

SECTION I: ERC Summary and Relevance

ERC Summary:

The mountain and plains states of Colorado, New Mexico, Arizona, Wyoming, Montana, North Dakota and South Dakota share a common set of burdens and needs that outstrip existing resources: rising population; large groups of underserved and minority workers; region-specific work-related health and safety issues such as mining, energy, small enterprises, and agriculture; and geographic distance from educational centers of excellence in occupational health and safety. The Mountain and Plains Education and Research Center (MAP ERC) was founded in 2007 to incorporate faculty and students from two institutions of higher learning into an integrated, multidisciplinary Center, to improve worker safety, health, and well-being. The objectives of the MAP ERC are to promote interdisciplinary graduate, professional and post-graduate medical education in occupational health, safety and well-being; to provide needs-based continuing education and outreach in an underserved region; to support pilot research projects that advance the National Occupational Research Agenda (NORA); and to improve diversity and inclusion in the professional fields of occupational safety and health.

The MAP ERC incorporates five training programs of the University of Colorado and Colorado State University. Core programs include Industrial Hygiene and Occupational and Environmental Medicine Residency. Three allied programs offer graduate training in Occupational Health Physics, Occupational Ergonomics and Safety, and Occupational Health Psychology. All five programs provide graduate or post-doctoral/residency level training. All programs are committed to providing a highly interdisciplinary educational experience through shared courses, field experiences, research collaboration, and conferences. The MAP ERC places a special emphasis on training the next generation of occupational safety and health leaders in policies, programs and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being (Total Worker Health®) in curriculum, outreach, and continuing education activities. The Pilot Projects Program rigorously reviews and supports research-to-practice community and academic projects that address regional priorities, serving as a stimulus for attracting junior investigators and advancing their careers in the field. Continuing Education places particular emphasis on state-of-the-art online courses for a geographically-dispersed occupational safety and health workforce, providing a learning management system platform that is available to CE programs at the other ERCs, in addition to the MAP ERC. The Communications and Outreach Program is integrated into all programs, bringing together many regional professional organizations and creating collaborative opportunities for addressing workplace challenges. Working in concert with university and community organizations, the MAP ERC has continued to address the need for greater diversity and inclusion of minorities in occupational safety and health professions. The MAP ERC enjoys partnerships with the High Plains Intermountain Center for Agricultural Health and Safety, with our newly designated Total Worker Health Center of Excellence, and with neighboring ERCs and other Training Programs in the region. It is a cornerstone of the Center for Health, Work, and Environment in the Colorado School of Public Health.

Public Health Relevance:

The MAP ERC fills a regional need to improve worker safety and health in a seven state region by training occupational safety and health professionals, advancing NORA sector and cross-cutting needs, conducting relevant research, promoting career development, and offering needs-based continuing educational opportunities. The long-term goal is to improve worker safety, health, and well-being, train the next generation of leaders to develop policies, programs and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being, and to develop a more diverse and inclusive occupational health professional workforce to serve their communities.

Key Personnel:

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ERC web link:

<http://www.ucdenver.edu/academics/colleges/PublicHealth/research/centers/CHWE/MAP/Pages/default.aspx#>

SECTION II: Program Highlights of High Impact

Occupational Medicine Fellowship

There is a critical shortage of trained and board-certified occupational medicine providers nationwide. To address this shortage, the Occupational and Environmental Medicine (OEM) training program created a unique one-year fellowship in occupational medicine, in addition to our traditional OEM residency pathway. This fellowship provides another avenue through which physicians can become trained and board certified in occupational medicine. It also represents an innovative public-private partnership to further occupational medicine training, with a portion of the funding coming from Pinnacle Assurance, a state-based workers' compensation insurer, and from the MAP ERC.

The fellowship is open to physicians who have completed another Accreditation Council for Graduate Medical Education (ACGME) residency. Fellows complete one year of clinical and non-clinical rotations in occupational medicine as well as complete public health coursework and scholarly projects. This qualifies fellows to pursue board certification in occupational medicine through the American Board of Preventive Medicine's Complementary or Alternative Pathways. Physicians with prior training in preventive medicine, internal medicine, family medicine, emergency medicine, and pulmonary medicine are among those anticipated to be interested in this one-year opportunity. It can also be completed by occupational medicine-trained physicians seeking to do more in-depth occupational and environmental research and scholarly work, including practitioners who have not been previously board-certified. The inaugural fellow started the program in July 2017.

Prevention of Logging Injuries in Idaho and Montana

Although professional logging operations consist of some of the most dangerous work tasks, there is limited information on the characteristics, causes and prevention of work-related injuries among loggers in the Intermountain West region of Idaho and Montana. The steep mountainous slopes, isolated work sites and extreme environmental conditions are significant and unique hazards for loggers in this region. In 2014, researchers from the MAP ERC and the High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) developed a partnership with the Montana Logging Association to begin to identify the leading types and causes of work-related injuries as well as develop strategies to prevent these injuries. A participatory community approach combined with a mixed-methods research model was utilized to determine the types and causes of logging injuries. A combination of workers' compensation data and focus group findings among loggers in Idaho and Montana provided a better understanding of injury characteristic and causation within the logging industry in Idaho and Montana. The results of these analyses indicated that a lack of early training as well as dangerous work conditions were significant factors leading to logging injuries. Among 801 workers' compensation claims among Montana loggers, nearly half (46%) of the work-related injuries occurred among newly hired workers (<1 year of experience). Focus group discussions with professional loggers highlighted communication, culture, training, and use of personal protective equipment as possible topics to address in order to improve safety.

The insights gained were used to develop and evaluate safety communication materials and training programs for professional loggers in Montana. One of the training programs developed was an emergency first-aid course. The course was developed by MAP ERC trainees and faculty from the Occupational Ergonomics Program at Colorado State University and the Occupational and Environmental Medicine Residency program at the University of Colorado Anschutz Medical Campus. The emergency first-aid training program was attended by more than 1,000 professional loggers in Montana. This work has also resulted in several regional, national and international presentations at conferences as well as publications in the peer-reviewed literature.

MAP ERC Alumni-Trainee Mentoring Program

The MAP ERC alumni board identified two needs of current trainees and alumni. The first was to better prepare current trainees to complete their degrees and enter the workforce. The second was to continue to engage alumni in the MAP ERC. To address both these needs, the alumni board developed and piloted a mentoring program during the 2016-2017 academic year. Trainees were matched with alumni who were able to share advice about managing a difficult course load, finding a job, and what they wish they had known when they were starting their careers. Mentors were provided with resources to guide their mentoring sessions throughout the year. Mentors and mentees meet at least four times for one hour each time to talk and share resources. These meetings occurred via phone, Skype, or in-person.

Feedback from the 7 MAP ERC trainees and 4 alumni was positive. One hundred percent thought that the amount of interaction they had with their mentor was just right, and all would recommend the program to their fellow trainees. One trainee said the most useful part of the mentoring process was "learning about what it is like to work in an applied setting, particularly the things that came as a surprise to my mentor and relaying things she wished she had known while in grad school." When asked for feedback on how to improve the mentoring program, one trainee said, "I thought the mentoring process was useful and should continue as is. I felt very

comfortable with my mentor and feel that I can contact them at any point in my professional career for advice." We currently have 4 trainees and mentors signed up for the second year of the program.

Increasing Safety Training in Occupational Safety and Health

To address the interdisciplinary needs of the occupational safety and health workforce, the Industrial Hygiene program at the MAP ERC applied and became recognized by the Board of Certified Safety Professionals as a Qualified Academic Program for the Graduate Student Practitioner (GSP) designation. In becoming a Certified Safety Professional, candidates must pass the Associate Safety Professional (ASP) examination and the Certified Safety Professional (CSP) examination. The GSP designation will allow Industrial Hygiene program graduates to bypass the ASP examination and directly sit for the CSP examination after they have acquired adequate field experience. To achieve this designation, Industrial Hygiene Program faculty had to propose a curriculum change to require its trainees to take additional safety courses as core requirements. This change in curriculum will result in IH Program trainees receiving more robust interdisciplinary training in occupational safety and health.

2017 Expanding Research Partnerships: State of Science

In partnership with NIOSH, the Center for Health Work and Environment and MAP ERC hosted the Expanding Research Partnerships: State of the Science conference at our facilities on the University of Colorado Anschutz Medical Campus. This three day meeting brought together intramural and extramural scientists to enhance and expand partnerships in occupational safety and health research and to launch the 3rd decade of the National Occupational Research Agenda (NORA). The conference featured 94 presentations, including plenary presentations, breakout sessions, poster sessions, and topic tables. The conference was attended by 247 people. Approximately one third were NIOSH intramural researchers and the remaining two thirds were extramural researchers. The feedback from participants was overwhelmingly positive, with attendees highlighting the networking and collaboration building aspects of meeting with other researchers from similar and divergent fields.

Inhalable Bioaerosols from Colorado Dairies

Particulate matter emissions from agricultural livestock operations contain both chemical and biological constituents that represent a potential human health hazard. The size and composition of these dusts, however, have not been well described. Researchers from the MAP ERC and HICAHS evaluated the full size distribution (from 0 to 100 μm in aerodynamic diameter) and chemical/biological composition of inhalable dusts inside several Colorado dairy parlors. Researchers in the Industrial Hygiene Program for the first time were able to determine the relative contribution of larger particles (10-100 microns) to the overall bioaerosol exposure among dairy workers. This is important because these larger particles are known to deposit in the nasopharyngeal region that can provoke inflammatory responses and result in conditions such as occupational rhinitis and sinusitis. The entire inhalable fraction needs to be evaluated during exposure assessment based on these findings. Our results suggest that the size distribution of bioaerosols emitted by dairy operations extends well above 10 μm in diameter and contains a diverse mixture of potentially hazardous constituents and opportunistic pathogens. Results were published in June 2017 in *Environmental Science & Technology*. Longer term, these findings should inform the development of more effective aerosol control strategies. Industrial Hygiene program faculty continue to work with dairy partners and stakeholders to reduce these exposures and improve respiratory health in dairy workers.

Occupational Safety and Health of Marijuana Cultivation Industry Workers

In Colorado and other states where medical and recreational marijuana have been legalized, there is a booming industry with safety needs that have not often been previously addressed. The MAP ERC developed a training geared towards marijuana cultivation industry workers to address common safety concerns in the industry, in partnership with the Colorado Department of Public Health and Environment and community stakeholders. On the pre-course survey, the top three health and safety concerns of participants cited were exposures to pesticides and other chemicals; absorbing chemicals through the skin; and slips, trips, and fall hazards. There were 105 participants in the full day training in June 2017.

The training was led by speakers from OSHA, the Colorado Department of Public Health and Environment, Pinnacol Assurance, and 3M. Content focused on helping workers in the industry establish safety and health programs, address ergonomic issues, improve communication, and learn about appropriate Personal Protective Equipment (PPE), among others. Post-course evaluation results indicate that participants feel confident they will be able to change their own health and safety practices at work (4.4/5.0). There was also an increase in knowledge from the pre- to post-course evaluations. Due to the high demand of this training, it will be offered again in November 2017, with both an in-person and webinar option.

Training Occupational Medicine Residents in International Total Worker Health®

Internationally, the burden of work-related injuries and illnesses, as well as the burden of preventable health conditions is high. International expertise in Occupational and Environmental Medicine is limited, especially in many developing countries where the need is greatest. Our objective is to train Occupational and Environmental Medicine physicians so that they are better prepared to help address global worker needs. Toward this goal, the MAP ERC OEM Residency Training Program is entering its third year of offering an international rotation that applies the principles of Total Worker Health. For the past two years, occupational medicine residents have rotated at two sites: a community clinic working with banana plantation workers and an on-site medical clinic for sugar cane and biofuel workers and their families in Guatemala. In addition to developing an appreciation for how to practice occupational medicine in a resource-constrained setting, trainees gain cultural competence, develop greater appreciation of diversity, improve language skills, and gain awareness of the relationship between poverty and worker safety. Projects have included participation in health and safety screenings of more than 900 banana farmers, leading to recognition of both work-related and non-work-related health conditions; and in the development of a hearing conservation program for sugar mill workers where dB levels routinely exceed OSHA and WHO standards.