PMR) residents. Primary care residents and medical students have completed rotations in the OccMed Clinic. The FM residency is developing a Community and Preventive Medicine rotation that will bring FMR's into the OccMed clinic. This objective is met.

**Objective 1f. Enhance the format of current educational offerings.**

**Result:** The RMCOEH has instituted electronic and internet based educational platforms and will continue to develop these resources for both its academic and continuing education offerings. This objective is met.

**Goal 2. Accomplish NORA-related Research**

**Objective 2a. Emphasize NORA-related areas.**

**Result:** The OM Program has markedly expanded its research programs. We emphasize NORA related research as we believe the NORA to be a critical pillar of the future of OHS. We believe so strongly in that pillar, that we worked aggressively to recruit people to come to the NORA II Town Hall meeting to help construct the NORA II. Our recruitment efforts produced by far the largest attendance at any Town Hall Meeting in the US with 150 in attendance. The agenda was so detailed from this meeting that senior NIOSH personnel commented that it was "by far the best Town Hall meeting" and were clamoring to get the electronic version of it immediately after conclusion of the meeting. This objective is met.

**Objective 2.b. Augment resident research experience.**

**Result:** For the past several years, residents have been required to complete a research project and write a paper based on the research. In the Summer of 2007, a new resident research course was implemented. While rotating at the OccMed Clinic, residents participate in monthly follow up of subjects enrolled in the upper extremity and low back cohort studies, thus learning and reinforcing the standardized examinations, collection of data, data entry, and adherence to research protocols. This objective is met.

**Goal 3. Provide Superior Service, Outreach, and Support of Continuing Education**

**Objective 3.a. Expand clinical services on-campus.**

**Result:** The OM Program opened the OccMed Clinic (2003). OM faculty are holding discussions to expand services on campus at the University of Utah. This objective is met.

**Objective 3b. Increase faculty commitments to clinical time.**

**Result:** Faculty time has increased and the OccMed clinic is staffed by OM faculty and OM trained physician assistants. This objective is met.

**Objective 3.c. Increase continuing education and maintain outreach activities. Conduct at least 6 training programs annually.**

**Result:** Faculty have increased CE offerings over the past 5 year period. We have been particularly successful with our CDME courses, our annual State-of-the-Art Conference on Musculoskeletal Disorders

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and our co-sponsorship of OM Grand Rounds. Our faculty accomplished extensive Outreach (Appendix OM-1). This objective is met.

#### **Goal 4. Accomplish Strong Interdisciplinary Efforts**

##### **Objective 4.a. Augment current interdisciplinary teaching activities**

**Result:** Several courses at the RMCOEH are now team taught with participation from multiple disciplines. Examples of this team approach include the Introduction to Industrial Toxicology and Physiology (IH, HSAT and OM) and Occupational Safety and Health Solutions (IH, E&S, OM), which is the capstone course for all graduate students. This capstone course takes real world problems presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to solve those problems, as well as quantify the costs and benefits with supervision of School of Business and Dept of Economics professors. This objective is met.

##### **Objective 4.b. Continue to provide IH and E&S students with opportunities to join the OM students in the OM clinic.**

**Result:** In FPMD 6758 Occupational and Environmental Health Clinic, academic students from all RMCOEH programs attend or review at least one patient encounter that involves a question relevant to that discipline. This objective is met.

##### **Objective 4.c. Foster interdisciplinary research efforts**

**Result:** Currently, nearly all research conducted through the RMCOEH is interdisciplinary with involvement of at least two core OEH disciplines. The master's thesis committees are also generally comprised of at least one member outside the primary discipline (e.g., 2 IH and 1 OM). This objective is met.

## **Outcomes/Relevance/Impact**

**We have made major progress in the past 5 year period including: (1) increasing numbers of residents trained, (2) increasing the numbers of full time OM faculty by two, (3) expanding research training for residents, (4) developing major, extramurally-funded research programs, particularly in MSDs, totaling \$3.5M, (5) assisting in developing the Statistical and Economic Evaluation Unit of the RMCOEH, (6) developing more state funding (Senate Bill 159, 2005 General Utah Legislative Session), (7) further increasing the content and rigor of our curriculum (e.g., increased injury care, Commercial Driver Medical Exams (CDMEs), fitness for duty, consultations), (8) increasing OM-related offerings in Continuing Education (CE), (9) increasing our Outreach, and (10) developing a new, full-service OM Clinic.**

Results of our 2006 Graduates Survey illustrate the OMR's success in training OM physicians. Forty-six out of 70 total graduates (66% of total graduates) responded to the survey. Thirteen of the responders graduated recently, between 2002 and 2006. Satisfaction with training was highly rated by residents with 82% of graduates from the last five years rating their training at '8' or higher (0= very dissatisfied and 10= very satisfied). The majority of recent graduates, 50-55%, rated the quality of their training and the likelihood that they would recommend training at the RMCOEH with a '10' out of 10.

The impact of the training program can be partly inferred from the survey results. In the survey, 55% of OM graduates identified themselves as 'Directors' in their work setting. The largest proportion of graduates practice in Utah with survey responses received from 15 states. Although the majority of graduates indicated they did not know the magnitude of injury or cost reduction their services provided to their organization, many indicated that their services had saved their clients or organization tens to hundreds of thousands of dollars with substantial reductions in injury rates (please see Appendix OM-2).

All of the residents who graduated between 2002 and 2006 who have taken the ABPM OM board certification examination have passed the examination. In the OMR's most recent ACGME accreditation site visit (December 2003), the program did not receive even one negative comment or citation.

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Aside from quality graduates, the program has produced many publications and educational and service outreach efforts. Program publications are subsequently detailed in this document. Examples of outreach include participation from all faculty members in the ACOEM Practice Guidelines development, presentations at regional, national, and international conferences, and service on professional and community committees. Examples of educational products include sponsorship of the State-of-the-Art Conference on Musculoskeletal Disorders, participation in ACOEM's Commercial Drivers Medical Examination (CDME) course, and co-sponsorship of OM Grand Rounds.

The OccMed Clinic at the University of Utah's Redwood Health Center provides primary occupational health services to the general community in Salt Lake City. The Occupational Medicine Clinic at the RMCOEH provides consultative services to Utah and the region.

The musculoskeletal cohort studies conducted partly through the RMCOEH are the largest of their kind and have already provided valuable information regarding causal factors and the natural history of upper extremity and low back musculoskeletal conditions. The studies conducted through the RMCOEH provide residents with valuable resources from which to learn research skills.

The OM Program worked with the RMCOEH to increase and diversify its revenue streams. The OM program assisted in passing Utah Senate Bill 159 that established a funding stream of voluntary dollar for dollar tax credit against workers compensation insurance premiums. The revenue source was developed and supported by the RMCOEH Advisory Board, particularly involving 2 members [Mr. Dennis Lloyd, Chief Council of the Workers Compensation Fund (WCF), and Senator Ed Mayne, Utah State AFL-CIO President]. This revenue source has resulted in over \$500,000 to date and has built a foundation for much of our success, including increasing the size of our OM program faculty.

## Technical Report

### Background for the Project

The Occupational Medicine Residency (OMR) program at the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) fills a critical need by providing highly trained and skilled OM physicians to a region underserved by OM specialists. Relatively few OM physicians practice in Region VIII (CO, MT, ND, SD, UT, WY) and we are one of only two OMRs in the region. According to the 2005-06 Membership Directory of the American College of Occupational and Environmental Medicine (ACOEM), there are only about 180 ACOEM members in Region VIII out of approximately 5,160 members listed (3.5% of the total). Yet the **occupational fatality rates in Region VIII are 50% higher than the national average** (Bureau of Labor Statistics). The combination of the small numbers of OM physicians, elevated injury and fatality rates and high population growth (both Utah and Colorado are growing at almost twice the national average) provide strong rationale for the need for OMR training at the RMCOEH.

The RMCOEH's OMR program meets regional needs by: (1) training OM physicians for the needs of Region VIII, (2) targeting our academic and CE programs' contents to regional needs, (3) obtaining active involvement of the Residency Advisory Committee and the RMCOEH Advisory Board which raise Regional issues for us to address, and (4) tying future research endeavors to the NORA agenda. Our graduate surveys confirm our success in training our residents to meet challenges and underscore the RMCOEH OMR Program's ability to continue to meet regional needs (Appendix OM-3).

**Not only is there a need for our training program, but we excel at meeting that need. The RMCOEH's OMR program is recognized to be such outstanding quality that, as only one example, in our most recent ACGME accreditation site visit (12/03), we did not receive even one negative comment or citation.** Graduates of the RMCOEH have become leaders in occupational and environmental health. In our most recent graduates' survey (6/06), 55% of RMCOEH OM graduates identified themselves as 'Directors' in their work setting. Our residents are highly sought, and it is not unusual for residents to receive job offers during their rotations. Satisfaction with training is highly rated by

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residents with 82% of graduates from the last five years rating their training at '8' or higher (0= very dissatisfied and 10= very satisfied).

### **OM Residency Program History and Description**

The RMCOEH OMR Program was founded in 1977. The program has been continuously supported by NIOSH since the original application in 1978. The RMCOEH's OMR program is housed in the Department of Family and Preventive Medicine (DFPM) at the University of Utah. We comply with local training guidelines/requirements established by the Graduate Medical Education (GME) office at the University of Utah, as well as assisting other University of Utah residency programs. The residency program is fully accredited by the American Council on Graduate Medical Education (ACGME). **To date, we have graduated 70 OM physicians from our residency program. In the last 5 years, the OM program has maintained between 4 and 7 total residents with 2-4 graduates each year.**

The OM program offers the MPH degree and a one-year practicum experience. The MSPH is an option, but has not been utilized in the prior 5 year period, as the degree requirements have become more difficult due in part to CEPH. Both the MPH degree, considered the academic phase, and the practicum components comprise our ACGME-accredited residency in Occupational and Environmental Medicine.

Admission to the training program is restricted to physicians who have completed at least one clinical year of training in an ACGME-accredited residency program. Applicants to the program are usually admitted to one of three tracks:

1. Entering into the MPH degree program as a resident (PGY-2). This is followed by the OM practicum year (PGY-3). Upon successful completion of this training program, the graduate is qualified to take the ABPM examination in the subspecialty of Occupational Medicine.
2. Applicants already holding an MPH degree, or equivalent, are admitted to the OM practicum year (PGY-3). After successfully completing this year, they are qualified to take the Board examination.
3. Physicians who have arranged to take the practicum (PGY-3) year of training in aerospace medicine at another institution, such as the Air Force residency, may be admitted into the MPH degree program for the PGY-2 year.

The MPH curriculum requires completion of 45 semester hours of course work, which takes three semesters. A listing of required courses for the degree programs is provided in Appendix OM-4.

The practicum year consists of 3 major components over the 12 month period. Residents must complete a minimum of 14 weeks of what have been traditionally called comprehensive "industrial rotations." The objective for these industrial rotations is for residents to learn in an OEHS interdisciplinary employment setting, as well as gain practical exposure to administration and management. Residents are also required to complete 12 weeks in our OccMed Clinic or another community OM clinic, where they have patient continuity experiences to learn how to care for patients who do not follow expected recovery timelines. Approximately 23 weeks are clinical and elective activities. Practicum year rotations are accomplished through formal affiliation agreements that include specific learning objectives for each site.

In addition to the core responsibilities for providing education and training to OMRs, the OM faculty provides instruction to students in IH, HSAT, E&S, OIPRT and Public Health. We train primary care residents in principles of OM, as well as teach other residents [e.g., Physical Medicine and Rehabilitation (PMR)]. Our faculty instruct first year medical students, as well as direct an elective OM rotation for fourth year students. The OM faculty sponsors the RMCOEH's Occupational and Public Health Journal Club and co-sponsor OM Grand Rounds. The OM faculty also regularly participates in continuing education. We accomplish extensive Outreach activities.

The OMR program at the RMCOEH is continuously evolving, mainly driven by the faculty's tremendously diverse experiences and drive for continuous improvement. Changes take into account ongoing feedback

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from graduates, including professional and Regional needs. The program also responds to changes from ACGME and the Council on Education for Public Health (CEPH). These changes are resulting in a stronger, even more effective training program. We have been told by many Program Directors and ACGME site reviewers that we have an outstanding OMR program. The RMCOEH anticipates further growth of the OMR program and increased success in its efforts to train highly skilled OM physicians. Accordingly, we have succeeded in increasing our funding base.

### **Specific Objectives, Results, and Discussion:**

The OM Program's objectives were updated in the summer of 2006 and are summarized below with a discussion of the results achieved relative to the objective in the past grant cycle. Results relative to objectives from the beginning of the grant cycle (2001) are described earlier in this report. The program objectives are subsumed under the 4 goals shared by all educational programs at the RMCOEH:

- 1.) Provide Quality Academic Programs
- 2.) Accomplish NORA research and translate it into practice.
- 3.) Provide Superior Service, Continuing Education and Outreach
- 4.) Accomplish Strong Interdisciplinary Collaboration

### **Goal 1. Provide Quality Academic Programs.**

#### **Objective 1.a. Maintain ACGME accreditation of the OM residency, including instruction and evaluation of OM residents in Core Competencies.**

**Progress/Result:** In December 2003, the OM residency was accredited with the maximum 5 years by ACGME. There were no citations or adverse comments. The next accreditation site visit will be in 2008. As demonstrated by the accomplishments in the past 5-year period, the OM Program faculty have long participated in a continuous improvement process. We have modified our academic and practicum training to improve residents' experiences. We also have developed and implemented core competencies, and are implementing evaluation methods for our competencies. We have performed an audit of the current curriculum (summarized in the matrix presented in Appendix OM-5) and significantly modified the content of courses such as Advanced Topics in Occupational and Environmental Health (OEH).

#### **Objective 1.b. Continually review and improve the quality of OEH instruction**

**Progress/Result:** Faculty meet monthly to discuss curriculum content and devise strategies to improve OEH instruction (see Appendix OM-6 for minutes from the last three meetings). This review process has identified content areas that are being enhanced through changes in course content. For example, didactic instruction in Aerospace Medicine has been added to the Advanced Topics in OEH course. In response to resident feedback, the Introduction to Public Health course will not be required. We have added a new, "Occupational Safety and Health Solutions" interdisciplinary problems solving course that brings real businesses' workplace OSH problems into the classroom, where interdisciplinary teams work to provide solutions and carry them out in the workplace. We also have added a new resident research course, FPMD 6710 Individual Research in Occupational Medicine, that will begin in the Summer of 2007. We have also added an outstanding practicum rotation with the Worker's Compensation Fund (65% of Utah market).

#### **Objective 1.c Provide excellent training opportunities**

**Progress/Result:** The OMR program provides the highest quality training. The program has cultivated and maintains unique and exceptional training opportunities for residents and benefits from the generosity of nationally regarded OM mentors in providing rotations within the state of Utah, in Region VIII and beyond. The program also encourages the establishment of new rotations that provide unique and valuable learning opportunities. In the last few years, out of state rotation sites have included Intel, Boeing, NIOSH, US OSHA, Puget Sound Naval Shipyard, Hanford, NASA, and National Jewish Hospital.

**Objective 1.d. Provide opportunities for OEH training of medical students and residents in other specialties**

**Progress/Result:** The program has had longstanding involvement in the training of other residents, medical students and graduate students. Currently, OM faculty instruct Family Medicine (FM) residents in their bi-monthly teaching sessions, are co-course masters of the medical student's Science of Medicine course, teach environmental health to the medical students, and provide opportunities for medical students and residents from other specialties to rotate in the OM clinics. Program faculty also provide instruction to Internal Medicine (IM) and PMR residents with plans to teach other residents (e.g. Orthopaedic Surgery). The FM residency is developing a rotation in Community and Preventive Medicine that will bring FM residents into the OccMed clinic.

**Objective 1.e Train and graduate a minimum of two OM residents each year who are qualified to take the ABPM Board examination**

**Progress/Result:** The OM residency has graduated 2-4 residents each year since 2001. The OMR is approved for 6 residents in each year (12 total).

**Objective 1.f. Train qualified individuals who are sponsored by other agencies**

**Progress/Result:** Besides NIOSH, residents are supported with funds from the Salt Lake City VA Medical Center and the University of Utah GME. Residents have also been sponsored by the Occupational Physicians' Scholarship Fund (OPSF). In past years, residents in the U.S. Air Force Aerospace Medicine Residency Program completed their MPH through the RMCOEH. Due to increased CEPH credit requirements for the MPH degree, it has become impossible to accommodate these residents. Faculty are working to return aerospace residents by modifying the academic training requirements.

**Objective 1g. Enhance current educational offerings.**

**Progress/Result:** The OM program is more fully utilizing electronic and internet based educational tools. The OM program also places significant emphasis on peer instruction/discussion with faculty guidance. Currently, most didactic teaching is performed using Powerpoint. The University of Utah supports an internet based classroom tool "WebCT" that allows instructors to post lecture content, administer exams, and evaluate students on-line. The residency has also recently started using the E\*Value system to track resident evaluations and enhance curricular content. We have a library of OM Grand Round presentations. We have videotapes of our standardized musculoskeletal examinations of the distal upper extremity and low back pain available to all posted on our website. We have learned in addition to their use in the US, they are also in use in Korea (r2p). The RMCOEH continually updates and improves its website and anticipates offering more educational resources online in the future.

**Goal 2. Accomplish NORA research and translate it into practice (r2p)**

**Objective 2a. Emphasize NORA-related areas.**

**Progress/Result:** The OM Program and the RMCOEH have embarked on major expansions of their research programs to emphasize NORA, r2p and WorkLife Initiative projects. To date, these efforts have resulted in the successful funding of three major interdisciplinary research studies. **Two** prospective cohort studies on musculoskeletal disorders (upper extremities and low back pain) have been funded through a consortium with the University of Wisconsin, Texas A&M, and the Medical College of Wisconsin. Those studies involve major efforts by all OM faculty and OM residents. A **third** major prospective cohort study, the National Children's Study (NCS) involves some OM support in this study of OEH health effects in children and expectant mothers. In addition, OM faculty have conducted a study of back injuries in commercial truck drivers. There are also multiple public and industry-funded projects that residents can elect to participate in. These projects involve work with air pollution, mining, minerals processing, and chemotherapeutics. Additional applications are pending.

**Objective 2.b. Further augment the resident research experience.**

**Progress/Result:** Residents are required to complete a research project. Residents now have virtually endless opportunities to participate in the above research projects currently underway at the RMCOEH. Additionally, they may elect to participate in an industry or preceptorship site research project. Clinical

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research projects are also possible through our clinics. Residents participate in monthly follow up of subjects enrolled in the upper extremity and low back cohorts. Residents accompany research staff into industrial sites where they perform brief interviews with study participants and if indicated perform focused, standardized physical exams. These examinations are practical and are highly translatable into the clinical setting. Residents are also required to participate in FPMD 6710 Individual Research in Occupational Medicine at the start of the PGY-3 year. The course provides residents with instruction, academic support, structure and a timeline for completing their research project.

### **Goal 3. Provide Superior Service, Continuing Education, and Outreach**

#### **Objective 3.a. Continue to enhance OM consultative services**

**Progress/Result:** The number of consultations performed through the RMCOEH OM clinic has increased significantly in the last five years. Faculty will continue to provide these and other consultative services.

#### **Objective 3.b Expand clinical and OEH services on-campus.**

**Progress/Result:** In 2003, the University of Utah Community Clinics provided assistance to open the OccMed Clinic at Redwood Health Center, a full service clinic staffed by RMCOEH OM faculty. This clinic provides community based OM services to municipal and corporate clients. Residents in this clinic learn mainly primary and secondary OM care by managing OM patients under the direct supervision of OM faculty. This clinic provides continuity care to injured workers.

#### **Objective 3.c. Increase continuing education and maintain outreach activities. Conduct at least 6 training programs annually.**

**Progress/Result:** OM faculty have increased both CE and Outreach efforts and will maintain such activities (see Appendix OM-1). As one example, OM faculty has hosted two State-of-the-Art Conference on Musculoskeletal Disorders. Drs. Hegmann and Wood have been very active in ACOEM's Commercial Drivers Medical Examination (CDME) course. Faculty and residents have also participated in the regional NORA conference that has been sponsored by the RMCOEH for the past 5 years. About 10 times a year, OMRs present information on the health effects of asbestos and asbestos medical surveillance during RMCOEH asbestos contractor/supervisor CE courses. OMRs have also provided lectures on Occupational Lung Diseases to Utah miners through our association with the Miners Hospital at the University. The RMCOEH is a co-sponsor of Intermountain Health Care's (IHC) OM Grand Rounds. We also are increasing our distance-based CE/CME. Dr. Moser provides distance-based instruction in Practical Aspects of Management, approved by ABPM for Maintenance of Certification (MOC) credit.

### **Goal 4. Accomplish Strong Interdisciplinary Collaboration**

#### **Objective 4.a. Augment current interdisciplinary teaching activities**

**Progress/Result:** The OM program collaborates extensively with other disciplines in teaching courses. Currently, several courses are team taught with faculty from different OEH disciplines. For example, FPMD 6752, "Introduction to Industrial Toxicology and Physiology" is co-taught by Drs. Wood (OM) and Larson (IH & HSAT). Interdisciplinary Field Trips was co-taught by Drs. Sesek (OIPRT and E&S), Pahler (HSAT) and Edwards (OM). This course offered the opportunity for demonstrations of team approaches in OEH activities at in-plant settings, and frequently involved OHNs. The Interdisciplinary Field Trips course has been incorporated into a new capstone course, "Occupational Safety and Health Solutions", MEEN 6960, that is taught by faculty representing the 3 RMCOEH core programs (Drs. Collingwood (IH), Sesek (E&S), and Wood (OM)). This course takes real world problems presented by businesses interested in having multidisciplinary teams of students under close faculty supervision work to solve those problems. Faculty from the School of Business (Dr. Smith-Crowe) and Dept. of Economics (Dr. Waitzman) participate in this course. All RMCOEH trainees, including OMRs, become familiar with both intervention development, as well as quantification of costs and benefits from proposed interventions. Some graduate students from the School of Business will likely enroll in the class and provide additional perspectives on interdisciplinary teams and underscore the need for those interactions that are so essential to success in today's business environment.

**Objective 4.b. Continue to provide IH, HSAT, E&S and OIPRT students with opportunities to join the OM students in the OM clinic.**

**Progress/Result:** In FPMD 6758, "Occupational and Environmental Health Clinic" IH, HSAT, E&S and OIPRT students have the opportunity to attend or review at least one patient encounter that involves a question relevant to the respective discipline. The students prepare a comprehensive report that analyzes all exposure-related aspects of the problem. Participation in this course is recommended for all RMCOEH academic students.

**Objective 4.c. Foster interdisciplinary research efforts**

**Progress/Result:** The OM program collaborates extensively with other disciplines in research activities. Currently, all major research conducted through the RMCOEH is interdisciplinary with involvement of at least two core disciplines. For example, the 2 MSD cohort studies involve major efforts by all OM, E&S and OIPRT faculty, as well as every student and resident. The third major prospective cohort study, the National Children's Study (NCS) primarily utilizes expertise of the IH core and HSAT program, however, the OM core has been involved in that project for several years and has provided assistance to the other programs. Other pending projects involve different mixes of disciplines. The master's thesis committees are generally comprised of at least one member outside the primary discipline (e.g., 2 IH and 1 OM, or 1 E&S, 1 OM and 1 biostatistician). OMRs generally do not complete theses, although that remains an option. Such committees would be interdisciplinary.

We also have helped to develop the RMCOEH Statistical and Economic Evaluation Unit (SEEU). This unit is led by Norm Waitzman and the deep resources of the SEEU are available to assist both faculty and students in incepting and conducting more refined research projects.

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## **CONTINUING EDUCATION (CE)**

Connie Crandall, MA, MBA

Program Director

## Abstract: Continuing Education

The Continuing Education (CE) program was established as part of the original University of Utah Educational Resource Center (ERC - now designated as Education and Research Center) grant in 1978. It remains as a primary OSH CE resource in HHS Region VIII and continues its mission to reduce human and financial costs by providing excellent short-course training in occupational safety and health that is marked by continuous improvement and response to needs, setting the highest standards for both internal and external service. Target audiences have included industrial hygienists, safety professionals, ergonomists, occupational health nurses, occupational medicine physicians, industry managers, and others concerned with OSH. During the period July 1 2002-June 30 2007, the CE program presented 518 courses to 11,762 registrants, with over 72% percent coming from HHS Region VIII. The remaining students came from throughout the nation and from foreign countries, demonstrating a responsiveness to both national and regional needs. Courses were focused on OSH disease and injury recognition and treatment but also, and of equal importance, methods to prevent workplace-related illnesses and injuries.

The program is supported by a broad base of faculty, both internal and external, to accomplish its stated goals: 1) Offer continuing education programs (courses and conferences) to occupational and environmental health and safety professionals and to others involved in the field; 2) Conduct research to identify training needs and training effectiveness; 3) Provide superior service and outreach that enhances and promotes the field of occupational and environmental safety and health; and 4) Accomplish Extensive Interdisciplinary Collaboration.

The Program also enjoys numerous collaborative relationships with businesses, employee groups, governmental units, and other community organizations. These foster the development of relevant, timely training for OSH professionals for the 21st Century. The program also has a Continuing Education Advisory Committee that actively supports the program's goals and objectives. In addition, the program enjoys the support of RMCOEH core faculty as well as a strong cadre of external faculty from the occupational safety and health community at large.

The CE Program faces a unique challenge in that HHS Region VIII is sparsely populated, with relatively few major population centers. Similarly, industry is not highly focused into concentrated industrial areas. Nevertheless, CE members have been successful in responding to industrial needs in the region and surrounding states to present CE for OSH professionals in the area.

## Highlights/Significant Findings

The following is a summary of progress in accomplishing the overall goals for the continuing Education (CE) program for the 2002-2007 grant period:

**Goal 1:** Offer continuing education programs (courses and conferences) to occupational and environmental health and safety professionals and to others involved in the field.

**Results:** Accomplished. During the 5-year grant period, 518 courses, including 72 new courses, were presented to 11,762 registrants. (See Table 12c for a breakdown of trainees by discipline and Appendix CE-1 for the new courses listing.) This goal was achieved through four major objectives: 1) Provide short-term occupational safety and health post-graduate training (a minimum of two per core discipline) on current issues and topics to a minimum of 400 participants/year; 2) Facilitate exchange with other safety and health professionals through course co-sponsorship with other organizations involved in occupational safety and health. Co-sponsors included the Utah Safety Council; the local Chapter of the American Industrial Hygiene Association; the local Chapter of the American Society of Safety Engineers; the

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Beryllium Health and Safety Committee, NIOSH, Savannah River National Laboratory, Eichrom, the Utah Council for Worksite Health Promotion; Intermountain Health Care; the University of Wisconsin at Milwaukee; and ConocoPhillips. 3) Obtain highly-qualified faculty from the private and public sector that bring both theoretical and practical knowledge to the issues presented; and 4) Hold at least one course per year regionally outside of Salt Lake City. During the 5-year grant period, Asbestos courses were held annually in Moab, Utah and Pocatello, Idaho. Asbestos courses were also held in Evanston, Wyoming and Green River, Wyoming. The co-sponsored 2<sup>nd</sup> annual IAIABC Workers' Compensation Medical Institute was held in San Diego, California. In addition, over the current project period, Pulmonary Function Testing courses were held in, Billings, Montana, and Albuquerque, New Mexico. OSHA courses were held in Park City, Utah, Cedar City, Utah, Vernal, Utah, and Billings, Montana.

**Goal 2:** Conduct research to identify training needs and training effectiveness

Results: Accomplished. The sole objective of this goal was to research the needs of each state within the Center's designated region by needs assessment surveys and questionnaires. During the grant period, the CE Program implemented an extensive needs assessment program. Assessments from a variety of sources were utilized. Needs information was collected from standard needs assessment surveys as well as from course evaluation forms placed in participants' course packets. Training effectiveness was measured through both post-course surveys and impact evaluations. All of these instruments were used to identify new topics as well as evaluate interest in established courses.

**Goal 3:** Provide superior service and outreach that enhances and promotes the field of occupational and environmental safety and health.

Results: Accomplished. This goal was supported by two objectives: 1) Increase awareness and understanding of occupational safety and health issues throughout the region and 2) Support activities that serve the needs of the target populations.

During the grant period, the Center promoted awareness of the field by exhibiting at national and regional association meetings as funds permitted. Activities that support the needs of the target population included courses to help practitioners prepare for professional certification such as the comprehensive Review of Industrial Hygiene and the ASP/CSP review courses. Continuing Education Units (CEUs) were offered for all courses as well as professional association certification maintenance points, as applicable. The CE program also identified an alternative way to meet the needs of the target populations by developing and offering intensive short-term certificate programs. These include Safety, Industrial Hygiene and OSHA certificate programs. The CE Program also promoted, provided registration support, and issued certificates for the Paul S. Richard memorial Lectureships which served as keynote addresses for the annual NORA symposium. Finally, Center core faculty also participated in extensive outreach activities including assistance to schools within the parent institution, schools outside the parent institution, professional societies and associations through presentations, lectures and awareness seminars.

**Goal 4:** Accomplish Extensive Interdisciplinary Collaboration

Results: Accomplished. This goal was addressed through three objectives: 1) Provide multi-disciplinary courses and conferences to promote interaction among professionals in all fields of occupational safety and health; 2) Identify needs and topics of interest that are interdisciplinary in nature, and 3) Engage in service activities that are applicable across the disciplines. Interdisciplinary in nature, continuing education courses attract attendees that cross all core disciplines. This effort has been facilitated by organizing efforts that bring different disciplines together. For example, the Annual Utah Conference on Safety and Industrial Hygiene united industrial hygiene and safety associations who assisted in organizing the conference. Many nurses attended occupational medicine courses and safety professionals supported the Workers Compensation conference, an effort primarily directed to insurance adjusters and risk managers. Interdisciplinary training needs were researched through needs assessment an evaluation

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activities. Finally, the "Richards Lectureship" and exhibiting at national meetings are representative examples of interdisciplinary efforts.

## Outcomes/Relevance/Impact

During the 2002-2007 grant period, the CE program conducted 518 courses to 11,762 registrants, including 72 new offerings. This is significant in light of the fact that Region VIII is sparsely populated, with relatively few major population enters.

Outcomes were evaluated in a number of ways. The CE Program conducted training impact evaluations two times within the 5-year grant period to capture data in terms of behavior change, lost work days, and dollars saved. Based on results from evaluations conducted in 2004 and 2006, 96% of the respondents reported that the courses offered through the CE Program met their continuing education needs. Sixty-six percent of the respondents reported a positive change in work behaviors and 59% felt that the training they had received had resulted in reduced injuries and illnesses.

As noted previously, several courses are intended to prepare practitioners for professional certifications. Based on post-exam communication with course attendees, 90% of attendees who responded to the questionnaire successfully passed the Industrial Hygiene examination.

Asbestos and lead training rely on skills-based assessments. Activities were designed to provide real-work preparation and experience; the experiences were observed and critiqued by course instructors.

Continuing education credits are a major need of the target populations and the CE Program has long provided appropriate specialty credit in addition to the standard CEU.

## Technical Report

As Indicated in the Highlights/Significant Results section, four goals were established for the Continuing Education (CE) Program with specific objectives established for each goal. The following details the progress in accomplishing these objectives

### **Goal 1. Offer quality CE programs (courses and conferences) to occupational and environmental health and safety professionals and to others involved in the field.**

**Objective 1.a. To provide short-term occupational safety and health post-graduate training (a minimum of three per core discipline) on current issues and topics to a minimum of 400 participants/year.**

- 1) Conduct a minimum of three short-term post-graduate courses in each of the core disciplines and in other related areas.** Two representative samples for each program area (including specialty areas) are documented in Table 2 below: (Note that the foci of some courses and conferences included major instruction in more than one area. Number of registrants were only reported under one category.)

**Table 2. Representative List of Program Area Courses**

<b>Program Area</b>	<b>Course</b>
<b>Industrial Hygiene</b>	Annual Utah Conference on Safety & Industrial Hygiene Comprehensive Review of Industrial Hygiene
<b>Occupational Injury Prev.</b>	State-of-the Art Conference on Musculoskeletal Disorders NORA Symposium
<b>Occupational Medicine</b>	State-of-the-Art Conference on Musculoskeletal Disorders OSH Grand Rounds (in conjunction with Intermountain Health Care)
<b>Occupational Nursing</b>	CAOHC-Approved Occupational Hearing Conservation Pulmonary Function Testing
<b>Ergonomics and Safety</b>	Personality Types and Injuries: Data and Effective Strategies Annual Utah Conference on Safety & Industrial Hygiene
<b>Other</b>	Annual Compensable Disability Forum Asbestos and Lead Abatement Training

**2) Distance-Based Education** The RMCOEH CE program was the first ERC to offer hard-copy distance learning courses and needs assessments have indicated a continued desire for them. Eleven courses were offered including Accident Investigation, Analysis & Prevention; Behavior-Based Safety, Environmental Strategies, Environmental Management in the 21<sup>st</sup> Century; Fundamentals of Industrial Hygiene, Groundwater Contamination Remediation; Practical Aspects of Management; Successful Project Management; Time-Based Management: A Tool for Improvement for the Health and Safety Professional; and Understanding and Managing Legal Issues: Safety Emphasis.

Although the Program has long had correspondence courses, the CE Director and RMCOEH faculty worked on offering a slate of on-line programs in two major ways. The first involved working with the School of Medicine's Continuing Medical Education (CME) department to obtain support in hosting CE programs. Delays occurred due to CME's change of software, but the course, "Practical Aspects of Management", was placed on line using Web-CT software.

At the 2006 NORA symposium, the CE program pilot tested an internet-based educational delivery tool (Elluminate Live!<sup>TM</sup>) that offers a real-time virtual classroom environment designed for distance-based education and collaboration in academic institutions that incorporates live discussion and dynamic interaction into the web-based training. However, although this deliver mechanism was piloted and promoted for several courses, implementation was problematical and costly; subsequently, plans to use this delivery tool were abandoned.

In addition, Dr. Collingwood coordinated efforts with the Department of Public Health at Western Kentucky University to offer a WebCT-based course entitled *Occupational Health and Safety*.

**3) The CE program worked to expand training to further target underrepresented minorities.** To assist in meeting the needs of this target population, under an initiative sponsored by the Utah Labor Commission, Associated Builders and Contractors, Associated General Contractors, Utah Farm Bureau Federation, Utah Chapter AFL-CIO and the Utah Restaurant Association, the **Rocky Mountain Center's OSHA Education Center is offered training to bilingual (Spanish) safety and health practitioners in Utah.** Under the proposed initiative, these qualifying individuals were given fee waivers to attend the OSHA 500 (Trainer Course in Occupational Safety and Health Standards for the Construction Industry) and OSHA 501 (Trainer Course in Occupational Safety and Health Standards for General Industry) courses. Those who did not yet meet the course prerequisites were also given fee waivers to attend the OSHA 510

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(Construction) and OSHA 511 (General Industry) to enable them to qualify for the trainer courses. Materials in Spanish for the 10- and 30-hour outreach courses were provided to the trainers.

The program also made a concerted effort to identify minority populations at its training courses. It included an optional question on the registration form which the majority of participants elected to complete. The highest percentages were white (n = 8625, 94%) and Hispanic (n = 293, 4%).

Finally, the RMCOEH became a member of the Coalition for Multicultural Workers' Safety and Health comprised of several other organizations with a significant interest in minority health and safety. These other organizations included:

Mexican Consulate	Utah OSHA Consultation Services
Pete Suazo Business Center	Utah Safety Council
Utah Dept. of Workforce Services	Workers Compensation Fund

Numerous meetings were held and the coalition successfully sponsored a conference in January 2007 to address many of these complex issues.

**Objective 1.b. To facilitate exchange with other safety and health professionals through course co-sponsorship with other organizations involved in occupational safety and health.**

The RMCOEH worked closely with groups that offer similar courses in an effort to avoid unnecessary duplication. Instead, we worked together as co-sponsors or tried to respect duplication by scheduling courses at different times. This often worked to each group's advantage as a course was given more often throughout the year to accommodate more participants' schedules.

**1) The RMCOEH CE Program collaborated with multiple organizations that promote OSH.** These include the local Chapter of the American Society of Safety Engineers, the local Section of the American Industrial Hygiene Association, and the Utah Safety Council who, collectively, planned and conducted the Annual Utah Conference on Industrial Hygiene and Safety. We also maintained close contact with the American College of Occupational and Environmental Medicine's Education Dept. The RMCOEH worked closely with the Utah Chapter of the American Association of Occupational Health Nurses in developing and promoting courses for nurses. The University of Utah's Continuing Medical Education Office co-sponsored both the hard copy distance-based education version as well as the online offering of the Practical Aspects of Management (previously co-sponsored with the American College of Occupational and Environmental Medicine) course. The RMCOEH also collaborated with the Utah Council on Worksite Health Promotion to develop, market, and implement an annual Worksite Health Promotion conference.

**2) Conference co-sponsorships.**

In addition to the previously mentioned Coalition for Multicultural Worker's Health and Safety, there were two other notable collaborations. First is the Second Symposium on Beryllium Particulates and Their Detection that the CE program co-sponsored with the Beryllium Health and Safety Committee, the Department of Energy, NIOSH, Savannah River National Laboratory, and Eichrom. Held in 2005, the symposium addressed beryllium sampling and analysis issues. Secondly, the CE Program co-sponsored the 2<sup>nd</sup> Annual IAIABC Workers' Compensation Medical Institute with the American Academy of Disability Evaluating Physicians and the California Commission on Health and Safety Workers' Compensation.

**Objective 1.c. To obtain highly-qualified faculty from the private and public sector that bring both theoretical and practical knowledge to the issues presented.**

The CE Program successfully drew faculty from a cadre of qualified individuals, both within and outside the Center. This ensured the diversity, quality, and reputation that the Center courses enjoy.

**Objective 1.d. To hold at least one course per year regionally outside of Salt Lake City.**

**1) Courses were held in Region VIII outside of Salt Lake City.**

Such courses are very cost-intensive due to very long distances and attendance was variable. Asbestos courses were held annually in Moab, Utah and Pocatello, Idaho. Asbestos courses were also held in Evanston, Wyoming and Green River, Wyoming. In 2006, the RMCOEH also co-sponsored the 2<sup>nd</sup> annual IAIABC Workers' Compensation Medical Institute held in San Diego, California. Over the 5-year grant period, Pulmonary Function Testing courses were held in Billings, Montana, and Albuquerque, New Mexico. OSHA courses were held in Park City, Utah, Cedar City, Utah, Vernal, Utah, and Billings, Montana.

**2) The RMCOEH sought to establish collaborative partnerships with other educational institutions within Region VIII as part of the OSHA Education Center** who would either serve as course delivery sites or as educational partners. Montana Tech of the University of Montana (one of the four Region VIII TPGs), the University of North Dakota, and Uintah Basin Applied Technology College.

**Goal 2. Conduct research to identify CE training needs and impact.**

**Objective 2.a. To research the needs of each state within the Center's designated region by needs assessment surveys and questionnaires.**

The RMCOEH CE Program relied on the following proven strategies to meet the changing needs and demands of students and subsequently determine program offerings: **1) formal needs assessments; 2) participant evaluations and requests; 3) faculty input, 4) CE Advisory Committee input, 5) RMCOEH Advisory Board input, 6) graduate surveys, and 7) regulatory/licensing requirements.** Programs were implemented, modified or eliminated based on their ability to meet the expanding needs of occupational safety and health professionals while generating an income that offsets course expenses.

**1) Needs assessments from a variety of sources assisted the RMCOEH CE Program in its development to address CE requirements.** Data were obtained from the needs assessments conducted at the NIOSH/ERC Exhibit, which travels nationally to professional meetings and provides feedback to each ERC. Other needs assessment information was gathered from a regional needs assessment that is administered twice within each grant period through direct mail with a pre-paid postage return to enhance response. These assessments (the most recent conducted in late 2005) served as the basis for new course development and retention of existing courses. In addition, surveys are distributed to RMCOEH graduates which include questions directed to continuing education needs.

Additionally, needs assessments were distributed at each RMCOEH-sponsored training course and summarized on an annual basis. Several new courses were added to the schedule as a result of the needs assessment activities including Personality Types & Injuries and the State of the Art Conference on Musculoskeletal Disorders. (See Appendix CE-1 for a complete summary of new courses conducted within the 2002-2007 project period.) Examples of existing courses that were retained as a result of the surveys included Safety Program Management and Core Concepts in Safety and Health.

Finally, the RMCOEH was fortunate to be a host site for a NIOSH NORA II Town Hall meeting in February 2006. This was, by far, the largest Town Hall meeting in the US (over 150 attendees) and provided us unique opportunities to identify research and training areas. Roundtable sessions were conducted that amassed a wealth of information regarding potential topics of interest.

**2) Standard course evaluations were also used as a needs assessment tool.** Responses were collected and kept on file for future planning. In addition, every other year, the CE Director administered an impact evaluation which included questions directed to participant satisfaction and future training needs.

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These, too, were compiled and used for program planning. From these evaluations, 95% of the respondents indicated that the training provided by the CE Program met meeting their educational needs.

**3) Input from the Center Executive Committee and the RMCOEH Advisory Board with the affiliated CE Advisory Committee** was an integral part of the strategy that was used to evaluate the program's offerings.

**4) Finally, an electronic needs assessment was available on the RMCOEH web home page.** However, response through this mechanism was been lower than desired.

**Goal 3. Provide superior service and outreach that enhances and promotes the field of occupational and environmental safety and health.**

**Objective 3.a. Increase awareness and understanding of occupational safety and health issues throughout the region.**

**1) The CE Program promoted and offered the Paul S. Richards Memorial Lectureship which has been tied to the annual NORA symposium.** This was a free public service that the RMCOEH provided through an endowment. Presenters included J. Steve Moore, MD, MPH, CIH, CPE, Texas A&M (2004); Michael S. Morgan, Sc.D., C.I.H., University of Washington (2005); Thomas E. Bernard, Ph.D., University of South Florida (2006); and Philip Harber, MD, MPH, UCLA School of Medicine (2007).

**2) The Center exhibited at national and regional professional association meetings as funds permitted.**

**3) Capitalizing on electronic delivery systems, the CE Program distributed a monthly course notification to its electronic mailing list.**

**Objective 3.b. Support activities that serve the needs of the target populations.**

**1) Curricular design and the approach(es) to training were both considered in meeting course participants' needs.** For example, the Comprehensive Review of Industrial Hygiene course is intended to help industrial hygienists prepare for their certification exam. Morning and afternoon quizzes were administered each day to prepare participants for the types of questions they might encounter on the examination. Skills-based courses like asbestos and lead incorporated numerous opportunities for hands-on activities that prepared participants to conduct the types of activities they will encounter on the job.

In addition, skills and knowledge levels of course participants were considered so that varying levels of expertise could be accommodated. Finally, the RMCOEH relied on experienced trainers who understand adult learning and incorporated interactive, visual, auditory and, at times, kinesthetic elements into the training to accommodate a mix of different learning styles. Also, courses were reviewed and revised as needed so that presentations remained timely with new and up-to-date information.

**2) Several RMCOEH CE programs were intended to prepare practitioners for professional certifications.** These courses include the Comprehensive Review of Industrial Hygiene and the Associate/Certified Safety Professional Review course.

**3) In addition to preparing practitioners for professional certifications, all RMCOEH CE courses were designed to maintain professional certifications.** Continuing education credits are a major need of the target populations, often to meet licensure requirements. Therefore, the CE Program has long provided appropriate specialty credit as well as Continuing Education Credits to assist attendees in maintaining certification and licensure. In addition to the American Board of Industrial Hygiene, AMA Category 1 CME credit and American Academy of Family Practice prescribed credit for occupational medicine courses were obtained through course co-sponsorship with both the American College of

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Occupational and Environmental Medicine (ACOEM) and the American Academy of Family Physicians (AAFP). American Board of Preventive Medicine MOC credits were also obtained for the State-of-the-Art Musculoskeletal Disorders Conference. The online and hard-copy distance-based education management course was approved and received MOC as a recertification module by the American Board of Preventive Medicine for specialists in occupational medicine, aerospace medicine, and general preventive medicine/public health. Insurance, legal, and case manager credits were also procured when applicable. The CE Program also obtained Utah Nursing Association (UNA) credits for the Compensable Disability Forum to assist nurses who are not occupational health nurses with licensure. The American Association of Occupational Health Nurses accepts the traditional Continuing Education Unit, making additional credits from it unnecessary.

**4) The CE Program continued to evaluate alternative ways to meet the needs of the target populations including intensive short-term certificate programs.** The Safety Certificate Program was developed years ago and continued to be successfully attended. It is unique in that it recognizes that it is difficult for many business people to attend day classes; courses are offered at night, one night per week over an 8-week period to accommodate the need to attend at night.

Needs assessments had supported the need for an Industrial Hygiene Certificate Program. This program was implemented in this grant period; it differs from the night program as courses are held during the day. Responses to needs assessments indicated this preference for day courses for this particular series.

Finally, an intensive short-term certificate program was developed for the OSHA Education Center. A series of core courses are required, and they are complemented by a set of electives from which participants can choose. This was intended to help round out their certificate based on their current employment and interests.

**4) The University of Utah received funding from the Labor Commission of Utah to support a fee-waiver program.** Fifty-percent tuition waivers were awarded to Utah-based small businesses (under 250 employees) who were either attempting to establish new or enhance existing safety programs.

**5) The Center worked closely with other ERCs.** Attendees were often referred to other Centers if their training needs could not be met by our program. In addition, the ERC Continuing Education Directors met annually and shared ideas about the development, marketing and presentation of programs.

**6) In addition, the RMCOEH annually co-sponsored at least one seminar annually with the Utah Association of Occupational Health Nurses (UAOHN).** RMCOEH donated its share of the proceeds from the event to support the ongoing activities of the UAOHN.

**7) When sufficient requests were received by either phone or through a formal needs assessment, the RMCOEH made every effort to accommodate the request.** Requests for additional 8-hour hazardous waste refresher courses, OSHA trainer courses and asbestos courses were offered in response to such needs.

**8) RMCOEH academic program students attended all CE courses at cost.** This is an added benefit to the student and reflects the commitment of the CE program to the efforts of the academic cores.

#### **Goal 4. Accomplish Extensive Interdisciplinary Collaborations**

**Objective 4.a. To provide multi-disciplinary courses and conferences to promote interaction among professionals in all fields of occupational safety and health.**

Interdisciplinary experiences are provided through the majority of continuing education courses and conferences. Industrial hygiene and safety professionals frequently intermixed in industrial hygiene and

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safety courses. Occupational medicine professionals intermixed in medical-related course offerings. A sample of these offerings is noted in the following:

a) The CE Program continued its support of and active involvement in the Annual Utah Conference on Safety and Industrial Hygiene. Annually, a mix of between 150-200 regional occupational safety and health professionals attended this event. Each year, new topics were specifically chosen to address the targeted interests of each profession as well as topics that are cross disciplinary. Although the primary target audience is industrial hygiene and safety professionals, occupational medicine physicians and occupational health nurses found applicability at this conference.

b) The Annual Compensable Disability Forum is another multi-disciplinary effort. Like the Annual Utah Conference, its focus changed each year to address current issues and trends in the field. The target audience included insurance adjusters, claims managers, risk managers, employers, human resource managers, physicians, therapists, case managers, and safety practitioners.

c) In 2006, the RMCOEH offered its first State-of-the-Art Conference on Musculoskeletal Disorders as a platform to present leading information from our two prospective cohort studies on MSDs. This conference was attended by occupational medicine physicians, occupational health nurses, industrial hygienists, safety professionals, physical therapists, occupational therapists, insurance adjusters and lawyers. This successful conference was held again in March 2007.

**Objective 4.b. Identify needs and topics of interest that are interdisciplinary in nature.**

The RMCOEH researched interdisciplinary training needs through needs assessments and evaluation instruments.

**Objective 4.c. Engage in service activities that are applicable across the disciplines.**

The RMCOEH engaged in service activities that are applicable across the disciplines. The "Richards Lectureship" and exhibiting at national meetings definitely served as interdisciplinary efforts. Certification maintenance credits were awarded across the disciplines with each course as appropriate.

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## **HAZARDOUS SUBSTANCE TRAINING PROGRAM (HST)**

Connie Crandall, MA, MBA  
Program Director

## Abstract: Hazardous Substances Training

The Hazardous Substances Training (HST) Program at the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH) has been providing short course training for professionals in state and local government agencies, as well as other professionals engaged in the handling of hazardous substances or the management of facilities engaged in hazardous substances-related activities since 1990. We are one of the primary Occupational Safety and Health (OSH) Continuing Education (CE) resources in Region VIII. During 2002-2007, our offerings included 92 courses to 1,030 participants on a variety of HST-related topics as identified in the original request for application and as identified by needs assessments

The HST Program is integral to the RMCOEH CE Program as a whole and strengthens it by adding another component to its entire slate of course offerings. It supports the CE program's mission to reduce human and financial costs by providing excellent short-course training in occupational and environmental health and safety that is marked by continuous improvement and response to needs. Developed on the basis of the results of an initial needs assessment survey and grant requirements, the program was intended to supplement, not duplicate, existing training. It serves its target community by offering reduced tuitions through the fee-waiver program that is included as part of the training initiative. The CE Program has also worked with the academic programs and principal faculty in helping piloting techniques in distance-based education that could potentially augment the traditional classroom setting courses.

Coordination with agencies is an essential component of this program's activities. Agencies that are integral to the effort are the Utah State Division of Risk Management, the Utah Division of Solid and Hazardous Waste, the Utah Division of Air Quality and the Salt Lake Valley Health Department.

The HST program operated under three stated goals:

- 1) Offer continuing education programs (courses and conferences) to professionals involved in the hazardous substances field.
- 2) Conduct research to identify training needs and training effectiveness.
- 3) Engage in service activities that enhance and promote the field of hazardous substances.

Specific objectives were identified to achieve these goals. The goals and the objectives are detailed in subsequent sections of this report.

## Highlights/Significant Results

The following is a summary of progress in accomplishing the overall goals for the Hazardous Substances Training (HST) program for the 2002-2007 grant period.

### **GOAL 1: Continue to offer education programs (courses and conferences) to professionals involved in the hazardous substances field.**

This goal was accomplished through five major objectives: 1) Provide short-term hazardous substance post-graduate training on current issues and topics; 2) Facilitate exchange with other safety and health professionals through coordination with agencies; 3) Involve the representatives of the target audience in planning and implementing programs through an

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advisory committee; 4) Obtain highly-qualified faculty from the private and public sector who bring both theoretical and practical knowledge to the issues presented; and 5) Develop and implement a comprehensive marketing program.

1) During the period July 1, 2002 through June 30, 2007, 1,251 trainees attended 92 HST CE courses; fifteen new courses were developed over the period. (See Table 12c for a breakdown of participants by discipline and Appendix HST1 for a list of new courses offered during the grant period).

2) Because the primary audience for the NIOSH-funded HST courses includes federal, state and local health and environmental agency personnel, the RMCOEH maintained close coordination with those agencies which include the Utah State Division of Risk Management, the Utah Division of Solid and Hazardous Waste, the Utah Division of Air Quality, the Salt Lake Valley Health Department, and the Salt Lake County Emergency Management Bureau.

3) This coordination process with agencies was formalized under the HST Program Advisory Committee that is comprised, in part, of representatives of the target audience. The rest of the committee is comprised of industry and academic representatives. Input from these members was used to evaluate the hazardous substances program schedule and course content each year. The Advisory Committee met at least once per year. During this project period, the RMCOEH formed a strategic partnership with the Salt Lake Community College. This partnership involved significant collaboration between the two programs to conduct 8- and 40-hour HAZWOPER training courses, and was established to avoid duplication of effort and more effectively reach similar target populations.

4) During the project period, the RMCOEH was able to successfully draw quality faculty from a wealth of occupational and environmental safety and health professionals in the immediate area.

5) An active marketing program and multi-faceted marketing plan was utilized to recruit prospective HST students. The program relied on a marketing mix that included a dedicated web site, direct mail and email campaigns, targeted advertising in trade association journals, and trade show exhibiting.

**GOAL 2: Conduct research to identify training needs and training effectiveness.**

This goal was accomplished. There were two supporting objectives: 1) Periodically estimate the need for hazardous substances training of each state within the Center's designated region by extensive questionnaires and needs assessment surveys and 2) Annually evaluate training effectiveness through post-course questionnaires.

The HST program has utilized a multi-faceted needs assessment approach comprised of various mechanisms which include the following:

- a) A needs assessment survey was distributed to every course participant as part of their course packets.
- b) Regional needs assessments were distributed every other year during the project period to various government agencies as well as other facilities and organizations with a projected need for hazardous substances training.
- c) During the current project period, Impact evaluations were also distributed on an every-other year basis (alternate years to the every-other-year needs assessment) to

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individuals who attended courses. Needs-related questions were included in these impact evaluations.

- d) Consultations with HST Advisory Committee members, RMCOEH Advisory Board members, and internal and external faculty were also an excellent and reliable source of needs information. The HST Advisory Committee was particularly important as it included representatives of the target audience. HST Program issues were also discussed at the RMCOEH Advisory Board meetings and with course faculty to provide an even wider perspective from agencies outside the Center.

### **GOAL 3: Engage in service activities that enhance and promote the field of hazardous substances.**

The sole objective in support of this goal was to support activities that serve the needs of the target audience.

Curriculum design and training approach were significant considerations in meeting course participants' needs. In addition, course faculty members queried course participants to assess skills and knowledge levels so that the needs of all participants can be addressed. The program also relied on experienced trainers who incorporated a mix of activities to accommodate differing learning styles. Finally, courses were reviewed and revised as needed to keep course content timely with current and relevant information.

The Certified Hazardous Materials Manager (CHMM) Review course was offered to meet the participant's need for professional certification. In addition to preparing practitioners for professional certifications, all RMCOEH continuing education courses, including HST courses, are designed to maintain professional certifications. Since CE credits are a major need of the target populations in order to maintain certification, the credits were obtained from appropriate professional associations.

Additionally, attractive tuition fees were offered primarily to state and local government attendees. Over the July 1, 2002 – June 2007 project period, 309 partial and, in some instances, full fee waivers were awarded. This facilitated attendance by those agencies or groups that would otherwise be unable to attend because of limited funding resources.

## **Outcomes/Relevance/Impact**

During the 2002-2007 grant period, the HST program conducted 92 courses to 1,251 registrants, including 15 new offerings. This is significant in light of the fact that Region VIII is sparsely populated, with relatively few major population centers.

Outcomes were evaluated in a number of ways. The HST Program, under the auspices of the CE Program, conducted training impact evaluations two times within the 5-year grant period to capture data in terms of behavior change, lost work days, and dollars saved. Based on results from evaluations conducted in 2004 and 2006, 96% of the respondents reported that the courses offered through the CE Program met their continuing education needs. Sixty-six percent of the respondents reported a positive change in work behaviors and 59% felt that the training they had received had resulted in reduced injuries and illnesses.

As noted previously, the CHMM Review course is intended to prepare practitioners for professional certifications. The Institute of Hazardous Materials Management (IHMM) has reported that the current pass rate for attendees at this RMCOEH-sponsored exam-preparation course is 85%, exceeding the national pass rate average of 70%.

Hazardous substances training often relies on skills-based assessments. Activities were designed to provide real-work preparation and experience; the experiences were observed and critiqued by course instructors.

Continuing education credits are a major need of the target populations and the HST Program has long provided appropriate specialty credit in addition to the standard CEU.

## Technical Report

As indicated in the Summary of Significant Findings section, three goals were established for the hazardous substances training (HST) program. Specific objectives were established to achieve these goals. The following details the progress in accomplishing these objectives.

Specific objectives have been established to achieve these goals. The following is a description of progress or plans towards achieving these objectives:

**GOAL 1: Continue to offer education programs (courses and conferences) to professionals involved in the hazardous substances field.**

**Objective 1a: To provide short-term hazardous substance post-graduate training on current issues and topics.**

The RMCOEH evaluated its training schedule for course relevance. Based on needs assessments, post-course evaluations, regulatory requirements, and Advisory Board input, the RMCOEH explored new topics for future course development. Courses were either augmented or replaced depending on reflected interest and need. For example, a Decontamination Specialist course was added to the schedule based on a new regulatory requirement.

In addition, the Annual Utah Conference on Safety and Industrial Hygiene incorporated both hazardous substances lectures and short courses into its schedule. Lectures included topics such as Bioterrorism, Clandestine Drug Labs and Methamphetamine Cleanup Issues, Disaster Site Worker Programs, and the Globally Harmonized System for Hazard Communication and Spill Response. Past hazardous substances short courses included Health Effects of Hazardous Materials, Hazmat Incident Commander and Managing Hazardous Materials in the Workplace.

A new course that was offered in 2007 was the International Air Transportation Association (IATA) training for those who must meet air transportation requirements for shipping hazardous substances.

The majority of the courses that comprise the program were at least three-days long; however, the target audience had expressed a need for the 8-Hour HAZWOPER refresher; those courses were offered several times throughout the year and were well attended.

**Objective 1b: To facilitate exchange with other safety and health professionals through coordination with agencies.**

Because the primary audience for the NIOSH-funded HST courses includes federal, state and local health and environmental agency personnel, the RMCOEH coordinated closely with those agencies. These included established interactive processes with agencies that

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included the Utah State Division of Risk Management, the Utah Division of Solid and Hazardous Waste, the Utah Division of Air Quality and the Salt Lake Valley Health Department. These processes were formalized under the HST Advisory Committee that is comprised, in part, of representatives of the target audience.

In addition, at the annual joint HST/HSAT meeting sponsored by NIOSH, update presentations by both NIEHS and EPA were included. This venue provided an excellent forum for federal agency coordination. The RMCOEH coordinated with both the regional office of the Environmental Protection Agency and the State Department of Environmental Quality. Each agency was instrumental in identifying contacts at local and regional health departments to assist in expanding the courses' target audience. In addition, Dr. Moser was involved with the Utah State Health Department, providing lectures on bioterrorism and response to other mass casualty events. He spent considerable time facilitating planning meetings and developed the Utah Medical Surge Plan for Terrorism (especially CBRNE) and other Mass Casualty Events that has subsequently been widely copied in other states.

A significant collaboration is the formal partnership created between Salt Lake Community College and the RMCOEH. Mr. Dumas, Principal Faculty, served as the liaison to the Salt Lake Community College in this effort. This partnership involved significant collaboration between the two programs to conduct HAZWOPER training courses and was established to avoid duplication of effort and more effectively reach similar target populations.

In summary, these consortial partnerships were integral to the hazardous substances training initiative.

**Objective 1c: To involve the representatives of the target audience in planning and implementing programs through an advisory committee.**

Representatives of the target audience sat on the RMCOEH HST Advisory Committee. Committee members were specifically selected on the basis of background and involvement in hazardous substances activities. The Division of Solid and Hazardous Waste (a division of the Department of Environmental Quality) was represented as well as the Utah State Office of Risk Management and the Salt Lake Emergency Management Bureau. Representatives from these agencies are connected to other affiliated agencies so that the coordination with agencies was far reaching. The rest of the committee was comprised of industry and academic representatives. Input from these members was used to re-evaluate the hazardous substances program schedule and course content.

The Committee was scheduled to meet at least annually and most recently met in June 2006. Issues related to assessing program needs as well as evaluating impact, identifying new courses and speakers, and marketing strategies were discussed including exhibiting/presenting at the spring Utah Facilities Operation & Maintenance Association (UFOMA) conference.

**Objective 1d: To obtain highly-qualified faculty from the private and public sector who bring both theoretical and practical knowledge to the issues presented.**

The RMCOEH successfully drew quality faculty from a wealth of occupational and environmental safety and health professionals in the immediate area. This input was complemented by outside faculty, individuals who are respected and current in the field.

**Objective 1e: To develop and implement a comprehensive marketing program.**

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The HST program focused on state and local government representatives as well as occupational safety and health professionals and others with responsibility for hazardous substances-related activities. The program relied on a marketing mix that included a dedicated web site, direct and email mail campaigns, targeted advertising in trade association journals, trade show exhibiting, and inclusion of courses in the Center Newsletter.

The RMCOEH's web site has individual pages for each core area including continuing education. All hazardous substances courses were on the continuing education portion of the site with downloadable brochures available for more extensive dissemination of information.

In support of the direct mail campaign, the HST program brochures were distributed to both in-house (3500 names) and leased lists that specifically targeted the program audience. Each course was promoted through this direct mail approach. Each course brochure also listed other upcoming programs so that additional coverage was provided in numerous brochures. The CE program published an annual calendar which was distributed through direct mail; hazardous substances programs were incorporated into that publication.

In addition, program ads were placed in key journals such as *Environmental Health & Safety*, *Facility Safety Management*, *Occupational Health and Safety*, *Occupational Hazards*, and *The Synergist*.

As an enhancement to the direct mail marketing activities, the program also utilized email notification. An electronic list of several thousand names was used to distribute monthly course notifications. Other electronics lists were also utilized including the safety list maintained at the University of Vermont and the asbestos list maintained at Utah State University. Course notifications were sent monthly to the local chapters of the American Industrial Hygiene Association, American Society of Safety Engineers, Utah Manufacturers Association and Associated General Contractors for distribution to their membership. Electronic course notification was also used to spotlight individual courses to spur enrollments as enrollment deadlines neared. These reminders were instrumental at increasing registrations to decrease course cancellations.

Finally, as funding permitted, the program reached out to its constituency through trade show marketing. The program exhibited at the AIHCE in 2005, 2006, and 2007 as well as at the Annual Conference on Safety and Industrial Hygiene. It also exhibited (June 2006) at an event sponsored by the Workers' Compensation Fund of Utah and the Utah Chamber of Commerce.

**GOAL 2: Conduct research to identify training needs and training effectiveness.**

**Objective 2a: To periodically estimate the need for hazardous substances training of each state within the Center's designated region by extensive questionnaires and needs assessment surveys.**

The HST program implemented a multi-faceted needs assessment program comprised of various mechanisms which include:

- 1) A needs assessment survey was placed in participants' course packets as part of the course evaluation process.

The HST Program employed a needs assessment tool that is now a standard item distributed to all course participants. Information obtained from ongoing needs surveys

accomplished as part of other RMCOEH CE courses was combined with feedback from students in the hazardous substances courses.

- 2) Regional needs assessments that target various facilities and organizations. These assessments were conducted on an every-other-year basis; the latest survey was mailed in August 2006.
- 3) A needs assessment on the RMCOEH home page. A Center-wide needs assessment is included on the Center home page. However, responses to this survey were less than desired.
- 4) Impact evaluations. During the current grant period, impact evaluations were distributed that include needs-related questions on an every-other-year basis to those individuals who attended courses; the last evaluation was sent in 2006.
- 5) Graduate surveys. Graduates of the academic programs were surveyed to evaluate their experience with the Center's programs. The survey that was distributed included questions directed to continuing education needs.
- 6) Consultations with Hazardous Substance Training Advisory Committee members, RMCOEH Advisory Board members, and internal and external faculty.

Finally, as noted previously, the HST Advisory Committee, which met annually, included representatives of the target audience as well as RMCOEH and industry representatives. Recommendations from this committee were an integral component of the Center's needs assessment/planning strategy. HST Program issues were also discussed at RMCOEH Advisory Board meetings to provide an even wider perspective from agencies outside the Center. In addition, course faculty, both internal and external to the RMCOEH, were consulted regarding course relevancy to the overall program.

**Objective 2b: To annually evaluate training effectiveness through post-course questionnaires.**

The HST Program relied on participant evaluations that are administered at every training course and impact evaluations that were administered on an every-other-year basis. Both of these evaluation tools were intended to determine the effectiveness and usefulness of the training for attendees at RMCOEH courses.

**GOAL 3: Engage in service activities that enhance and promote the field of hazardous substances.**

**Objective 3a: Support activities that serve the needs of the target audience.**

Curriculum design and training approach were both considered in meeting course participants' needs. For example, skills-based courses like the 8- and 40- hour hazardous waste operations and emergency response courses incorporated numerous opportunities for practical activities that prepared participants to conduct the types of activities they will encounter on the job.

In addition, course participants were queried at the courses as to individual skills and knowledge levels; this was considered so that varying levels of expertise could be accommodated. Also, the RMCOEH relied on experienced trainers who understand adult learning and incorporate interactive, visual, auditory and, at times, kinesthetic elements into the training to accommodate a mix of different learning styles. Finally, courses were

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reviewed and revised as needed so that presentations remained timely with new and up-to-date information.

One particular HST program, the Certified Hazardous Materials Manager (CHMM) Review course, is intended to prepare practitioners for CHMM professional certification. Based on statistics provided by the Institute of Hazardous Materials Management (IHMM), the current pass rate for attendees at the RMCOEH-sponsored exam-preparation course is 85%. This compares favorably to the national pass rate of 70%.

In addition to preparing practitioners for professional certifications, all RMCOEH CE courses are designed to maintain professional certifications. As continuing education credits are a major need of the target populations, they were obtained from appropriate professional associations to assist attendees in maintaining certification. In addition to the credits obtained from the IHMM, credits from the American Board of Industrial Hygiene were also requested for HST courses.

Additionally, attractive tuition was offered to state and local government attendees. State and local government attendees were charged at a rate of 50% of non-government participants with some attendees also being considered for full scholarships. This was done to facilitate attendance by those agencies or groups that would otherwise have been unable to attend because of funding constraints.

Finally, multi-disciplinary experiences were provided through the majority of continuing education courses and conferences. Many different types of occupational safety and environmental health professionals including industrial hygiene and safety professionals with an ancillary interest in hazardous substances frequently intermixed in industrial hygiene, safety, and HST courses.

# PUBLICATIONS

Students authors are signified by underlining.

## **PEER-REVIEWED**

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## **2005**

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## **2003**

**Wood EM,** **Hegmann KT,** Garg A, Alder SC, Kapellusch J, Thiese MS, Thompson CJ, Wendelboe A. “Risk for Low Back, Neck and Shoulder Pain among Home Health Care Workers,” presented at the American Occupational Health Conference, Atlanta, GA, May 2003. *J Occup Env Med* 2003;45(7):774.

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Haws A, **Hegmann KT,** Hegmann KB, Alder SC, White GL, Lyon JL, Wendelboe AM. “Influenza Surveillance using an Electronic Medical Record and Variations in Symptoms over Three Influenza Seasons.” Presented at the 36<sup>th</sup> Annual Meeting of the Society for Epidemiologic Research, Atlanta, GA, June 2003. *Am J Epidemiol* 2003;157(11):186-S.

Thiese MS, **Hegmann KT,** Garg A, Kapellusch J, Alder SC, Wendelboe AM. “A Cross-sectional Analysis of Musculoskeletal Disorders in Home Healthcare Workers.” Presented at the 36<sup>th</sup> Annual Meeting of the Society for Epidemiologic Research, Atlanta, GA, June 2003. *Am J Epidemiol* 2003;157(11):290-S.

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Wendelboe AM, Hegmann KT, Gren LH, Alder SC, White GL, Lyon JL. “Associations between Body Mass Indices and Surgeries for Rotator Cuff Tendinitis.” Presented at the 36<sup>th</sup> Annual Meeting of the Society for Epidemiologic Research, Atlanta, GA, June 2003. *Am J Epidemiol* 2003;157(11):331-S.

## **2002**

Wendelboe AM, Hegmann KT, Biggs JJ, Cox CM, Portmann AJ, Gildea JH, Gren LH, Lyon JL. “Relationships between body mass indices and surgical replacements of knee and hip joints.” Presented at the 35<sup>th</sup> Annual Meeting of the Society for Epidemiologic Research, Palm Desert, CA, June 2002. *Am J Epidemiol* 2002;155(11):S88.

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

# **ERGONOMIC AND SAFETY (E&S)**

Appendices

## Appendix E&S-1 Graduate Survey Results

The RMCOEH initiated the 2006 Graduates Survey in June of 2006. At the time the following summary was prepared (August 31, 2006), the survey had received 32 E&S graduate responses, for an E&S graduate response rate of 39%. Graduates either received email links to the survey on the RMCOEH homepage or paper versions of the survey if a valid email address was not available. Initial non-responders received reminder emails and/or a postcard reminder to complete the survey. The survey was powered by SurveyMonkey through SurveyMonkey.com. All paper responses were entered into the web-based survey.

### 1. Which professional certifications do you hold? (check or write in all that apply)

	Response Percent	Response Total
Certified Associate Industrial Hygienist	0.0%	0
Certified Industrial Hygienist	23.1%	3
Associate Safety Professional	7.7%	1
Certified Safety Professional	38.5%	5
Certified Hazardous Material Manager	0.0%	0
Professional Engineer	30.8%	4
Certified Professional Ergonomist	7.7%	1
Certified Human Factors Professional	0.0%	0
Certified Occupational Health Nurse	0.0%	0
Certified Case Manager	0.0%	0
Medical Review Officer	0.0%	0
Certified Independent Medical Examiner	0.0%	0
Board Certification with the American Board of Preventive Medicine, Occupational Medicine	0.0%	0
Board Certification with the American Board of Preventive Medicine, Aerospace Medicine	0.0%	0
Board Certification with the American Board of Preventive Medicine, General Preventive Medicine and Public Health	0.0%	0
Board Certification with another medical board (i.e. Family Medicine, Internal Medicine, Anesthesia)	0.0%	0
Other (please specify)	7.7%	1
	<b>TOTAL</b>	<b>13</b>

\*Other: JD and Registered Patent Attorney

### 2. What is your current job title?

1	Project Engineer
2	Attorney
3	engineering consultant
4	Senior Industrial Hygienist/Ergonomist
5	Senior Safety Engineer
6	Manager, Risk Control

7	Safety & Environmental manager
8	Radiation Safety
9	engineering Director
10	HSE Manager
11	Industrial Hygiene Officer
12	Safety Administrator
13	now retired [was V.P. Safety & Loss Prevention
14	Lab Supervisor
15	Director of Testing
16	Aerospace Engineer
17	Sr. Safety Engineer
18	Assistant Professor
19	Vice President
20	Safety Manager
21	Aerospace Engineer
22	Research Assistant Professor
23	Aerospace Structural Engineer
24	Staff Engineer - Ergonomist
25	Assistant Professor
26	Environmental Engineer
27	Tool Engineer
28	Design Engineer
29	Manager R&D
30	Corporate Health & Safety Manager

**3. If you participated in an educational program after graduating from the RMCOEH, what subjects did you study? Which degrees did you pursue?**

1	Law, particularly intellectual property law
2	N/A
3	no further studies
4	n/a
5	NORAH
6	None
7	PhD in Mechanical and Aerospace Engineering
8	A variety of safety, health and environment courses
9	Mechanical Engineering, Ph.D.
10	none yet

**4. What is your work setting (check or write in all that apply)?**

	Response Percent	Response Total
Clinic	3.2%	1

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Hospital	0.0%	0
HMO	0.0%	0
Industry	64.5%	20
Government	19.4%	6
Consultant/own business	6.5%	2
Consulting Company	3.2%	1
Education/University	9.7%	3
Other (please specify)	16.1%	5
	TOTAL	31

**5. Where do you primarily work (which state)?**

1	Utah
2	Michigan, (just moved to Utah)
3	utah
4	Utah
5	New Mexico
6	New York
7	Utah, Idaho, New Mexico, Nevada & CA
8	Utah
9	Utah
10	Utah
11	Texas
12	North Carolina
13	Oregon
14	Utah
15	Utah
16	Utah
17	Utah
18	Utah
19	Virginia
20	Utah
21	Colorado
22	Utah
23	Utah
24	UT
25	Ohio
26	Utah
27	Colorado
28	Utah
29	Utah
30	Utah
31	MI

**6. Which OEHS specialists do you interact with on a regular basis? (check all that apply)**

	Response Percent	Response Total
Ergonomics and Safety specialists	83%	20
Industrial Hygienists	63%	15
Occupational Health Nurses	38%	9
Occupational Medicine Physicians	42%	10
Other (please specify)	25%	6
	TOTAL	24

7. **Approximately how much annual cost savings do your OEH services provide to your organization? If you are an OEH consultant, how much annual cost savings do your services provide to your clients (in total)?**

	Response Percent	Response Total
\$0 to <\$5,000	4%	1
\$5,000 to <\$50,000	7%	2
\$50,000 to <\$100,000	11%	3
\$100,000 to < \$250,000	4%	1
\$250,000 to \$500,000	0%	0
>\$500,000	15%	4
Unknown	52%	14
Other (please specify)	7%	2
	TOTAL	27

8. **Since you started working in your current position, by what percent have OEH services reduced injuries in your organization(s) (approximately)?**

	Response Percent	Response Total
Unknown	65.2%	15
0%	0.0%	0
5%	4.3%	1
10%	4.3%	1
15%	0.0%	0
20%	0.0%	0
25%	0.0%	0
30%	13.0%	3
35%	0.0%	0
40%	0.0%	0
45%	0.0%	0
50%	8.7%	2
55%	0.0%	0
60%	0.0%	0
65%	4.3%	1

70%	0.0%	0
75%	0.0%	0
80%	0.0%	0
85%	0.0%	0
90%	0.0%	0
95%	0.0%	0
100%	0.0%	0
	TOTAL	23

**9. At your workplace, what OEH problems require a significant percent of your time, generate costs and injuries, or worry you?**

1	Machine guarding, CTDs
2	Inappropriate ordering of office equipment
3	Strains and sprains from aging workforce
4	Office (computer use) and industrial musculoskeletal disorders (ergonomic issues).
5	Occupational exposures due aviation operations and aircraft maintenance.
6	At WCF, repetitive stress injuries were the primary loss source.
7	15%
8	Workers Compensation issues appear to have the greatest impact on costs time consumption, and efficiency of OEH programs. Problem areas are mainly lack of resources to adequately address OEH requirements of the governing agencies.
9	I do not work in this department. I work in a system program office for a weapon system.
10	Environmental issues require a significant percentage of time. Waste management generates the highest cost. General employee behaviors and individual choices cause most of our workplace injuries.
11	None
12	Costs of technical compliance with regulations that really don't reduce risk.
13	handling and storage of chemicals -- basic haz com in laboratories
14	Occupational Ergonomics
15	Ergonomic injuries pareto as the highest total number of injuries, highest rate, and highest costs.
16	I have been assigned a part time task of reducing product errors in the workplace - because of my studies in ergonomics and safety I have applied these as well (considering them a significant part of reducing product errors). Consequently I spend approximately 1/3 to 1/2 of my time in ergonomic related issues.
17	Ergonomics related illnesses due to long recovery times when employees are injured Safety (in particular Vehicles within the factory and power lockout) Case Management (Back to work issues Workers Compensation)

**10. What subjects would you add?**

1	Not sure
2	none

3	An indepth analysis of office/administrative work area ergonomic analysis based on the individual's physical characteristics. Not a generalized workstation analysis. I would be glad to help develop a class outline for such a course.
4	None
5	More basic safety and hazard recognition and control courses. A general course in establishing relationships with customers and clients coupled with technics in how to "sell" yourself and your services in a positive and effective manner.
6	A broader understanding of OSHA Safety audit and investigation
7	It has been so long, but possibly hazards material handling, packaging, and shipping courses would be significant. Additionally curriculum on how to handle hazard waste materials would also be of interest.
8	Aerospace medicine.
9	Include more environmental compliance education. Not necessarily more regulatory overviews but focusing on how to comply with environmental regulations. Items such as what does a hazardous waste management program look like. Also, the addition of a couple of courses that would allow RMCOEH students to fulfill the requirements set forth by the Public Health department that applies specifically to the workplace.
10	more collaborations between cores -- more participation by cores in other core's classes
11	Behavioral Based Safety
12	ISO 14001/9001-becoming industry standard
13	Communicable Diseases & Control Intro to Occ Health (IH, Safety, Ergo basics) should be mandatory as well
14	I think the holistic approach to safety has been very beneficial, however I would also like to see a little better overview of safety for the graduate in ergonomics and safety because it allow the graduate to better assess how to fit into a safety organization - if there is a lack of safety know-how in one area the graduate can more clearly see the deficit. In addition I would like to have a field trip class wherein someone with experience could show how a practical ergonomic assessment is performed - how the company is approached, how to organize records, what to concentrate on (posture, frequency, force, metabolism, interaction with product, and etc.), how not to get lost in the thick of thin things, how a final report to the company should look to give them the best opportunity to take the next steps to help their employees, and so forth.
15	Case Management materials and Workers Compensation Law

### 11. What subjects would you remove?

1	Fewr public health courses
2	none
3	None
4	none come to mind
5	??
6	The injury fact/statistics course was interesting but not very useful. I cannot recall the actual course name/#.
7	None

8	Any public health classes that can be replaced with a more workplace specific version of these courses. "Social context of medicine" and "Healthcare systems-(Hammer's class)" were an absolute waste of time and effort. A course focusing on occupational medicine or hospitals as workplaces would be far more beneficial to those entering the OEHS field.
9	many of the general public health requirements such as "health care administration"
10	Too long to remember
11	None
12	If I were to take classes over again I would remove a little more of the overlap in ergonomics and try to get a little better practical application. However, I do not regret taking any course.
13	None

## 12. What changes to existing courses or rotations do you recommend?

1	consider combining safety/IH/Environmental curriculums since most companies combine the 3 into one position.
2	??
3	The industrial hygiene courses are excellent as are the ergonomics. Possibly increase the availability.
4	The ergonomics problems were all static two dimensional problems. I believe that dynamic analysis would more clearly reflect real life situations.
5	The more hands on experience that the program can provide, the better. More "clinical" and projects at actual businesses would provide students with the real world experience that is hard to duplicate in the classroom.
6	more co-instruction with instructors from various cores
7	I was enrolled through the video tape program and really enjoyed it - I did attend the university when practical. If I were to be responsible for a student in a university setting I would try to emulate the same care my professors did.
8	None

## 13. How likely are you to recommend the training programs at the RMCOEH?

	Response Percent	Response Total
Advise against	0.0%	0
1	0.0%	0
2	0.0%	0
3	3.7%	1
4	0.0%	0
5	3.7%	1
6	0.0%	0
7	18.5%	5
8	25.9%	7
9	18.5%	5
Enthusiastically	33.3%	9

recommend		
		27

**14. How satisfied are you with the training you received at the RMCOEH?**

	Response Percent	Response Total
Very dissatisfied	0.0%	0
1	0.0%	0
2	0.0%	0
3	0.0%	0
4	0.0%	0
5	3.8%	1
6	0.0%	0
7	19.2%	5
8	23.1%	6
9	19.2%	5
Very satisfied	34.6%	9
		26

**15. Please describe a continuing education course that you might attend.**

1	Emerging issues in Ergonomics
2	Certification prep classes.
3	With 900 Risk Control Forks at our organization, we end up doing most of this in house. I am however interested in new trends, issues and concerns to safety health.
4	Recertification courses, Hazcooper, Asbestos, etc.
5	N/A
6	OSHA laws Ergonomic refresher
7	Hazardous Materials Handling/Packaging/Shipping
8	I would like to continue my education. However, I have found the university to be an obstical. I have all the credits I need. They don't want people taking courses unless they are enrolled in a degree program. It would be nice if there was a contrac or some other vehicle in place where a USAF employee could sign up for and take a class or two as deemed nesceary. My work teaches or sends me to numerous courses, however the university doesn,t seem to know how to handle this unless I am presung a degree and attend the UofU full time. They son't seem to cater to or handle the full time working students who are already in a career.
9	Financial management of OEHS programs. Perhaps a course on speaking the language of the business for EHS professionals.
10	Current injury trends.
11	I have attended the RMCOEH Industrial Hygiene Review for CIH exam prep. Within my company this course is recognized as THE course and all those preparing for the exam go to it. Keep that course going as it is excellent PR for the RMCOEH (that's the only contact many people have with RMCOEH and is the basis for their opinion of the

	UofU public health programs)
12	Workers Compensation Law and Practice This should be very practical with a focus on what the health professional needs to know and NEEDS TO DO when working with insurrers and the state plans.

**16. Any additional comments?**

1	none
2	RMCOEH is an excellent resource and organization!
3	I feel I need to clarify my responses to the above rankings of program recommendation and program satisfaction. When I was accepted to the program (2000), my initial impression of the program was through the IH faculty conducting the required application interviews. There were several reasons I chose the U but in looking back, the biggest reason was the IH Program faculty. Since I have graduated from the program, the entire IH faculty has moved on to other positions, in my opinion, primarily due to the increased friction between the RMCOEH and the Public Health Department. I am thankful I was able to benefit from the instruction, mentoring, experience and advice of the former IH faculty during my stay and the U. It is their departure from the program causes hesitation in recommending prospective MSPH in IH Students to the current program. Until the contention between RMCOEH and the Pubic Health Department can be resolved, I will continue to have difficulty recommending the program.
4	With regard to the ....recommend the training ... question above: I recommended the program to all of my safety engineers. Four (that I can recall) took my recommendation and have either graduated or will within one semester. They are: Ben Gerlach, Michael Brown, Danielle Denne, and Craig Allen.
5	I would be willing to talk to anyone about my experience and education, please fell free to call me. Lowell B
6	We receive a significant number of MSHA training requests. This could be an area of interest for the RMCOEH.
7	The UofU just doesn't cater to the working adult student. They seem to expect the students to quit their jobs and attend full time. Jobs are not always easy to get. It is better to have a job and attend part time then to attend the university full time with no prospect of a job upon graduation. They expect the students to take more then one class per quarter. This may be either extreemly stressfull or impossible. Often times, classes a student needs are not offered in a consecutive order. My work funds continuing education, however, I find it dufficult to take advantage of these opportuinies at the UofU.
8	Keep up the good work!
9	I am not sure this has been of any value because I was a video student.

**17. Would you like to receive the RMCOEH newsletter by email?**

YES	NO
61.5%	38.5%

## Appendix E&amp;S-2 Occupational Safety Program Core Course Topics for MS Master Level Programs

		High Category (Highly Recommended)										Medium Category (Recommended)																						
		Accident Investigation	Engineering Controls	Ergonomics/Biomechanics	Industrial Hygiene	Materials Handling	Mechanical Equipment Protection	Personal Protective Equipment	Practicum Field Experience	Program Management	System Safety	Computer Applications	Construction Safety	Communications Skills (Oral and Written)	Education/Training	Electrical Safety	Emergency Planning for Disasters	Emerging Occupational Safety Issues	Engineering Economics/Cost Analysis	Environmental/Physical Agents	Epidemiology	Exposure Assessment	Facilities and Workplace Design	Fire Protection/Explosions	Human Behavior (Job Stress)	Interdisciplinary Interaction (ERC Concept)	Legal and Regulatory Issues	Process Safety	Product Safety	Professionalism/Ethics	Risk Management/Loss Control	Statistics	Workers Compensation	
ME 6100 Ergonomics*	3		P	P		P			P	P				X				X	X	X		P	P			X	X		X	X				X
ME 6110 Industrial Safety*	3	P	P		X	X	P	X		P	X		X		X	P	X	X		X			X	P		X	X	X	X	X	X	X		P
ME 6330 Reliability	3	X	X				X				X	X		X					X									X	X	X	X	X		
ME 6040 Quality Assurance	3											X		X														X	X	X		X		
ME 6120 Human Factors Eng*	3	X	X	P		X		X			X			P	X		X			P			X		P	X		P	X	P				
ME 6960-3 Occupational Safety and Health Solutions	3	P	P	P	P	X	P	P	P	X			X	X	P	X	X	X	X	P	X	X	X	X	X	P	P	X			P	X		

		High Category (Highly Recommended)										Medium Category (Recommended)																						
		Accident Investigation	Engineering Controls	Ergonomics/Biomechanics	Industrial Hygiene	Materials Handling	Mechanical Equipment Protection	Personal Protective Equipment	Practicum Field Experience	Program Management	System Safety	Computer Applications	Construction Safety	Communications Skills (Oral and Written)	Education/Training	Electrical Safety	Emergency Planning for Disasters	Emerging Occupational Safety Issues	Engineering Economics/Cost Analysis	Environmental/Physical Agents	Epidemiology	Exposure Assessment	Facilities and Workplace Design	Fire Protection/Explosions	Human Behavior (Job Stress)	Interdisciplinary Interaction (ERC Concept)	Legal and Regulatory Issues	Process Safety	Product Safety	Professionalism/Ethics	Risk Management/Loss Control	Statistics	Workers Compensation	
ME 6960-4 Work Physiology and Occupational Heat Stress	3	P	X	X	X		X	X											P		X	X			X		X							
ME 7XXX Technical Elective (ME 7110 required unless waived based on past experience)	3	P	X				X		X	P	X						X	X			X	X			X			P	P	X	P	P	X	
ME 7XXX Technical Elective	3																																	
FPMD 6750 Fundamentals of Industrial Hygiene	2	X	P	X	P		P					X							P		P	X			X	X	X				X			

		High Category (Highly Recommended)										Medium Category (Recommended)																							
		Accident Investigation	Engineering Controls	Ergonomics/Biomechanics	Industrial Hygiene	Materials Handling	Mechanical Equipment Protection	Personal Protective Equipment	Practicum Field Experience	Program Management	System Safety	Computer Applications	Construction Safety	Communications Skills (Oral and Written)	Education/Training	Electrical Safety	Emergency Planning for Disasters	Emerging Occupational Safety Issues	Engineering Economics/Cost Analysis	Environmental/Physical Agents	Epidemiology	Exposure Assessment	Facilities and Workplace Design	Fire Protection/Explosions	Human Behavior (Job Stress)	Interdisciplinary Interaction (ERC Concept)	Legal and Regulatory Issues	Process Safety	Product Safety	Professionalism/Ethics	Risk Management/Loss Control	Statistics	Workers Compensation		
FPMD 6100 Biostatistics <u>OR</u> ESS 6560 Experimental Design and Analysis	3										P									P	X					X								P	
FPMD 6754 Noise and Other Physical Agents <u>OR</u> FPMD 6573 Industrial Ventilation	2		P		P			P		X									P		P	P			X	X	X								
FPMD 6759 Occupational Safety & Health Field Trips	1	X	P	X	X	X	P	P	P	P		X	P		X	X	X	X	X		X	X	X	X	X	P	X	X			P	X		X	
ME 6975 Thesis	9																																		
Statistics "Elective"	3																			X														P	

ERC Applicant Institution: University of Utah  
 Program Director: Donald Bloswick  
 Discipline: Ergonomics & Safety (E&S)

**Table 4a**  
**Academic Training Report**  
**Previous Budget Period: July 1, 2006 to June 30, 2007**

<b>Degree Awarded</b>	<b>How Does Degree Read?</b>	<b># Full-Time Trainees Enrolled<sup>1</sup></b>	<b># Full-Time NIOSH-Supported Trainees</b>	<b># Part-Time Trainees Enrolled</b>	<b># Part-Time NIOSH-Supported Trainees</b>	<b># Other Trainees Taking OS&amp;H Courses<sup>2</sup></b>	<b># Trainees Graduated</b>
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	MS in Mechanical Engineering	3	3	5	0	37	2
ME	ME in Mechanical Engineering	0	0	1	0	0	0
MPH/MSH	Master of Public Health, Master of Science in Public Health	0	0	0	0	4	0
<b>Doctorate degree</b>							
PhD	Ph.D. in Mechanical Engineering	2	2	0	0	6	0
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

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

<sup>3</sup> In this case, there may be double counting between Master's degree and Post-doctoral categories.

ERC Applicant Institution: University of Utah  
 Program Director: Donald Blosswick  
 Discipline: Ergonomics & Safety (E&S)

**Table 5**  
**Tracking Graduates-Academic Training Report<sup>1</sup>**  
**Previous Budget Period: July 1, 2006 to June 30, 2007**

Trainee Name (if supported by a NIOSH training grant, denote with *)	Date Entered Program (mm/yy)	Date Degree Awarded (only if at your institution) (mm/yy)	Degree Awarded (also specialty area as noted on degree/transcript)	Date of Certificate of Completion (for Occ Med Residency programs) (mm/yy)	Current Employment (Job Title/Employer)	Employed in OS&H Field or Enrolled in OS&H Academic Program? Y/N
J. T.*	8/04	5/07	M.S.	N/A	Design Engineering / DH Engineering Center	N
S. D.*	8/05	12/07 (exp)	M.S.	N/A	Environmental and Safety Coordinator / Questar	Y

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Graduate counts include all trainees graduated from the approved programs.

ERC Applicant Institution: University of Utah  
 Program Director: Donald Bloswick  
 Discipline: Ergonomics & Safety (E&S)

**Table 13a - Group Data From All Programs  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2006 to June 30, 2007**

GROUP DATA FROM ALL PROGRAMS			
Name of Program	# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program <sup>2</sup>
<b>Core Programs</b>			
Industrial Hygiene			
Occupational Medicine			
Occupational Health Nursing			
Occupational Safety	0	0	0
<b>Other Programs Listed by Name</b>			
Health Services Research			
Occupational Injury Prevention			
Occupational Health Psychology			
Other: Please List Below			

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> Please include applicant data for students who applied for admission to enter during the previous budget period (7/1/06 - 6/30/07).

<sup>2</sup> If student(s) indicate they will enroll during the next budget period (in this case 7/1/07-6/30/08), please note this with an asterisk, e.g., 2, 1\*. This would indicate two students enrolled previous budget period and one student plans to enroll next budget period.

ERC Applicant Institution: University of Utah  
 Program Director: Donald Bloswick  
 Discipline: Ergonomics & Safety (E&S)

**Table 13b - Individual Trainee Data From Each Program  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2006 to June 30, 2007**

INDIVIDUAL STUDENT DATA FROM EACH PROGRAM			
Identify Enrolled Trainees by a Sequential Number	Current Status (in training, graduated, left program etc.)	Primary Sources of Support	Subsequent Career Development/ Employment
<b>Trainees Who Entered Prior Budget Period (7/1/06 - 6/30/07)</b>			
None			
<b>Continuing Students</b>			
1	In Training	NIOSH	N/A

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> Please note that trainees who entered this budget period/academic year should be part of applicant pool in Table 13a.

**HAZARDOUS SUBSTANCE ACADEMIC TRAINING (HAST)  
INDUSTRIAL HYGIENE (IH)**  
Appendices

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Rod Larson, PhD, CIH  
 Discipline: Industrial Hygiene

**Table 4b  
 Academic Training Report  
 Since Beginning of Current Project Period**

<b>Degree Awarded</b>	<b>How Does Degree Read?</b>	<b># Full-Time Trainees Enrolled<sup>1</sup></b>	<b># Full-Time NIOSH-Supported Trainees</b>	<b># Part-Time Trainees Enrolled</b>	<b># Part-Time NIOSH-Supported Trainees</b>	<b># Other Trainees Taking OS&amp;H Courses<sup>2</sup></b>	<b># Trainees Graduated</b>
Master's degree							
MSPH	Masters of Science in Public Health emphasis in Industrial Hygiene	16	12	5	3	26	18
MPH	Masters of Public Health emphasis in Industrial Hygiene	2	1	4	0	2	3

Refer to: Supplemental Instructions, page 8.

<sup>1</sup> Trainee counts include all students in the approved programs.

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

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

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Rod Larson, PhD, CIH  
 Discipline: HSAT

**Table 4b  
 Academic Training Report  
 Since Beginning of Current Project Period**

<b>Degree Awarded</b>	<b>How Does Degree Read?</b>	<b># Full-Time Trainees Enrolled<sup>1</sup></b>	<b># Full-Time NIOSH-Supported Trainees</b>	<b># Part-Time Trainees Enrolled</b>	<b># Part-Time NIOSH-Supported Trainees</b>	<b># Other Trainees Taking OS&amp;H Courses<sup>2</sup></b>	<b># Trainees Graduated</b>
Master's degree							
MSPH	Masters of Science in Public Health emphasis in Industrial Hygiene	10	10	1	1	5	8
MPH	Masters of Public Health emphasis in Industrial Hygiene	2	2	2	2	5	1

Refer to: Supplemental Instructions, page 8.

<sup>1</sup> Trainee counts include all students in the approved programs.

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

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

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Rod Larson, PhD, CIH  
 Discipline: Industrial Hygiene & HSAT

**Table 5**  
**Tracking Graduates-Academic Training Report<sup>1</sup>**  
**Since Beginning of Current Project Period**

Trainee Name (if supported by a NIOSH training grant, denote with *)	Date Entered Program (mm/yy)	Date Degree Awarded (only if at your institution) (mm/yy)	Degree Awarded (also specialty area as noted on degree)	Date of Certificate of Completion (for Occ Med and other Certificate programs) (mm/yy)	Current Employment (Job Title/Employer)	Employed in OS&H Field or Enrolled in OS&H Academic Program? Y/N
Year 1: July 1, 2002 to June 30, 2003						
M, J	08/00	8/02	MSPH-IH	12/02	Sandia National Laboratory, Albuquerque, NM, Industrial Hygienist	Y
A, D*	08/01	05/03	MSPH-IH (HSAT)	05/2003	US Air Force; San Antonio, TX	Y
I, J*	08/01	07/03	MSPH-IH	05/03	Bell Helicopter, TX	Y
S, C*	08/01	05/03	MSPH-IH (HSAT)	05/03	Consultant; San Antonio, TX	Y
L, M	08/01	05/03	MSPH-IH	05/03	NAVY Cherry Pt., NC	Y
C, B	08/01	05/03	MSPH-IH	05/03	US Navy, Japan	Y
Y, D	08/01	05/03	MSPH-IH	09/03	US Air Force, Schertz, TX	Y
B, J*	08/01	08/03	MSPH-IH	08/03	Industrial Hygienist, IHI Environmental	Y
T, K*	08/01	05/03	MSPH-IH (HSAT)	05/03	Industrial Hygienist, Rocky Mountain Environmental Consultants, SLC, Utah	Y
Year 2: July 1, 2003 to June 30, 2004						
G, A*	08/02	07/04	MSPH-IH	08/04	R&R Environmental, SLC, UT; Industrial	Y

Principal Investigator/Program Director (Last, First, Middle): **Hegmann, Kurt T., MD, MPH**

					Hygienist	
J, M*	08/02	07/04	MSPH-IH	08/04	Applying for P.A. at UofU	Y
K, N*	08/02	05/04	MSPH-IH	05/04	Medical Student, U of U, entered 2004	Y
W, S*	08/02	05/04	MSPH-IH	05/04	US Navy, Japan, Industrial Hygienist	Y
C, K*	08/03	05/05	MSPH-IH (HSAT)	05/05	Industrial Hygienist, Conoco-Phillips, Lake Charles, LA	Y
N, S*	08/03	05/05	MSPH-IH	05/05	Industrial Hygienist, WCF	Y
N, D*	08/03	05/05	MSPH-IH (HSAT)	05/05	Industrial Hygienist, Rocky Mountain Environmental Consultants, SLC, Utah	Y
<b>Year 3: July 1, 2004 to June 30, 2005</b>						
P, L*	08/03	05/05	MPH-IH (HSAT)	05/05	Assistant Professor, RMCOEH	Y
S, S*	08/03	05/05	MSPH-IH	05/05	Industrial Hygienist, US Navy, Hawaii	Y
VO, L*	08/03	05/05	MSPH-IH	05/05	Safety & Health; Chevron Corp., Houston, TX	Y
B, S*	08/03	05/05	MSPH-IH	05/05	Professor	Y
<b>Year 4: July 1, 2005 to June 30, 2006</b>						
N, K*	08/04	05/06	MSPH-IH	05/06	OSHA Technical Center, SLC	Y
D, D*	08/04	08/06	MPH-IH (HSAT)	08/06	Safety Consultant, WCF	Y
K, J*	08/04	05/06	MSPH-IH (HSAT)	05/06	Consultant, Mineapolis, Minnesota	Y
<b>Year 5: July 1, 2006 to June 30, 2007</b>						
L, C	08/05	05/07	MSPH-IH	05/07	US Navy, Guam	Y
E, L*	08/05	05/07	MSPH-IH	05/07	Industrial Hygienist-Idaho National Laboratory	Y
A, C*	08/04	12/06	MPH-IH(HSAT)	05/07	Director of Safety, Security and Env. Health - Intermountain Healthcare	Y
P, J*	08/05	05/07	MSPH-IH(HSAT)	05/07	Industrial Hygienist - Kennecott Minerals	Y

Principal Investigator/Program Director (Last, First, Middle): **Hegmann, Kurt T., MD, MPH**

Refer to: Supplemental Instructions, page 8.

<sup>1</sup> Graduate counts include all trainees graduated from the approved programs.

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Rod Larson, PhD, CIH  
 Discipline: Industrial Hygiene/HSAT

**Table 13  
 Minority Recruitment Data<sup>1</sup>  
 Since Beginning of Current Project Period**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
Year 1: July 1, 2002 to June 30, 2003						
0	0	0				
Year 2: July 1, 2003 to June 30, 2004						
2	2	1	1	Graduated	NIOSH	Industrial Hygienist, WCF
Year 3: July 1, 2004 to June 30, 2005						
0	0	0				
Year 4: July 1, 2005 to June 30, 2006						
0	0	0				
Year 5: July 1, 2006 to June 30, 2007						
1*	1*	1*	1	Attending Fall 07	NIOSH	

Refer to: Supplemental Instructions, page 11.

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

**OCCUPATIONAL INJURY PREVENTION RESEARCH  
TRAINING (OIPRT)**  
Appendices

ERC Applicant Institution: University of Utah

Program Director: Donald Bloswick

Discipline: Occupational Injury Prevention Research Training (OIPRT)

**Table 4a**  
**Academic Training Report**  
**Previous Budget Period: July 1, 2006 to June 30, 2007**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
Baccalaureate/associate degree							
Master's degree							
Doctorate degree							
PhD	Ph.D. in Mechanical Engineering (a)	1	1	0	0	10	0
PhD	Ph.D. in Public Health (b)	1	0	0	0	8	0
Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.) <sup>3</sup>							

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories<sup>3</sup> In this case, there may be double counting between Master's degree and Post-doctoral categories.



ERC Applicant Institution: University of Utah  
 Program Director: Donald Blawick  
 Discipline: Occupational Injury Prevention Research Training (OIPRT)

**Table 13a - Group Data From All Programs  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2006 to June 30, 2007**

GROUP DATA FROM ALL PROGRAMS			
Name of Program	# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program <sup>2</sup>
<b>Core Programs</b>			
Industrial Hygiene			
Occupational Medicine			
Occupational Health Nursing			
Occupational Safety			
<b>Other Programs Listed by Name</b>			
Health Services Research			
Occupational Injury Prevention	0	0	0
Occupational Health Psychology			
Other: Please List Below			

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> Please include applicant data for students who applied for admission to enter during the previous budget period (7/1/06 - 6/30/07).

<sup>2</sup> If student(s) indicate they will enroll during the next budget period (in this case 7/1/07-6/30/08), please note this with an asterisk, e.g., 2, 1\*. This would indicate two students enrolled previous budget period and one student plans to enroll next budget period.

ERC Applicant Institution: University of Utah  
 Program Director: Donald Blawick  
 Discipline: Occupational Injury Prevention Research Training (OIPRT)

**Table 13b - Individual Trainee Data From Each Program  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2006 to June 30, 2007**

INDIVIDUAL STUDENT DATA FROM EACH PROGRAM			
Identify Enrolled Trainees by a Sequential Number	Current Status (in training, graduated, left program etc.)	Primary Sources of Support	Subsequent Career Development/ Employment
<b>Trainees Who Entered Prior Budget Period (7/1/06 - 6/30/07)</b>			
None			
<b>Continuing Students</b>			
None			

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> Please note that trainees who entered this budget period/academic year should be part of applicant pool in Table 13a.

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

## **OCCUPATIONAL MEDICINE (OM)**

### Appendices

**Local Government**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Collingwood	Panel Discussion: Rulemaking updates w/ regards to Clandestine Drug Lab Legislation Utah Dept. Environmental Quality at Provo City Offices. UT	8/15/2006	2hr for approx 20 attendees
Dr. Hegmann	"Office Ergonomics" Salt Lake County District Attorney's Office managerial Staff, SLC, UT	3/24/2005	1 hour x 14 managerial staff = 14 hours
Dr. Moser	"Weapons of Mass Destruction" to 4 groups of Utah Dept. of Health personnel as part of the Department's Roadmap to Preparedness program	10/06-12/06	1.5 hours x 345 attendees
Dr. Moser	"Leadership-What Works and What Doesn't" to 8 groups of Utah Department of Health personnel as part of the Department's Management Training Program	12/06-01/07	3 hours x 200 attendees
Dr. Moser	"Countering Bioterrorism 2005: Breaking New Ground", Planning for Responses to Bioterrorism and Emerging Infections. Utah Department of Health	2005	200
Dr. Moser	"Developing the Utah Medical Surge Capacity Plan, 2004 Bioterrorism" Utah Department of Health , Logan, UT Conference, Park City, UT	05, 07, 08, 09 & 10/2004	5 meetings x 35 attendees, 7 MDs, 7 RNs, 21 others=175 hrs.
Dr. Moser	"Bioterrorism-the threat and response" Utah Department of Health , Logan, UT	7/10/2003	1.5 hrs x 30 attendees, 8 MDs, 8 RNs, 24 other= 45 hours

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Moser	"Bioterrorism" Hill Air Force Base	2/19/2004	1 hr x 30 attendees, 7 MDs, 7 RNs, 16 other = 30 hrs
Dr. Moser	"Health Professionals Response to Bioterrorism." Hill Air Force Base	3/4/2004	1 hr x 30 attendees, 7 MDs, 7 RNs, 16 other = 30 hrs
Dr. Moser	"Bioterrorism Responses by Health Care Professionals." Presentations at 7 regional meetings of Utah public and other concerned professionals and at the October State-wide Public Health symposium on terrorism.	2003	7 regional meetings of Utah public and other concerned professionals
Dr. Larson	Member of Utah Asthma Task Force	2005 to present	10-15/meeting
Drs. Seseck/ Blosswick/ Merryweather	Ergonomic consultation on NIOSH RLE for Utah OSHA	12/2/05,12/8/05	16 hours
Dr. Seseck/Thiese	Facility Walkthrough Inspection Alcoholic Beverage Commission (ABC) SLC UT	9/15/2004	2 hours
Dr. Wood	Member of Utah Asthma Task Force	2005 to present	10-15/meeting

**National Government**

	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Hegmann	Member, Federal Motor Carriers Safety Administration's Medical Review Board (Acting Chair) (Appointed by U.S. Secretary of Transportation Norman Mineta)	2006-	N/A
Dr. Holmes	Assessing Credibility of Alleged Disability Symptoms" to Social Security/ Disability MDS	1/9/2006	5 hours
Dr. Holmes	"Assessing Childhood Disability" to Social Security/Disability MDS	1/9/2006	5 hours
Dr. Holmes	"Weighing Opinion Evidence" " to Social Security/ Disability MDS	1/9/2006	5 hours
Dr. Holmes	"Continuing Disability Reviews" Utah Disability Determination Services for Social Security	4/20/2006	3 doctors, 20 Disability Claims Examiners x 3 hours = 69 hrs
Dr. Holmes	"Cardiovascular Disability Ratings" Utah Disability Determination Services for Social Security	4/20/2006	3 doctors, 20 Disability Claims Examiners x 2 hours = 82
Dr. Moser	"Gaining Line Support as a Manager, Leader, and Decision Maker", "Communication", "Time Management" at the USAF School of Aerospace Medicine, San Antonio TX.	12/1/2006	4 hours x 15 aerospace medicine and occupational medicine residents
Dr. Pahler	Reviewer of NIOSH research grant applications (RFA) WA, DC	June 5-7, 2006	Hours: 40/Preparation 15-20 /Meeting
Drs. Blosswick/ Sese/ Drinkaus	Ergonomic content for OSHA website Salt Lake Technical Center	Jul-02	20 hours
Dr. Moser	Member, Program Committee and Council of the Aerospace Medical Association	Nov-06	

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Moser	Member, Program Committee and Council of the Aerospace Medical Association	May-07	
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**University of Utah**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Blosswick	"Back Injury Prevention", University of Utah Plant Operations	Feb-03	1 hour x 250 attendees = 250 hours
Dr. Edwards	"Workplace Drug Testing" University of Utah Family Medicine Conference	3/1/2006	20 MDs x 1 hour
Dr. Edwards	"Workers Compensation and Return to Work" University of Utah Family Medicine Conference	8/1/2005	20 MDs x 1 hour
Dr. Hegmann	Search Committees for the Department of Family & Preventive Medicine (Biostatisticians, Epidemiologists, Industrial Hygienists)	2001-present	N/A
Dr. Hegmann	University of Utah Health Sciences Center Clinical Practice Group Research Committee, Member	2003-2005	N/A
Dr. Hegmann	Admissions Committee (Interview Committee) (University of Utah Medical School), member		N/A
Dr. Hegmann	Primary Care Research Center Review Committee, member	2005-present	N/A
Dr. Pahler	1. Noise lecture/Eng. Dept. 2. OSHA/Environmental/Eng. Dept.	Spring semester 2006	1. 2/Prep; 1. 5/lecture 2. 2/Prep; 1.5/lecture
Drs. Seseck/ Blosswick /Students	Seseck (ME safety representative) Blosswick (College of Engineering Safety Rep) Inspect Mechanical Engineering Labs to ensure safe working conditions	2002-2006 through-out the grant period	80 hours / year x 5 years = 400 hours
Drs. Seseck/ Blosswick	Ergonomics and safety advice to Solar Car Team University of Utah	6/02-7/02	10 hours x 3 students = 30 hours
Dr. Wood	"Air Pollution and the Public Health," University of Utah Environmental Studies Program, Introduction to Environmental Studies 2100, SLC, UT	11/28/2005	50 participants

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Larson	Worked with Pediatrics Dept at U of U to obtain contract to participate in National Children's Study	12/3/2004	15-50 min/meeting
Drs. Bloswick/Sesek	"Ergonomics", Intermountain Health Care Occupational Medicine Grand Rounds	11/6/2003	2 hours x 10 participants = 20 hours
Dr. Bloswick	"Occupational Risk Factors for Upper Extremity Cumulative Trauma Disorders", University of Utah Department of Orthopedics Weekly Hand Conference	Mar-04	1 hour x 10 participants = 10 hours
Dr. Hegmann	Lecturer, "Upper Extremity Musculoskeletal Disorders," presented at the Internal Medicine noon conferences, University of Utah Internal Medicine Program.	2-Sep	18 (UUMC), 25 (VAMC) and 30 (LDSH)
Dr. Hegmann	(VAMC) lecturer, "Potpourri of Occupational and Environmental Toxicological Topics," presented at the Internal Medicine noon conference, University of Utah Internal Medicine Program.	11/4/2002	12 IM residents
Dr. Hegmann	(UUMC) lecturer, "Heavy Metals Toxicity: Lead, Mercury and other Heavy Metals," presented at the Internal Medicine noon conference, University of Utah Internal Medicine Program.	2/4/2003	15 IM residents
Dr. Hegmann	Occupational Medicine Residency Program, Friday morning teaching sessions (Discussant)	2002-present	5 residents
Dr. Hegmann	October 21 (UUMC), 22 (LDSH) and 28, 2003 (VAMC) lecturer, "Heavy Metals Toxicity: Lead, Mercury and other Heavy Metals," presented at the Internal Medicine noon conference, University of Utah Internal Medicine Program.	10/21/03-10/23/03 & 10/28/03	53 IM residents
Dr. Hegmann	December 2 (VAMC) & 8 (LDSH) lecturer, "Upper Extremity (Neuro)Musculoskeletal Disorders," presented at the Internal Medicine noon conference, University of Utah Internal Medicine Program.	12/02 & 12/08	47 IM residents
Dr. Hegmann	February 17 (VAMC), 23 (UUMC) & 24 (LDSH) lecturer, "Low back pain and Spine Issues," presented at the Internal Medicine noon conference, University of Utah Internal Medicine Program.	02/17, 23, 24	61 IM residents
Dr. Hegmann	Lecturer, "Management of the Injured Worker," presented at the Physical Medicine and Rehabilitation Didactic Series, University of Utah Physical Medicine and Rehabilitation Program.	2/24/2005	10 PMR residents
Dr. Edwards	UofU Institutional Biosafety Committee meetings every other month.	1/1/07	1.5 hours

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Drs. Seseck, Blosswick

Ergonomics and Safety Program Open House included Safety & Health professionals and students

1/11/07

1 hour x 50+ attendees, 2 hours x 3 attendees

**Regional Academia**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Bloswick	Lectures to IH Program Utah State University 3 hours x 20 students x 5 years = 300 hours	11/17/05 & 11/19/05	2 hours x 20 students x 2 days = 80 hours
Drs. Bloswick	"Ergonomic Issues and Concerns in Trail Building," Trails Maintenance Best Practices Workshop	February 1-2, 2005	1 hour x 30 participants = 30 hours
Dr. Hegmann	"Upper Extremity and Back Studies Update" BYU 4th Annual Safety Conference "Mission Possible-Putting Safety Into Practice"	8/3/2005	1 hour x 45 Health & Safety Personnel
Dr. Larson	Met with faculty of SLC Community College to identify areas of interest and for cooperation on projects	10/06/05 & 07/18/06	1-3/meeting
Dr. Hegmann	"Occupational Epidemiology," 1-day course presented at the 21st annual Utah Conference on Safety and Industrial Hygiene, SLC, UT.	10/6/2004	8 hours
Dr. Bloswick	"UAW Ford: Research and Application of Upper Extremity Tool Survey", 20 <sup>th</sup> Annual Utah Conference on Industrial Hygiene and Safety	Oct-03	1 hr x 30 attendees = 30 hours
Dr. Bloswick	"Back Injury Causation", 19 <sup>th</sup> Annual Utah Conference on Industrial Hygiene and Safety	Oct-02	1 hour x 30 attendees = 30 hours
Ms. Crandall	Presented the Annual Utah Conference on Safety and Industrial Hygiene	2-Oct	2 days
Ms. Crandall	Presented the Annual Utah Conference on Safety and Industrial Hygiene	3-Oct	2 days
Ms. Crandall	Presented the Annual Utah Conference on Safety and Industrial Hygiene	4-Oct	2 days
Ms. Crandall	Presented the Annual Utah Conference on Safety and Industrial Hygiene	5-Oct	2 days

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Bloswick, Sesek, Drinkaus, Chang, Nye, Davis, Wood, Rodriguez, Church, Edwards	2005 Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium	Apr-05	1 conference x 11 hours x 50 attendees = 550 hours
Dr. Bloswick, Sesek, Drinkaus, Kannas, Merryweather, Reading, Rodriguez, Parker, Thobe	2006 Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium	Apr-06	1 conference x 11 hours x 50 attendees = 550 hours
Dr. Collingwood	"Recommendations for the Control of Respirable Dust Exposures During Masonry Restoration," at Regional NORA Symposium	4/20/2006	30 min for approx 30 attendees
Dr. Hegmann	"Occupational Epidemiology," 1-day course presented at the 21st annual Utah Conference on Safety and Industrial Hygiene, SLC, UT.	10/6/2004	
Dr. Hegmann	"Upper Limb Musculoskeletal Disorders Study Results to Date," presented at the 21st annual Utah Conference on Safety and Industrial Hygiene, SLC, UT.	10/7/2004	1 hours x 20 IH, 25 others = 45 hours
Dr. Wood	1. "Attitudes, Knowledge, and Preparedness on Use of Respiratory Protection Among Physicians in Training", 3rd Annual Regional National Occupational Research Agenda (NORA) Young/New Investigators Symposium, Salt Lake City, UT,	4/21/2005	30 min x 40-50 attendees

**National Academia**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Bloswick	"Ergonomics & Rehabilitation Engineering," Auburn University Industrial Engineering Seminar	3/6/2006	1 hour x 30 participants = 30 hours
Dr. Collingwood	"An Ergonomic Evaluation of a Hand-Tool Modification Used During Mortar Removal," University of Iowa Research Colloquium. (Iowa City via Elluminate)	5/3/2006	30 min for approx 30 attendees
Dr. Hegmann	"Upper Extremity Neuromusculoskeletal Disorders," presented for the graduate ergonomics students at the University of Wisconsin-Milwaukee	10/14/2002	14
Dr. Moser	Member, Chair of the Award of Merit Committee, Harvard School of Public Health Alumni Council	Nov-06	
Dr. Moser	Member, Chair of the Award of Merit Committee, Harvard School of Public Health Alumni Council	Jun-07	

**Local Business and Trade Groups**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Drs. Bloswick/Sesek	Facility Walkthrough Inspection Paramed Systems SLC, UT	3/22/2006	2 hours x 2 faculty =- 4 hours
Dr. Bloswick	"Ergonomics", LDS Church National Risk Management Seminar	2-Sep	2 hours x 70
Dr. Bloswick	"Office Ergonomics", LDS Church National Risk Management Seminar	3-Aug	1.5 hours x 60 participants = 90 hours
Ms. Crandall	Exhibited at the Workers Comp. Fund/Chamber of Commerce Meeting	6/22/2006	1.5 hours
Dr. Hegmann	"Ergonomics for the Distal Upper Extremity," presented for the safety and human resources personnel (US and global) at Autoliv, Ogden, Utah.	11/13/2002	33 OSH professionals
Dr. Hegmann	"Upper Limb Musculoskeletal Disorders: Quantifying Risk," presented for the safety and human resources personnel (US and global) at Autoliv, Ogden, Utah.	11/13/2002	15 OSH professionals
Dr. Hegmann	"Upper Limb Musculoskeletal Disorders Study Results to Date," presented at the 21st annual Utah Conference on Safety and Industrial Hygiene, SLC, UT.	10/7/2004	1 hours x 20 IH, 25 others = 45 hours
Dr. Hegmann	"Impacts of Health Promotion Issues on Musculoskeletal Disorders" Senior HR Executive Round Table, SLC, UT	2/15/2006	7 H. R. Participants x 1 hour
Dr. Hegmann	"Carpal Tunnel Syndrome , Epicondylitis, Shoulder Disorders" US School of Aerospace Medicine, San Antonio, TX	3/9/2006	32participants x 2.5 = 80
Dr. Larson	Worked with local company (Idaho Tech) to help develop and implement Hazard Communication Program	6/7/2005	2-5 per meeting
Dr. Moser	"Preparation by Individuals and families for Natural Disasters, Major Accidents, Terrorism and Pandemics," Used by OC Tanner Jewelry Company in their employee training.	<b>ongoing</b>	<b>N/A</b>

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Howard/(Ph.D student E&S)	Ergonomic training for Dupont Holographics in Logan UT	7/27/2006	20 hours
Merryweather(Ph.D student OIP)/Dr. Bloswick			
Howard/Drs. Seseck/Bloswick/Pahler/Kannas	Vibration analysis of Heavy Equipment Operation for Kennecott Utah Copper Magna UT	6/05-12/05	200 hours
Merryweather/Seseck	Training for Church of Jesus Christ of Latter Day Saints Granite Mountain Vault and Church Office Building	02/25/04-02/26/04	6 hours
Drs. Seseck/Pahler	Community Noise Assessment for Holly Refining and Marketing Woods Cross Utah	6/27/06 & 7/5/06	6 hours
Dr. Seseck / Students	Facility Walkthrough Inspection and Student Semester Safety Projects Martin Door SLC, UT	11/05 & 12/05	20 hours
Dr. Seseck	Facility Walkthrough Inspection Futura Industries, Clearfield UT	10/5/2005	2 hours
Dr. Seseck	Ergonomic Training Martin Door SLC, UT	5/4/2005	2 hours x 100 employees = 200 hours
Dr. Seseck/ Merryweather	Workstation Evaluations and Recommendations, LDS Granite Mountain Vault Facility	2/4/2004	4 hours
Dr. Seseck	Office/Control Room Ergonomic Assessment for Kern River Gas, SLC UT	4/12/2006	5 hours
Dr. Seseck	Ergonomics Consulting Job Evaluation Hyclone Labs, Logan, UT	8/13/2004	10 hours
Drs. Seseck/Church/Pahler	Noise Evaluation and Recommendations for Manufacturing Processes Black Diamond Equipment SLC, UT	5 months: 01- 05, 2005	40 hours
Dr. Seseck	Noise Evaluation of a Consumer Product (coffee grinder)	1/28/2005	2 hours
Dr. Seseck	Ergonomic Evaluation Doughnut Packaging Line for Smith's Manufacturing Layton UT	1/7/2005	10 hours
Dr. Seseck	Ergonomic recommendations for machine redesign at Hospira Labs SLC, UT	12/13/04 & 1/7/05	8 hours
Dr. Seseck/ Mecham/Drinkaus	Facility Walkthrough Inspection Cabinetry by Karmen SLC UT	7/9/2004	2 hours

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Sesek	Facility Walkthrough Inspection Huish Detergents SLC UT	10/30/2003	3 hours
Dr. Sesek/ students	Safety and health program review and improvement	4 months: 01 - 04- 2003	20 hours
Dr. Sesek	Ergonomic Training for Refinery Operators Phillips 66 Woods Cross Utah	12/02 – 01/03	30 hours

**National Business and Trade Groups**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Bloswick	"Ergonomics in Manufacturing", Weir Specialty Pumps Corporate Safety Meeting	Jun-06	1 hour x 16 participants = 16 hours
Dr. Bloswick	Two Presentations to Chinese Delegation of Health & Safety Officers, Utah Engineering Experiment Station	Jan-03	2 hour x 20 attendees = 40 hours
Dr. Hegmann	Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts "Carpal tunnel syndrome: Results from recent and ongoing epidemiological studies."	5-Mar-07	Total 48 attendees. 2 OM, 4 HR, 42 E&S, 1.25 hours, 60 contact hours
Dr. Hegmann	"Insights into Causes and Prevention of Musculoskeletal Disorders: What We Do/Not Know," presented at Caterpillar World Headquarters, Peoria, Illinois.	12/11/2003	30 orthopedists, hand surgeons, physiatrists and OM physicians
Dr. Hegmann	National Audio Conference for Ryan Associates	3/22/2006	1 hour x 62 participants: MD, NP& managers
Dr. Hegmann	"Distal Upper Extremity and Lower Back Pain Progress Report," Participating Companies In Milwaukee, WI	4/1/2005	3 hours x 13 OM, PT, PMR doctors, ergonomics, engineers = 39 hours
Dr. Hegmann	"Distal Upper Extremity and Lower Back Pain Progress Report," Participating Companies in Milwaukee, WI	4/2/2005	2 HR x 22 PT, OT, Ergonomists= 44 hours
Dr. Moser	Preparation by Individuals & Families for Emergencies, Including Natural Disasters & Terrorism," National Meeting of the Association of Contingency Planners	10/21/2004	1 hour x 30 participants

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Seseck	Human Factors and Ergonomics presentation at Annual Conoco Safety Conference	7/19/2005	3 hours x 75 participants = 225 hours
Dr. Seseck	Ergonomic Training Martin Door Las Vegas NV	5/6/2005	4 hours /x 10 = 40 hours
Dr. Seseck	Ergonomic Job Evaluations for Conoco-Phillips Refinery Billings, Montana	9/13/002-9/14/02	20 hours
		9/26/2002	
Dr. Seseck	Present and participate at John Deere Annual Ergonomics Conference	5/7/07-5/18/06	16 hours x 65 participants = 1040 hours

**Employee Groups**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Drs. Bloswick/Sesek	Ergonomic Training at UAW-Ford Training Center Detroit MI	10/26/2005	8 hours x 2 sessions x 75 people/session = 1040 hours
Dr. Hegmann/ Mr. These	Firefighter & Police Officer officers & representatives including Utah Narcotics Officers Association, Utah Firefighters Association, United Fire Authority	2005-06 Multiple meetings	(2 hr x 10) + (2 hours x 9) + (2 hours x 8) = 54 hours
Dr. Hegmann	Professional Fire Fighters of Utah	May-07	
Dr. Hegmann	Salt Lake County Firefighters Local 1696	May-07	
Dr. Hegmann	Joint Council of Fire Service Organizations	May-07	
Dr. Hegmann	Salt Lake City Firefighters Local 1645	May-07	
Dr. Hegmann	Salt Lake Retired Firefighters Association	May-07	
Dr. Hegmann	Utah State Fireman's Association	May-07	
Dr. Hegmann	Teamsters Union	May-07	

**Health Care Organizations**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Hegmann	"Evidence-Based Evaluation & Treatment of Upper Extremity Musculoskeletal Disorders," Medical Grand Rounds, St. Francis Medical Center, Peoria, Illinois.	12/11/2003	54 physicians
Dr. Larson	Member, Utah Health Research Network (UHRN)	monthly meetings since '05	15/20/mtg
Dr. Bloswick	"Worksite Ergonomics," Presentation to Southeast Alaska Regional Health Center	Jun-04	1 hour x 20 attendees = 20 hours
Dr. Bloswick	"Ergonomics in Patient Handling," Presentation to Southeast Alaska Regional Health Center	Jun-04	1 hour x 10 attendees = 10 hours

**Insurers**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Beck/Drs. Bloswick/Sesek	Vibration analysis of a vibratory compactor for Workers Compensation of Utah	Summer '03	20 hours
Drs. Hegmann/ Larson/ Bloswick	Member, Worker's Compensation Fund's Paul S. Richards Safe Workplace Scholarships Selection Committee	2003-	
Dr. Hegmann	"Practice Guidelines. The ACOEM Practice Guidelines," presented at the Utah Labor Commission's Administrative Updates and Evidence Based Guidelines in Workers' Comp conference, SLC, UT	9/30/2005	1.25 hours x Mix of 73 MDs, DCs, HRs, Lawyers, Claims Adjusters + 91.25 hours
Dr. Holmes	"Spinal Impairment ratings and Apportionment Issues," Annual Utah Labor Commission Conference on Workers Compensation. Salt Lake City Utah.	5/2/2006	SSAs/disability MDs

**Community Groups**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Sese/Merryweather	Open Classroom (2 <sup>nd</sup> and 3 <sup>rd</sup> Graders) field trip and presentation in the Ergonomics and Safety Laboratory	3/20/2006	2 hours x 26 = 52 hours
Dr. Bloswick	"Build a Better Future Through Engineering", hosted by the College of Engineering and Girl Scouts of Utah	2003	0.5 hours x 50 attendees = 25 hours
Dr. Bloswick	Bennion 6 <sup>th</sup> grade ELP lab tour and demonstration	Mar-03	1 hour x 20 attendees = 20 hours
Drs. Bloswick/Sese/E&S students	Engineering Day Ergonomic Display (annually)	Spring annually	8 hours x 5 yrs = 40 hours numerous students: elementary, high school, Univ. of Utah

**Media**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Hegmann	Health Sciences Report, "Surveillance Systems Give First Alert,"	Summer 2002	
Dr. Hegmann	UWM News Page, "UWM Awarded Nearly \$2 Million to Study Workplace Hand Injuries."	10/1/2002	
Dr. Hegmann	Deseret Morning News, "U. to Help Research Carpal Tunnel, Tennis Elbow."	8/14/2003	
Dr. Hegmann	Daily Utah Chronicle, "U Researcher gets \$2million in grant money."	8/21/2003	
Dr. Hegmann	Daily Utah Chronicle, "U physician elected to national board."	9/18/2003	
Dr. Hegmann	Miami Herald, "MedTech patents challenged."	9/19/2003	
Dr. Hegmann	Deseret News, "U. doctor joins board for preventive medicine."	9/23/2003	
Dr. Hegmann	November 29, 2003, Deseret News, "Hip/knee research yields a surprise."	11/29/2003	
Dr. Hegmann	Deseret Morning News, "Obesity a risk for shoulder problems."	4/21/2004	
Dr. Hegmann	May 23/30, 2005, AMNews, "Aching backs and shoulders taking a toll. Studies are determining that age and obesity may not be ergonomically correct."	5/23/30/05	
Dr. Hegmann	Salt Lake Tribune, "Riding Out the Heat Wave: Outdoor job? Work Smart."	7/13/2005	
Dr. Hegmann	AMNews, "Aching backs and shoulders taking a toll. Studies are determining that age and obesity may not be ergonomically correct."	05/23-05/30/05	
Dr. Hegmann	Associated Press, "Utah Study Links Obesity and Bad Knees." (50+ newspapers)	5/9/2005	
Dr. Hegmann	Salt Lake Tribune, "Riding Out the Heat Wave: Outdoor job? Work Smart."	7/13/2005	
Dr. Hegmann	July 14, 2005, KSL, Heat Stress.		
Dr. SeseK	"Ergonomics at Home" television interview with KSL Channel 5	11/6/2003	1 hour
Dr. SeseK /Rodriguez/ Ellis/Mecham	"Office of the Future" television interview with KSL Channel 5	10/28/2003	2 hours
Dr. Wood	"Occupational Medicine" Radio Call In KUER, local NPR affiliate,	Spring	1 hours x KUER's

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	Spring 2005	2005	audience
Dr. Wood	"Early Ozone Alert Coming: Warnings will seek to head off bad-air days." 6/1/2005	6/1/2005	SL Tribune audience
Dr. Wood	"Utah officials launch a new ozone warning system.'	6/1/2005	Deseret News Audience
Dr. Wood	"Ozone Alert System" News Conference	5/31/2005	10 media, 2 Engineers = 12

**Peer Review Activities**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Dr. Hegmann	Reviewer, Society for Epidemiologic Research's Annual Meeting abstracts 1999, 2002, 2003, 2004, 2005, 2006.		
Dr. Hegmann	Contributing Editor, <i>ACOEM CDME Review</i> , Hartenbaum N (Ed.), 2000- .		
Dr. Hegmann	Reviewer, <i>American Journal of Preventive Medicine</i> , 2002, 2006.		
Dr. Hegmann	Reviewer, <i>American Industrial Hygiene Association Journal</i> , 2002.		
Dr. Hegmann	Reviewer, <i>Utah's Asthma Plan</i> , Utah Department of Health Asthma Program, 2003		
Dr. Hegmann	Reviewer, "Occupational Medicine Practice Guidelines. Evaluation and Management of Common Health Problems and Functional Recovery in Workers." 2nd Edition. Harris JS (Ed). OEM Press: Beverly, MA, 2004.		
Dr. Hegmann	Reviewer, <i>Journal of Emerging Infectious Diseases</i> , 2004.		
Dr. Hegmann	Reviewer, <i>International Journal of Industrial Ergonomics</i> , 2004.		
Dr. Hegmann	Session Chair, Prevention and Rehabilitation Session, Fifth International Scientific Conference on Prevention of Work-related Musculoskeletal Disorders. ETH Zurich, Zurich, Switzerland. July 12, 2004.		
Dr. Hegmann	Reviewer, <i>Postgraduate Medical Journal</i> , 2004, 2006.		
Dr. Hegmann	Reviewer, Centers for Disease Control and Prevention (National Institute for Occupational Safety and Health) Special Emphasis Panel/Initial Review Group 2005/05 ZOH1 JFK (04) (R), Study Section on Musculoskeletal Disorders.	3/22/2005	
Dr. Hegmann	Reviewer, Secretary's Third National Prevention Summit: Innovations in Community Prevention, abstracts 2005		
Dr. Hegmann	Reviewer, <i>Archives of Physical Medicine and Rehabilitation</i> , 2005.		
Dr. Hegmann	Reviewer, Centers for Disease Control and Prevention (National Institute for Occupational Safety and Health) Special Emphasis Panel ZOH1 SBO (52) Agriculture Center Review.	05/1-2, 16, 2006	

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Hegmann	Reviewer, National Prevention Summit Management, abstracts, 2006.		
Dr. Moser	Reviewer, The International Journal of Occupational and Environmental Medicine, 2007	Jan-07	

**OEHS Professional Organizations**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./ Contact Hours</b>
Mr. Thiese	Lectured at Regional AIHA meeting regarding Distal Upper Extremity research and preliminary findings	Sep-04	55 Safety professionals, IH students, Nurses 1.5 hours
Dr. Larson	Member, AIHA Tox Committee and Responsible for developing and presenting Tox PDC (Prof. Dev. Cse) working on '07 conf.	quarterly preparation meetings	3 hours, 40 attendees at PDC
Dr. Collingwood	AIHA Local Section Meeting "New Utah Legislation for the Cleanup of Clandestine Drug Labs"	3/8/2006	1hr for approx 50 members
Ms. Crandall	Exhibited at AIHCE conference	6-May	3 days
Ms. Crandall	Exhibited at AIHCE conference	5-May	3 days
Dr. Edwards	Member, ACOEM Practice Guidelines Committee, Foot and Ankle Section	4/2005 -	
Dr. Hegmann	Member, American Board of Preventive Medicine Core Examination Committee	1994-	
Dr. Hegmann	Chair, American Board of Preventive Medicine Examination Committee (Occupational Medicine)	2004-	
Dr. Hegmann	Member, American National Safety Council's - Accredited Standards Committee (ASC) Z -365 Committee as the American College of Occupational and Environmental Medicine Representative	1997-2003	
Dr. Hegmann	Member, American College of Occupational and Environmental Medicine's Council on Scientific Affairs	2001-	
Dr. Hegmann	Member, Co-Chair (2003-present), Thrasher Research Fund Advisory Committee	2001-	
Dr. Hegmann	Trustee, American Board of Preventive Medicine (Elected)	2001-	

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Hegmann	Law and Regulation Series: "The Physician as an Expert Witness: Medical Sciences in the Litigation Arena, Part 1"	10/12/2003	117 Contact hours
Dr. Hegmann	The Commercial Driver Medical Examiner: New York NY	7/25/2003	1 hours x 61 MDs = 61 contact hours
Dr. Hegmann	Member, Chair (2004-present) American Board of Preventive Medicine, Examination Committee	2003-	40 x 1 hr = 40 hours
Dr. Hegmann	Member, American Board of Preventive Medicine, Certification Committee	2003-	
Dr. Hegmann	Member, American Board of Preventive Medicine, Nominating Committee	2003-	
Dr. Hegmann	Treasurer, Association of University Programs in Occupational Health and Safety	2004-	
Dr. Hegmann	Chair, American College of Occupational and Environmental Medicine's Evidence Based Practice Committee	2005-	
Dr. Hegmann	Member, American College of Occupational and Environmental Medicine's Evidence- Based Practice Committee's Methodology Committee	2005-	
Dr. Hegmann	Western Slope Medical Conference, Grant Junction CO.	8/11/2006	122 participants x 1.5 hours = 183 contact hours. 85% health care providers (MD, DO, NP, PA).
Dr. Larson	Member of the AIHA, attend annual meeting which last 5 days, including board meeting.	1975-	3 hour board mtg, 10-20 attendees at meetings
Dr. Larson	Member ACGIH, attend annual meetings	1991-	8 hours annually
Dr. Larson	Member, AIHA Tox Committee and Responsible for developing and presenting Tox PDC (Prof. Dev. Case) working on '07 conf.	2006 Quarterly preparation meetings by Conf. call	1 hour x quarterly conference calls

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Moser	Planning for responses to terrorism events and other disasters. Aerospace Medical Association Annual Scientific Meeting, San Antonio, TX	2003	
Dr. Moser	Responding to the Bioterrorism threat. Rocky Mountain Academy of Occupational and Environmental Medicine, Denver, CO	2002	
Mr. Thiese	Member of AIHA, ACGIH, ASSE, SER		
Mr. Thiese	SER 2003, SER 2004, SER 2005 national conferences, ICOH 2004 International Conference		1 conference per year
Dr. Seseck	Ergonomics research presentation to local chapter of ASSE	3/2/2006	2 hours x 25 participants = 50 hours
Dr. Collingwood	Presentation/Discussion: "AIHA Communication Training Methods Committee—Global Harmonization System," AIHA Committee Meeting (Chicago)	5/15/2006	1hr for 20 members
Dr. Hegmann	Chair, ABPM Examination Committee. AOHC-ABPM update session.	5/3/2005	1 hour x 40 MDs, 22 HR, PT, OT, ergonomists = 60
Dr. Hegmann	Trustee, American Board of Preventive Medicine		
Dr. Hegmann	Chair, American College of Occupational and Environmental Medicine's Ergonomics Committee		
Mr. Thiese	Lectured at Regional AIHA meeting regarding Distal Upper Extremity research and preliminary findings	Sep-04	55 Safety professionals, IH students, Nurses 1.5 hours
Dr. Wood	Evidence Based Practice Committee, American College of Occupational and Environmental Health (2006).	Member 2006	25 members
Dr. Blowski	"Ergonomics Overview," AIHA Nevada Chapter	6/6/06	1.5 hours x 14 participants = 21 hours
Dr. Moser	Member, Council and Program Committee meetings of the Aerospace Medical Association	Nov-06	

**National and International Presentations**

<b>Faculty/Staff Member</b>	<b>Activity</b>	<b>Date</b>	<b>Pop./Contact Hours</b>
Balaji/ Dr. Sesek	"Environmentally Conscious Machining of Cast Aluminum Alloy: Investigation of Cutting Fluid Effects in Drilling" presented at North American Manufacturing Research Conference	6/3/2004	1.5 hours x 50 participants = 75 hours
Dr. Bloswick	"An Ergonomic Survey Tool for Industrial Operations", 15 <sup>th</sup> Triennial Congress of the International Ergonomics Association, Seoul, Korea	Aug-03	0.5 hours x 20 attendees = 10 hours
Dr. Bloswick	"Quantification of Low-Back and Shoulder Stress in Commercial Crab Fishing Operations," The Second International Fishing Industry Safety & Health Conference	Sep-03	0.5 hours x 100 attendees = 50 hours
Dr. Bloswick	"The Use of Operating Hazard Analysis to Review On-Deck Procedures in Commercial Crab Fishing," The Second International Fishing Industry Safety & Health Conference	Sep-03	0.5 hours x 100 attendees = 50 hours
Dr. Bloswick	"Keynote Address: Positioning for Good Health – the Business Case for Ergonomics" (Address delivered at the Occupational Health Best Practices Conference and Workshop 2005, Singapore)	Nov-05	1 hour x 200 attendees = 200 hours
Dr. Bloswick	"Workshop on Ergonomics," Occupational Health Best Practices Conference and Workshop 2005, Singapore	Nov-05	12 hours x 120 attendees = 1440 hours
Dr. Hegmann	A Cohort Study of Distal Upper Extremity Musculoskeletal Disorders: Lateral Epicondylitis," presented at the American Occupational Health Conference, Kansas City, MO.	5/3/2004	1.75 hours x 150 MDs
Dr. Hegmann	"Preventing Rotator Cuff Disorders: Evidence from Epidemiology and Laboratory Investigations," presented at the Northwest Occupational Health Conference, Pasco, Washington	10/17/2002	34 OSH professionals
Dr. Hegmann	"Epidemiology and Laboratory Studies of the Shoulder," presented at the American Academy of Orthopaedic Surgeon's Occupational Orthopaedics and Workers' Compensation: A Multidisciplinary Perspective Course #3423, Chicago, IL.	11/3/2002	400 contact hours

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Hegmann	"Returning Science to the Decision Process in Worker's Compensation," presented at the Wisconsin Council of Safety's Safety Congress, Madison, WI.	4/29/2003	190 OSH professionals
Dr. Hegmann	"Shoulder Disorders: Advances in Knowledge?," presented at the American Occupational Health Conference, Washington, DC.	5/4/2005	220 OM Doctors
Dr. Hegmann	American College of Occupational & Environmental Medicine's Practice Guidelines Administrative Updates and Evidence Based Guidelines in Workers' Comp	9/30/2005	1.25 hours x Mix of 73 MDs, DCs, HRs, Lawyers, Claims Adjusters = 91.25 hours
Dr. Hegmann	"Evaluation, Diagnosis & Treatment of Common Hand/Wrist Problems," presented at the 21st Annual Update in Clinical Medicine, Scottsdale, AZ.	11/7/2005	40 min x 52 MDs = 35 contact hours
Dr. Hegmann	"Elbow & Shoulder Disorders – "Pearls" for the Internist," presented at the 21st Annual Update in Clinical Medicine, Scottsdale, AZ.	11/7/2005	40 min x 52 MDs = 35 contact hours
Dr. Hegmann	"ABPM Certification: Rules for the Initial Examination and the Four Parts of Maintenance of Certification," presented at American Occupational Health Conference 2006, Sherman Oaks, CA	5/7/2006	1 hour x 40 MDs = 40 contact hours
Dr. Hegmann	"Current Status and Future of the ACOEM <b>Occupational Medicine Practice Guidelines</b> ," presented at the California Division of Worker's Compensation, Los Angeles, CA.	3/2/2006	.5 hrs x 180 claims adjusters, lawyers, ALJs, MDS & RNs = 90 contact hrs
Dr. Hegmann	"Current Status and Future of the ACOEM <b>Occupational Medicine Practice Guidelines</b> ," presented at the International Association of Industrial Accident Boards and Commissions' 2 <sup>nd</sup> Annual Medical Institute, San Diego, CA.	3/11/2006	45 min. x 60 MDs = 45 hours
Dr. Hegmann	ABPM: Certification: Rules for the Initial Examination and the Four Parts of Maintenance of Certification, American Occupational Health Conference (AOHC) 2006	5/7/2006	1 hour x 40 MDs
Dr. Hegmann	ABPM: Commercial Driver Medical Certification - Current and Complex Issues, American Occupational Health Conference (AOHC) 2006	5/7/2006	1.5 hours x 210 MDs = 315 hours

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Dr. Hegmann	"ACOEM <b>Practice Guidelines: Elbow Update</b> ," presented at the American Occupational Health Conference (AOHC) 2007, New Orleans, LA.	5/8/2007	1.5 x 51 MDs = 76.5 practice hours
Dr. Moser	"Occupational health support of bioterrorism response planning." Council of State Territorial Epidemiologist Annual Meeting, Hartford, CT.	2003	40
Dr. Moser	Aeromedical approaches to preventing hospital errors. Aerospace Medical Association Annual Scientific Meeting, Montreal Canada.	2002	40
Dr. Sesek	"Ergonomic Field Studies" presented at John Deere Annual Ergonomics Conference	5/17/2006	1.5 hours x 64 participants = 96 hours
Dr. Wood	<i>Seasonal Influences on Low Back Pain</i> , NORA 2006: Research Makes a Difference, Washington, DC.	4/19/2006	1 hour x 100 attendees
Dr. Wood	<i>Respiratory Protection Among Health Care Workers, and Patient Perception of Use</i> , 2 <sup>nd</sup> International Scientific Conference on Occupational and Environmental Health, Hanoi, Vietnam, November 16-18, 2005.	11/16-18/05	2 hours x 100 attendees

**OM-2 Dollars Saved and Injuries Prevented**

**10. Approximately how much annual cost savings do your OEH services provide to your organization? If you are an OEH consultant, how much annual cost savings do your services provide to your clients (in total)?**

<b>Savings</b>	<b>Response %</b>	<b>Response Total</b>
\$0 to <\$5,000	4.7%	2
\$5,000 to <\$50,000	2.3%	1
\$50,000 to <\$100,000	4.7%	2
\$100,000 to < \$250,000	9.3%	4
\$250,000 to \$500,000	2.3%	1
>\$500,000	7.0%	3
Unknown	62.8%	27
Other *	7.0%	3

\* - Other: probably a negative number since I am an expense item; Millions of Dollars (on a corporate basis); N/A

**11. Since you started working in your current position, by what percent have OEH services reduced injuries in your organization(s) (approximately)?**

<b>Reduction</b>	<b>Response %</b>	<b>Response Total</b>
Unknown	65.7%	23
0%	5.7%	2
5%	2.9%	1
10%	2.9%	1
15%	2.9%	1
25%	5.7%	2
35%	2.9%	1
50%	8.6%	3
75%	2.9%	1

## OM Graduates Survey Results

The RMCOEH initiated the 2006 Graduates Survey in June of 2006. At the time the following summary was prepared (August 15, 2006), the survey had received 44 OM graduate responses, for an OM graduate response rate of 62.8%. Graduates either received email links to the survey on the RMCOEH homepage or paper versions of the survey if a valid email address was not available. Initial non-responders received reminder emails and/or a postcard reminder to complete the survey. The survey was powered by SurveyMonkey through SurveyMonkey.com. All paper responses were entered into the web-based survey.

### 1. What percent of your time do you spend in clinical practice (approximately)?

<b>% Time in Clinic</b>	<b>Response %</b>	<b>Response Total</b>
<5%	15%	6
10%	10%	4
20%	3%	1
30%	0%	0
40%	5%	2
50%	10%	4
60%	5%	2
70%	5%	2
80%	13%	5
90%	10%	4
<b>100%</b>	<b>25%</b>	<b>10</b>
	<b>TOTAL</b>	<b>40</b>

**2. In which areas do you specialize or devote a significant portion of your work time (select all that apply)?**

	<b>Response %</b>	<b>Response Total</b>
Musculoskeletal disorders	82%	36
Lacerations and wound care	57%	25
Eye injuries	41%	18
Toxicology or hazardous materials exposures	55%	24
Noise	32%	14
Occupational Health and Safety Program Management	39%	17
Hazardous Materials Medical Surveillance	43%	19
Impairment/Disability	43%	19
Independent Medical Evaluations	25%	11
Fitness for Duty Evaluations	66%	29
Education	46%	20
Research	18%	8
Medical Review Officer	41%	18
Other *	27%	12
	<b>TOTAL</b>	<b>44</b>

\* - Other: managed care, consulting, RARE: eye, skin, occ asthma, hazmat survey, impairment rating, Public health medical direction and program direction, Administrative, Comp. Case Mgt., Medical Necessity, Health and wellness promotion, ergonomic job analysis, total & permanent disability evaluation review/determinations, emergency response protocols, Aviation Medicals, Sleep disorders and Fatigue

## 3. How well did the OM residency program prepare you in the following areas?

	Minimal (1)	2	3	4	Excellent (5)	N/A	Response Average
Patient Care	4	4	9	19	7	0	3.49
Medical Knowledge	0	2	10	20	11	0	3.93
Assessment of scientific evidence and patient care practices	0	4	5	18	16	0	4.07
Interpersonal & Communication Skills	2	3	13	15	10	0	3.65
Professionalism	1	1	8	14	19	0	4.14
Understanding of health care systems	1	3	13	19	7	0	3.65
Health Services Management	1	3	14	19	4	1	3.54
Biostatistics	0	4	7	18	11	4	3.9
Epidemiology	0	2	3	20	15	4	4.2
Behavioral Aspects of Health	2	4	17	14	4	3	3.34
Clinical Preventive Medicine	1	2	11	18	9	2	3.78
Disability Management and Work Fitness	4	3	8	21	7	0	3.56
Workplace Health and Surveillance	1	1	7	21	13	0	4.02
Clinical Occupational Medicine	1	2	9	16	15	0	3.98
Occupational Health Program Management	2	4	13	13	11	0	3.63
Environmental Health & Risk Assessment	2	6	11	16	8	0	3.51
Toxicology	0	2	9	21	9	0	3.9
						<b>TOTAL</b>	<b>44</b>

**4. Which professional certifications do you hold? (check or write in all that apply)**

<b>Certification</b>	<b>Response %</b>	<b>Response Total</b>
Medical Review Officer	61%	26
Certified Independent Medical Examiner	12%	5
Board Certification with the ABPM, Occupational Medicine	84%	36
Board Certification with the ABPM, Aerospace Medicine	5%	2
Board Certification with the ABPM, General Preventive Medicine and Public Health	9%	4
Board Certification with another medical board (i.e. Family Medicine, Internal Medicine, Anesthesia)	35%	15
Other certifications*	19%	8

\* - Other: MRO; Lapsed: Audiometric tech, PFT, MRO; Certified in Occ Med through the American Osteopathic Board of Preventive Medicine; Medical Management (CPE); Aviation Medical Examiner; Lab Director; Board eligible in OM; Certification by the American Osteopathic Board of Preventive Medicine

**5. If you participated in an educational program after graduating from the RMCOEH, what subjects did you study? Which degrees did you pursue?**

1.	PhD in Public Health
2.	Practicum Year @U California
3.	Completed Air Force sponsored residencies in: Aerospace Medicine General Preventive Medicine
4.	Occupational Medicine; Master of Science in Physiology (Occupational Medicine), Harvard School of Public Health
5.	CME only
6.	None
7.	Currently working on Masters in Medical Management- attended courses and distance learning. Will probably complete the Tulane MMM program.
8.	MRO CIME
9.	Medical Education Fellowship
10.	N/A
11.	N/A
12.	MBA
13.	I completed an Epidemic Intelligence Service (EIS) fellowship through the Centers for Disease Control & Prevention from 1998-2000. I was assigned to the National Institute for Occupational Safety and Health (NIOSH) and worked in the Health Hazard Evaluation (HHE) Branch, doing epidemiologic investigations at occupational sites throughout the U.S. I am currently pursuing a Master's of Business Administration (MBA) degree at Indiana Wesleyan University.
14.	DOT evaluations Respirator evaluations
15.	CDC's Epidemic Intelligence Service (EIS)training in applied epidemiology. No additional degrees.
16.	n/a
17.	FAA AME

**6. What is your work setting (check or write in all that apply)?**

	<b>Response %</b>	<b>Response Total</b>
<b>Clinic</b>	63%	27
<b>Hospital</b>	14%	6
<b>HMO</b>	5%	2
<b>Industry</b>	16%	7
<b>Government</b>	28%	12
<b>Consultant/own business</b>	23%	10
<b>Consulting Company</b>	5%	2
<b>Education/University</b>	28%	12
<b>Other (please specify) *</b>	9%	4

\* - Other: Non-profits; VA Healthcare System; Academic medicine; MRO

**7. What is your current job title?**

1.	Consultant	21.	Occupational Staff Physician
2.	attending physician	22.	Medical Consultant
3.	staff physician	23.	faculty
4.	Occupational Medicine physician	24.	Medical Director
5.	medical officer, government occ med health clinic	25.	Staff physician
6.	Commander, Aerospace Medicine Squadron	26.	Medical Director
7.	Staff Physician	27.	Attending Staff
8.	Medical Director, Bellin Occupational Health Solutions and Employee Health Services	28.	staff physician
9.	President/Medical Director	29.	Occupational Medicine Residency Director
10.	staff physician	30.	Plant Medical Director, General Motors Vehicle Manufacturing/Moraine Assembly Plant
11.	Director	31.	Staff Physician
12.	Medical Director	32.	Medical Director
13.	Staff Physician & Director of Occupational Health Services	33.	Medical Officer/Epidemiologist
14.	Medical Director / Division Leader	34.	Associate Professor and Director, Division of Public Health
15.	Site Medical Director	35.	Physician
16.	Chief, Occupational Medicine	36.	assembly plant physician
17.	Physician, Lab Director, Consultant, Managing	37.	medical director
18.	Center Director	38.	President
19.	Attending Physician	39.	Director, Center for Environmental and Occupational Health
20.	Medical Director	40.	clinical instructor
		41.	staff physician

**8. Where do you primarily work (which state)?**

State	Response Total
Utah	15
Georgia	1
Michigan	1
Oregon	3
Texas	2
Ohio	3
Wisconsin	3
Florida	1
Virginia	2
California	3
New Mexico	2
Washington	2
Nevada	1
Kansas	1
Oklahoma	1
<b>TOTAL</b>	<b>41</b>

**9. Which OEH specialists do you interact with on a regular basis? (check all that apply)**

	Response %	Response Total
Ergonomics and Safety specialists	43%	17
Industrial Hygienists	55%	22
Occupational Health Nurses	73%	29
Occupational Medicine Physicians	80%	32
Other (please specify) *	33%	13

\*- Other: other physicians; Comp program claims examiners; Public health practitioners; Worker Comp administrators; Health Physicists; Military Public Health; Nurses and physician non-occupational; PA; Audiologists; Employee Assistance Program (EAP) representatives; Physical therapists, Occupational therapists; Employee Health Nurse Specialists; physician assistant

**10. Approximately how much annual cost savings do your OEH services provide to your organization? If you are an OEH consultant, how much annual cost savings do your services provide to your clients (in total)?**

Savings	Response %	Response Total
\$0 to <\$5,000	4.7%	2
\$5,000 to <\$50,000	2.3%	1
\$50,000 to <\$100,000	4.7%	2
\$100,000 to < \$250,000	9.3%	4
\$250,000 to \$500,000	2.3%	1
>\$500,000	7.0%	3
Unknown	62.8%	27
Other *	7.0%	3

\* - Other: probably a negative number since I am an expense item; Millions of Dollars (on a corporate basis); N/A

**11. Since you started working in your current position, by what percent have OEH services reduced injuries in your organization(s) (approximately)?**

Reduction	Response %	Response Total
Unknown	65.7%	23
0%	5.7%	2
5%	2.9%	1
10%	2.9%	1
15%	2.9%	1
25%	5.7%	2
35%	2.9%	1
50%	8.6%	3
75%	2.9%	1

**12. At your workplace, what OEH problems require a significant percent of your time, generate costs and injuries, or worry you?**

1.	Back injuries, but an aggressive nurse education program reduced injuries by 25-50%. A comprehensive Dental Ergonomics program has reduced musculoskeletal injuries among dental assistants, dental hygienists (rarely, dentists) by over 50%.
2.	Musculoskeletal disorders
3.	Fire fighter evaluations Potential exposures at firing ranges LASER research (military applications) Exposures at research labs - especially the combination of unique chemicals Noise
4.	Back pain, lower and upper
5.	back injuries cost the most, needle-sticks worry me the most
6.	Disability is the primary issue in a state employee circumstance. It is very poorly managed.
7.	Ergonomics
8.	Managing primary care physicians providing occupational health services, transitioning to a different electronic medical record system (and assuring it's appropriate for occupational medicine setting), consulting with the companies worker compensation coordinators, addressing ergonomic issues with in the plants.
9.	Emergency Operations Chemical, radiological, and biological exposures Public relations
10.	Internal and external political issues and relationship building.
11.	Workplace exposures to cadmium, strontium chromate, and aircraft composite fibers. Occupational skin disease outbreak in certain areas of the complex. Ergonomic concerns with workplace plant management, and aircraft production workers specifically the variety of stools they use underneath various aircraft. The seemingly increase in fitness for duty exams for psychiatric reasons.
12.	Clinic / Post Exposure Services Consultant / Mining Hazards
13.	MSDs
14.	Back injury, RTC tear, Meniscus tear, TB exposure, Needlestick with positive HIV/Hep C.
15.	Comp. Costs due to delayed recovery, #OSHA recordable on 300 log, inappropriate physician advocacy with RTW discussions, quantifying functional ability and fitness for duty problems.
16.	Unknown
17.	N/A
18.	Low back disorders - lifting injuries in hospital staff. Shoulder disorders

19.	Trying to get management to agree to the importance of employee health, modified duty, early return to work and injury management.
20.	NA
21.	Dermatological problems; LBP; MS injuries
22.	1. Drug and Alcohol Use/Abuse 2. Chronic Psychiatric Disorders (Depression/anxiety) 3. Poor Health Habits (including lack of exercise/poor diet) and resulting health conditions (obesity, HTN, CVD, diabetes, etc.) 4. Smoking 5. Poor employee attitude towards safety
23.	Poor ergonomic workstations and repetitive injuries cause concern but require less than 1% of my time
24.	Fatigue
25.	Lost work time, inefficient coordination among units or departments or institutions, working population health status.
26.	musculoskeletal disorders specifically back injuries and upper extremity injuries
27.	None
28.	employers who do not accommodate alternate duty
29.	cumulative trauma and to establish causation

**Based on your experience since graduation, what curriculum changes would you recommend?****13. What subjects would you add?**

1.	More OM clinical experience, MRO experience
2.	I graduated from the program in 1986 while it was in relative infancy; my ratings would undoubtedly be much higher if a more recent grad. My suggestions are based on my experience nonetheless. 1) Alert residents there are a variety of Occ Med 'niches' out there. A generalist in a fee for service clinic needs to be well grounded in musculoskeletal injuries, including reasonable matching of modified duty to injury status, impairment ratings, post op care, familiarity with joint/spine procedures. I came away from ROMCOEH with a broad smattering of skills but quickly found 85% of my patient base was musculoskeletal acute injury care. I used continuing education courses to maintain some clinical acumen in occupational dermatitis, asthma, eye injuries, BBF and hazardous exposures. 2) Our Kaiser Marketing dept (sadly) overrides the Occ Med dept chief desire to market medical surveillance and preventive services. We do some basic medical surveillance but other HMOs have captured the market because most of our Marketing people DON'T get it! So...have a course that covers marketing Occ Med services beyond acute injury care. 3) ANY new physician to Kaiser has to spend hours learning the computerized medical charting system; our HyperSpace/Epic system is the largest, most advanced medical charting in the country. We have computer geeks in OH that can cut/dice any which way contract employer injury data. Problem is: no feedback loop between individual OM docs in our dept and specific employers to review data on an ongoing basis... if there was, I'd know about it. Teach the basics of analyzing injury or medical surveillance data and how to advise employers (do NOT get too esoteric!)
3.	Negotiating a contract
4.	I only completed Academic Year
5.	More case study work-ups. Consider linking with Air Force Consult in OM for interesting/challenging cases.
6.	I understand you have address substantially the patient care and bread and butter OM practice areas. Musculoskeletal and wound care issues should be well understood.
7.	Occupational psychiatry (if there is such a subject) - addressing safety and basic mental competency for work. Occupational dermatology (we only had pulmonary, it was excellent)
8.	Public and Press Interactions More medical management
9.	Perhaps more in toxicology.
10.	More heavy metal toxicology More disability and impairment More Ergonomic answers
11.	It was a good program! I would keep the Thesis program
12.	Occupational Safety and Health Problems Solving with real industry problems. More financial management. Occupational Epidemiology.
13.	Workers Comp., Fitness for Duty, and Disability evaluation

14.	Disability & FFD Mgt.
15.	Not sure
16.	None
17.	Causation assessment Impairment rating
18.	Probably mandate more time on musculoskeletal injuries since that is the bread and butter of real life occ med
19.	More time with occupational medicine. A biostatistics and epidemiology class specifically for physicians. A second level toxicology class for physicians without the IH students.
20.	Most of the changes I saw a need for have already been implemented in the OM program. Increased clinical, more research, better teaching time with residents, etc.
21.	no opinion
22.	Practical Impairment and Disability evaluation
23.	1. Disability & Worker's compensation case management 2. Psychiatric conditions and their impact on workplace safety 3. Risk management
24.	More about DOT and fitness for duty. More IME experience.
25.	Intensify clinical trauma care in occ health clinics-your graduates experience are currently inadequate in this area Sleep/fatigue issues
26.	More management and administration; health economics.
27.	mro course
28.	more training in physical examination, medical surveillance, and impairment rating

**14. What subjects would you remove?**

1.	1) Dr. Charles Hughes (God rest his soul) taught something about Social/Behavioral applications, but I frankly can't remember a significant pearl... so wasn't very relevant to where I ended up. 2) Doug Hammer's class on the Law/Government seemed dry; I'm sure that improved over time. 3) The entire MSPH program in 1982-86 was weighted too heavily toward design and interpretation of clinical studies, and way too skimpy on clinically relevant Occ Med practice.
2.	Ergonomics has not proved very useful.
3.	All of the ones I took were sound.
4.	No recommendations.
5.	None
6.	none
7.	Introduction to Public Health. Social Context of Medicine.
8.	N/A
9.	Graduated too long ago (~30 yrs) Not sure what curriculum is anymore
10.	Not Sure
11.	None
12.	Core Public Health requirements - too much emphasis on unrelated subject matter
13.	None, some could be made more educational but since there has been staff turnover/death that's probably happened
14.	Intro to public health. Social context of medicine (although Dr. Byrd was fabulous, this is really not applicable to OM)
15.	no opinion
16.	VAH rotation for Agent Orange.
17.	1. Law & medicine course (my experience was that the content was not very useful overall)
18.	none I can think of
19.	??
20.	-

**15. What changes to existing courses or rotations do you recommend?**

1.	More OM clinical experience, MRO experience
2.	1) I had one years worth of EPI and Biostatistics each.... how I wish 2/3 of that time had been spent in more clinically relevant material. 2) It would be helpful to see the current course choices for your Occ Med residents. It was exciting to be taught by professors with vast experience, eg William Rom & Jim Lockey; or learn from skilled clinical epidemiologists. The RMCOEH program would have been more helpful to me personally if I had landed in an academic position.
3.	Ensure military rotate thru Hill AFB, consider sending them to Tinker or Wright-Patterson for Military spin ( contractor at Hill)
4.	Too far out to say. Your IH and admin components were excellent.
5.	More occupational specific clinical courses, though over the past 20 years the school may have done this.
6.	Program Development
7.	No recommendations.
8.	None that I know of.
9.	none
10.	Increase OSH information in Public Health classes.
11.	N/A
12.	same as above
13.	Having available dictation/transcription service for IME's on OMC
14.	It would be up to the individual preferences to select the particular rotations that will fit his or her future needs.
15.	OM clinical rotation - more time at OM clinic to experience day to day operation and practical management of patients. IME rotation - more experience with toxicology assessments.
16.	More clinical training with orthopedists and in clinical occupational settings.
17.	Offer more local opportunities to rotate in industry-based occupational medicine settings. The opportunities available within the Salt Lake City area were limited.
18.	I don't know the current curriculum for the MPH program and therefore won't comment, however, I think a health promotions clinical rotation as well as more industrial clinical experience would be very practical in the real world experiences to come.
19.	Do whatever it takes to get them to rotate through existing Occ Health Clinics to get some trauma experience, as it seems that yours does

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	not provide them with sufficient trauma experience.
20.	??
21.	more rotations in urgent care clinics
22.	more emphasis on practical, clinical OEM More exposure to work comp insurance process
23.	Urgent care

**16. How likely are you to recommend the training programs at the RMCOEH?**

		Response %	Response Total
<b>Advise against</b>	0	0.0%	0
	1	2.4%	1
	2	0.0%	0
	3	0.0%	0
	4	0.0%	0
	5	2.4%	1
	6	11.9%	5
	7	4.8%	2
	<b>8</b>	<b>16.7%</b>	<b>7</b>
	<b>9</b>	<b>28.6%</b>	<b>12</b>
<b>Enthusiastically recommend</b>	<b>10</b>	<b>35.7%</b>	<b>15</b>
		<b>TOTAL</b>	<b>42</b>

**17. How satisfied are you with the training you received at the RMCOEH?**

		Response %	Response Total
<b>Very dissatisfied</b>	0	0.0%	0
	1	0.0%	0
	2	2.4%	1
	3	2.4%	1
	4	0.0%	0
	5	4.8%	2
	6	9.5%	4
	7	4.8%	2
	<b>8</b>	<b>21.4%</b>	<b>9</b>
	<b>9</b>	<b>33.3%</b>	<b>14</b>
<b>Very satisfied</b>	<b>10</b>	<b>21.4%</b>	<b>9</b>
		<b>TOTAL</b>	<b>42</b>

**18. Please describe a continuing education course that you might attend.**

1.	Something to do with research, epidemiology, statistical analysis, data
2.	Clinical Occ med, with an emphasis on musculoskeletal and eye injury
3.	I retire 11/30/06 from Kaiser. I'm looking for a course that would train physicians who want to volunteer for teaching in underserved countries/communities... focus on preventive care or injury reduction.
4.	Injections and other musculoskeletal procedures courses
5.	Dr. McKAY at the Univ. of Cincinnati has an excellent course on respiratory function assessment- consider bringing it out west
6.	a refresher in epidemiology and biostatistics would have an appeal. also an intro to "medical informatics". i have a friend that went through a master's program at UC Davis which i believe was entitled "computer science - medical informatics" that sound interesting
7.	Generally too far.
8.	Updates in OM Review of toxicology
9.	I really really want to take the MSK / ergo course offered the last weekend (or second to the last weekend) in Feb (Kurt's course). But I'm always tied up with a xc ski event here in Wisconsin. How about offering it at a different time - summer or fall would both be reasonable.
10.	Future of Occupational Medicine
11.	Toxicology
12.	? Asbestos refresher
13.	I used to enjoy Bill Rom's giants in Occ Med Guest Lectures
14.	Financial/managerial aspects of OSH programs.
15.	Ergo & Job Analysis Methods Compensable Disability Mgt. EBM as applied to quantifying performance and ability in the workplace.
16.	Board Review for ABPM
17.	Because of not practicing Occupational Medicine, I have been attending primary care/internal medicine continuing education courses to keep up with the current knowledge and practices of the general medicine.
18.	DOT training, IME training
19.	MSD conference.
20.	Anything on commonly encountered clinical injuries and illnesses.

21.	DOT Exams
22.	1. Disability/impairment ratings & independent medical evaluation (IME) training 2. Psychological effects of shift work 3. Effective implementation of health and wellness programs in the workplace.
23.	Another dot course, fitness for duty evaluations regarding narcotics and dot, and return to work with substance abuse.
24.	Linking multiple services for health promotion and disease care and disability/impairment assessment into an efficient, coherent whole with benchmarked metrics.
25.	disability management
26.	DOT medical certification IME/Impairment Rating certification
27.	WOEMA

**19. Any additional comments?**

1.	No :)
2.	I attended RMCOEH only for my practicum year. I completed my Masters degree in the OJOC program at the University of Michigan.
3.	It seems to me you have been working hard to address deficits. You have a premier program, it just wasn't quite there in my time in all areas but it was moving forward. I am very glad to have been there and will always remember my time and the faculty and staff fondly.
4.	I already receive the newsletter, but if I don't feel free to add me to the list.
5.	I'm concern that occupational medicine programs are not turning out leaders for the profession. Also, I would encourage selecting residents with an excellent clinical background.
6.	None
7.	Love working with all OM/CE staff (also Don B.) at RMCOEH!!
8.	N/A
9.	For RMCOEH to offer online continuing medical education courses (to save time and travel costs)
10.	no
11.	-(misspelled receive below! :*)
12.	none

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**20. Would you like to receive the RMCOEH newsletter by email?**

72.5% Yes, 27.5% No

**OM-4 MPH Course Curriculum****Occupational & Environmental Medicine Required Courses****July 2007****Total of 45 credit hours**<http://uuhsc.utah.edu/dfpm/phgroups/>**Fall**

<b>Course</b>	<b>Title</b>	<b>Credits</b>
FPMD 6100	Introduction to Biostatistics	3
	Biostatistics Laboratory	
FPMD 6300	Introduction to Epidemiology	3
	Epidemiology Laboratory	
FPMD 6703	Occupational Injuries and Diseases	3
FPMD 6750	Fundamentals of Industrial Hygiene	2
MEEN 6100	Ergonomics	3
	Ergonomics Laboratory	
	<b>TOTAL</b>	<b>14</b>

**Spring**

<b>Course</b>	<b>Title</b>	<b>Credits</b>
FPMD 6760	Health Care Administration in OEH	3
	(or FPMD 6400 Public Health Administration)	
FPMD 6504	Clinical Prevention	3
FPMD 6600	Social Context of Medicine & Public Health	3
FPMD 6700	Environmental Health Problems	3
FPMD 6752	Introduction to Toxicology and Physiology	3
MEEN 6960	Occupational Safety and Health Solutions	3
	<b>TOTAL</b>	<b>18</b>

**Summer**

<b>Course</b>	<b>Title</b>	<b>Credits</b>
FPMD 6702	Advanced Topics in OEH	3
FPMD 6960	Practicum (UT OSHA)	6
FPMD 6710	Individual Research in Occupational Medicine	4
	<b>TOTAL</b>	<b>13</b>

**Total of 45 credit hours**

### Scoring Method for OM Curriculum Matrix

**Goals:**

1. Estimate the amount of instruction in a given competency relative to other competencies
2. Estimate the quality of instruction in each competency

**Curriculum:** Practical experiences and Didactics

**Levels of content in practical and didactic curriculum elements:**

- Primary purpose (i.e. rotation with a dermatologist to learn dermatology)
- Included content (i.e. course containing dermatology lectures)
- Peripheral or possible content (i.e. course that refers to dermatologic complications)
- No content

#### Method for Matrix Scoring (utilized with ACGME competencies)

Score	Level of Content
4.0	Primary purpose
3.0	Included content
2.0	Peripheral content
1.0	Possible content
Blank	No content

**ACGME Competencies - Basic OM Program Elements**

	Epidemiology	Biostatistics	Occ Inj & Dz	Fundamentals IH	Intro Tox	Ergonomics	HC Admin OEHS	Clin. Prevention	Soc. Context Med	Env. Health Prob	Adv. Topic OEH	OEHS Field Trips	Practicum	Resident Research	Occ. Health Nurse	Journal Club	Grand Rounds	Public Questions	CE Asbestos Talks	OccMed/OMC	Industrial Rotation	Preparation Rotation	Clinical Rotations	Total
<b>ACGME Competencies</b>																								
Patient Care	2	1	4	2	3	3		4	2	2	4	2		2	1	3	4	3	2	4	3	2	4	57
Medical Knowledge	3		4	2	4	1		4	2	2	4		1	4	1	4	4	4	4	4	4	3	4	63
Practice-Based Learning & Improvement	3.5	3.5	3	3	1	3	3	4	2	3	4	4	4	4	3	4	4	1		3	4	3	2	69
Interpersonal & Communication Skills				2	3		4	1	4	1	4	4	4	4	3	4	4	4	4	4	4	4	4	66
Professionalism				2		2	4		4		3	4	4	4	4	3	4	4	4	4	4	3	4	61
Systems-Based Practice	1		3				4	4			3	4	3	3	4	1	2	1		3	4	4	1	45
<b>Total</b>	9.5	4.5	14	11	11	9	15	17	14	8	22	18	16	21	16	19	22	17	14	22	23	19	19	

**OM Competencies - Basic Program Elements**

	Epidemiology	Biostatistics	Occ Inj & DZ	Fundamentals IH	Intro Tox	Ergonomics	HC Admin OEHS	Clin. Prevention	Soc. Context Med	Env. Health Prob	Adv. Topic OEH	OEHS Field Trips	Practicum	Resident Research	Occ. Health Nurse	Journal Club	Grand Rounds	Public Questions	CE Asbestos Talks	OccMed/OMC	Resident Research	Population Rotation	Clinical Rotations	Total
<b>Core</b>																								
<b>Health Services Management</b>																								
Organization							1	1							1					1	1	1	1	7
Health Care Delivery							1	1							1					1	1	1	1	7
Finance and Economics							1	1	1													1	1	5
Organizational Structure and Development							1	1			1				1					1	1	1	1	8
Legal and Ethical Issues			1	1		1	1		1		1	1			1		1			1	1	1	1	13
<b>Biostatistics</b>																								
<b>Epidemiology</b>																								
Design and Methods	1	1	1	1				1			1			1		1								8
Interpret	1	1	1	1				1			1			1		1								8
Vital Statistics & Demography	1	1	1			1	1	1	1		1			1		1	1						1	12
Prevention and Control	1	1	1	1	1	1	1	1		1	1	1	1	1	1		1					1	1	17



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Neoplastic Diseases	1		1	1	1			1	1						1	1	1	1	1	1	1	1	14
Infectious Diseases			1					1	1	1					1	1	1		1		1	1	10
Metabolic Disorders & Nutrition			1					1	1						1	1	1		1			1	8
Musculoskeletal Disorders			1			1		1		1	1	1	1		1	1	1		1	1		1	13
Neurological Disorders			1			1		1		1					1	1	1		1	1		1	10
Oral Health, Vision & Hearing Disorders			1	1	1			1	1		1	1			1	1	1		1	1	1	1	14
Maternal & Child Health	1		1	1	1			1	1	1					1		1		1	1	1		12
Genetics	1		1		1			1	1				1	1	1		1			1	1		11
Complementary & Alternative Care					1			1	1						1		1		1		1	1	8
<b>OM Knowledge Content</b>																							
<i>Disability Management &amp; Work Fitness</i>																							
Disability Prevention & Management						1				1	1			1	1	1	1		1	1		1	10
Americans with Disabilities Act						1	1			1									1	1			5
Fitness for Duty & Return to Work										1					1				1	1		1	5



Principal Investigator/Program Director (Last, First, Middle): **Hegmann, Kurt T., MD, MPH**

Medical programs				1	1		1			1			1									6
<b>Clinical</b>																						
General (hx, lab studies, work relatedness)				1			1			1							1	1		1		7
Cardiology				1			1										1	1		1		5
Dermatology				1						1							1	1		1		5
Ear, Nose, & Throat				1			1										1	1		1		5
Hematology Oncology				1						1							1	1		1		5
Infectious Diseases & Biohazards				1			1			1						1	1		1			7
Musculoskeletal				1			1			1							1	1		1		6
Neurology				1			1			1							1	1		1		6
Ophthalmology				1			1			1							1	1		1		6
Psychiatry (psych dz, subst use, violence, eap)				1			1			1							1	1		1		6
Pulmonary				1			1			1							1	1		1		6
Reproductive Medicine				1			1			1							1	1		1		6
<b>Occupational Health Program Management</b>																						
Medical ethics & confidentiality							1			1							1	1				5
Regulations (OSHA, DOT, FAA, EPA, FMLA)							1									1	1		1	1		7

Principal Investigator/Program Director (Last, First, Middle): **Hegmann, Kurt T., MD, MPH**

Workers' compensation			1	1		1	1											1	1			8	
Health Promotion							1	1												1	1	1	5
Early intervention			1																				1
Health care delivery systems								1	1										1	1	1	1	6
Medical quality management	1	1						1	1							1			1	1		1	8
Emergency planning (haz mat, disaster, bio, chem, nuc)	1		1	1	1					1	1	1									1	1	9
<b><i>Environmental Health and Risk Assessment</i></b>																							
Risk assessment	1	1	1	1	1				1	1	1	1	1						1		1	1	13
Community "Right to Know"				1				1			1		1								1	1	6
Environmental monitoring	1		1	1	1					1		1	1					1		1	1		10
Human health effects	1	1	1	1	1				1	1	1		1			1	1	1	1	1	1	1	17
Environmental exposures (waste, iap, radon, . . .)	1	1	1	1	1						1	1	1	1			1	1	1	1	1		14
<b><i>Toxicology</i></b>																							
Toxicokinetics				1		1						1							1	1			5
Carcinogenesis				1		1				1	1								1				5



## OM -6 OM Faculty Meeting Minutes

### Occupational Medicine Faculty Meeting May 22, 2007

Attendees: Drs. Holmes, Edwards, Moser and Karen Bradakis

1. Reviewed and approved minutes from last meeting: April 24, 2007
2. Resident survey for ACGME: All residents will do the survey.  
(Editor's note: All have now done it.)
3. Residents taking responsibility for timely compliance.  
Dr. Moser suggested a 5pm (we compromised on 4:45pm meeting) to be sure residents take care of what they need to. Karen will notify the residents of this mandatory meeting from which the residents can be excused only if their items are completed. Let the residents know that in their 360 evaluations they will be evaluated on responsiveness to items like this, or if they are **non**-compliant.
4. Faculty annual reviews for Program Directors. Dr. Holmes will start today with Dr. Edwards'.
5. OM residency internal review--list of all required items and status- We went through the list. Dr. Moser and Dr. Edwards answered a couple of questions there. One question (remained) to ask Anne Vinsel (editor's note items #16 & 17 not applicable to our program.)
6. 360 evaluations on E\*Value: The first version went out, however some people received the wrong type of forms. 3 preceptors received forms who shouldn't have yet. Dr. Edwards and Karen have contacted E\*Value rep about it, Karen will speak to Meg again this week. Dr. Edwards & Karen will speak with E\*Value Representative together on June 13.
7. Residency transition of leadership for residency – Dr. Wood will become the Residency director July 1.
8. Resident orientation: Who will be conducting? Dr. Wood: July 5, noon  
Dr. Edwards said Dr. Wood is out of town July 2-4. Dr. Hegmann will standardize residents for studies from 8 until 11AM that morning.
9. RMCOEH orientation date—which faculty will attend Aug. 16? Dr. Wood is out of town August 16 10-4pm.
10. News from residency directors meeting?  
Dr. Edwards reported that ABPM has their own competencies. Most of the meeting was spent discuss trying to save the OM Board Certification and not develop a 'Certificate of Occupational Medicine.' They don't want to dilute the need for Board Certification.
11. Resident Sick Leave Policy – we are clarifying wording in our leave policy on sick days and vacation. 48 weeks a year is necessary to meet Board Requirement.
12. Resident contract dates (when off-cycle) Dr. Holmes noted considerations.

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

13. Our Physician Assistant (at Clinic) plans to be off from October through December, back in January. She doesn't want the late nights in Urgent Care. She may be more interested in our position than nights, but our position is full time.
14. Dr. Hegmann is considering posting a position for Deputy Center Director. If a Physician, would this new-hire do some clinical work?

**Occupational Medicine Faculty Meeting  
June 26, 2007**

Attendees: Drs. Edwards, Hegmann, Holmes, Moser and Wood, Karen Bradakis

1. Resident evaluation forms of the Program were discussed, Dr. Edwards worked on those for use in the E\*Value system. Do we want to restructure the forms to make them simpler - only 1 question? For evaluating the faculty – we could ask residents to rate their quality of teaching and leave room on form for comments. Forms are currently set up with 1 to 9 rating scale, change to 3 or 4 point scale? We discussed the processing of the evaluations. Residents will enter these in the E\*Value system. Residents should have access to completing these in E\*Value 1 month before the Residency Advisory Committee (RAC) meeting. Dr. Teynor, chair of the RAC, will have access to viewing these evaluations, instead of the residents emailing or faxing him their comments. The faculty should also be able to view anonymous residents comments, let residents know to keep their comments brief. Let the residents know what we will do with the data - if it is for the RAC (to help improve our program) and be prepared for how the residents may respond.
2. We have notified Ms. Short, GME Director, of OM program director change from Dr. Holmes to Dr. Wood. Ms. Short is working on the process to notify ACGME of the change of program directors. Dr. Wood is scheduled to meet formally with the GME Committee at their August meeting.
3. Our New Residents Orientation will be held July 5th at noon. It may be helpful for the PGY-3 residents to attend at least part of this.
4. The Rocky Mountain Center Orientation will be August 16 from 10-noon. One of the topics will be the training/certification all new students need for the Studies with Human Subjects. Dr. Moser will cover the overview of the Rocky Mountain Center, program directors will cover their program information for their students.
5. We will soon finalize the contract for our resident for the remaining weeks she needs to complete to make up time missed during leave. She is expected to complete her PGY-3 year and our residency program in October, 2007.
6. The Masters of Health (MOH) degree program (and Masters of Science in Health (MSOH) is on its way to the next level in the approval process, we are contacting some academic senators.
7. Residents' Attendance Policy: Residents need to complete 48 weeks on service (this is an American Board of Preventive Medicine Policy). Ms. Short, our GME Director said that it is up to the Program to determine if a resident has successfully completed the required number of weeks. We need to make our policy on this clear to the residents at resident orientation. We must distribute the policy so that each resident has a copy of our policy when it is revised (Editor note: each resident has signed for receiving a copy of the leave policy). Course (or rotation) evaluations may include a line that the student be evaluated on attendance.
8. We want the residents use the Portfolio section of E\*Value when new residents begin.
9. We will ask residents to help us incorporate the ACGME Core Competencies in the rotation goals and objectives.
10. The content for New Resident Orientation will be discussed in a separate meeting than this one. The Residency portion of the OM Faculty concluded. Drs. Edwards and Holmes stayed to discuss clinic items.

**Occupational Medicine Faculty Meeting  
August 28, 2007**

Attendees: Drs. Edwards, Holmes, Moser, Wood and Karen Bradakis

A meeting was not held in July, 2007 due to holiday travel.

1. Dr. Holmes will be working on a Masters of Toxicology Dissertation over the next year, using some annual leave time (working 50% time). The Masters in Toxicology will increase his consulting ability. While working on the degree, if Dr. Holmes cuts back on his time to do consulting, it affects revenue for the program; that revenue pays for a lot. Only revenue from non-patient related work goes into his Development account. Patient Care related to clinical work goes into the Clinic Account.
2. Dr. Holmes will be meeting with an account soon to discuss some OM items.
3. We are hiring a new Physician Assistant for the clinic to cover absence for our Physician Assistant while she is out and when she returns from maternity leave. We hope that the P.A. selected will be able to begin working part time for us and part time for the Community Clinic. We would like to hire a faculty, but we need the accountant to look at our budgets and look forward to consider that. We have many sources of income and many expenses to look at. Dr. Holmes suggested that Dr. Edwards suggest schedules for current P.A. and the new P.A. We have been using our P.A. for short notice coverage. We may need to ask Dr. Hegmann about continuing that; though we don't want to overburden the faculty by asking them to cover that.
4. Dr. Edwards has been asked by Dr. Catinella, at the Department of Family and Preventive Medicine, work with ARUP employees. She may begin work (possibly 20% time) on that beginning October 1, 2007. Dr. Holmes suggests that she write a Memo of Understanding on this Shared Medical Director position and the FTE, to clarify this. She would be subcontracting and they would pay 20% of her Malpractice and Benefits. This will be good to have her work for us and also with DFPM and with ARUP. She can make this short term if she wants.
5. We are aware that we should have someone cross-trained if a specially trained staff person at the Redwood Clinic leaves suddenly. We need to be prepared if we do not have someone available at Redwood to do EKGs. We need to look into that.
6. Dr. Holmes noted a site visit in the plating process at a Jewelry plating and smelting refinery. He invited residents who may be able to attend.
7. Some items of interest came up at RMCOEH's retreat, including we will strive for more collaboration with other RMCOEH groups. We will discuss these at our next meeting.
8. The two PGY-2 residents received incompletes for a summer course which is continuing through the fall. Peggy in Public Health said that the incompletes will not prevent them from graduating in December.
9. Dr. Edwards is concerned that residents on the OMC rotation are not getting enough time at the clinic the weeks there are studies, so she has them go to clinic instead of going to the study follow-ups when she is the attending. Do Drs. Hegmann and Wood think the residents work a certain amount of clinic time?
10. Dr. Holmes is working on the OM Narrative section and graphs for the NIOSH report for September 26.
11. Our faculty is reviewing the set up of Resident Portfolios in E\*Value - it is a little different than we anticipated. Dr. Wood suggested that residents be introduced to the formal introduction to E\*Value with the program director, so they can see generally what it is like and the types of items we will save there. We

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH  
scheduled a time for this overview with the residents. Dr. Edwards asked that evaluations go out 3 times a year at the end of the 3 semesters, to course instructors, and the 360 evaluations for staff go to staff who work with residents at study sites and clinic staff.

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
Edward Holmes, MD, MPH  
Discipline: Occupational Medicine

**Table 4b  
Academic Training Report  
Since Beginning of Current Project Period**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.) <sup>3</sup>							
<b>2002-2003</b>							
Masters (PGY2s)	Masters of Public Health	2	1	0	0	1	1
Certificate (PGY3s)	Certificate of Residency in Occupational Medicine	5	4	0	0	N/A	5
<b>2003-2004</b>							
Masters (PGY2s)	Masters of Public Health	2	2	0	0	2	2
Certificate (PGY3s)	Certificate of Residency in Occupational Medicine	4	3	0	0	N/A	4
<b>2004-2005</b>							
Masters (PGY2s)	Masters of Public Health	3	2	0	0	1	3
Certificate (PGY3s)	Certificate of Residency in Occupational Medicine	3	3	0	0	N/A	3
<b>2005-2006</b>							
Masters (PGY2s)	Masters of Public Health	1	1	0	0	1	1
Certificate (PGY3s)	Certificate of Residency in Occupational Medicine	4	3	0	0	N/A	3
<b>2006-2007</b>							
Masters (PGY2s)	Masters of Public Health	2	2	0	0	1	2
Certificate (PGY3s)	Certificate of Residency in Occupational Medicine	2	2	0	0	N/A	2

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Refer to: Supplemental Instructions, page 8.

<sup>1</sup> Trainee counts include all students in the approved programs.

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

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

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Edward Holmes, MD, MPH  
 Discipline: Occupational Medicine

**Table 5**  
**Tracking Graduates-Academic Training Report<sup>1</sup>**  
**Since Beginning of Current Project Period**

Trainee Name (if supported by a NIOSH training grant, denote with *)	Date Entered Program (mm/yy)	Date Degree Awarded (only if at your institution) (mm/yy)	Degree Awarded (also specialty area as noted on degree/transcript)	Date of Certificate of Completion (for Occ Med Residency programs) (mm/yy)	Current Employment (Job Title/Employer)	Employed in OS&H Field or Enrolled in OS&H Academic Program? Y/N
Year 1: July 1, 2002 to June 30, 2003						
M.M., MD, MS*	08/01	07/02	Certificate of Residency in Occupational Medicine	07/02	Not known	
D.D., MD*	08/01	06/02	MPH, Certificate of Residency in Occupational Medicine	06/03	PM&R Residency, Med. Col. of Wisc, Milwaukee	N
P.L., MD*	08/01	06/02	MPH, Certificate of Residency in Occupational Medicine	06/03	Director Public Health Laboratories, Deputy Director Epidemiology and Lab Services; Utah Dept. of Health, Salt Lake City, Utah	Y
E.W., MD, MPH	10/02		Certificate of Residency in Occupational Medicine	06/03	Clinical Instructor, University of Utah, Rocky Mountain Center for Occupational and Environmental Health	Y
R.P., MD, MS*	09/02		Certificate of Residency in Occupational Medicine	04/04	Occ. Med. Physician, Brooks Army Med. Center, 2410 Stanley Rd. Bldg 1029, Ft. Sam Houston, TX	Y

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH

Year 2: July 1, 2003 to June 30, 2004						
D.H., MD*	08/02	06/04	MPH, Certificate of Residency in Occupational Medicine	06/04	Occ. Med. Physician, GM, 1000 General Motors Dr, Janesville, WI 53546	Y
L.R.K., MD, PhD	08/03		Certificate of Residency in Occupational Medicine	06/04	Occ. Med. Physician, Group Health Cooperative, Tacoma, Washington	Y
C.O., MD, MSPH*	07/03		Certificate of Residency in Occupational Medicine	06/04	Occ. Med. Physician, WorkCare Industrial Clinic, SLC, UT	Y
C.T., MD, MPH*	10/03		Certificate of Residency in Occupational Medicine	10/04	1. Attending staff at Los Angeles VAMC; Consultant staff (Surgery) at Long Beach VAMC 2. Active locum tenens assignments (ENT & Occ Med) 3. Active as flight surgeon (assigned as Officer in Charge of Occupational Medicine) Virginia medical squadron.	Y
Year 3: July 1, 2004 to June 30, 2005						
H.E., MD*	08/03	06/04	MPH, Certificate of Residency in Occupational Medicine	06/05	Clinical Instructor, University of Utah, Rocky Mountain Center for Occupational and Environmental Health	Y
K.C., MD*	08/03	06/04	MPH, Certificate of Residency in Occupational Medicine	06/05	Staff Physician, Occ. Health Clinic, Portland, OR	Y
B.Y., MD, MPH*	08/00	06/01	MPH 2001, took Leave till 2004, Certificate of Residency in Occupational Medicine 2005	06/05	Attending physician at two Occupational/Employee Health Clinics (two VA NJ campuses)	Y
Year 4: July 1, 2005 to June 30, 2006						

Principal Investigator/Program Director (Last, First, Middle): **Hegmann, Kurt T., MD, MPH**

S.T., MD, MPH*	08/04	06/05	MPH, Certificate of Residency in Occupational Medicine	06/06	Staff Physician, Occ. Health Clinic, Dugway, Utah	Y
C. V., MD, MPH	08/04	06/05	MPH, Certificate of Residency in Occupational Medicine	06/06	Staff Physician, Occ. Health Clinic, Hill AFB, Ogden, Utah	Y
S. R., MD, MPH*	07/05		Certificate of Residency in Occupational Medicine	06/06	Staff Physician, Occ. Health Clinic-Arlingate, Columbus, Ohio	Y
Year 5: July 1, 2006 to June 30, 2007						
A. Z., MD, MPH*	08/05	08/06	MPH	expected 10/07	Currently in program	N/A
P.J., MD, MS.*	07/06		Certificate of Residency in Occupational Medicine	06/07	Staff Physician, IHC WorkMed, SLC, Utah	Y
Refer to: Supplemental Instructions, page 10.						
<sup>†</sup> Graduate counts include all trainees graduated from the approved programs.						

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Edward Holmes, MD, MPH  
 Discipline: Occupational Medicine

**Table 13  
 Minority Recruitment Data  
 Since Beginning of Current Project Period**

<b># of Minorities Applied</b>	<b># of Minorities Offered Admission</b>	<b># of Minorities Entered Program</b>	<b>For those who entered program: Identify by sequential #</b>
Year 1: July 1, 2002 to June 30, 2003			
0	0	0	N/A
Year 2: July 1, 2003 to June 30, 2004			
0	0	0	N/A
Year 3: July 1, 2004 to June 30, 2005			
0	0	0	N/A
Year 4: July 1, 2005 to June 30, 2006			
0	0	0	N/A
Year 5: July 1, 2006 to June 30, 2007			
1	0	0	N/A

Refer to: Supplemental Instructions, page 13.

1 Please include applicant data for students who applied for admission to enter during the previous budget period (7/1/06 - 6/30/07).

2 If student(s) indicate they will enroll during the next budget period (in this case 7/1/07-6/30/08), please note this with an asterisk, e.g., 2, 1\*.  
 This

would indicate two students enrolled previous budget period and one student plans to enroll next budget period.

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Edward Holmes, MD, MPH  
 Discipline: Occupational Medicine

**Table 13b - Individual Trainee Data From Each Program  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2006 to June 30, 2007**

INDIVIDUAL STUDENT DATA FROM EACH PROGRAM			
Identify Enrolled Trainees by a Sequential Number	Current Status (in training, graduated, left program etc.)	Primary Sources of Support	Subsequent Career Development/ Employment
<b>Trainees Who Entered Prior Budget Period (7/1/06 - 6/30/07)</b>			
Not applicable			
<b>Continuing Students</b>			
Not applicable			

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> Please note that trainees who entered this budget period/academic year should be part of applicant pool in Table 13a.

## **Appendix CE-1**

### **New Courses Held During 2002-2007 Project Period**

1<sup>st</sup> Annual NORA Symposium  
Answers to Crucial Workplace Issues  
Commercial Driver Medical Examiner  
DOT Medical Examinations Update  
Industrial Hygiene Program Management  
Machine Guarding  
Mobile Crane  
Overview of Heat Stress and Strain  
UAOHN Fall seminar  
UAOHN Spring seminar  
OSHA 510  
OSHA 500  
Safety in Diverse Workforces  
Scaffold Safety and Compliance  
Steel Erection Standard

2003-2004

OSHA 511: OSH Standards for General Industry  
Law & Regulation: The Physician as an Expert Witness  
Behavior-Based Safety Correspondence Course  
Chemical Protective Clothing  
Compensable Disability Forum: Views from the Bench and the Bar  
Effective Safety Committees  
Environmental Management Strategies Correspondence Course  
Exposure Assessment and Project Management Strategies  
Fire Protection  
Fundamentals of Industrial Hygiene Correspondence Course  
Insights into Causes and Prevention of MSDs  
Groundwater Contamination Remediation Correspondence Course  
Improving Health & Safety Training  
Mold: Latest Developments  
AOHC Millenium Series 1102  
Overhead Crane Limitations & Liabilities  
Rigging  
Safety Program Management  
The Complete Expert Witness Course

2004-2005

Achieving Cultural Integration in the Workplace  
Basics of Local Exhaust Ventilation Design & Evaluation  
Confined Space  
Construction Indoor Environmental Quality Management  
Effective Management Techniques  
Implementing a Hearing Conservation Program  
Incident Investigation  
Introduction to Ergonomics and Tools for Evaluating Workplace Hazards  
Occupational Epidemiology  
Office Ergonomics: Injury Prevention and Injury Accommodation  
Open Eye Security

2005-2006

1<sup>st</sup> Annual State-of-the-Art conference on Musculoskeletal Disorders  
2<sup>nd</sup> Symposium on Beryllium Particulates and Their Detection  
AOHC ABPM Update Session  
AOHCV: Shoulder Disorders: Advanced in Knowledge  
ASP/CSP Comprehensive Review courses  
Compensable Disability Forum: Ethical Management of Cultural Diversity in Workers Comp  
Developing a Wellness Program  
Ethics in the Workplace  
IAQ: Mold Control in HVAC Systems  
Time-Based Management: an Improvement Tool for Health & Safety Correspondence course  
Non-Ionizing Radiation and Instrumentation  
OSHA 10-hour for the Construction Industry  
OSHA 10-Hour for General Industry  
OSHA 2264: Permit-Required Confined Space Entry  
OSHA 503: Update for General Industry Outreach Trainers  
OSHA 7000: OSHA's Ergonomics Guidelines Training for the Long-Term Care Industry  
OSHA 2225: Respiratory Protection  
Tips, Tricks & Hints for More Effective EHS Training  
Update and Case Studies in Commercial Driver Medical Fitness  
VPPPA Application Workshop

2006-2007

OSHA 6000: Collateral Duty Course for Other Federal Agencies  
OSHA 7505: Introduction to Accident Investigation  
Effective Occupational Health & Safety Management Systems  
Fundamentals of Hearing Conservation and Noise Sampling in Industry  
Pandemic Preparedness for You and Your Employees  
Physical Assessment Skills for Nurses  
Understanding Today's Age-Diverse Workforce

ERC Applicant Institution: RMCOEH/University of Utah  
Program Director: Connie Crandall

**Table 12c**  
**CE Course Offerings - Summary by Program Area**  
**Since Beginning of Current Project Period: July 1, 2002 - June 30, 2007**

Program Area	Total # of Trainees	Number of Courses	Total Person Days	# Trainees by Profession					# Trainees by Employer						
				MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
Industrial Hygiene (IH)	1521	51	3986	9	12	671	617	212	798	239	178	44	19	151	111
Occupational Health Nursing (OHN)	1,275	47	2,043	7	306	33	133	796	724	80	79	93	0	123	176
Occupational Medicine (OM)	2,483	74	1,787	2,322	29	17	43	72	2,268	17	10	1	86	71	116
Occupational Safety (OS)	2,376	177	5,157	28	40	427	1,298	583	1,270	201	284	64	9	322	235
Hazardous Substance Training (HST)															
Agricultural Safety and Health (Ag S&H)															
Other OS&H, e.g. Tox, Epi, Ergo, Biostat (OT)	4,107	169	5,987	18	55	572	346	3,116	2,097	266	268	266	0	733	477
<b>TOTAL</b>	<b>11762</b>	<b>518</b>	<b>18,960</b>	<b>2384</b>	<b>442</b>	<b>1720</b>	<b>2437</b>	<b>4,779</b>	<b>7157</b>	<b>803</b>	<b>819</b>	<b>468</b>	<b>114</b>	<b>1400</b>	<b>1115</b>

## Appendix HST-1

### New Courses Held During 2002-2007 Project Period

Principal Investigator/Program Director (Last, First, Middle): Hegmann, Kurt T., MD, MPH  
2002-2003

Hazmat Incident Commander  
Emergency Preparedness  
Introduction to Hazardous Waste

2003-2004

Chemistry for the Non-chemist  
Chemical Protective Clothing

2004-2005

Hazardous Materials Transportation Certification Refresher  
Hazardous Waste Management Review  
Health Effects of Hazardous Materials

2005-2006

Decontamination Specialist  
Emergency Plans & Emergency Response Workshop  
Managing Hazardous Materials in the Workplace  
Hazardous Materials: The Language of Chemistry

2006-2007

International Air Transportation Association (IATA) Training  
Personal Protective Clothing Selection and Use  
Practical Chemistry for Hazardous Materials

ERC Applicant Institution: Rocky Mountain Center for Occupational & Environmental Health - U of U  
 Program Director: Connie Crandall

**Table 12c**  
**HST Course Offerings - Summary by Program Area**  
**Since Beginning of Current Project Period: July 1, 2002 - June 30, 2007**

Program Area	Total # of Trainees	Number of Courses	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
				MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
Industrial Hygiene (IH)															
Occupational Health Nursing (OHN)															
Occupational Medicine (OM)															
Occupational Safety (OS)															
Hazardous Substance Training (HST)	1,251	92	2,707	0	27	100	390	734	650	102	245	111	2	86	25
Agricultural Safety and Health (Ag S&H)															
Other OS&H, e.g. Tox, Epi, Ergo, Biostat (OT)															
<b>TOTAL</b>	<b>1,251</b>	<b>92</b>	<b>2,707</b>	<b>0</b>	<b>27</b>	<b>100</b>	<b>390</b>	<b>734</b>	<b>650</b>	<b>102</b>	<b>245</b>	<b>111</b>	<b>2</b>	<b>86</b>	<b>25</b>